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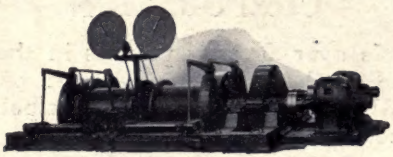

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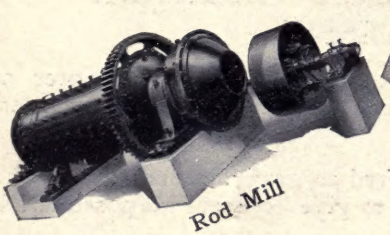

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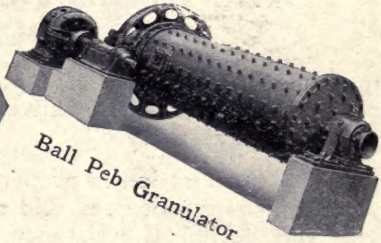

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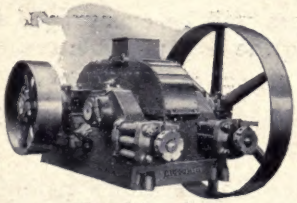

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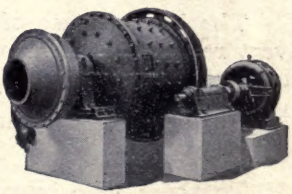

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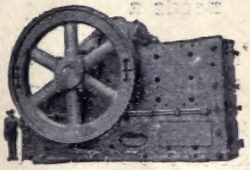

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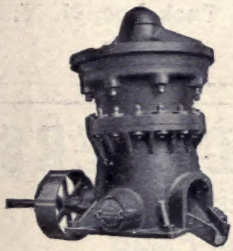

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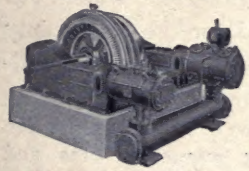

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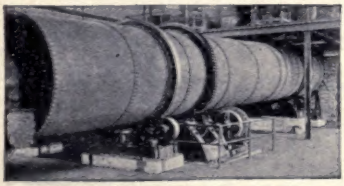

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WALTER HARVEY WEED, E. M.

Former Geologist in the United States Geological Survey, 1883-1906;
Member of Mining and Metallurgical Society of America;
Fellow Geological Society of America; Author: Copper
Mines of the World; Geology of Butte,
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Deposits, etc.

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PREFACE

This issue of The Mines Handbook covers the many and varied changes which have occured during 1920, 1921 and part of 1922. The book has been entirely rewritten, and as the index contains 10,004 titles, it will be seen that the task was not a light one.

The book is as full a record of all active mining companies, whether producing, developing or dormant, as we are able to present. The prospects and small mines of today are the children of the industry, some of which will grow to be big factors in the future life of the industry. While the large successful companies are described in other publications, The Mines Handbook is the only work covering the entire field, and its preparation has involved constant unremitting effort in gathering information from every possible source, verifying same if possible and separating the wheat from the chaff. Every description has been revised and wherever possible, official verification obtained.

An earnest effort has been made to get the actual facts and the opinions given, while not guaranteed, are believed to be correct conclusions deduced from the facts available. It is the only book published in America dealing with the mining industry, giving unbiased independent facts and opinions, instead of statements written by interested parties.

When information has been refused or our letters have not been answered, we present the facts as we obtain them. In many cases our opinions are unfavorable or the company is considered to be working the public and not the mine. Many suspicious promotions are however not positively condemned because we lack adequate evidence, but our cautionary remarks should lead our readers to investigate.

Besides the usual details of capital, officers, financial condition, etc., we have given full particulars of the properties owned, or leased, and in stead of bare statements concerning operations, as given in the manuals, an account of the geology, development, equipment, production, etc. is given enabling the reader to determine the merit of the mining property, which itself is the only reason for the company's existence and operation.

The editors welcome criticism and information and will be glad to hear of changes, betterments or even of failures.

We feel that the worth of the volume is largely due to the work of Mr. Edward B. Sturgis, the assistant editor, of M. Stencel, and a cheerfully industrious staff.

WALTER HARVEY WEED

July 1, 1922.
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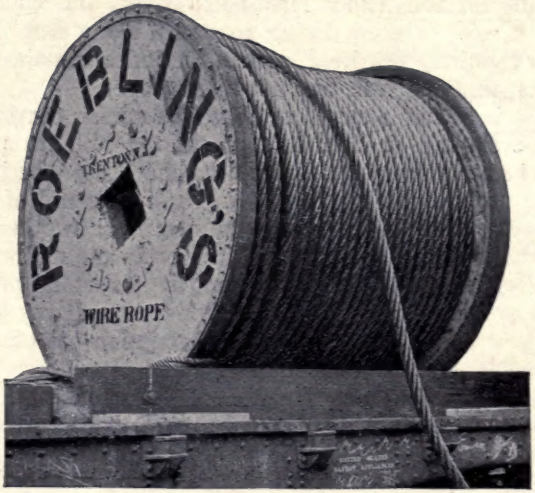

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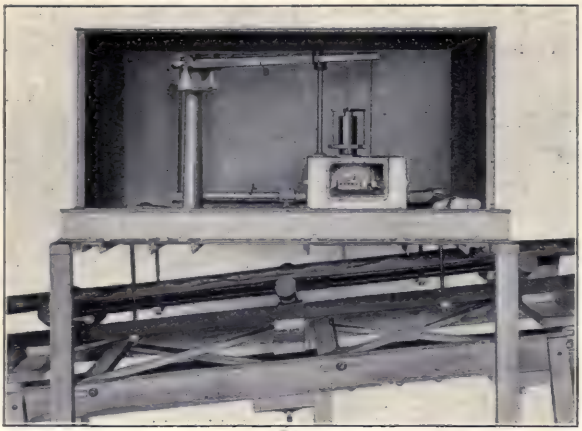

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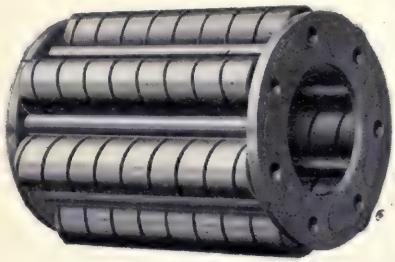

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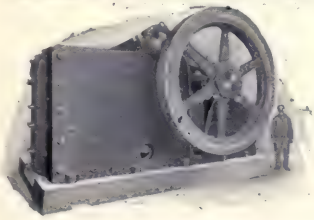

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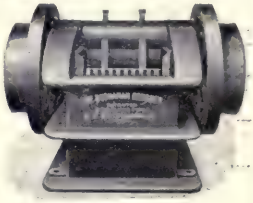

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THE MINES HANDBOOK

(Descriptions of Mining Companies begins in Chapter IV)

CHAPTER I

GLOSSARY OF MINING TERMS

The following glossary of mining, milling, and trade terms will be found useful by our non-technical readers.

Acicular. Needle-shaped.

Acid. An acid of silicious rock is one in which bases are combined with silica. The antithesis of basic.

Adit. A level mine opening driven into a hill or mountain.

Adobe. Sun-dried brick used in all Latin-American countries.

Air-blast. A violent explosion caused by the escape of air compressed by the settling down of rocks in the upper workings of a mine.

Air-Compressor. A machine for condensing air to a pressure sufficient to actuate machinery. The compressed air is forced through pipes to various parts of the mine, or surface plant, and used in the same way as steam for driving drills, pumps, hoists, etc.

Air-doors. Doors built in mine passageways to stop air currents.

Air-drill. A drill driven by the elastic pressure of compressed air.

Air-shaft. A shaft used to provide ventilation for deep workings. Two shafts, one opening on slightly higher ground than the other, will provide natural ventilation underground, when connected by a drift, the longer shaft becoming a chimney, and the shorter an inverted syphon, down which the air is sucked with great force.

Alkali. Potash and soda are the common alkalis. An alkali is the opposite of an acid; it turns red litmus blue, and forms salts with acids.

Alloy. Two or more metals united mechanically, but not chemically by fusion.

Alluvium. Soil or broken rock deposited by the action of water.

Altered. An altered rock is one that has undergone changes in its chemical and mineralogical structure since its original deposition.

Aluminous. Containing aluminum.

Amalgam. An alloy of mercury with another metal such as gold, silver or copper. Mercury will not amalgamate with iron.

Amalgamation. The process of extracting gold and silver from crushed ores by amalgamation with mercury. The quicksilver is expelled later by heat, and recovered for further use.

Amorphous. Without form.

Amygdaloid. A trap rock, containing vesicles or small rounded cavities filled by mineral matter such as calcite, agate, etc. Rock is spotted and in outcrop often pitted as amygdules weather out, leaving cavity. In the Lake Superior district copper-bearing amygdaloids frequently show native copper in the cavities left by the leaching out of the soft minerals originally therein.

Analysis. A determination of the constituents of a chemical substance.

Anhydrous. Devoid of water.

Anode Copper. Copper from a converter, cast in molds into plates with ears, and used in cells of electrolytic refineries.

Anticline. An arch or fold of rock-strata bulging upwards, in U shape; is the reverse of syncline.

Antigua. In Mexico, is a mine worked by Spaniards or Mexicans at a time so remote—from 50 to 300 years—that particulars have been forgotten; sometimes valuable, but "every antigua is not a bonanza."

Antimonide. An ore of any metal chemically united with antimony.

Apartado. Aparatado de correos is Spanish for postoffice box; usually abbreviated to Ap.

Apex. The top or uppermost part of a vein. In the United States the ownership of the outcrop or apex carries the right to follow the vein downward beneath another's ground, if within one's end lines extended.

Arastra. A circular rock-lined pit in which broken ore is pulverized by stones attached to horizontal poles fastened in a central pillar and dragged around by mules.

Arenaceous. Sandy; carrying silica as sand.

Argentiferous. Silver-bearing.

Argillaceous. Clayey.

Aroba. A Spanish weight of 25.36 lbs. avoirdupois; Portuguese, 32.38 lbs.

Arroya. A gulch.

Arsenide. A mineral composed of arsenic combined with another metal.

Arsenopyrite. A mineral composed of arsenic sulphur and iron; often carries gold or silver also.

Assay. A test of ore or metal to determine the exact amount of any metal or metals contained in it. Usually fire assay; smelting on a small scale.

Assessment Work. The work required annually by the U. S. government, on an unpatented mining claim to keep title.

Attle. Cornish term for waste rock.

Auriferous. Containing gold.

Back. The rock above mine opening like the ceiling of a room. The part or section of a vein between two levels or between a level and the surface.

Bad Air. Air vitiated by powder fumes, noxious gases or insufficient ventilation.

Ball Head or Stamp. A steam stamp, named after its inventor.

Barilla (De Cobre). Spanish term for particles of native copper, cleaned (concentrates). Equivalent to the "mineral" of Lake Superior mines. Used mainly in Bolivia among tin producers.

Barranca. A deep gulch or canyon, with precipitous sides.

Barrel Work. Masses of crude native copper, picked out by hand before ore passes beneath stamp. Was formerly shipped in barrels to the smelter.

Barrow. A wheelbarrow.

Basalt. A dark colored heavy igneous rock, carrying much iron; a trap rock.

Base. Impure; an alkaline element.

Base Bullion. Copper or lead carrying much gold or silver.

Base Metal. Any of the non-precious metals.

Basic. Low in silica; containing more than enough iron and lime to form a good slag.

Basin. A syncline; a trough in the earth's surface.

Battery. A set of stamps; usually five in a stamp mill.

Bearing. The course of direction, as that of a mineral outcrop in degrees, east or west of, north (meridian).

Bed. A seam or layer of stratified rock. Used in some mineral districts for flat veins or lodes.

Bed Rock. The solid rock underlying stream gravel or rock.

Bedded Vein. One parallel with the bedding of the country rock.

Bells. Signals for lowering and hoisting the bucket, skip or cage in a

shaft usually are given by bells, the number of strokes indicating the nature of the load, the place for stopping, etc.

Bit. The cutting end of a boring tool. A steel drill; a short hollow cylinder of soft steel, used in diamond-drilling. The diamonds are set around the inner and outer edges of the bottom of the bit, and cut into the most refractory rocks when the bit is rotated.

Black Copper. Impure copper, smelted, but containing impurities requiring refining.

Black Jack. Sphalerite, zinc blende of dark color.

Blanched Copper. Copper containing a large amount of arsenic, practically forming an alloy.

Blast. (N.) Air forced through tuyeres into a blast furnace or Bessemer converter. (V.) to explode gunpowder or dynamite.

Blast-Furnace. A cupola furnace in which ore is smelted, with the aid of air pumped in under pressure.

Blasted. A blasted miner is one who has been injured by the explosion of dynamite or gunpowder.

Blasting. The breaking of rock by means of high explosives, inserted in holes bored in the rock for the purpose.

Blende. Zinc-blende or sphalerite; sulphide of zinc.

Blind Drift. A drift connected with other workings of the mine at one end only; a cul de sac.

Blind Lode. A lode not outcropping at surface.

Blister Copper. Copper of 96 to 99% purity; applied to product of Bessemer converter.

Blocking Out. Exposing the ore in a mine so that it can be extracted by stoping. Properly speaking, ore is not blocked out for stoping until opened on three sides.

Blossom. The oxidized, softened outcrop of an orebody altered by weathering.

Blout. A mass of quartz, often mineralized, that is often isolated and not connected with a vein; an abbreviation of blow-out.

Blower. A fan used to force air into a mine; a blowing engine.

Blowing Engine. An engine for forcing air into blast furnaces under pressure, often about one pound avoirdupois per square inch.

Blowing In. A smelting furnace is blown in when charge is ignited, fusion begins and the process of reduction by fire is begun.

Blowing Out. A smelting furnace is blown out when the metal and slag are tapped out, and the fires are allowed to die out.

Blowout. An outcrop larger than the orebody beneath; see blout.

Bluestone. Copper sulphate.

Bonanza. Spanish for pay-ore. Usually applied in United States to a body of exceptionally rich ore, especially in silver mines.

Bonnet. The cover or roof of a cage; also a steel casting connecting the piston-rod with the upper end of a stamp-shaft.

Bostonite. A light colored igneous rock composed mainly of potash feldspar.

Bore Hole. A drill hole bored for test purposes.

Bort (Bortz). A form of crystallized carbon between the diamond and the black diamond.

Botryoidal. Resembling a bunch of grapes.

Bottom. A mass of impure copper formed below the matte, in matting copper ores.

Boulders. Loose, rounded masses of rock, larger than cobbles.

Box Canyon. A canyon closed at one end.

Branch. A vein branching off from the main orebody.

Brattice. A screen for the regulation of air currents in a mine.

Breast. The face or innermost end of a mine working.

Breccia. A rock formed of angular fragments cemented together.

Brecciated. Broken into angular fragments partly or wholly cemented together.

Broken. A vein is broken when dislocated by faults.

Broken Ground. Rock strata where the walls are poorly defined and the general formation shattered.

Bucket. An iron or steel bucket used for hoisting men or ore in a mine. In a vertical shaft a bucket swings free, but in an incline shaft the bucket runs on a skidway of plank timbers.

Buddle. A conical table on which ore is dressed; formerly used in Cornwall, etc., and recently applied to a new concentrator.

Bulkhead. A wooden or masonry partition walling off part of a mine or protecting it against soft or creeping ground; also a damming back water.

Bullion. Includes any of the base metals containing gold and silver; also mixture of gold and silver.

Bullion Bars. Unrefined gold and silver melted and cast into bars.

Bunch. A small mass or pocket of exceptionally rich ore.

Bunchy. An orebody containing small scattered masses or bunches of ore.

Cable The steel wire rope used in shafts for hoisting buckets, skips or cages.

Cage. The elevator used in vertical shafts for hoisting ore and rock, and for lowering men, timber, etc.

Calcareous. Limey.

Calcine. To drive off sulphur, carbonic acid gas, or other volatile constituents of an ore by heating.

Calcining Furnace. A furnace for roasting ore to drive off sulphur, previous to smelting; also for heating cement materials.

Calcite. Crystallized calcium carbonate.

Cam. A double-curved tooth, fixed on a shaft, for lifting gravity stamps.

Camp. A mining town.

Canyon. A deep gorge with precipitous walls.

Cap. The top piece of a framed set of mine timbers; copper caps containing fulminate of mercury, used to explode dynamite in blasting rock.

Capping, or Cap-Rock. The rock or other ground above a mineral deposit.

Captain. In most mining fields where Cornishmen are employed the foreman in charge of mining work is termed a captain.

Carbonaceous. Any mineral in which carbon and oxygen are chemically united.

Carbonates. A term commonly applied in the western part of the United States to oxidized lead ores, usually argentiferous.

Carboniferous. Rocks of the coal age of geological eras.

Carga. A Mexican weight of 300 lbs. avoirdupois.

Cartridge. Dynamite put up in cylindrical cases of oiled paper to fit the holes bored by drills.

Casing. The wooden lining of a shaft; an iron pipe put down outside of a diamond drill hole when passing through soft or broken ground, to prevent the hole becoming clogged by matter intruding from outside.

Casting Copper. Impure copper better suited for casting into various forms than for drawing into wires or rolling into sheets.

Cave. A natural opening or vug in a rock formation; the part or complete falling in of a mine.

Caving System. A plan of mining, by which the worked out upper levels and surface are allowed to subside gradually, as the mine workings are deepened.

Cement Copper. Regulus; the loose and usually impure copper deposited on iron by copper-bearing waters.

Cerro. Spanish for a mountain or hill showing rock outcrops.

Chalybeate. Iron-bearing waters.

Chamber. A large stope.

Change House. Building where miners change their clothing before entering a mine.

Change Day. The day when miners are transferred from day shift to night shift, or the reverse.

Chapeau de Fer. French term for an oxidized iron outcrop; gossan or iron hat.

Charge. The amount of ore, flux and fuel fed to a smelting furnace.

Chert. A coarse impure chalcedony or flint.

Chile Bars. Bars of Chilean blister copper, weighing about 200 lbs each.

Chilean Mill. A grinding apparatus with three heavy wheels running around in a circular pan.

Chimney. An orebody of pipe shape in an approximately vertical position.

Chloride. A mineral (or ore) of any metal united chemically with chlorine; usually applied to hornsilver ore.

Chloride. (V.) To work the oxidized part of an ore deposit on a lease or tribute; a term used in the western part of the United States.

Churn Drill. A drill having a churning motion, used for boring oil wells, test-holes, etc.

Chute. A hole usually lined with planks, used for dropping ore or waste to a lower level of a mine.

Claim. The area of 600′ x 1,500′, or 20 acres of U. S. public land staked off and claimed by a prospector or miner. Size of claims varies in different countries.

Classifier. A machine which separates mineral particles according to their weight.

Clay Gouge. A thin seam of clay separating ore, or ore and rock.

Clay Slate. An argillaceous slate.

Clean-up. The collection or gathering together of accumulated ore or metal in a mill or smelter.

Cleavage Planes. The more or less regular lines along which slates and other metamorphic rocks break into slabs or leaves.

Coarse Jigs. The jigs used to handle the larger sizes and heavier grades of ore or metal.

Coarse Metal. Matte resulting from the first smelting in old-style smelting of oxidized copper ores.

Cobbing. Breaking masses of ore into lumps by hand hammers and sorting ore out.

Collar. The top of a shaft; surface timbering of a shaft.

Colloids. Non-crystalline materials.

Compartment. Mining shafts usually are divided into two or more compartments or sections, separated by framed timbers and planking.

Concentrate. The ore or metal, after part or complete elimination of gangue rock.

Concentration. The process of separating the metallic part of an ore from the waste rock or mineral in which it has been enclosed. It involves crushing to free the metallic particles. The separation may be by gravity, either dry or in water; by oil or froth flotation, or magnetic separation.

Concentrating Table. A table on which a stream of finely crushed ore and water flows downward and the heavier metallic minerals lag behind and flow off in a separate compartment.

Concentrator. A plant where ores are constructed; a jig or machine for separating ore or metal from gangue-rock, the process usually employing a rocking or oscillating motion, aided by jets of water, whereby the worthless gangue is carried off and the heavier mineral remains.

Conchoidal. Breaking with a curved or shell-like face, or fracture.

Concretion. A rounded mass or nodule formed of mineral matter gathered about a center.

Conductivity. Electrical conductivity is measured by the resistance offered to the passage of an electrical current.

Conglomerate. A rock formed of pebbles and rounded boulders cemented together. Sedimentary conglomerates are ancient shore deposits whose pebbles and sands are hardened into rock. Volcanic conglomerates are formed of rounded masses ejected from volcanic vents cemented togethed by volcanic sand or ash (tuff) rock.

Construction Account. Many mining companies summarize their finances so that the cost of operation is divided into two classes, one being for general working expense and the other for construction, sometimes classed as capital account. It includes new buildings and machinery on surface and frequently new mine openings.

Contact. The junction of two dissimilar bodies of rock, as limestone and porphyry.

Contact Deposit. A mineral deposit found between two unlike rocks, usually applied to an orebody at the contact between a sedimentary rock, limestone, shale or sandstone, and an igneous rock.

Contract. In mining applies to an agreement between operator and workman to pay latter so much per foot for excavating drift or stope. These men are known as contract miners and are usually skilled workmen. They work harder than men on wages, due to the incentive of higher earnings.

Copper Ore. Rock carrying copper mineral or minerals. See detailed descriptions of copper-bearing minerals in Chapter III.

Core. A drill core.

Cornish Pump. A form of mine pump actuated by long rods reaching from surface down mine shafts.

Costeaning. Proving an ore deposit or vein by trenching across its outcrop at approximately right angles.

Counterbalance. Hoisting plants usually are worked in counterbalance for deep shafts. The weight of the descending cage or skip is used to partly offset the weight of the ascending cage or skip.

Counter Vein. A cross vein running at approximately right angles to the main orebody.

Country Rock. The predominant rock about an ore deposit.

Course. The direction or strike of a vein; a stretch of mineralized matter in a vein.

Crab. A hand winch.

Creeping. The slow movement of the rock in mine workings caused by the pressure of super-incumbent and adjacent rock masses .

Cretaceous. A geological age characterized by chalky beds in England, The limestones of Arizona and Mexico are largely of Cretaceous age, and so are the coal-bearing beds of the Rocky Mountain region.

Cribbing. Close-set round timbers supporting an underground roof, or lining a shaft.

Croppings. Outcrops.

Cross-Course. An intersecting vein.

Crosscut. A mine opening, similar to a tunnel, that is driven across the rocks at approximately right angles to the orebody; a drift follows the lode or vein.

Cross Vein. An intersecting vein.

Crucible. A vessel of refractory material in which ores and fluxes are melted.

Crystals. Geometrical forms, with plane faces, of infinite variety, assumed by the majority of minerals.

Cupola. An upright furnace used in smelting.

Cupriferous. Copper-bearing.

Cut. To intersect an orebody; the portion of a working face of mineral removed at one operation.

Cwt. A hundredweight, or 112 lbs avoirdupois.

Cyanide. (V.) To treat crushed rock with a weak solution of cyanide of potash or of soda, dissolving the gold and silver, which is recovered by precipitating it with zinc (or aluminum for certain silver ore.)

Datum Level. The level (usually sea-level or mean level of nearest considerable body of water) from which altitudes are measured in surveys.

Dead Roasting. Sulphide ores are dead roasted when all the sulphur possible to drive off by roasting has been eliminated.

Dead Work. Underground work which is not in ore; the opening of new shafts, drifts, and winzes preliminary to the stoping of the mineral bodies.

Debris. Broken down rock material; the fragmental material broken off by frost, etc., from rock exposures; talus.

Decomposed. Rock or ore altered and leached by air and water.

Decrepitate. To break into fragments with violence, under the blowpipe or great heat.

Dendrite. A moss or fern-like mineral stain or film usually of manganese or iron oxides.

Denouncement. In Mexico, the formal filing of a claim to mineral land.

Denudation. The uncovering of rock or an ore deposit by the weathering of wind and water, or glaciation.

Dessication. Drying out; loss of water from any given substance.

Detritus. Debris; broken down rock, usually applied to gravel, etc., moved and deposited by streams or glaciers.

Development Work. Mining work performed to develop or expose an ore deposit and to open up new and further amounts of ore.

Diabase. A dark trap rock composed largely of a felt of lathe shaped crystals of plagioclase feldspar, plus ferro-magnesian minerals, etc.

Diamond-Drill. A machine used for boring holes in rocks, with a hollow cylinder for a bit, whose end is set with black diamonds or bort.

Die. The iron block in a mortar, onto which ore is fed for crushing by a stamp.

Dike. A vein of igneous rock; locally a reef or wall of rock projecting above the ground; also applied to the hardened waste material filling fissures.

Diorite. A crystalline granitic rock with predominant plagioclase feldspar.

Dip. The inclination or angle at which a lode or vein pitches downward into the earth.

Dip Compass. A compass having the needle fixed to swing in a vertical plane, so it can be readily deflected by magnetic rocks.

Dirt. Frequently used to designate ore broken underground; for instance, in Joplin district, Missouri.

Disintegration. The breaking down of rock through weathering.

Disseminated Ore. Ore carrying fine particles of metallic minerals, usually sulphides, scattered through rock or gangue matter

Disturbed. An orebody is disturbed when lacking defined walls and settled character.

Dolomite. Magnesian limestone; carbonate of calcium and magnesium.

Donkey. A small auxiliary hoisting engine, usually operated underground and actuated by compressed air, or used for preliminary work at new shafts or exploring pits.

Downcast. A shaft having a downward air current.

Draftage. An arbitrary allowance claimed by some British smelters to cover loss of weight in transport.

Dress. To separate ore from gangue rock by hand or machinery.

Dressing Floor. A floor where ore is sorted by cobbing and picking.

Drift. A horizontal passage in a mine following the lode or vein.

Drift Copper. Native copper found in gravel and clay, far from original orebody, from which it has been carried by glaciers.

Drifting. Opening drifts; driving.

Drill. A steel bar with chisel shaped end used for boring in rock; is

struck on the other end by a hammer, or is forcibly driven against rock by air piston.

Drill-Core. Solid, cylindrical cores of rock cut out by a diamond drill. These form a record of the strata through which the drill has passed.

Driving. Extending a drift horizontally.

Drum. The cylinder of a hoisting engine, around which the rope is wound.

Druse. The crystallized crust lining a cavity in rock or ore.

Dry Ore. Argentiferous ores containing insufficient lead for fluxing in a smelter.

Ductile. That which is capable of being extended in length by tension, as into wire.

Ductility. The capacity of a metal to elongate, when under pull from the ends, without cracking or breaking.

Dump. A place for depositing rock taken from a mine; a pile of ore or rock.

Dyke. See dike.

Dynamite. Nitro-glycerine held in wood pulp, infusorial earth, or some similar article, to render it safer in use. Strength varies according to percentage of nitro-glycerine contained.

Eisener Hut. German for iron hat, or gossan, occurring above an ore-body.

Electrolyte. The solution in which electrolytic separation of metals is carried on.

Electrolysis. The separation and redeposition of metals by electrolytic action.

Electrolytic. Applied to copper means copper made from impure metal by electrical decomposition and redeposition. The bar of impure copper is gradually dissolved and the pure metal redeposited at the opposite pole of the battery, while other metals fall as black slime to the bottom of the tank in which the solution (electrolyte) is held.

Elvan. Cornish name for dikes of greenstone, porphyrite and granite.

Erosion. The wearing away of surface masses of rock and soil by the elements, or by glacial action.

Eruptive. Igneous rocks, brought to the earth's surface or outer crust by volcanic activity.

Escarpment. A rock wall, nearly or quite vertical.

Exfoliation. The separation of thin leaf-like layers from a rock mass.

Exploders. A fulminating cap for setting off high explosives.

Exploitation. The productive working of a mine or ore deposit.

Exploration. Prospecting work; looking for ore.

Face. The inner or working end of any mine opening. A face of ore is the ore shown at the extreme end of a drift, stope, or tunnel.

Fahlband. A zone or band of crystalline rock, carrying finely disseminated metallic sulphides.

Fall of Ground. Rock falling from the roof into a mine opening.

False Set. A temporary set of timber.

Fan. A machine for forcing or sucking air into or out of a mine.

Fathom. Six feet. In stoping, a fathom is a cube of six feet.

Fault. Dislocation of a vein or of a rock stratum.

Feeder. A branch or small vein joining a larger one.

Ferruginous. Containing iron.

Filling. The waste material used to fill up old stopes or chambers; allowing a mine to fill with water.

Filter. A machine for removing the solution or moisture from crushed ore, either by forcing it under pressure or sucking it through canvas or cloth, leaving the muddy ore behind.

Fines. The finer particles of ore or metals saved in concentrating processes.

Finisher Jigs. The jigs used to save the smaller particles of ore in a concentrator or stamp mill.

Fire. The miner's warning cry when a blast is to be set off is "fire."

Fissile. Splitting easily into plates.

Fissure Vein. A fissure in the earth's crust filled with mineral matter.

Flake Copper. Very thin scales of native copper.

Float. Loose ore or rock, away from its parent mass, on the surface.

Float Copper. Drift copper.

Float Ore. Loose ore, often water worn ore, found at a distance from its outcrop.

Flocculent. Resembling tufts; cloudy masses of slightly coherent material floating in a liquid.

Floor. The floor of a drift or other horizontal mine opening; the rock bed beneath an orebody.

Flour Copper. Very fine scaly native copper that floats on water and is difficult to save in milling.

Flotation. A process of concentrating or separating out the valuable metallic sulphide minerals of an ore, by mixing the pulverized ore with acid and oil and agitating it by air or paddles to make a scum or froth that takes up the metallic minerals and floats them off, leaving the waste behind.

Flume. A launder or conduit for carrying water.

Flux. Substances used in furnaces to form a fusible compound with the waste matter and make slag. In assaying, borax, soda, salt, etc., are used; in smelting, limestone, ironstone, etc.

Fluxing Ore. An ore containing appreciable metallic minerals, but smelted mainly because containing fluxing agents required in the reduction of richer ores.

Foliated. Having a laminated structure.

Foot. The foot-wall.

Foot-wall. The rock wall under a vein or underlying inclined mineral deposit.

Fork. The branching of a vein.

Formation. A term used by miners for any particular body of rock, as a granite formation, a sandstone formation. Geologists limit term to groups of rock beds of similar age.

Founders Shares. The few shares issued to the individuals organizing a stock company. In companies owned outright by other companies, founders shares are issued to as many individuals as are required to incorporate and hold the offices required for corporate management, as the laws do not permit a corporation, which is an artificial person, to form another corporation, or to serve as a director of another corporation.

Free. A metal is free when virgin or native, and not combined chemically with any other element.

Free Milling. An ore that readily yields metallic contents by simple means, such as amalgamation or cyanidation.

Freeze. A furnace freezes when the molten charge solidifies.

Friable. That which may be pulverized or broken up easily.

Froth. Foam; a mass of bubbles.

Furnace. A structure for the smelting or roasting of ore.

Fuse. A cotton cord with a gunpowder core, so made as to carry fire to an explosive.

Fusible. That which may be melted.

Fusion. Melting; alloying metals while liquid, through heat.

Gabbro. A rock composed mainly of plagioclase feldspar and iron magnesia minerals.

Gad. A small steel wedge or chisel.

Galena. Lead sulphide; see Mineralogy.

Gallery. A drift or level.

Gallows Frame. The timber or steel framework over the mouth of a

shaft, carrying a sheave-wheel, over which the hoisting rope passes to the engine; now commonly called head frame.

Gangue. The waste rock or mineral in which ore or metallic particles are held.

Gash Vein. A gash-shaped fissure vein, rapidly pinching downward.

Geode. A hollow crystal-lined cavity or the rounded mass containing such a cavity.

Geological Horizon. Rocks of one geological age.

Geology. The science of the formation of the earth and the rocks of which it is made.

Giant Powder. Dynamite.

Girt (or Girth). A horizontal brace in direction of a drift in mine timbering.

Glaciation. The erosive effect produced by glaciers.

Glance. A metallic sulphide showing a bright shining surface. Copper glance is chalcocite; silver glance is argentite.

Glory Hole. A large open pit from which ore is or has been extracted.

G. M. B. Good Merchantable Brands, an English grade of refined copper. Term replaced by "Standard."

Gneiss (pronounced nice). A banded coarse-grained rock often formed of the same minerals as granite, often in patchy and irregular arrangement. May be a diorite gneiss, granite gneiss, etc.

Gob. Waste used to fill worked-out openings.

Gophering. Prospecting work confined to digging shallow pits or starting adits. Term used from similarity of this work to the crooked little holes dug in the soil by gophers.

Gossan. Iron hat; is the leached capping, usually quartzose, showing yellow to reddish brown iron stains found overlying veins.

Grade. The percentage, or value of ore and partly refined metals; the percentage of rise in roads or mine openings driven on an approximately horizontal plane.

Gram. A metric weight of 15.4 grains or 1-500 of a pound avoirdupois.

Granite. A dense, granular rock of igneous origin, composed of varying proportions of quartz, feldspar and mica.

Granulated. In the form of grains.

Gravity Stamp. A stamp, usually set in batteries of five, in which the piston is raised by a cam, the stamp crushing the charge in the mortar by its weight, when allowed to fall.

Greenstone. An altered basic porphyry; usually andesite or diorite.

Grizzly. A screen or grating of heavy iron rails or steel bars, through which the smaller pieces of rock or ore fall through.

Groundsill. The bed-piece of a set of mine timbers.

Guides. Perpendicular square wooden strips or stringers for guiding cages in vertical shafts. Cables or steel rails are used instead in some mines.

Gut. To rob, or extract, only the rich ore of a mine.

Hade (American). Inclination or pitch of a vein, measured from the vertical, while dip is measured from the horizontal. Becoming obsolete, and should not be confounded with rake of an ore-shoot.

Hanging. The hanging wall; the rock on the upper side of a mineral vein or deposit.

Hardinge Mill. A cone-shaped cylinder, resting horizontally and half filled with pebbles, which fall and crush ore when mill is revolved.

Haulage Plant. A mechanical installation for the underground tramming of rock, operated by ropes, compressed air, or electricity.

Head or Heading. An underground level or airway in a mine; also water pressure.

Head Frame or Gallows Frame. A framework of 2 or 4 legs, made of wood or steel, fitted with sheaves, over the mouth of a shaft.

Heap-Roasting. Burning the sulphur out of ores piled in heaps, with a small amount of wood or other fuel.

Heave. A horizontal dislocation of a vein or bed caused by a fault. Also applied to the rolling out of line of a lode in making depth.

Hectare. An area 100 meters on each side; called pertenencias in Mexico; equals 2.471 acres.

Hoist. An engine for raising ore from a mine and for lowering men and material.

Holing Through. A drift or other mine opening is holed through when a connection is made between two separate sections working toward each other.

Horizon. The sky-line, commonly used in the sense of absolutely flat, as shown by a spirit level. Geologically, all rock strata of the same geological period.

Horse. A mass of country rock enclosed in a mineral vein or deposit.

Horsepower. A measure of power of an engine. One horsepower is rated as equivalent to raising 33,000 lbs. avoirdupois to a height of one foot in one minute.

Horse-Whim. A windlass operated by horses.

Hot Blast. Heated air supplied to a blast-furnace.

Hungry. Nearly or quite barren.

Hunt & Douglass Process. A leaching process, using chloride of iron and salt, to dissolve oxide ores of copper.

Huntington Mill. Somewhat similar to a Chilean mill.

Hutch. See Jig.

Hydrated, Hydrous. Containing water combined chemically.

Hydro-Metallurgy. The reduction of ores by wet processes.

Igneous. Rocks consolidated from a molten state; includes not only volcanic rocks but those deep-seated rocks, hardened under cover, which have been exposed to view by erosion, or artificial openings.

Impregnated. Containing metallic minerals, scattered or diffused through the mass; properly used in referring to country rock carrying mineral similar to that in the vein.

Incrustation. A solidified coating, usually crystallized.

Infiltration. The deposition of mineral matter from percolating water.

Ingot. A mass of metal cast in a peculiarly formed mold; applied only to gold, silver, or copper. Iron and lead are cast in pigs.

In Place, In Situ. Rock or ore that is in the position where deposited by nature.

Intrusive. Igneous rock masses pushed up through other and older rock formations.

Iridescent. Showing the colors of the rainbow.

Iron Hat. Gossan; outcrop of iron-stained material over an ore deposit or vein.

Jack. A miner's term for sphalerite; is called black jack, ruby jack, or rosin jack, according to color.

Jig. A machine for concentrating ore; i. e., separating the metallic mineral from the waste, by means of oscillatory or vibratory motion, aided by jets of water. The heavier minerals sink, and the lighter rock or gangue is carried off by the current.

Jump. To locate and take possession of mineral lands held or claimed by another party.

Kaolin. China clay.

Keweenawan. Pertaining to or of the Keweenaw formation of rocks in which the Lake Superior copper veins occur.

Kibble. A bucket used for hoisting material in a shaft.

Kilo or Kilogram. A metric weight of 2.2046 lb.

Kilometer. 0.621,376 miles. For rough computations may be figured as 3/5 of a mile.

Kin. A Japanese weight of 1.31 lb. avoirdupois.

Kindly. The appearance of rock carrying or promising to carry good mineral value.

Ladderway. The series of ladders giving ingress and egress to a mine; the compartment in which the ladders are located.

Lagging. Timber, usually of small diameter, placed over the cap-timbers of incline shafts and drifts, to prevent damage from falling rock.

Lamina. A thin plate; plural is laminae.

Lamellar. In thin sheets of laminae.

Lander. The top man at the mouth of the shaft who receives signals from below, and attends to the unloading of rock sent up in buckets, skips or cages.

Launder. A wooden flume or sluice, used to convey water, or tailings held in suspension in water.

Lava. Rock from volcanoes.

Leach. To dissolve metals out of ore by water or acid, or both.

Leaching. The process of extracting a metal from its ores or salts by treatment with a solvent, such as weak acid.

Lead. (Pronounced leed). A mineral body.

Leader. A small vein running into a larger one.

Ledge. The solid vein or lode.

Leg. An upright timber supporting the cap of a set of timber.

Lens. An orebody of lenticular form.

Lenticular. Having the shape of a double convex lens.

Level. A horizontal opening in a mine, usually connected with a shaft. Levels are commonly opened at stated intervals as depth is gained—usually at 100 feet in modern mining practice. The word "level" frequently is used interchangeably with the word drift, but is more comprehensive. Both drifts and crosscuts may be opened on a level, though a crosscut is not a level.

Limestone. A rock composed of lime carbonate.

Lixiviation. The process of leaching out the metallic contents of ores.

Locate. To locate a mining claim is to file a notice claiming ownership at the point where mineral is dicovered, and to put up stakes or monuments at the corners of the rectangular area claimed.

Location Work. Labor required by law to be done on mining claims within 60 days of location, in order to establish ownership.

Lode. A metalliferous vein. In Lake Superior region refers to the mineralized beds; is used generally as synonymous with vein; used by geologists as meaning an aggregation or congerie of mineralized veins.

Long Ton. An English ton of 2,240 lbs. avoirdupois.

Low Grade. Ore whose recoverable value yields but slight profit per ton. Carrying mineral value but sparingly.

Magma. An originally molten mass of rock coming to the earth's crust from depth.

Magmatic Segregation. The process by which the different constituents of molten rock masses crystallize at varying temperatures with a tendency to separate themselves, so far as circumstances allow, from the other compounds.

Malacate. A horse whim with vertical drum used for hoisting in Mexico. Sometimes is called a Zacatecas malacate.

Mass. Copper; a solid chunk of native metal.

Massive. Rock without defined lines of cleavage; ore occurring without appreciable gangue, as contra-distinguished from ore disseminated throughout a gangue.

Matrix. The rock between imbedded objects, such as a particle or mass of ore or native metal. More rarely a metallic mineral is the matrix cementing together rock particles.

Matte. A furnace product composed of copper and iron sulphides, produced by shaft or reverberatory fusion. Usually contains 30-40% copper, but varies from 20-60%. Is blown to blister copper 98-99% fine in bessemer converters.

Matting. The process of smelting sulphide ores into matte.

Mesa. Spanish for tableland or plateau.

Mesh. The size of openings in a screen.

Metalliferous Carrying metal.

Metallurgy. The science and practice of reducing metals from ores and minerals.

Metamorphic. Rock that has been changed from its original condition by pressure, chemical action, heat, or other causes.

Metamorphosis. The process by which changes in structure are affected in a rock form by heat or percolating waters.

Metasomatic. Replacement, particle by particle, so that original structure is often preserved.

Meter or **Metre.** 39.37 inches.

Metric Ton. A weight of 2,204.6 lb avoirdupois.

Mica. A scaly transparent mineral. Biotite is brown or black mica; muscovite or isinglass is the clear mica used in stoves, lanterns, electric apparatus, etc.

Mill. Works for treating ores without smelting.

Milling. Dressing ore in a mill; also dumping ore in a winze to be drawn off into cars or wheelbarrows on a lower level.

Mill Run. The treatment of a definite quantity of ore in a mill; also the result or yield thereof.

Mill Test. The determination of the metallic contents and recoverable values in any given ore by the milling of a sufficient quantity to afford average milling conditions.

Miner. In strict construction, the man that does the drilling and blasting in a mine. In a broader sense, all men working underground.

Mineral. Ore or rock containing metal. In the Lake Superior district the term mineral has a special use, being employed to designate the concentration of native copper, with its small amount of admixed amygdaloid or conglomerate, as it comes from the mill, before going to the smelter.

Mineral Belt. The strip or zone of mineralized territory in a given formation or district.

Mineral Right. The ownership of mining rights under the surface of land owned by another holder. Mineral rights sometimes are reserved in selling land in some districts.

Mineralized. Carry metalliferous minerals.

Miner's Inch. The amount of water that will flow through an opening one inch square under a six-inch head, which is 2,274 cubic feet in 24 hours, or 94¾ cubic feet per hour, equal to 655 wine gallons or 593 imperial gallons hourly.

Mining Engineer. Graduates of technical mining schools are given the degree of engineer of mines and sign the letters E. M. after their names. The letters M. E. stand for mechanical engineer, when given by a school, but are often used by men engaged in mining, who lack scholastic degrees, as an abbreviation for mining engineer, or mining expert.

Missed Hole. A drill hole, charged with explosives, which fails to be set off by the fulminating cap.

Moil. A steel bar, like a drill, except that it is sharpened to a point instead of having a cutting face.

Molybdenite. A graphite-like, flaky lead-colored mineral found in some ores; composed of molybdenum and sulphur.

Momme. A Japanese weight equal to 3.75 grams or 2.4113 pennyweights.

Monocline. Upturned beds of rock that have a practically uniform dip.

Monzonite. A granitic rock intermediate between diorite and granite.

Morgen. A South African land measure—2.1165 acres, or 1.44 claims.

Mortar. An assayer's mortar in which rock or ore is crushed with a pestle. A mortar is the box, about the stamp of a mill, in which the ore is stamped and crushed.

Mother Lode. The main lode of the district. In America applies to the mineralized belt of the principal California gold region.

Mouth. The surface entrance or opening of an adit, tunnel or shaft.

Mucker. Ore shoveller, who loads the mine cars and in most mines is also a trammer, pushing the cars to the shaft or tunnel mouth.

Mullock. Australian for waste rock broken underground.

Mundic. Pyrrhotite, magnetic pyrite; iron sulphide.

Mynpacht (South Africa). A part of (10%) of a farm, which the owner has the first right to locate or peg out, when the farm is proclaimed a public goldfield.

Nickeliferous. Carrying nickel.

Nodule. A small concretionary, rounded mass of mineral matter.

Non-Conformable. Rock strata not associated originally in the position now occupied.

Nugget. A lump of native metal; usually applied to gold.

Open-Cast, Open-Cut. A mine worked as a quarry, or pit open to the sky.

Ore. Metallic minerals; mineralized material or rock, holding metallic minerals. Called pay ore when it can be profitably worked; low-grade ore when it yields but slight profit.

Ore-Car. A mine car for carrying ore or waste rock.

Ore-Chute. An opening in ore or rock through which ore is dropped downward. Also used for ore bins and pockets.

Ore Dump. A heap or pile of ore at the tunnel mouth or top of shaft.

Ore-Shoot. An orebody or portion of a vein carrying high-grade, or payable ore. Usually has a vertical or diagonal dip on the plane of the dip of the vein.

Orthoclase. A white, or pale-colored feldspar composed of silicate of potassium and aluminum. Occurs as white crystals or spots in porphyry.

Outcrop. The apex, or part of a vein or mineral deposit that is exposed at the surface of the earth.

Outlier. An isolated mass of rock or group of rocks lying at a distance from the main body, and separated therefrom, on the surface by a different rock formation.

Output. Production.

Overburden. Waste material, usually drift or alluvium above the solid rock, or orebody.

Overhand Stoping. Removing ore in ascending steps.

Oxide. An ore of any metal or metals chemically united with oxygen.

Oxidize. To unite with oxygen. Many minerals and most metals oxidize with greater or less rapidity when exposed to air or water.

Panning. To wash gravel, etc., in a pan, so that the sand and gravel is loosened and thrown out and the gold or heavy metallic minerals left in the pan.

Patent. A deed given by the Government, to mineral lands.

Patio. A walled yard with paved floor in houses and mine plants, in Mexico and other Spanish countries.

Paystreak. The rich band, part, or zone in a vein or ore deposit which carries the profitable, or pay ore.

Pegmatite. Very coarsely grained granite; a giant granite.

Penthouse or **Pentice.** A shed-roof erected in the bottom of a shaft, when sinking, to protect miners from accidental fall of rock, timber or tools from above.

Peroxide. The oxide of any metal containing the greatest proportion of oxygen.

Pertenencia. The unit of a mineral claim in Mexico; 100 meters square, or one hectare, 2,471 acres.

Peter Out. To pinch out, or feather out and end.

Petrology. The study of rocks by thin sections and microscope.

Phosphate. An ore of any metal or metals with which phosphorous and oxygen are chemically united.

Picul. A Chinese weight of 133⅓ lb.; commonly used in the Orient.

Pillar. A section, or block of ore left in place to support shafts or roofs.

Pinching. The narrowing of a vein.

Pinching Out. The narrowing of a vein to extinction.

Pipe Vein. An orebody of chimney form.

Pitch. The angle and direction of dip or rake of an ore-shoot in a vein. If a vein dips east, an ore-shoot may pitch at a flatter angle than the vein, to the N. E. or S. E.

Plain. A flat or nearly level country.

Placer. A deposit of metal-bearing gravel or alluvium.

Plant. The machinery equipment of a mine or reduction works. In general use the term includes buildings, housing, machinery.

Plat. To draw to scale. In Lake Superior and Australian usage it is the station or enlargement of a level, to give extra space for loading and unloading the cage, skip, or bucket.

Plumbiferous. Carrying lead.

Plutonic. Rocks of deep-seated, igneous origin.

Pocket. An orebody of small extent; a natural underground reservoir of water; a cavity cut in the rock underground to hold ore; a bin at shaft house or mill, in which ore, flux, or fuel is stored.

Pockety. Carrying only occasional bunches of good ore.

Poling. The process of deoxidizing molten copper and tin in a reverberatory furnace by stirring with long poles of green timber.

Poll-Pick. A tool having a pick on one end, and a poll, or hammer head, on the other.

Pood. A Russian weight of 36.112 lb. avoirdupois.

Poppet-Head. Framework or gallows frame over a shaft, for sheave-wheel and hoist rope.

Porphyritic. Carrying isolated crystals in a ground mass, like plums in a pudding.

Porphyry. Properly, is any igneous rock showing phenocrysts, i. e., distinctly isolated crystals in a dense or crystalline matrix. Porphyry may be granite, quartz, or one of several other rocks.

Pound. The troy pound alone is used for gold, silver, and platinum only. It is 0.82286 of an avoirdupois pound. A pound of gold weighs 12 troy ozs. or 5,760 grains and the avoirdupois pound 7,000 grains.

Primary. The first; primary ores are those first or originally formed in an ore deposit, before alteration began. Also applies to the oldest rock formations.

Prop. A heavy timber placed with its foot against the floor of a mine opening, and its top against the roof, to support the rock above.

Prospect. To seek for mineral; a new mining property that has not yet been developed enough to be called a mine.

Prospector. A searcher for mineral deposits.

Protoxide. The oxide of any metal containing the least proportion of oxygen.

Puddingstone. A coarse conglomerate showing rounded pebbles.

Pulp. Pulverized ore or concentrate.

Pulverize. To crush to powder.

Pulverulent. That which may easily be reduced to powder.

Pyrrhotite. Iron sulphide, often called mundic or magnetic pyrite.

Pyrite. Iron disulphide; fool's gold.

Pyrites. A local term for pyrite and for sulphide ores; more properly, iron disulphide.

Pyrolusite. A black manganese ore containing 63% manganese.

Quarry. An open pit, of varying size, sometimes several acres, from which stone or ore is mined.

Quarter-Section. In the United States a quarter of a square mile; 160 acres, laid out in a parallelogram, each side of which is one-half mile in length.

Quartz. Crystalline silica; any hard silicious ore, in miners' usage.

Quartz Claim. In the United States mining claims are of two classes: placer claims, carrying mineral, usually gold, in alluvium; and quartz lode claims, any prospect carrying metalliferous bodies in place.

Quartzite. An altered (metamorphosed) crystalline sandstone.

Quartzose. Rock having much quartz in its composition.

Quicksand. Fine sand, which flows easily when wet.

Ragging. Cornish for rough cobbing; broken lumps of ore of medium size.

Raise or **Rise.** A shaft or winze that is being opened from below. Sometimes called upraise or uprise.

Rake. The pitch of an ore-shoot on the plane of the vein. Also applied to cross veins, which are sometimes called rake, or counter veins.

Range. A mineral belt; also in many American states a surveyor's term for describing and locating lands. The state is surveyed in sections, towns, and ranges. A township comprises 36 sections and is a square of six miles. Each township receives a double number, one for the town and one for the range. The towns are numbered consecutively from south to north, and the ranges are similarly numbered from east to west. Thus T. 2 N., R. 5 W. means Township 2 north or 12 miles north and Range 5, or 30 miles west of the State meridian.

Reamer. A tool like a bit, used to enlarge a hole previously drilled.

Reduction. The separation of metals from their ores.

Reef. A quartz vein or lode; a projecting ledge or inclined wall like an outcrop. The gold deposits on the Rand are termed reefs.

Refining. The elimination of impurities from crude metals, or separation of metallic alloys obtained in the reduction of ores.

Refractory. A refractory ore is one that cannot be smelted or otherwise treated by ordinary metallurgical processes. A refractory stamp-rock is one that is pulverized with unusual difficulty.

Regulus. The metallic material that separates and settles in the bottom of a pot of molten matte, or slag.

Reniform. Kidney-shaped.

Reserves. The amount of payable ore, developed and ready for extraction, or blocked out ahead of immediate requirements.

Reverberatory Furnace. A smelting furnace in which the flame from the grate below is reflected back by the roof on the charge of ore.

Rise. A raise or opening driven upward.

Roasting. Driving off sulphur and other volatile elements from ore, by heat. When done in a furnace, under great heat, the process is called calcining.

Rob. To remove pillars and other supports from a mine for their mineral content, regardless of the future of the property.

Rock. Lake Superior; applied to ore mined and ready for the stamp mill. In English practice ore is called "Stone." More properly applied to the stony matter surrounding ore, or constituting the earth's crust; is a synonym for stone.

Rock-Crusher. A machine for reducing rock or ore to smaller sizes. Crushers are of two types, the jaw and the gyratory. The jaw-crusher works by means of swinging jaws; the gyratory operates on the plan of a coffee-grinder, only that the motion is somewhat eccentric.

Rock-Drill. A power drill.

Rock Filling. Waste rock, used to fill up worked-out stopes to support the roof.

Rock-House. Lake Superior; the building (usually the one over the shaft) where copper-bearing ore from the mine is dumped from the ore skip

(or bucket), is screened, crushed and stored in a bin, ready for shipment to the mill.

Rolls. Heavy steel rolls, worked in pairs, like a clothes wringer, for crushing rock and ore.

Roof. The rock overhead in a mine opening.

Room. Similar to a stope; term usually applied to mines working mineral bodies lying nearly horizontally.

Royalty. A percentage of the ore or value thereof paid to the land owner by the lessee of the mine; often a fixed sum for each ton of ore extracted.

Run. See mill run. A bar or course of ground better or worse than the average value of the mine.

Running Ground. Superincumbent material that breaks off readily and falls into the mine openings.

Saddle. Depression or U-shaped fold; the reverse of an arch or anticline.

Safety Cage. A cage furnished with automatic appliances to stop its descent in case the cable breaks.

Salting. Placing rich foreign ore, minerals or substances in a mine to deceive intending purchasers or other interested parties.

Sample. A specimen of ore from a mineral deposit. A selected sample is misleading because containing far above average value, and splendid samples frequently come from the poorest mines. An average sample is what its name purports—if it be an average sample.

Sampling. Cutting a representative part of an ore deposit, which should truly represent its average value. Most usually a trench-like cut 4 inches wide and 2 inches deep, cut into the clean face of ore and across its course. Honest sampling requires good judgment and practical experience.

Sand Pump. A pump, usually centrifugal, designed to lift water carrying large quantities of coarse tailings or sand in suspension.

Sand. Tailings from the stamp mills of Lake Superior copper mines; in fact, from any mills.

Sand (or tailings) Wheel. A large wheel, having buckets on its inner perimeter, for elevating water carrying stamp-sand.

Scale Copper. Copper in very thin flakes.

Schist. A crystalline, usually micaceous rock of foliated structure, made up of superimposed flattened particles.

Scoria. Slags from copper smelters; volcanic ash.

Scoriaceous. Of the nature of scoria.

Scram. To search for ore in a mine that is apparently worked out and to extract it.

Screen. A grating of perforated metal or woven wire.

Seam. A thin layer of rock or ore.

Secondary Enrichment. An enrichment of a vein or an orebody by material of later origin, often derived from the oxidation of decomposed overlying ore masses. Nature's process of making high-grade out of low-grade ores. First discovered by Weed and announced by publication in Geol. Soc. of America program, Dec. 8, 1899. Confirmed by Emmons and by Van Hise, Feb., 1900.

Sectile. Easily cut.

Section. A field or district; also, in the U. S. a square mile of land.

Sedimentary. Rocks formed by deposition from water, as contra-distinguished from rocks formed by igneous action.

Selvage. A clay seam along which parting occurs; also called fluccan.

Set. A framed form of timber, used for supporting ground in a mine.

Shaft. A pit or deep mine opening.

Shaft-House. A building at the mouth of a shaft, where ore or rock is received from the mine.

Shale. A hardened clay with fissile structure.

Shear-Zone. A belt in which the rocks are crushed by many parallel fissures.

Sheave. A grooved wheel, notched to carry rope; an open pulley.

Shift. A miner s work period of 8 to 10 hours' time; a force of men employed on one turn.

Shift Boss. A mine boss, or under-captain, in charge of a gang or shift of miners.

Shoot. See ore-shoot. To fire or explode dynamite in holes drilled for that purpose. An erroneous spelling for chute.

Short Ton. A weight of 2,000 lb. avoirdupois.

Shot. A blast of some explosive.

Shot Copper. Small rounded particles of native copper, somewhat resembling small shot in size and shape.

Shrinkage Stoping. Taking out ore by blasting it down on a heap of broken ore. Working space for drilling is kept open by drawing out part of the ore from an opening beneath. Is a method of overhead stoping.

Silica. Quartz, a compound of oxygen and silicon. Ordinarily sand is composed largely, if not wholly, of silica.

Silicate. A mineral composed of any metal or element chemically united with silica.

Silicious. Containing much silica or quartz.

Sill. The floor-piece of a set of mine timbers.

Sinking. The process of deepening a shaft or winze.

Sinking-Pump. A movable pump, usually vertical, hung in a shaft, and lowered, as the shaft is deepened.

Skip. An iron box, open at the top, running on guides, on four wheels, and hauled by a cable; used for hoisting ore and rock, and for lowering timber.

Skip-Road (or Way). A track of T-rails, spiked to wooden sleepers, on which a skip runs.

Slag. The melted rock or waste separated from the metal in a smelting furnace.

Slice. To remove ore in mine in pillars, or by successive slices.

Slickenside. A polished rock surface, showing striations produced by the opposing walls of a fracture rubbing and grinding against each other in the movement produced by earth stresses.

Slide. A bedding fault, or slipping caused by the subsidence of the overlying rock formation; also applied to masses of loose rock, or ore on a mountain slope.

Slime. Exceedingly small particles of rock and mineral held in suspension in water. This mud is called slum.

Slime Table. A circular revolving table, on which slime flows and minute particles of mineral are saved.

Slip. A fault.

Sludge. The mixture of rock and water, or slime, formed by a diamond-drill.

Sluice. A wooden trough, box, flume, or launder.

Smelter. Works where ores or crude metals are reduced by fusion.

Soapstone. Steatite; a soft unctuous rock.

Soft Ground. Heavy ground; rock about underground openings that does not stand well and requires heavy timbering.

Sollar. A platform or ladder landing in a shaft.

Spathic. Containing carbon dioxide; a carbonate.

Specimen. A sample of mineral selected because typical, unusual or exceptionally rich.

Speiss. Impure metallic arsenides produced in copper smelting; ore particles finely disseminated through a rock, usually occurring as impregnations.

Spelter. The common term for metallic zinc.

Sphalerite. Zinc blende; zinc sulphide; the most common zinc ore mineral; is often found associated with galena and chalcopyrite.

Spile. Lagging driven ahead of the regular timbering in treacherous ground.

Spitzkasten. Pyramidal boxes wherein ores are concentrated and sized by a jet of water fed from below.

Spoon. A long-handled spoon, used to scrape out drill holes.

Sprag. A prop or cross-timber set to secure the hanging wall in a stope. A short piece of wood used to block the wheels of a mine car.

Spur. A short, small branch from a vein.

Square Sets. A frame of mine timbers with mortised and tenoned sill top piece and uprights of equal length, joined at right angles.

Squib. A fuse.

Squeeze. The slow settling down of the roof in mine workings without fracture.

Stack. The chimney of a furnace; usually employed to designate a number of furnaces, when used in the plural.

Stamp-Mill. A mill for crushing and concentrating minerals by stamps and jigs, etc.

Stamp-Rock. Ore containing fine copper that must be crushed and jigged to recover the metal. Use restricted to Michigan.

Stamps. Machines to crush rock or ore by heavy blows.

Stamp-Shoe. The heavy chilled iron casting attached to the lower end of a stamp piston, and does the actual crushing of rock in a stamp-mill. It hits against a round steel block called a die.

Stanniferous. Tin-bearing.

Station. A chamber in a shaft, cut out for pumps, landing place, etc.

Station-Pump. A mine pump permanently placed, as distinguished from a moveable sinking-pump.

Steatite. Soapstone; a greasy mineral, having a talc base.

Step-Fault. A series of faults, rising like steps.

Stockwerk. A mass of rock penetrated by numerous small stringers of ore, the entire mass averaging sufficiently rich in metallic material to warrant its mining and treatment.

Stone. See Rock.

Stope. (V.) To mine or extract ore. (N.) The workings between levels or drifts, in which ore is broken down in a series of chambers and taken away for treatment.

Stoping. Breaking down the mass of pay-rock or ore above a drift. When stoping in an orebody of average width, miners can break rock much more quickly and cheaply than when driving the drifts.

Stoping Ground. Part of an orebody opened by drifts and raises and ready for breaking down.

Strata. The successive beds or layers of sedimentary rocks.

Stratified. Having regular layers of varying rock varieties.

Stratum. A layer or bed of rock.

Streak. The color given by a mineral when scratched or when rubbed on porcelain.

Strike. The horizontal direction of a vein, measured by the points of the compass; a discovery of ore.

Stringer. A thin seam of ore.

Strip. To remove the overburden of waste, drift, or alluvial soil overlying an orebody.

Stripping. The waste or overburden above an orebody.

Structure. The form of a mineral, whether granular, crystalline or amorphous.

Stull. The top-piece of a set of mine timber. A timber prop supporting the roof of a mine opening.

Sulphate. A chemical compound (or a mineral) of a metal combined

with sulphuric acid; an ore of any metal or metals with which sulphur and oxygen are united chemically.

Sulphide. A mineral or ore of any metal or metals with which sulphur is combined chemically.

Sulpho-antimonite. A mineral in which sulphur and antimony are united chemically with a metal.

Sulpho-arsenite. An ore mineral of any metal or metals with which sulphur and arsenic are united chemically.

Sulphuret. A sulphide; term becoming obsolete, but used in California.

Sump. The pit at the bottom of a shaft, where water collects; also in cyanide plants.

Surface Rights. The ownership of the surface of land only, where mineral rights are reserved.

Swabstick. A stick used to clean out drill-holes.

Syncline. Canoe or U-shaped fold of rock layers; the reverse of an anticline.

Table. A concentrating machine for separating finely crushed particles of ore from gangue.

Table Land. A plateau.

Tailings. The sandy and gravelly residue or refuse matter from a concentrating mill.

Tamp. To closely pack clay or other sticky earth into a drill-hole above the cartridges, to give greater force to the blast.

Tap. To draw off molten metal or slag from the vent of a furnace.

Taper Off. Cornish for stopping work temporarily.

Tenor. The percentage or average metallic content of an ore, matte, or impure metal.

Terrero. Spanish for heaps of partly leached ore.

Tertiary. The third great geological period preceding the present Quarternary period.

Test-Pit. A shallow pit sunk to look for mineral.

Texture. A rock structure; is fine or coarse grained, porphyritic, etc.

Throw. The displacement of a vein caused by faulting.

Timber. The wooden logs and sticks used for underground supports.

Timberman. One who works at timbering a mine.

Ton. Long, 2,240 lb.; metric, 2,204 lb.; short, 2,000 lb.

Tonelada. Spanish for long ton.

Township. Abbreviated T. or Twp.; see Range.

Trachyte. A light-colored volcanic rock made of alkaline feldspar with black mica and hornblende.

Tram. To load rock or ore in cars and push same to the shaft, a tramway.

Trammers. Men who load and tram the broken rock underground.

Trap. A dense gray, blue or greenish rock of volcanic origin; usually an old and altered basaltic rock.

Trend. The general direction of a mineral body.

Trestle. A frame-work of timbers, carrying tram-tracks.

Tribute. The money per ton or percentage of ore extracted which is paid by lessees to owners for the privilege of working a mine.

Tripod. The three-legged iron frame on which the working parts of a power-drill rest; a three-legged wooden frame over the mouth of a pit or shaft.

Trommel. A revolving cylindrical sieve for sizing ore.

Troubled. A vein is sometimes called troubled when disturbed or faulted.

True Fissure Vein. All mineralized fissures are true fissure veins. Term commonly used as meaning a fissure vein with promise of holding to great depth, in contra-distinction to a gash vein.

Tsubo. A Japanese measure of 6 feet square, equalling 36 square feet.

Tube-Mill. A steel cylinder half lined with flint pebbles or steel balls, which crush ore when the tube is revolved.

Tufa. A limestone formed by spring waters. Name frequently used in place of tuff.

Tuff. Volcanic ash, cinder, and lapilli, ejected from volcanic vents and deposited in layers from air or water and solidified by time and superincumbent pressure. Name also used for coarser volcanic debris, including breccia and conglomerate.

Tunnel. A practically horizontal opening entirely through a hill or mountain. Term is commonly used instead of adit, which is a horizontal gallery having only one opening to surface.

Turbine. The most efficient form of water-wheel; also a new form of steam-engine in which the entire movement of the power-producing parts is rotary instead of reciprocating.

Tuyeres. The pipes in a furnace wall by which air is supplied under pressure, to either blast furnaces or bessemer converters.

Unconformable. With a break between rock beds lying at different angles or with erosion surface between.

Underhand Stoping. Cutting out ore from the floor of an opening. Removing ore in descending steps.

Underlay, Underlie. The downward extension of a vein or bed beneath the ground. Is technically the horizontal departure of a vein from the vertical measured in feet, per fathom (or 100'). Mineral bodies lying under a given tract, though not outcropping on surface.

Unpatented. Mining claims to which a deed from the U. S. Govt. has not been received. They are subject to annual assessment work, in order to maintain ownership.

Unstratified. Rock that is not bedded in layers.

Unwater. To free from water; to pump out or drain a mine.

Upcast. A shaft having an upward air current.

Upraise. A raise, an upward opening in a mine. Term almost obsolete, "raise' being preferred.

Van. To wash ore on a shovel, like panning.

Vanner. A concentrating table or machine for dressing ore by means of vibratory motion, aided by jets of water to carry away waste rock.

Vara. A Spanish-American measure of length, of 33 inches.

Vein. A rock fissure filled with mineral matter; a mineral body having defined walls. See contact vein and fissure vein.

Veinstuff. Vein filling; also used for gangue.

Vertical Shaft. One sunk at an angle of 90° with the horizon, or directly downwards toward the center of the earth.

Virgin. Native metal occurring elementally, as distinguished from ore minerals, which are chemical compounds.

Vitreous. Of a glassy nature.

Volatile. That which can be driven off as vapor, by heat.

Vug. A cavity in the rock; usually lined with a crystalline incrustation.

W. The chemical symbol for tungsten.

Wall. The side of a mine opening or drift. The waste or country rock on each side of a vein.

Wall-Plates. Are the two side pieces of a set or frame of shaft timbers, as distinguished from the end pieces.

Water-Jacket. An outer casing for a blast-furnace, in which water circulates, to keep the metallic furnace-walls from melting because of the intense heat of the charge.

Water-Level. The level above which water does not rise, when a mine is allowed to fill. The water-level is often the point below which altered and enriched ores are succeeded by base unaltered sulphides.

Weathered. Changed by long exposure to air and water.

Wet Process. Leaching or lixiviation.

Wheal. Cornish for mine.

Whim. A windlass with a vertical drum revolved by horse-power and used for hoisting.

Whip. A fixed pulley with hoisting rope passed through it and pulled by a horse or mule.

Wilfley. A Wilfley concentrating table; about 20,000 in use throughout the world.

Winch. A windlass.

Winding. Hoisting with rope and drum.

Windlass. A device for hoisting from a pit or shaft, by means of coiling a rope or cable around a drum, with crank handles.

Winze. A shaft, usually short, extending downward from the floor of a mine opening.

Wire Bars. Refined copper cast into bars for wire drawing.

Workings. The underground openings of a mine.

Wulfenite. See molybdenum in minerals.

Zinc Blende. Sphalerite; sulphide of zinc.

Zinckiferous. Carrying zinc.

Zinc Sulphide. A compound of zinc and sulphur. See minerals.

Zn. The chemical symbol for zinc.

CHAPTER II

MINERALOGY OF THE ORE MINERALS

ORE MINERALS:

Ores as mined are very seldom composed entirely of ore minerals, usually consisting of a mixture of quartz, or other non-metallic mineral, or of altered rock and metal-bearing minerals. The mixture constitutes ore when it contains enough value, in one or more metals, to pay for the cost of mining, concentrating, transportation, smelting, and marketing. As this cost varies with each mine and locality, and the price of every metal, save gold, also fluctuates, there is a wide range of value to ore. The Alaska gold quartz mines operating on a gigantic scale can mine, mill, and extract their product for less than $1 per ton, whereas many smaller mines cannot make a profit on $3 ore of similar character. Copper ores show a much greater margin, between the costs at the Utah Copper Co. and those of small vein mines.

In the following pages I have given a list of the more important ore minerals of each metal. It is intended only for general reference, the minerals being arranged under the name of the metal. For sight tests and recognition of ore minerals, see "Practical Field Mineralogy," Farrell-Moses, 1912.

ALUMINUM.

Bauxite. 74% alumina. Hydrated alumina. Regarded as a hot spring deposit. Occurs in pockets in clay in Arkansas.

Corundum. 53% aluminum. A bluish-grey, brown or white mineral which is harder than and will scratch any other mineral except diamond; will scratch steel. The clear red is the gem ruby and the blue, sapphire, found in many basic igneous dikes in Montana, especially in the sapphire mines at Yogo.

Cryolite. 12.8% aluminum, sodium alumina fluoride. A Greenland ore, essential to aluminum reduction.

Gibbsite. 65.4%alumina. Hydrated alumina, derived in Arkansas deposits from decomposition of a granite rock (Elaeolite syenite).

ANTIMONY.

Stibnite. Antimony glance 71.4% antimony. Is the common ore; a sulphide of the metal. Is in process of deposition at Steamboat Springs, Nevada. Antimony occurs in many silver ores. Is common in tetrahedrite or silver-bearing copper minerals. Antimony ores are mined at Pine Creek, near Wardner, Idaho. Specific gravity, 4.5.

ARSENIC. ..

This metal is largely derived from arsenopyrite deposits, from nickel or cobalt arsenides, common at Cobalt, from enargite, copper arsenide, at Butte.

Arsenopyrite, or **Mispickel,** a sulpharsenide of iron, with 45% arsenic, which looks like iron pyrite, but emits a garlic odor when struck. Occurs in fissure veins, with gold ores. Ruby silver and other minerals rich in silver also contain arsenic. Gravity, 6.

Bismuthinite. $Bi_2 S_3$, 81.2% bismuth, a sulphide of bismuth. Gravity, 6.4 The metal is a subordinate constituent of many gold, tin, and silver ores, especially those of Leadville, Colo. It is obtained mainly as a by-product from gold-silver and lead ores and not from ores mined for this metal itself.

CADMIUM.

Greenockite. Is the only important ore mineral, the yellow sulphide, which occurs with zinc (sphalerite) ores in the Mississippi states.

CHROMIUM.

Chromite. FeO, Cr_2O_3, or chrome iron ore, with 68% chromium, is the sole ore of commerce. Gravity, 4.5. It resembles magnetite, the black iron oxide ore.

COBALT.

Cobaltite, or cobalt sulpho-arsenide, with 35.4% cobalt.

Erythrite. A cobalt bloom, 37.4% cobalt, a creamy raspberry red mineral, formed by oxidation; a hydrated arsenious oxide.

Smaltite. Cobalt arsenide with 28.2% arsenious oxide. A silver-white mineral, harder than cobaltite; garlic odor when struck. Gravity, 6.5.

COPPER. Cu. Native copper. The chemical symbol Cu is an abbreviation of cuprum, the Latin word for copper. The metal, native or refined, has the following names in modern languages; kupfer in German; koppar in Swedish; kobber in Norwegian; cobre in Spanish and Portuguese; cuivre in French, rame in Italian.

Atomic weight, 63.2. Belongs in the first group and is the leader of the fifth series of Mendeleéf's Periodic System. The group is as follows: 1, hydrogen; 2, lithium, 3, sodium; 4, potassium; 5, copper; 6, rubidium; 7, silver; 8, caesium; 9, unknown (possibly terbium, atomic weight 160); 10, gold; 11, unknown. The fifth series, of which copper is the basic leader, is as follows: 1, copper; 2, zinc; 3, gallium; 4, germanium; 5, arsenic; 6, selenium; 7, bromine. The three metallic elements falling between series four and five in Mendeleéf's table are iron, cobalt, and nickel. The frequency with which these three elements are found associated with copper, and the ease with which all four metals replace one another, is notable. The general resemblance between copper, silver and gold, which form ascending steps in the same group, is readily apparent.

System of crystallization, isometric. Tetrahexahedronal forms are the most common, with much twinning. Crystals often show cavernous faces and occasionally elevations, are often distorted and pass gradually through distortions into filiform and arborescent forms. Native copper also occurs massive, in granular form, and in laminae. In the Lake Superior mines the metal occurs in all observed forms and sizes, including lamellae from microscopic flakes up to sheets of immense size and weight, crystals of greatly varying form and size, grains from microscopic size to considerable nodules, and druses, often of considerable size, show various filiform and arborescent shapes. The finest particles are grains and exceedingly minute flakes, occurring in an upper sandstone of the Keweenawan series, while the largest masses, weighing upwards of 500 tons, have been found in contact and fissure veins.

Cleavage, none; fracture hackly; tenacity, second only to that of iron. Is perfectly sectile and highly ductile and malleable, ranking in these particulars with the precious metals. Electrical conductivity, 931, as compared with 1,000 for silver, which possesses the most perfect electrical conductivity of any known metal or alloy. Conductivity for heat, 898, as compared with 1,000 for gold, the most perfect conductor of heat.

Hardness, 2.5 to 3. Specific gravity, in vacuo, at degrees Centigrade (equal to 32°, or freezing point, Fahrenheit); when chemically pure and devoid of porosity, is 8.945. Specific gravity of the ordinary copper of commerce, none of which is free from impurities, varies from about 8.75 when cast, to about 8.95 when rolled, hammered or drawn, the exact gravity depending upon how handled, as well as upon the extent and nature of the impurities contained.

Lustre, metallic. Color, copper-red. Streak, copper-red, metallic, shining. Tarnishes upon exposure to air to brownish red, and is liable to form a coating of verdigris or oxide upon long exposure to air. Atmosphere

laden with moisture and carbonic acid is especially favorable to the formation of verdigris.

Fusibility: Copper is fusible at approximately 2,000° Fahrenheit, or a trifle less than 1,100° Centigrade. Color, when fused, sea-green. Copper becomes volatile under the high temperature of the electric arc.

Solubility: Copper is soluble in nitric acid, aqua regia, and strong boiling sulphuric acid, also slowly, in dilute hydrochloric and sulphuric acids, with admission of air. When in solution in nitric or sulphuric acids will deposit metallic copper on iron immersed therein.

Affinities: Copper has a greater affinity for sulphur than for any other element, possessing also marked affinities for oxygen, carbon dioxide, arsenic, antimony and bismuth, and unites with many other elements.

Alterations: Native copper alters on exposure, especially in damp air, to the simpler oxide and carbonate ores, such as cuprite malachite and azurite, and occasionally, in time, to the more complex ore forms.

Occurrence: Native copper occurs, usually in small quantities, in most of the principal copper districts of the world. The native metal is mined upon a considerable scale only in Lake Superior, U. S. A., and Bolivia. The Lake Superior native copper carries considerable silver, mechanically admixed, though not alloyed, but carries no gold. In districts outside of Lake Superior and Bolivia the metal occurs most frequently in connection with the oxide and carbonate ores, and occasionally with the secondary sulphide ores.

Impurities: Native copper frequently contains silver, arsenic, bismuth, antimony, zinc and occasionally mercury. Commercial copper, refined from ores, may contain any of the elements already named, and also gold, tin, lead, selenium and tellurium, the latter two elements in very minute quantities.

Azurite. $2CuCO_3Cu(OH)_2$. A basic copper carbonate containing 53.3% copper. Common names, blue carbonate of copper, blue malachite, azure copper ore. Crystallization, monoclinic. Fracture, conchoidal. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.77 to 3.83. Lustre, vitreous. Color, azure blue. Streak, lighter blue. Is subtranslucent to transparent. Occurs frequently in the oxidized zone of copper ore bodies, almost invariably with malachite, but is much less common than malachite. Is a valuable commercial ore of copper.

Bornite. Cu_3FeS_3. A copper and iron sulphide, containing 55.5% copper, 16.4% iron, 28.1% sulphur. Common name, peacock copper ore. Crystallization, rare isometric, with many hexagonal penetration twins. Structure, granular or compact. Fracture, small conchoidal to uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.9 to 5.4. Lustre, metallic. Color, copper red to bluish brown, quickly tarnishing to irridescence, often most brilliant. Streak, pale grayish-black. Is soluble in nitric acid, with separation of sulphur. Is a primary mineral, at Butte and in contact metamorphic ores, but also occurs as the first alteration product from chalcopyrite among the secondary copper sulphides, and often carries nodules and occasionally larger masses of chalcocite. Is one of the most important ores of copper.

Bournonite. 3(Pb, Cu.)S. Sb_2 S_3. A lead and copper sulphantimonite, containing 13% copper and 42.5% lead. Crystallization orthorhombic. Structure, massive, granular and compact. Cleavage, imperfect. Fracture, subconchoidal to uneven. Tenacity, rather brittle. Hardness, 2.5 to 3 Gravity, 5.7 to 5.9. Lustre, brilliant metallic. Color and streak, steel-gray, inclining to blackish gray or iron-black. Fuses easily on charcoal and is soluble in acids. Occurrence: in many copper fields.

Brochantite. $4CuO.\ SO_3 3H_2O$. A basic copper sulphate containing 56.2% copper. Crystallization, orthorhombic. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 3.9. Lustre, vitreous. Color, emerald-green to blackish green. Streak, paler green. Is translucent to transparent. Is found in many copper fields, and is an important commercial ore in the Clifton district. Graham county, Arizona, and Chuquicamata, Chile.

Chalcanthite. $CuSO_4+5H_2O$. A hydrous copper sulphate containing

25.4% copper. Common names, blue vitriol, bluestone, copper sulphate. Crystallization, triclinic. Structure, massive, stalactitic and reniform, sometimes fibrous. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5. Gravity, 2.12 to 2.30. Lustre, vitreous. Color, sky-blue. Streak, uncolored. Is translucent to subtransparent. Is soluble in water. Occurs as deposits from mine water in most sulphide copper mines, and is found in impure state, in beds, in Chile.

Chalcocite. Cu_2S. A copper sulphide carrying 79.8% copper. Common names, copper glance, cuprous sulphide. Crystallization, orthorhombic; also occurs massive, with structure granular to compact and impalpable. Cleavage, indistinct. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 5.5 to 5.8. Lustre, metallic. Color and streak, blackish lead-grey, tarnishing to dull green or blue. Is soluble in nitric acid. Occurs in all copper districts, frequently in large quantities. Is the richest commercial ore of copper and yields more than one-half of world s copper supply.

Chalcopyrite. Cu S Fe S_2. A copper and iron sulphide containing 34.5% copper and 30.5% iron. Is the primary ore of copper. Crystallization, tetragonal, sphenoidal, often twinning, also frequently massive and compact. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 4.1 to 4.3. Lustre, metallic. Color, brass-yellow, often tarnishing to iridescence. Streak, greenish black. Is soluble, except sulphur, in nitric acid, and, on being heated, yields a portion of its sulphur. On exposure to moisture and heat becomes hydrated, and copper and iron change readily to sulphates. Alters to azurite, malachite, melaconite, chalcocite, covellite, bornite, brochantite, chrysocolla, tetrahedrite, and tennantite. Is found in practically every copper field in the world, and is second only to chalcocite in importance among the commercial ores of copper.

Chrysocolla. $CuSiO_3+2H_2O$. A hydrous copper silicate carrying 36% copper. Common names, mountain green and mountain blue. Structure, cryptocrystalline, enamel-like, sometimes botryoidal. Fracture, conchoidal. Is brittle and somewhat sectile. Hardness, 2 to 4. Gravity, 2 to 2.24. Lustre, vitreous to earthy. Color, mountain green, bluish green and sky blue to turquoise-blue, with impure varieties brown to dull black. Streak, white, from pure green and blue varieties. Is opaque to translucent. Is decomposed by acids, without gelatinization. Commonly occurs with carbonate ores in the oxidized zones of copper orebodies, and is a commercial ore of value in many districts.

Covellite. Covelline. CuS. A beautiful bright blue copper sulphide containing 66.4% copper. Chemical name, cupric sulphide. Crystallization, hexagonal; also occurs massive. Is flexible in thin layers, with basal cleavage. Hardness, 1.5 to 2. Gravity, 4.6. Lustre, submetallic on crystals, dull when massive color, indigo-blue. Streak, lead-gray to black, shining. Occurs in most sulphide copper districts, as a secondary ore and is a valuable commercial ore of copper, when found in sufficient quantities as in Butte, Mont., Utah, Wyoming and elsewhere.

Crednerite. $3CuO\ 2Mn_2O_3$. A copper manganate containing 34.4% copper. Crystallization, monoclinic. Cleavage, basal, perfect, less distinct in other directions. Hardness, 4.5. Gravity, 4.9 to 5.1. Lustre, metallic. Color, iron-black to steel-gray. Streak, brownish black. Is soluble in hydrochloric acid.

Cuprite. Cu_2O. A copper oxide, containing 88.8% copper, being the richest copper ore. Chemical names, cuprous oxide, copper protoxide. Common names, ruby copper, red glassy copper ore, octrahedral copper ore. Crystallization, isometric, commonly in octohedrons; also occurs massive, granular and sometimes earthy. Fracture, conchoidal. Is brittle. Hardness, 3.5 to 4. Gravity, 5.85 to 6.15. Lustre, adamantine to earthy. Color, light to dark red; when fresh, usually ruby-red, but fades to duller red. Streak, brownish red, shining. Is subtransparent to subtranslucent. Occurs in most copper districts in the upper oxidized zone, frequently shading into crystals of native copper.

Enargite. $3Cu_2.As_2S_5$. Enargite grades into famatinite. A copper sulpharsenite containing 48.3% copper. Crystallization, orthorhombic; also occurs massive and granular. Fracture, uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.45. Lustre metallic. Color and streak, grayish-black to iron-black. Is soluble in aqua regia and fusible on charcoal. Occurs in many copper fields, notably at Butte, Montana, where it is a common and valuable ore.

Epigenite. Formula probably $4Cu_2S.3FeS.\ As_2S_5$. A copper and iron sulpharsenite, carrying about 41% copper. Crystallization, orthorhombric, in short prisms. Fracture, uneven. Hardness, 3.5. Lustre, metallic. Color, steel-gray. Streak, black. Is soluble in nitric acid. Occurrence: Wittichen, Baden, Germany.

Famatinite. $3Cu.S.Sb_2S$. A copper sulphantimonite carrying 43.3% copper. Crystallization, orthorhombic; is isomorphous with enargite; also occur massive. Fracture, uneven. Tenacity, brittle. Hardness, 3.5. Gravity, 4.57. Color, gray with copper-red tinge. Streak, black. Is fusible on charcoal. Decrepitates in closed tube. Occurrence: Sierra de Famatina, Rioja, Argentina; and Cerro de Pasco, Junin, Peru.

Glance. Common name for sulphide ores with dark metallic lustre, Copper glance is chalcocite.

Malachite. $2CuO.CO_2H_2O$. A basic copper carbonate carrying 57.5% copper. Common names, green copper carbonate, basic cupric carbonate. Crystallization, monoclinic. Commonly massive, but frequently Incrustive and sometimes granular or earthy, and disseminated as stains. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.9 to 4.03. Lustre, of crystals, adamantine, frequently with concretionary bands of varying shades from pistachio-green to bluish-green. Streak, green. Is opaque to translucent. Is soluble in nitric acid. Occurs in most copper districts, in the upper portions of the oxidized zones of ore bodies, and frequently is an important commercial ore. When massive and beautifully marked is a semi-precious stone, used for table tops, etc.

Melaconite. Massive, compact, shining or earthy dull, black copper oxide of same composition as tenorite.

Mohawkite. $(Cu, Ni, Co)_3As$. A copper, nickel and cobalt arsenide, carrying 63 to 69% copper, 3 to 7% nickel and 0.5 to 2% cobalt, usually somewhat argentiferous. Crystallization, hexagonal, by synthesis, no crystals being found in nature. Cleavage, indistinct. Fracture, uneven. Tenacity, slight. Hardness, 4. Gravity, 8.05. Color, light gray on fresh fractures, tarnishing to purple or brassy yellow. Streak, gray. Is soluble in nitric acid. Occurrence: Mohawk mine, Keweenaw county, Michigan.

Tennantite. $4Cu_2S\ As_2S_3$. A copper sulpharsenite containing 57.5% copper when pure, but shading into a great number of varietal forms. Common name, gray copper ore, in common with tetrahedrite, to which tennantite is closely related and joined by a chain of rather obscure minerals shading gradually from tennantite into tetrahedrite. The many varietal forms of this mineral are brought about by part replacement of copper by silver, lead, zinc, iron, mercury, cobalt, nickel, tin, and platinum, with a marked tendency toward mutual substitution of the antimony of tetrahedrite for the arsenic of tennantite, and vice versa, rendering the tetrahedrite-tennantite group unusually prolific. Crystallization, isometric; also occurs massive and granular, compact. Cleavage, none. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3.5 to 4.5 Gravity, 4.4 to 5.1. Lustre, metallic. Color and streak, flint-gray to iron-black. Diapheneity, opaque to subtranslucent in small splinters. Is soluble in nitric acid and fusible on charcoal. Occurrence: at numerous points, being found in greater or less profusion in most copper districts. Is not regarded usually as a commercial ore, except where argentiferous, which is commonly the case.

Tenorite. Earthy form is known as melaconite. CuO. A copper oxide, containing 79.8% copper. Common names, **Black Copper, Black Oxide of Copper.** Chemical names, copper monoxide, copper peroxide, cupric oxide.

Crystallization, monoclinic; also occurs massive, pulverulent and earthy. Fracture, conchoidal to uneven. Hardness, 3 to 4. Gravity, 5.8 to 6.25. Lustre, metallic. Color, dull grayish-black when massive, steel-gray in flakes. Is soluble in nitric and hydrochloric acids. Is found in most copper districts, and is a valuable ore of copper when occurring in quantities, but much of what has been considered tenorite in the past really was chalcocite, for which it is easily mistaken when disseminated. Found in very thin, long, flexible, minute scales of glistening gray color in Vesuvian lavas.

Tetrahedrite. $4Cu_2S.\ Sb_2S_3$. A copper sulphoantimonite containing 52.1% copper. Shades into tennantite, which see, for reference to protean forms of these two closely related and frequently indistinguishable minerals. Common name, gray copper ore. Crystallization, isometric; also occurs massive and granular, coarse to fine, compact. Cleavage, none. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4.5. Gravity, 4.4 to 5.1. Lustre, metallic, brilliant. Color, flint-gray to iron-black. Streak, grayish-brown to cherry red. Opaque in quantity, but occasionally subtranslucent in very thin splinters, giving cherry red transmitted light. Is soluble in nitric acid and fusible on charcoal. Occurrence; in most copper districts, but commonly is not regarded as a commercial ore, except when argentiferous, which frequently is the case.

GOLD.

Calaverite. A pale bronze yellow telluride of gold with 40% gold, 1-2% silver and balance tellurium. Breaks with uneven fracture and scratches easily. If burned in a forge gives beads of gold. Common at Cripple Creek and Kalgoorlie, Western Australia.

Native. As clean metallic gold; as rusty and mustard colored gold, and as pale colored electrum, an alloy with silver.

Petzite. Tellurides of gold and silver, a steel or iron gray metallic lustered mineral easily scratched with knife, slightly scaly, 20% to 25% gold; 18% to 25% silver.

Sylvanite. A silvery telluride of gold and silver, with brilliant metallic lustre, very soft, and carries 26% gold, 12.5% silver. Common in Cripple Creek, Colorado, ores.

IRON.

Hematite. 70% iron; black to brick red color; 5.5 to 6.5 hardness; 4.9 to 5.3 gravity. Mined in enormous quantities in Lake Superior region.

Magnetite. 72.4% iron; a black, sandy material or as coarse and fine-grained masses; is magnetic; 5.5 to 6.5 hardness; 4.9 to 5.2 gravity.

Pyrite. 46.7% iron; 53.4% sulphur; brass color; occurs frequently in crystalline masses; 6 to 6.5 hardness; 4.9 to 5.2 gravity. Rarely used as a direct source of iron.

LEAD.

Galena. The common ore of lead; lead sulphide, 8.6% lead, a steely, silvery mineral that crystallizes in cubes, occurs massive, resembling pig iron, or with sheeted structure. Breaks with perfect cleavage. Is often silver-bearing. Gravity, 7.5 to 7.7.

Cerussite. White lead ore, lead carbonate, 77.5% lead, a white or gray brittle mineral with waxy lustre. Is the most common oxidized ore of lead and effervesces with acid. Gravity, 5.5.

Anglesite. Lead sulphate, 73.6% lead; a brittle, colorless, or white mineral, often coating a kernel of galena and mixed with cerussite; very common. Gravity, 6.3.

Pyromorphite. Lead phosphate, 76.30% lead, a green, gray or brown mineral fusing easily to crystalline globules. Occurs in six-sided crystals and mossy fibres.

Jamesonite. Feather ore, lead sulpho-antimonide 50.8% lead, 29.5% antimony, 19.7% sulphur, steel gray, metallic hairs and needles, also compact.

Bournonite. Lead copper sulphide. See Copper.

Vanadinite. A lead chloro-vanadinite, containing 18.7% lead oxide,

19.4% vanadium oxide, 2.5% chlorine, a bright yellow, orange or brown mineral, occurring in small, sharp hexagonal crystals; fuses easily.

Wulfenite. See molybdenum.

MANGANESE.

Ores to be valuable must contain at least 40% of the metal. Only the oxide ores are valuable.

Braunite. 69.6% manganese. Occurs as brown and black bands in clay in Arkansas.

Franklinite. See under zinc.

Psilomelane. 77% manganese; earthy manganese.

Pyrolusite. 63.2% manganese; black manganese ore resembling limonite. Is the common form of the Virginia deposit.

Wad. A soft earthy brown or black ore of variable composition, generally 20 to 45% manganese, also 10 to 25% water, and oxides of iron and copper.

MERCURY.

Cinnabar. 86.2% mercury. Sulphide of mercury, a red mineral, which is easily decomposed by heat.

MOLYBDENUM.

Molybdenite. The sulphide carries 60% molybdenum. Is a soft, lead colored, scaly metallic mineral resembling graphite, but malleable and giving a greenish streak on unglazed porcelain. Easily scratched by finger-nail. Gives sulphurous odor when heated, thus distinguishing it from graphite.

Molybdite. Oxide with 66.7% molybdenum. Is an earthly yellow powder, formed by oxidation, but has never been found in commercial quantity.

Wulfenite. Lead molybdate, contains 39.3% molybdic oxide. It usually occurs in flat, resinous, lustered, yellow, orange or red crystals, in the oxidized parts of lead deposits. Arizona has several deposits.

Nickel-Scheelite

NICKEL.

Niccolite. Arsenical nickel, copper nickel, 43.6% nickel, 56.4% arsenic; somewhat resembles native copper. Has brownish, black scratch; metallic lustre and melts on heating.

Millerite. Sulphide of nickel, 64.4% nickel, a brass yellow, easily tarnished mineral, easily scratched by a knife.

Pyrrhotite (magnetic iron pyrite). Contains 2 to 6% nickel at Sudbury, Ont. Sulphur content is about 30%.

PLATINUM.

Metallic. In America is found in the black sand of gold placers, also at the Boss mine in Nevada, and as minute crystals of sperrylite in Sudbury, Canada, nickel ores.

RADIUM.

Carnotite. See Uranium.

Pitchblende. See Uranite (uranium).

SILVER.

Argentite. Silver glance; 85% silver; a silver sulphide of leaden-gray, metallic appearance; scratches with thumb nail.

Embolite. Silver bromide, 67% silver; resembles horn-silver.

Frieslebenite. Gray silver; 22% silver, 30% lead, 28% antimony, 18% sulphur. Resembles gray copper ore (tetrahedrite), but contains silver.

Galena. Lead sulphide. Is usually silver-bearing in our Western ore deposits.

Hornsilver. Cerargyrite; 75.3% silver, 24.7% chlorine. When pure resembles wax and cuts like it. A fragment put on zinc and wetted turns black and is reduced to silver.

Polybasite. 50.6% silver. A brittle, metallic mineral formed of silver and copper, combined with arsenic and antimony.

Proustite. Light red or ruby silver, with 65% silver; also called arsenical silver; a brilliant red or ruby colored mineral that is sub-translucent, and is bright red, when powdered.

Pyrargyrite. Dark ruby; 60% silver; antimonial silver; a dark red to black metallic lustered mineral with brilliant red streak, or purplish powder.

Stephanite. Brittle silver, 68.5% silver; an antimonial sulphide of silver with iron black color and streak.

Tetrahedrite. Gray copper ore, often rich in silver, with up to 17% silver. Usual composition, copper., 30-40%; antimony,. 15-25%; sulphur, 20-25%. Brittle iron gray to black metallic mineral; an important silver ore. See under Copper.

TIN.

Cassiterite. Oxide of tin, 78.67% tin. Is the common ore of tin; when weathered, looks like wood, but is very heavy.

Stannite. Tin sulphide, rare.

TUNGSTEN.

Wolframite. Iron manganese tungstate, 76.4% tungstic acid (WO_3). Has a hardness of 5; gravity 5, and a dark brown streak. The name covers all transitions and variations of iron-manganese tungstate from iron tungstate ferberite to manganese tungstate hübnerite.

Occurs in long, dark brown crystals, or short, stoutish columnar masses, varying to black, brilliant, lamellar masses in quartz and pegmatite. The brown varieties are softer and more brittle than the blacker form, whose thin flakes are deep red in transmitted light. Is the most common ore of tungsten.

Ferberite. Iron tungstate, 76.3% tungstic acid. A dull, coal black mineral, sometimes in an aggregate of cubic crystals, more often massive in black, sooty looking material in veins in pegmatite. Is thus far only found commercially in Nederland district, Boulder Co., Colo., and is a desirable ore.

Hübnerite. Manganese tungstate, 76.6% tungstic acid. A light brown mineral often in needle-like crystals of hair brown color, in quartz.

Scheelite. Tungstate of lime, 80. 6% tungstic acid. Hardness 4.5, gravity 6. Streak white, gray or pale brown, very heavy mineral with peculiar glitter to fractured surfaces. Occurs massive, and as crystals imbedded in quartz, and also in garnet (Hawthorne, Nev., and Bishop, Calif.). Also in gold ores, as at Grass Valley, Calif.; Seoul, Korea; Murray, Idaho; and in New Zealand.

The field test for tungsten is to crush the specimen and "pan" it, to get the heavy residue; powder a part of the residue and put it in a glass or porcelain dish; add a half ounce (tablespoonful) of muriatic acid and heat to near boiling for fifteen minutes. Then add a few drops of nitric acid and boil one minute. Set aside a moment to settle and pour off liquid into a large tumbler of cold water. Also add cold water to residue and stir. Set aside both dishes a few minutes to settle, then pour off liquid. Canary yellow sediment in dish shows tungstic acid.

The more common test is to wrap tin foil about the specimen and boil hard in hydrochloric (muriatic) acid for 15 minutes, remove foil; a blue color indicates tungsten, but the test does not always show the color.

URANIUM.

Carnotite. 52 to 57% oxide of uranium. A vanadate of uranium and potassium; a canary yellow powdery mineral occurring in large bedded deposits of impregnated sandstone in southern Utah and southwestern Colorado.. Is the chief ore of uranium.

Uraninite. Pitchblende. 65%-80% uranium. A black to dark brown, olive green, very heavy mineral, found in Connecticut, Texas, Colorado, South Dakota, and in Austria. (See Bull. 70, U. S. Bureau of Mines, for description of mines.)

VANADIUM.

Carnotite. (See above.) 18% vanadium.

Roscoelite. 21%-29% vanadium; a scaly green to brown micaceous mineral mined at Vanadium, Colo., by the Primos Co., and also found in California quartz mines.

Vanadinite. 19.4% vanadium oxide. See under lead minerals.

ZINC.

Calamine. Hydrated zinc silicate, 67.5% zinc oxide, balance water and silicon; gravity, 3.9.

Is also the trade name for oxidized zinc ores. Often occurs in clay. Is yellow to brown, rarely pale blue or green.

Franklinite. An iron manganese zinc mineral with 5.54% zinc, 51.8% iron and 7.5% manganese; found at Franklin, N. J.

Smithsonite. Zinc carbonate, 64.8% zinc oxide. Dry bone, the white carbonate of zinc, differs from calamine by effervescing in acid; hardness, 5.

Sphalerite. Blende, black jack, zinc blende, 67% zinc. Is the chief source of the metal; varies from brown to black, rarely clear resinous. Gravity, 4. Hardness, 3.5-4. Knife scratch, brown to yellow.

Willemite. Zinc silicate, with 72.9% zinc oxide. Is a greenish yellow to applegreen mineral with resinous lustre. Is only important as an ore mineral at Franklin, N. J.

Zincite. Red zinc ores, 80.3% zinc. Occurs at Franklin, N. J.

CHAPTER III

RESUME AND STATISTIC OF THE MINING INDUSTRY

The essential, vital facts concerning the mining industry, both of the United States and of all other countries are presented in this chapter in a series of tables, giving price and production of the various metals. A list of all the metal smelting plants and refineries with their capacities and outputs is also given.

From 1900 to 1914 the total value of the metal production of the United States varied between $513,700,000 and $904,000,000 per annum. The total value of the metals produced for each of the past seven years is: $691,000,000 in 1914; $991,730,000 in 1915; $1,620,500,000 in 1916; $2,086,200,000 in 1917; $2,153,100,000 in 1918; $1,351,600,000 in 1919; $1,724,300,000 (approx.) in 1920.

Early reports indicate that the production for 1921 was about $51,186,000 of gold; 45,051,000 oz. silver, 515,546,000 lb. copper, 196,500 tons of zinc, 390,000 tons of lead and 16,650,000 tons of iron.

PRODUCTION OF METALS IN THE UNITED STATES*

Metal	1917	1918	1919	1920
Aluminum, pounds	(e)200,000,000	(e)225,000,000	(e)119,000,000	(e)124,000,000
Copper, pounds	1,886,120,721	1,908,533,595	1,286,419,329	(f)1,209,061,040
Ferro manganese, tons	260,225	306,076	198,255	276,594
Gold, dollars	83,750,700	68,493,500	60,333,400	51,186,900
Iron, long tons	38,612,546	38,230,440	30,130,231	35,710,277
Lead, short tons	548,450	539,686	424,433	476,849
Quicksilver, flasks	36,159	32,883	21,415	13,392
Silver, Troy oz.	71,740,362	67,879,206	56,682,445	55,361,573
Zinc, short tons	584,597	492,405	452,272	450,045

*U. S. Geol. Survey figures. (e) estimated, Mineral Industry figures. (f) approximate.

METAL PRICES

The price of each metal (gold excepted, which is fixed by law at $20.67+ per fine ounce) is based upon averages of daily market prices current at New York for silver, copper and lead, and at St. Louis for metallic zinc or spelter. The prices used by the U. S. Geological Survey for calculation of values for years 1850-1920, inclusive, are as follows:

YEARLY AVERAGE

PRICES OF SILVER, COPPER, LEAD, AND ZINC

Year	Silver Fine oz.	Copper Pound	Lead Pound	Zinc Pound	Year	Silver Fine oz.	Copper Pound	Lead Pound	Zinc Pound
1850..	$1.32	$0.22	$0.05	$....	1886..	$ .99	$.111	$.046	$.044
1851..	1.34	.166	.05	....	1887..	.98	.138	.045	.046
1852..	1.33	.22	.05	....	1888..	.94	.168	.044	.049
1853..	1.35	.22	.06	0.055	1889..	.94	.135	.039	.05
1854..	1.35	.22	.06	....	1890..	.05	.156	.045	.055
1855..	1.34	.27	.07	....	1891..	.99	.128	.043	.05
1856..	1.34	.27	.066	....	1892..	.87	.116	.04	046
1857..	1.35	.25	.06	....	1893..	.78	.108	.037	.04

PRICES OF SILVER, COPPER, LEAD, AND ZINC—Continued

1858..	1.34	.23	.06	....	1894..	.63	.095	.033	.035
1859..	1.36	.22	.055	....	1895..	.65	.107	.032	.036
1860..	1.35	.23	.056	....	1896..	.68	.108	.03	.039
1861..	1.33	.22	.05	....	1897..	.60	.12	.036	.041
1862..	1.35	.22	.06	....	1898..	.59	.124	.038	.046
1863..	1.345	.34	.06	....	1899..	.60	.171	.045	.058
1864..	1.345	.47	.07	.139	1900..	.62	.166	.044	.044
1865..	1.337	.3925	.066	....	1901..	.60	.167	.043	.041
1866..	1.339	.3425	.07	....	1902..	.53	.122	.041	.048
1867..	1.33	.2537	.065	....	1903..	.54	.137	.042	.054
1868..	1.326	.23	.065	....	1904..	.58	.128	.043	.051
1869..	1.325	.2425	.06	....	1905..	.61	.156	.047	.059
1870..	1.328	.2118	.06	....	1906..	.68	.193	.057	.061
1871..	1.325	.2412	.06	....	1907..	.66	.20	.053	.059
1872..	1.322	.3556	.064	....	1908..	.53	.132	.042	.047
1873..	1.297	.2800	.06	....	1909..	.52	.13	.043	.054
1874..	1.278	.2200	.06	....	1910..	.54	.127	.044	.054
1875..	1.24	.227	.058	.07	1911..	.53	.125	.045	.057
1876..	1.16	.21	.061	.072	1912..	.615	.165	.045	.069
1877..	1.20	.19	.055	.06	1913..	.604	.155	.044	.056
1878..	1.15	.166	.036	.049	1914..	.553	.133	.039	.051
1879..	1.12	.186	.041	.052	1915..	.507	.175	.047	.124
1880..	1.15	.214	.05	.055	1916..	.658	.272	.068	.134
1881..	1.13	.182	.048	.052	1917..	.824	.273	.087	.102
1882..	1.14	.191	.049	.053	1918..	1.00	.247	.071	.091
1883..	1.11	.165	.043	.045	1919..	1.12	.186	.053	.073
1884..	1.11	.13	.037	.044	1920..	1.09	.184	.08	.081
1885..	1.07	.108	.039	.043					

ALUMINUM

Aluminum Production (in pounds) and Prices in the United States.

1883.....	83	1896.....	1,300,000
1884.....	150	1897.....	4,000,000
1885.....	283	1898.....	5,200,000
1886.....	3,000	1899.....	6,500,000
1887.....	18,000	1900.....	7,150,000
1888.....	19,000	1901.....	7,150,000
1889.....	47,468	1902.....	7,300,000
1890.....	61,281	1903.....	7,500,000
1891.....	150,000	1904.....	(a) 8,600,000
1892.....	259,885	1905.....	(a)11,347,000
1893.....	333,629	1906.....	(a)14,910,000
1894.....	550,000	1907.....	(a)17,211,000
1895.....	920,000	1908.....	(a)11,152,000

		Per lb.			Per lb.
1909.....	(a)34,210,000	23.18c	1916.....	139,000,000	34.00
1910.....	(a)47,734,000	22.97	1917.....	124,000,000	37.00
1911.....	(a)46,125,000	20.34	1918.....	122,500,000	33.60
1912.....	(a)65,607,000	22.52	1919.....	119,000,000	32.38
1913.....	(b)72,379,000	23.63	1920.....	124,000,000	33.22
1914.....	(b)79,129,000	18.595			
1915.....	99,000,000	31.90	Total.....	1,184,366,779	

(a) Consumption. (b) American Metal Market figures. During 1921, the demand for this metal slackened considerably and prices for domestic 99% grade were correspondingly lower, with a high in January of 28.5c. and a low in December of 20c. Imported aluminum sold for even less.

EXPORTS OF ALUMINUM OF UNITED STATES PRODUCTION

(Includes manufactured articles)

1908	$330,092	1915	$3,682,117
1909	567,375	1916	15,419,134
1910	949,215	1917	14,586,467
1911	1,158,603	1918	10,869,388
1912	1,347,621	1919	3,890,326
1913	966,094	1920	5,630,781
1914	1,546,510	1921	3,108,857

Imports in 1920 were valued at $13,077,022 and in 1921, $8,769,469.

ANTIMONY

ANTIMONY PRODUCTION OF THE UNITED STATES, IN SHORT TONS,

	Contained in Antimonial lead of domestic origin		Antimony produced from domestic ore		Recovery from old alloys, scrap, dross, etc		Average price per
Year	Quantity	Value	Quantity	Value	Quantity	Value	Pound
1903..	2,558	$ 445,092	570	$ 103,341	....	$	....
1904..	2,571	443,598	(a)486	61,926	....	.....	.....
1905..	2,747	588,354	493	117,433	....	.....	....
1906..	1,362	544,800	(b)404	58,149	....	.....	20.00c
1907..	1,561	508,886	(b)351	77,300	....	.....	6.30
1908..	2,246	359,360	(c)	(c)	....	.....	8.00
1909..	1,617	252,252	....	.....	1,556	242,736	7.80
1910..	1,598	263,431	....	.....	2,779	457,979	8.24
1911..	1,543	264,780	....	.....	2,369	406,520	8.58
1912..	1,224	209,059	....	.....	2,506	428,025	8.54
1913..	2,204	375,562	....	.....	2,705	460,932	8.52
1914..	2,530	(d)529,740	....	.....	2,645	(d)555,450	10.50
1915..	3,425	1,735,105	2,100	1,063,860	3,100	1,811,568	25.33
1916..	3,496	1,775,968	1,770	.....	4,480	2,270,016	25.37
1917..	2,759	1,142,226	390	.....	4,961	2,061,700	20.69
1918..	2,566	646,632	50	.....	5,226	1,317,000	12.58
1919..	1,943	318,652	....	.....	4,399	717,900	8.19
1920..	2,033	345,203	....	.....	5,600	938,560	8.49

The price was but 5.5cts in Dec. 1920., and the average New York price in 1921 was 4.96c.

(a) Estimated from the average content of the ore. (b) Figured as 60% of domestic ores only. (c) None produced from domestic ore. (d) Includes actual marketed value of a few tons eof antimony made as a by-product in the electrolytic refining of copper.

The average price for 30 years preceding 1914 was 7.5 cts. per pound.

The antimony deposits of the U. S. may be classed as those containing antimony only, and those whose antimonial content is a valuable by-product. Though many deposits of stibnite are known, they cannot be worked with normal prices, because in ordinary years the Chinese and Japanese smelters can supply it cheaper than we can produce it, and because the market for the metal is limited and easily glutted, resulting in still lower prices. In recent years, 60% of the world's production has come from China, the Wah Chang Mng. & Sm. Co., being perhaps the most important individual producer. The domestic production has therefore come almost entirely from the electrolytic refining of antimonial lead and copper metal. Antimonial ores to be valuable must be free from arsenic, zinc and lead.

Uses of Antimony. The principal uses of antimony are in making type metal, babbit and other anti-friction bearing metals, battery plates, siphon

tops, cable sheathing, white metals for the foundation of silver-plated ware, and other plated ware, such as clock-cases, table-ware, coffin trimmings, and toys.

Its compounds are used in enamels, rubber vulcanizing, pigments, glass making, and safety matches.

ARSENIC

U. S. PRODUCTION OF WHITE ARSENIC, As_2O_3, IN SHORT TONS

Year	Quantity	Value	Price per lb.,c.	Year	Quantity	Value	Price per lb.,c.
1901....	300	$18,000	.....	1911....	3,132	$73,408	3.01
1902....	1,353	81,180	.....	1912....	3,142	190,757	3.48
1903....	611	36,691	.....	1913....	2,513	159,236	4.37
1904....	36	2,185	.....	1914....	4,670	313,147	3.77
1905....	754	35,210	.....	1915....	5,498	302,116	4.30
1906....	737	63,460	.....	1916....	5,986	555,186	5.70
1907....	1,751	163,000	.....	1917....	6,151	1,118,313	9.05
1908....	.....	.....	.....	1918....	6,323	1,213,000	9.40
1909....	1,214	52,946	.....	1919....	6,029	1,181,684	9.80
1910....	1,497	52,305	3.06	1920....	11,502	2,021,356	8.78
				1921....	5,732	.....	....

WORLD'S PRODUCTION OF ARSENIC, BY COUNTRIES, IN METRIC TONS

	1915	1916	1917	1918	1919	1920
Great Britain, white arsenic ..	2,536	2,575	2,669	2,387	2,568	.....
Canada, white arsenic	2,174	1,983	2,936	3,560	3,389	2,408
France, (arsenopyrite).....	.....	1,800	344	728	226	523
Germany, oxide and sulphide.	....	.....	.....	398	1,299	.....
Japan, white arsenic.....	15	....	....	560	1,803	.....
United States white arsenic..	4,990	5,430	5,579	5,735	5,468	10,432

The occurrence of arsenic in metal-bearing ores is so common as to be practically universal. This is shown at the smelters treating lead, copper, and zinc ores, which send over 20,000 tons of arsenious trioxide yearly into the atmosphere in the form of smelter smoke or fume. A small amount is saved at the Anaconda, Mont., smelter, and at the Ontario smelters treating Cobalt ores, and also in Mexico by the Mapimi smelter of the American Metal Co. The amount lost yearly from the Anaconda smelter is greater than the American production.

With such an enormous wastage, it is, only in exceptional cases, that it is profitable to work arsenical ores for the arsenic alone. The chief use of the metal is in glass-making and for insecticides in agriculture; the glass industry uses about half of the amount produced in this country.

BISMUTH

Occurrence. Bismuth ores are comparatively rare, though the metal occurs in many of the lead ores of the Rocky Mountain regions. The U. S. production comes entirely from electrolytic lead refineries at Grasseli, Ind., Omaha, Neb., and a few other plants. The world's supply comes mainly from Bolivian mines owned by Aramayo Francke Mines Ltd., at Chorolque and Tasna. Another producer is the Seoul Mining Co, Korea. New South Wales and Tasmania produce a moderate amount. Occasionally lots of gold-silver or lead ore containing from 10 to 20% bismuth have been marketed in the West, but buyers gave nothing for the bismuth contained.

Prices. The price for bismuth in America, formerly about 65 cents a

pound, was $2.75 per lb. at the beginning of 1915. In 1920, price ranged from $2.85 early in year to $2.40 per lb.

The price and market for bismuth ores and metal is artificial, being fixed by Johnson Matthey & Co., of London, who absolutely control the market. Were American production constant, domestic producers could have secured the American market. At present the A. S. & R. Co., and U. S. Smelting Lead Refinery, Inc., East Chicago, Ind., are the main producers and dealers.

The Anaconda smelter dust carries over 1% bismuth, equal to a daily production of 1,580lbs., and this plant will probably be a factor in the market.

Uses. Metallic bismuth is employed in making low-fusing alloys or cliché metals which are used in automatic fire sprinklers, fuses for electric wiring, and solders. Some of the salts have a smooth, unctuous feel, and are used in toilet powders, and in medicinal preparations. It is also employed to a small extent in making optical glasses.

*U. S. IMPORTS OF METALLIC BISMUTH IN POUNDS

Year	Quantity	Value	Year	Quantity	Value
1904.....	185,905	$339,058	1913.....	151,030	$257,176
1905.....	148,589	318,007	1914.....	133,190	241,448
1906.....	254,733	318,452	1915.....	34,237	72,587
1907.....	259,881	325,015	1916.....	64,821	155,925
1908.....	164,793	257,397	1917.....	88,465	196,113
1909.....	183,413	286,516	1918.....	85,611	208,098
1910.....	198,174	332,668	1919.....	76,539	228,376
1911.....	172,093	311,771	1920.....	75,781	97,489
1912.....	166,980	305,282			

*From Mineral Industry 1920.

CADMIUM

The bulk of the world's supply of cadmium used to come from the zinc smelters of Upper Silesia, Germany, but over half the supply now comes from American smelters. The U. S. production is as follows:

UNITED STATES PRODUCTION OF CADMIUM

1913...	54,198	lb....	$0.77 Av. price	1917...	207,408	lb....	$1.47 Av. price
1914...	91,409	"	0.89 "	1918...	127,164	"	1.48 "
1915...	91,415	"	1.19 "	1919...	99,939	"	1.22 "
1916...	135,212	"	1.56 "	1920...	129,283	"	1.17 "

In 1921, the domestic production fell to 65,101 lb. and the price to 98c.

In addition to the above metallic output, the United States produces 30,000 to 50,000 lb. of cadmium sulphide per annum, selling for a few cents per pound less than the metal.

A recent use for cadmium is for electroplating with after heating, by the udylite process to make rustless cutlery, locks and hardware.

CHROMIUM

The chromium produced in the U. S. all comes from chromite or chrome ore.

U. S. CHROMITE PRODUCTION* (Long Tons)

Year	Quantity	Value	Price **	Year	Quantity	Value	Price **
1880.....	2,288	$27,808	$12.15	1902.....	315	$4,567	$14.50
1881.....	2,000	30,000	15.00	1903.....	150	2,250	15.00
1882.....	2,500	50,000	20.00	1904.....	123	1,845	15.00
1883.....	3,000	60,000	20.00	1905.....	22	375	17.05
1884.....	2,000	35,000	17.50	1906.....	107	1,800	16.82

U. S. CHROMITE PRODUCTION—Continued

1885.....	2,700	40,000	14.81	1907.....	290	5,640	19.45
1886.....	2,000	30,000	15.00	1908.....	359	7,230	20.14
1887.....	3,000	40,000	13.33	1909.....	598	8,300	13.88
1888.....	1,500	20,000	13.33	1910.....	205	2,729	13.31
1889.....	2,000	30,000	15.00	1911.....	120	1,629	13.58
1890.....	3,599	53,985	15.00	1912.....	201	2,753	13.70
1891.....	1,372	20,580	15.00	1913.....	255	2,854	11.19
1892.....	1,500	25,000	16.67	1914.....	591	8,715	14.75
1893.....	1,450	21,750	15.00	1915.....	3,281	36,744	11.20
1894.....	3,680	53,231	14.46	1916.....	47,035	726,243	15.44
1895.....	1,740	16,795	9.65	1917.....	43,725	1,049,400	24.00
1896.....	786	6,667	8.48	1918.....	82,430	3,955,567	47.99
1897.....	.....	.....	.....	1919.....	5.079	129,302	25.46
1898.....	.....	.....	.....	1920.....	2,502	44,857	17,93
1899.....	.....	.....	.....				
1900.....	140	1,400	10.00				
1901.....	368	5,790	15.73				

* U. S. Geol. Survey.
** price per ton.

Chromic-iron ore is sold on the basis of 40% chromic oxide and 80% silica. Production in 1920 was mainly from Oregon.

Occurrence. The chief producing areas are the belts of serpentine in the Sierra Nevada and Coast ranges, the foothill regions being the important producers. Most of the orebodies are small and lenticular in shape, containing only from 1 to 200 tons ore. An interesting occcurrence of disseminated ore is found near Red Bluff, Calif.

Use. Chromic iron ore is used in the manufacture of ferrochrome and steel for high-speed tools, armor plate and projectiles, bichromates of soda and potash, chromic acid, chrome alum and chrome tannage, and in steel industry as refractory brick. A recent use is for stainless steel cutlery.

COBALT

The Haynes Stellite Co. and Missouri Cobalt Co. are the only U. S. producers. The material used in making high-priced steels and stellite is generally reduced from the imported oxide. (Stellite is an alloy, 75% cobalt and 25% chromium, valuable for making high-speed steels and non-tarnishable cutlery.) Experimental work has shown that cobalt may be substituted for nickle in plating. Canadian production, mainly from Cobalt, Ont., is as follows:

Year	Metallic Cobalt (a)	Cobalt Oxide	Total Metal (b)
1915	211,610	379,219	477,063
1916	215,215	670,760	841,859
1914, pounds.....	242,572	899,027	871,891
1917	393,773	802,448	1,079,572
1918	294,476	476,053	737,157
1919	113,943	429,359	530,371
1920	166,375	536,457	546,023

(a) as shipped (b) metallic content of all salts, etc.

Prices varied from $3 to $6 per lb. for metal and $2 to $4.10 for oxide, in 1920.

COPPER

The Copper industry shared the very great War prosperity of the country early in 1917, but the fixation of the price by the government, September 21, 1917, at 23½ cts., did not give the industry the same ratio of profit granted other industries, and the raise to 26 cts. on July 2, 1918, was so tardy a recognition of this condition that the entire advance was taken up in advanced freight, smelter and labor costs.

A report by the Federal Trade Commission on the cost of producing copper shows that the average cost of producing a pound of copper, in 1918 was 16.167 cents per pound. This figure is based on the returns from the 85 largest producers, whose costs varied from below 12 cents, for two companies that turned out over 122,000,000 pounds jointly, to over 34 cents above which level five small concerns produced approximately 7,000,000 pounds.

Several small Michigan companies which came into being during the regime of high prices were the highest cost properties, as five of them, contributing in all 6,975,960 pounds, had an average cost of 34.614 cents a pound, thereby showing a big loss from the fixed prices of 23½ and 26 cents.

The items making up the average cost are as follows:

	Cents per Pound	% of Total Cost
Mining	6.94	42.97
Depletion of ore	.72	4.45
Purchases of ore	.51	3.19
Transportation of ore	.83	5.18
Reduction of ore	5.89	36.44
Trans. to refinery	.85	5.28
Refining	1.02	6.36
Administrative	.89	5.56
Selling Expense	.18	1.16
Credits for precious metals	1.71	10.59
Total	16.17	.....

The above averages are reckoned against an output of 2,258,234,125 lbs. of copper by 85 producers. The costs for each state or country are as follows:

Arizona & New Mexico	15.175c
Utah, Nevada and California	16.801
Montana, Idaho & Washington	17.245
Michigan	17.622
Other United States	19.910
Mexico, Cuba & South America	15.648
Canada and Alaska	16.263

Another highly interesting analysis is that showing amount expended directly for labor, materials, etc. In this table we have:

	Cents per Pound	% of Total
Materials and supplies	3.76	23.28
Labor	5.30	32.83
Overhead	2.14	13.27
Depreciation	.94	5.85
Depletion	.72	4.45
Tolls	4.99	30.91
Credits	1.71	10.59

The largest companies as a rule were the cheapest producers. The average of the porphyry group was 14.886 cents.

The allocation of production of copper in 1918 according to cost per pound as figured in the Federal Trade Commission report is:

Range of Cost	Companies	Production	% of Total
Cost less than 12 cents	2	122,245,051	5.41
Cost between 12 and 13 cents	4	208,571,191	9.24
" " 13 " 14 "	4	314,553,177	13.93
" " 14 " 15 "	4	359,617,743	15.92
" " 15 " 16 "	2	98,307,293	4.35
" " 16 " 17 "	8	460,528,645	20.39
" " 17 " 18 "	9	255,399,696	11.32

"	"	18	"	19	"	3	72,373,388	3.20
"	"	19	"	20	"	5	28,491,436	1.26
"	"	20	"	21	"	5	36,871,193	1.63
"	"	21	"	22	"	9	135,538,602	6.00
"	"	22	"	23	"	3	60,861,465	2.70
"	"	23	"	24	"	5	44,919,772	1.99
"	"	24	"	25	"	1	6,230,694	.28
"	"	25	"	26	"	3	7,605,224	.34
Cost over		26 cents				18	46,119,555	2.04
Total all companies.....						85	2,258,234,125	100.00

The above figures include several companies that buy and sell ores so that a duplication approximating 63,700,000 pounds is involved. Of the 85 companies used in the tabulation 75 are in the United States, one in Alaska and the remaining nine in Canada, Cuba, Mexico and South America.

Up to the year 1917, few companies reported depletion as a cost; whereas practically all companies now include such a charge based on the re-valuation of their mineral land. This is one of the largest single factors accounting for the large increase in the cost of producing copper in the last year or two.

Depreciation appeared on the books of mining companies at about the same time as depletion and for the same reason. Unfortunately the rates are not based on the life and residual value of particular assets, but are more often arbitrary amounts based sometimes on what will be allowed as deductions on tax reports and sometimes on the best judgment and opinion of officers or directors.

The commission did not equalize depreciation for the various companies, accepting the depreciation charges made by the company, save where the cost of shafts, tunnels, openings, and underground equipment charged to cost in prior years was called depreciation and again charged into cost.

SMELTERS' PRODUCTION OF COPPER IN THE UNITED STATES[1]

(In Pounds)

State.	1915.	1916.	1917.	1918.	1919.	1920.(2
Alaska.....	72,621,844	115,933,315	92,094,023	64,326,616	53,560,128	66.093,924
Arizona.....	444,089,147	692,630,286	704.156,391	787,338,533	531,777,990	552,988,731
California.....	37,935,893	51,358,334	46,824,320	43,623,933	21,691,192	11.822,928
Colorado.....	8,126,000	9,802,183	11.894,900	5.930,200	13,334,000	4,282,616
Idaho.....	5,602,000	6,741,001	6,401,988	5,051,531	2,737,800	1.922,116
Michigan.....	241,123,404	270.058,601	274.936,224	236.243,679	613,003,513	153,483,952
Montana.....	268,027,557	351,995,058	277,362,886	323,377.564	153,903,261	177,743,747
Nevada.....	66,394,906	100,143,431	115,436,671	115,842.177	63,179,794	55,580,322
New Mexico....	75,515,138	83,013,805	110,020,997	92,813.482	54,827,501	52,159,751
Utah.....	180,951,174	225,396,808	244.443.071	235,978.152	123,124,850	110,357,748
Washington.....	(a)	(a)	2,152,560	2,290,600	2,667,038	2,125.586
Wyoming.....	1,020,926	(a)	(a)	(a)	(a)	24,256
East and South.	18,858.677	20.018,261	18.704,304	17,292,875	20,072,119	17,349,827
Other States....	3.431.494	15.685.226	18.127,568	7.791.545	5,736.027	3,126.436
Total.....	1.423.698,160	1,942,776,309	1,922,555,903	1,937,900,887	1,209,614,818	1,209,061,040

(a) Included in "Other States." [1] Eng. Min. Jour. (2) U. S. Geol. Surv.

In considering the copper production of America it is noteworthy that a very large part of the silver production of the United States and a respectable part of the gold output come from our copper mines. Moreover, several copper companies have also become zinc producers. Thus the copper mines around Kennett, Calif., yielded 315,549 tons copper ore in 1915 with a value of $17.97 per ton, made up as follows: gold, $1.51 per ton; silver, $1.26 per ton; copper, $11.96 per ton; zinc, $3.24 per ton. The descriptions of several companies at Butte, Montana, in another part of this volume will show the advance made along this line.

HIGH, LOW AND AVERAGE PRICES OF COPPER

Year	Highest Price	Lowest Price	Average
1860 Prices cts. per lb.	24,000 January	19.750 December	22.875
1861	27.000 December	17.500 July	22.250
1862	32.875 November	20.750 May	21.875
1863	38.750 December	29.000 July	33.875
1864 Highest	55.000 July	39.000 January	47.000
1865	50.500 January	28.000 July	39.250
1866	42.000 January	26.500 November	34.250
1867	29.250 January	21.500 December	25.375
1868	24.500 December	21.500 January	23.000
1869	27.000 February	21.500 December	24.250
1870	23.375 November	19.000 March	21.188
1871	27.000 December	21.250 April	24.125
1972	44.000 April	27.125 January	35.563
1873	35.000 January	21.000 November	28.000
1874	25.000 January	19.000 August	22.000
1875	23.875 September	21.500 January	22.688
1876	23.250 January	18.750 August	21.000
1877	20.500 February	17.500 December	19.000
1878	17.625 January	15.500 October	16.563
1879	21.750 November	15.500 January	18.625
1880	25.000 January	17.875 June	21.438
1881	20.375 December	16.000 July	18.188
1882	20.375 January	17.875 April	19.125
1883	18.125 January	14.875 November	16.500
1884	15.000 December	11.000 December	13.000
1885	11.875 February	9.800 May	10.838
1886	12.125 December	10.000 May	11.063
1887	17.750 December	9.950 May	13.850
1888	17.600 November	15.850 January	16.775
1889	17.500 January	11.000 September	13.490
1890	17.250 July	14.000 March	15.600
1891	15.000 January	10.250 December	12.760
1892	12.375 December	10.500 February	11.560
1893	12.500 January	9.600 August	10.750
1894 Lowest	10.250 January	9.000 June	9.250
1895	12.250 August	9.375 April	10.730
1896	12.000 June	9.750 January	10.980
1897	12.000 January	10.750 November	11.360
1898	13.250 December	11.000 January	12.050
1899	19.375 April	13.250 January	17.760
1900	17.250 April	16.000 February	16.650
1901	17.000 January	13.000 December	16.720
1902	13.500 February	11.000 January	12.160
1903	15.375 March	12.000 December	13.720
1904	15.375 November	12.250 February	13.010
1905	18.875 December	15.000 May	15.890
1906	24.000 December	17.875 February	19.616
1907	26.250 March	12.500 October	20.004
1908	14.750 December	12.500 February	13.500
1909	14.750 January	12.500 March	13.480
1910	14.125 January	12.500 July	13.125
1911	14.250 December	12.250 June	12.779
1912	18.000 October	14.250 January	16.695
1913	17.250 October	14.500 July	16.695
1914	14.491 February	11.739 Nov.	13.602*
1915	20.133 December	13.641 January	17.275
1916	33.075 December	24.100 January	28.170
1917	31.750 February	23.500 November	29.180

HIGH, LOW AND AVERAGE PRICES OF COPPER—Continued

1918	26.000	August	23.500	January	24.628
1919	23.500	August	14.370	February	18.691
1920	18.918	January	13.188	December	17.456
1921	13.555	December	11.634	August	12.502

No quotations in Aug., Sept., Oct., 1914.

The following table* gives the essential figures of the Copper Industry for the past twelve years. The column headed "Pounds reported" represents the sales of the eight largest producers, aggregating 40% of the United States production so that the prices given may be considered as representative of the entire industry.

*From the Eng. & Mng. Journal.

Production, Sale and Price of Copper for 12 Years:

Year	Total Production	Pounds Reported	Average Realized, Cents	Quotational Average, Cents
1905	219,000,000	82,372,955	15.597	15.699
1906	224,071,000	113,411,645	19.146	19.616
1907	220,317,041	66,316,025	18.043	20.661
1908	222,267,444	125,949,248	13.348	13.424
1909	226,602,134	136,005,773	13.211	13.335
1910	221,400,864	126,710,763	12.960	13.039
1911	216,412,867	135,329,098	12.657	12.634
1912	1,228,333,298	552,155,308	15.841	16.341
1913	1,406,448,665	658,533,402	15.222	15.269
1914	1,342,634,206	566,687,750	13.458	13.602
1915	1,411,652,418	619,832,987	17.299	17.275
1916	2,300,000,000	1,217,014,743*	25.710	27.202

*15 producers.

COPPER REDUCTION WORKS.

Company	Situation of Works	Blast Furnaces	Ann'l Capacity	Reverb. Furnaces	Annual Capacity	Converters	Annual Capacity in Ore[1]
nerican Sm. & Ref. Co.	Aguascalientes, Mex.	10	800,000	..	.....	4	†
" " "	Perth Amboy, N. J.	1	90,000	..	.....	3	†
" " "	Omaha, Neb.	..	.....	..	.....	2	†
" " "	Matehuala, S. L. P., Mex.	3	325,000	..	.....	.	.....
" " "	El Paso, Tex.	3	300,000	3	435,000	3	†
" " "	Hayden, Ariz.	..	.....	2	290,000	3	†
" " "	Garfield, Utah	4	800,000	6	875,000	6	†
" " "	Tacoma, Wash.	2	375,000	1	.....	7	†
" " "	Velardena, Dgo., Mex.	3	250,000	..	.....	.	.....
aconda C. Mg. Co.	Anaconda, Mont.	3	1,750,000	9	1,750,000	7	105,000
aconda C. Mg. Co.	Great Falls, Mont.	2	280,000	2	330,000	2	49,000
rizona Cop. Co.	Clifton, Ariz.	..	.....	3	360,000	3	.....
laklala Cons. Cop. Co. ††	Coram, Calif	3	630,000	1	52,500	2	.....
lbach Sm & Ref'g. C.	Newark N. J.	.	.....	.	.....	.	.....
mpagnie du Boleo	Santa Rosalia, Mex.	8	650,000	..	.....	.	.....
nada Copper Corp'n	Greenwood, B. C.	3	912,500	..	.....	2	.....
lumet & Ariz. Mining Co.	Douglas, Ariz.	2	649,500	4	486,500	6	33,500
lumet & Hecla Mng. Co.	Hubbell, Mich.	1	75,000	21	150,000	.	.....
ternational Nickel Co.	Coppercliff, Ont.	7	1,020,000	2	300 000	5	43,200
nanea Cons. Cop. Co.	Cananea, Son	8	868,000	2	153,000	6	35,000
rro de Pasco Copper Co.	La Fundicion, Peru	4	438,000	6	.....	.	.....
ms. Ariz. Sm. Co.	Humboldt, Ariz.	..	.....	2	150,000	2	10,000
ns. Mg. & Smg. Co.	Trail, B. C.	5	450,000	..	.....	2‡	.....
lps Dodge Corporation	Douglas, Ariz.	10	1,225 000	3	275.000	7	34,160
lps Dodge Corporation	Morenci, Ariz.	1	132.657	..	.....	3	7,578
cktown Sulph., C. & I. Co.	Isabella, Tenn.	2	171.500	..	.....	.	.....
st Butte Cop. Mng. Co.	Butte, Mont.	2	350.000	..	.....	3	5.000
anby Con. M., S. & P. Co.	Grand Forks, B. C.	8	1.440.000	..	.....	4	7.000
anby Con. M., S. & P. Co.	Anyox, B. C.	4	1.080,000	..	.....	3	28,000

COPPER REDUCTION WORKS—Continued

Company	Situation of Works	Blast Furnaces	Ann'l Capacity	Reverb. Furnaces	Annual Capacity	Con-v't'rs	Annual Capacity in Ore
International Smg. Co.	International, Utah	..	.....	5	525,000	5	14,000
International Smg. Co.	Miami, Ariz.	..	.....	3	420,000	5	7,000
Mt. Lyell M. & R. Co.	Queenstown, Tasmania	3	.....	..	.....	3	.....
Lake Superior Sm. Co.	Hancock, Mich.	..	.....	..	.....	.	.....
Mt. Morgan G. M. Co.	Mt. Morgan, Queensland	2	.....	..	.....	3	.....
Mason Valley Mines Co. ††	Thompson, Nev.	2	800,000	..	.....	2	22,000
Mazapil Copper Co. ††	Concepcion del Oro, Zac., Mex.	4	250,000	..	.....	.	.....
Michigan Smelting Co.	Houghton, Mich.	1	4,500	5	85,000	.	.....
Mond Nickel Co.	Coniston, Ont.	3	630,000	..	.....	3	70,000
Mountain Cop. Co.	Martinez, Calif.	..	.....	3	125,000	2	**
New Cornelia Copper Co.	Ajo Ariz. Leaching & Electrolytic.						
Nevada Cons. Cop. Co.	McGill, Nev.	1	175,000	5	900,000	4	40,000
Nichols Copper Co.	Laurel Hill, N. Y.	2	94,500	..	.....	2	.....
Norfolk Smelting Co.	West Norfolk, Va.	1	140,000	..	.....	2	4.20
Ohio Colorado S. R. Co.	Salida, Colo.	..	.....	.	.....	.	.....
Old Domin. C. M. & S. Co.	Globe, Ariz.	5	562,500	..	.....	1	6,06
Orford Wks., Int. Nickel Co.	Constable Hook, N. J.	2	94,500	..	.....	3	.....
Penn Mining Co.	Campo Seco, Calif.	1	50,000	2§	96,000	.	.....
Pioneer Smelting Co.	Corwin, Ariz.	1	60,000	..	.....	.	.....
Quincy Mining Co.	Hancock, Mich.	1	25,000	4	30,000	.	.....
Santa Fe G. & Cop. Co.	San Pedro, N. M.	1	45,000	..	.....	.	.....
Swansea C.G. & C.M. Co. ††	Bouse, Ariz.	1	190,000	..	.....	2	.....
Tennessee Copper Co.	Copperhill, Tenn.	7	1,000,000	..	.....	4	15,00
Teziutlan C. M. & S. Co. ††	Teziutlan, Peubla, Mex.	2	350,000	..	.....	3	.....
Cia. Metal. de Torreon.	Torreon Coah., Mex.	2	175,000	..	.....	2	.....
Tyee Copper Co.††	Ladysmith, B. C.	2	175,000	..	.....	.	.....
U. S. Metals Refining Co.	Chrome, N. J.	2	200,000	..	.....	2	†.
U. S. Sm., Ref. & Mng. Co. ††	Midvale, Utah	6	670,000	1	40,000	4	36,00
" " "	Kennett, Calif.	5	730,000	.	.....	2	28,50
United Verde Copper Co.	Clarkdale, Ariz.	4	720,000	3	324,000	5	54.00
United Verde Extension Mining Co.	Jerome, Ariz.	..	.....	..	.....	.	.....
Wanakah Co.	Ouray, Colo.	2	105.000	..	.....	.	.....
Western Sm. & P. Co. †	Cooke, Mont	1	.....	..	.....	.	.....

*Transferred to Phelps, Dodge Corp'n., 1921.

1 Raw ore smelted as flux. † Included in furnace tonnages. ‡ Under construction. §Penn Min. Co. has 2 reverberatories, each with capacity of 48,000 tons per annum, but only one is run at a time. ** No raw ore charged. †† Not in operation, but being overhauled during 1917.

ELECTROLYTIC COPPER REFINERIES OF THE UNITED STATES

Name	Location	Capacity in Pounds† 1915	1916
Nichols Copper Co.	Laurel Hill, N. Y.	400,000,000	450,000,000
Raritan Copper Works	Perth Amboy, N. J.	400,000,000	460,000,000
Baltimore Copper Smelting & Refining Co.	Canton, Md.	354,000,000	600,000,000
American Smelting & Refining Co.	Maurer N. J.	240,000,000	240,000,000
U. S. Metals Refining Co.	Chrome, N. J.	200,000,000	250,000,000
Balbach Smelting & Refining Co.	Newark. N. J.	48,000,000	48,000,000
Anaconda Copper Mining Co. (old)	Great Falls, Mont.	65,000,000	65,000,000
Anaconda Copper Mining Co. (new)	" " "	.....	180,000,000
Tacoma Smelting Co.	Tacoma, Wash.	120,000,000	130,000,000
Calumet & Hecla Mining Co.	Calumet, Mich.	65,000,000	65,000,000
Consolidated Mining & Smelting Co.	Trail, B. C.	.....	13,000,000
Tottenville Copper Co.	Tottenville, N. Y.	.....	100,000,000
Total		1,892,000,000	2,601,000,000

† All of the figures were officially furnished.
(Engineering and Mining Journal).

Grades of Copper

Lake.—Copper from the native copper mines of the Lake Superior district. The standard of conductivity is 99.5%.

Electrolytic.—Copper refined by the electrolytic process and running 99.93% upwards for cathodes. Conductivity to 103%.

Casting.—Copper analyzing 99 to 99.75% made from ore and scarp. Used for casting purposes.

Best Selected.—British copper averaging 99.75% fine. Largely used in the British brass trades.

Tough.—British copper used for casting, rolling, and drawing; has about 99.25%.

Chile Bars.—Copper smelted in Chile, running 95 to 99% pure.

Standard.—Practically anything running from 96% upwards; dealt in on London Metal Exchange.

Matte.—A smelter product usually running from 25 to 55% copper; an intermediate product between the ore and the finished copper.

Description of Copper

Wire Bars.—About 3 to 4" square and 3 to 7' long. Average weight 135 to 175lbs. Used for wire drawing.

Ingots.—Average weight about 18 to 20lb. Notched. Used for casting.

Ingot Bars.—Notched bars for casting. Weight about 55 to 60lb.

Cakes.—Weight 100 lbs. and upward. Used for rolling.

Anodes.—About 2 by 3', and 1½" thick, weighing 250lb. Crude copper used by electrolytic refiners.

Cathodes—About 2' by 3' but thicker at the top than the bottom. Refined copper from the electrolytic tanks which is run down to wire bars, etc.—*From American Metal Market.*

PRODUCTION OF COPPER IN THE UNITED STATES SINCE 1845

	Production Pounds	Increase or Decrease Pounds	Per Cent.	Average Annual Increase by Decades Pounds	Per Cent.
1845.....	224,000	.....	.....		
1846.....	336,000	112,000	50.1		
1847.....	672,000	336,000	100.0	246,400	50.0
1848.....	1,120,000	448,000	67.0		
1849.....	1,568,000	448,000	47.0		
1850.....	1,456,000	—112,000	—7.1		
1851.....	2,016,000	560,000	38.4		
1852.....	2,464,000	448,000	22.2		
1853.....	4,480,000	2,016,000	81.8		
1854.....	5,040,000	560,000	12.5		
1855.....	6,720,000	1,730,000	33.3	1,472,200	28.5
1856.....	8,960,000	2,240,000	33.3		
1857.....	10,752,000	1,792,000	20.0		
1858.....	12,320,000	1,568,000	14.6		
1859.....	14,112,000	1,792,000	14.5		
1860.....	16,128,000	2,016,000	14.3		
1861.....	16,800,000	672,000	4.1		
1862.....	21,160,000	4.360,000	26.0		
1863.....	19,040,000	—2,120,000	—10.0		
1864.....	17,920,000	—1,120,000	—5.9		
1865.....	19,040,000	1,120,000	6.3	1,209,600	6.2
1866.....	19,936,000	896,000	4.7		
1867.....	22,400,000	2,464,000	12.3		
1868.....	25,984,000	3,584,000	16.0		
1869.....	28,000,000	2,016,000	7.7		
1870.....	28,224,000	224,000	.8		

PRODUCTION OF COPPER IN THE UNITED STATES

SINCE 1845—Continued

	Production Pounds	Increase or Decrease Pounds	Per Cent.	Average Annual increase by Decades Pounds	Per Cent.
1871.....	29,120,000	896,000	3.2		
1872.....	28,000,000	—1,120,000	—3.8		
1873.....	34,720,000	6,720,000	24.0		
1874.....	39,200,000	4,480,000	12.9		
1875.....	40,320,000	1,120,000	2.9		
1876.....	42,560,000	2,240,000	5.6	3,225,600	8.2
1877.....	47,040,000	4,480,000	10.0		
1878.....	48,160,000	1,120,000	2.4		
1879.....	51,520,000	3,360,000	7.0		
1880.....	60,480,000	8,960,000	17.4		
1881.....	71,680,000	11,200,000	18.5		
1882.....	90,646,232	18,966,232	26.5		
1883.....	115,526,053	24,879,821	27.4		
1884.....	144,946,653	29,420,600	25.5		
1885.....	165,875,766	20,929,113	14.4	18,928,949	14.8
1886.....	156,735,381	—9,140,385	—5.5		
1887.....	180,920,524	24,185,143	15.4		
1888.....	226,361,466	45,440,942	25.0		
1889.....	226,775,962	414,496	.2		
1890.....	259,763,092	32,987,130	14.5		
1891.....	284,121,764	24,358,672	9.4		
1892.....	344,998,679	60,876,915	21.4		
1893.....	329,354,398	—15,644,281	—4.5		
1894.....	354,188,374	24,833,976	7.5		
1895.....	380,613,404	26,425,030	7.4		
1896.....	460,061,430	79,448,026	20.0	34,635,407	9.4
1897.....	494,078,274	34,016,844	7.4		
1898.....	526,512,987	32,434,713	6.6		
1899.....	568,666,921	42,153,934	8.0		
1900.....	606,117,166	37,450,245	6.6		
1901.....	602,072,519	—4,044,647	—.7		
1902.....	659,508,644	57,436,125	9.5		
1903.....	698,044,517	38,535,873	5.8		
1904.....	812,537,267	114,492,750	16.4		
1905.....	888,784,267	76,247,000	11.0		
1906.....	917,805,682	15,897,839	1.7	47,404,234	6.1
1907.....	868,996,491	—48,809,191	—5.3		
1908.....	942,570,721	73,074,230	8.4		
1909.....	1,092,951,624	150,380,903	15.9		
1910.....	1,080,159,509	—12,792,115	—1.2		
1911.....	1,097,232,749	17,073,240	—1.6		
1912.....	1,243,268,720	146,035,971	13.3		
1913.....	1,224,484,098	—18,784,622	1.5		
1914.....	1,150,137,192	—74,346,906	6.1		
1915.....	1,388,009,527	237,872,335	20.7	5,757,686,278	67.2
1916.....	1,927,850,548	539,741,021	28.0		
1917.....	1,886,120,721	—41,729,827	—2.21		
1918.....	1,908,533,595	22,412,874	1.17		
1919.....	1,286,419,329	—622,114,266	—32.6		
1920.....	1,209,061,043	—77,358,289	—6.0		
Total....	29,613,608,862				

WORLD'S PRODUCTION OF COPPER

(In Metric Tons)

Country	1913	1914	1915	1916	1917	1918	1919	1920
United States....	555,990	525,529	646,212	8812.37	842,013	852,675	583,410	548,327
Mexico.....	58,323	36,337	30,969	55,128	46,752	74,336	38,170	49,169
Cuba.....	3,381	6,251	8,336	7,816	10,150	12,142	9,711	6 485
Canada.....	34,880	34,027	47,202	47,985	49,826	51,860	34,044	36,806
Australasia.....	47,325	37,592	32,512	38,807*	37,498	33,303	19,307	27,017
Peru.....	25,487	23,647	32,410	41,625	44,899	44,094	39,230	31,276
Chile.....	39,434	40,876	47,142	64,636	81,786	84,493	63,930	107,685
Bolivia.....	3,658	1,306	3,000	4.000	3,937	3,937	7.000	9,900
Japan.....	73,152	72,938	75.415	81,280	109,498	94,286	78,443	65,995
Russia.....	34,316	31,933	25,465*	20,541*	15,747	4,922	.....	.....
Germany.....	25,308	30,480	34,918	44.277*	44,289	32,357*	15.775	17,255
Africa.....	22,870	24,135	27,327	34,572	44 424	30,614	28,268	23,270
Spain-Portugal...	54,696	37,099	35,216*	36.818*	44,038*	18,457*	62,070*	25,000
Other countries..	27,158	25,176	25,000	25,000	24,605	24,605	12,567	13,336
Totals.....	1,005.978	923,888	1,082,059	1.396,779	1,396.760	1 390,991	955,574	961.521

*Imperial Mineral Resources Bureau of Great Britain figures are long tons.

WORLD'S COPPER PRODUCTION FOR NINETEENTH CENTURY AND AFTER

(Long Tons)

	Average Price of Rough Copper	Cents per Pound	World's Prod. of each Decade	Inc. of Prod. over Prev. Decade	Aver.Ann. Prod. for each Decade	Increase of Aver. Annual Prod.
1801 to 1810	£160	30.31	91,000	.....	9,100	.....
1811 to 1820	130	28.14	96,000	5,000	9,600	500
1821 to 1830	101	21.87	135,000	39,000	13,500	3,900
1831 to 1840	94	20.35	218,400	83,400	21,840	8,340
1841 to 1850	83	17.97	291,000	72,600	29,100	7,260
1851 to 1860	111	24.03	506,999	215,999	50,699	21,599
1861 to 1870	87	18.84	900.000	393.001	90.000	39,300
1871 to 1880	79	17.10	1,189,000	289,000	118,900	28.900
1881 to 1890	60	12.99	2,373,398	1,084,398	237,339	108.439
1891 to 1900	52	11.26	3,708,901	1,335,503	370,890	133,550
Totals&Averages	£96	.....	9,507,298	.....	95,073	361,790
1901 to 1910	65.55	14.76	6,968.000	5,632,497	696,800	563,250
1911 to 1916	74.56	17.01	6,277,320	.....	.....	.....

Above statistics from **Engineering and Mining Journal.**

COPPER CONSUMPTION

The following table, listing the largest copper consumers in the United States, compiled by the Boston News Bureau, though 3 years old, is of value.

	Monthly lb.	Per annum lb.
American Brass Co.	25,000,000	300,000,000
Buffalo Brass Co.	12,000,000	144,000,000
Chase Rolling Mills	12,000,000	144,000,000
National Conduit & Cable Co.	10,000,000	120,000,000
Detroit Copper & Brass Co.	8,000,000	96,000,000
Scoville Manufacturing Co.	8,000,000	96,000,000
Roebling Sons Co.	6,000,000	72,000,000
Standard Underground Cable Co.	6,000,000	72,000,000
Bridgeport Brass Co.	6,000,000	72,000,000

COPPER CONSUMPTION—Continued

	Monthly, lb.	Per annum lb.
Rome Brass & Copper Co	6,000,000	72,000,000
American Electrical Works & Phillips Insulating	6,000,000	72,000,000
Waclark Manufacturing Co	4,000,000	48,000,000
Baltimore Copper Smelting & Rolling Co	4,000,000	48,000,000
Seymour Mfg. Co	3,500,000	42,000,000
American Steel & Wire Co	2,500,000	30,000,000
Michigan Brass Co	2,000,000	24,000,000
Plume & Atwood	1,500,000	18,000,000
Bristol Brass Co	1,250,000	15,000,000
Baltimore Tube Works	1,000,000	12,000,000
Taunton-New Bedford Copper Co	1,000,000	12,000,000
Randolph Clowse	1,000,000	12,000,000
C. G. Hussey Co	1,000,000	12,000,000
Stamford Rolling Mills	1,000,000	12,000,000
Hendricks Brothers	750,000	9,000,000
Miscellaneous	6,500,000	78,000,000
Total	136,000,000	1,632,000,000

As an indication of the industries covered by the foregoing table and of the copper consumed annually by each, the following is of interest:

ESTIMATED CONSUMPTION OF COPPER IN THE UNITED STATES*

	1919		1920	
	Pounds	Per Cent.	Pounds	Per Cent.
Electrical manufactures	284,000,000	23.48	340,000,000	26.12
Telephones and telegraph	65,679,218	5.43	100,000,000	7.68
Wire (not included elsewhere)	160,000,000	13.23	190 000,000	14.59
Automobiles	92,965,000	7.68	99,320,400	7.63
Locomotives	8,998,000	0.74	9,457,250	0.73
Railway cars—freight	15,676,400	1.30	7,543,500	0.58
Railway cars—passenger	156,400	0.01	576,000	0.04
Steam railways—electrified	250,000	0.02	2,200,000	0.17
Shipbuilding	101,884,625	8.42	61,906,325	4.76
Buildings	76,778,800	6.35	53,443,200	4.10
Ammunition	23,000,000	1.90	23,400,000	1.80
Fire extinguishers	2,000,000	0.16	2,100,000	0.16
Pins	2,000,000	0.16	2,000,000	0.15
Valves	10,000,000	0.83	10,000,000	0.77
Coins	2,075,321	0.17	3,148,863	0.24
Bearing metal—steam railways	45,000,000	3.72	45,000,000	3.46
Cash registers	1,300,000	0.11	1,340,000	0.10
Condensers	10,000,000	0.83	6,000,000	0.46
Miscellaneous	150,000,000	12.40	180,000,000	13.83
Total	1,051,763,764	86.94	1,137,435,538	87.37
Exported in manufactures	157,965,641	13.06	164,420,412	12.63
Total in manufactures	1,209,729,405	100.00	1,301,855,950	100.00

* C. F. Kelly in Mining and Metallurgy.

STOCKS

The U. S. Geological Survey supplies the following estimate (in pounds) of refined copper in stock on the first day of each calendar year:

1917	128,000,000	1920	631,000,000
1918	114,000,000	1921	659,000,000
1919	180,000,000	1922	496,000,000

AMERICAN COPPER IMPORTS (In Pounds)

The following table, showing imports of copper, in various forms, into the United States, is summarized from the official figures of the United States

Government. The Government statisticians have seen fit to vary the methods employed in presenting these figures, from time to time, but the present plan of giving contents in the fine copper of imported ore and matte is preferable to the old plan of giving actual weight of imported ore and matte:

Year	Copper Contents Ore and Matte	Raw Copper	Old Copper	Total Fine Copper
1890.....	3,448,237	5,189	284,789	3,960,053
1891.....	8,391,554	2,556	134,407	11,472,436
1892.....	7,669,978	22,097	71,485	8,066,647
1893.....	7,256,015	554,348	59,375	11,045,297
1894.....	4,804,614	606,415	160,592	11,445,441
1895.....	5,300,000	7,979,322	1,336,901	14,616,223
1896.....	5,900,000	9,074,379	2,422,554	17,396,933
1897.....	12,000,000	12,646,552	1,780,390	28,923,098
1898.....	19,750,000	5,892,944	1,986,133	73,916,467
1899.....	23,800,000	64,282,583	6,678,145	95,722,340
1900.....	36,380,000	62,404,489	3,354,756	105,176,808
1901.....	64,000,000	71,001,713	2,818,757	137,826,406
1902.....	40,000,000	112,420,253	2,119,031	194,501,757
1903.....	32,000,000	133,472,398	3,235,597	168,707,995
1904.....	38,947,772	142,344,433	4,000,000	181,292,205
1905.....	50,105,300	156,358,243	4,561,142	210,724,685
1906.....	49,034,891	176,558,390	6,487,226	225,843,281
1907.....	59,718,787	192,901,267	.....	252,620,054
1908.....	56,481,343	162,224,144	.....	218,705,487
1909.....	81,087,393	240,713,722	.....	321,801,115
1910.....	85,224,975	259,210,796	.....	344,435,771
1911.....	68,626,778	265,980,760	.....	334,607,538
1912.....	104,871,703	305,369,592	.....	410,240,295
1913.....	108,710,105	300,068,849	.....	408,778,954
1914.....	104,801,324	201,549,503	.....	306,350,827
1915.....	114,331,441	201,367,008	.....	315,698,449
1916.....	174,787,854	287,548,126	.....	462,335,980
1917.....	.....	.....	.....	556,420,297
1918.....	.....	.....	.....	575,805,115
1919.....	126,455,063	298,359,209(a)	4,573,322	429,387,594
1920.....	116,437,055	353,439,622(a)	15,794,014	485,670,691

(a) Includes copper in composition metal.

GOLD

GOLD PRODUCTION OF THE UNITED STATES IN OUNCES

(Includes Philippines and Porto Rico in later years)

Year	Quantity	Value	Year	Quantity	Value
1880.....	1,741,500	$36,000,000	1901.....	3,805,500	$78,666,700
1881.....	1,678,612	34,700,000	1902.....	3,870,000	80,000,000
1882.....	1,572,187	32,500,000	1903.....	3,560,000	73,591,700
1883.....	1,451,250	30,000,000	1904.....	3,892,480	80,464,700
1884.....	1,489,950	30,800,000	1905.....	4,265,742	88,180,700
1885.....	1,538,373	31,801,000	1906.....	4,565,333	94,373,800
1886.....	1,686,788	34,869,000	1907.....	4,374,827	90,435,700
1887.....	1,603,049	33,136,000	1908.....	4,574,340	94,560,000
1888.....	1,604,478	33,167,500	1909.....	4,821,701	99,673,400
1889.....	1,594,775	32,967,000	1910.....	4,657,018	96,269,100
1890.....	1,588,877	32,845,000	1911.....	4,687,053	96,890,000
1891.....	1,604,840	33,175,000	1912.....	4,520,717	93,451,500
1892.....	1,597,098	33,015,000	1913.....	4,299,783	88,884,400

GOLD PRODUCTION OF THE U. S. IN OUNCES—Continued

1893.....	1,739,323	$35,955,000	1914.....	4,572,976	$94,531,800
1894.....	1,910,813	39,500,000	1915.....	4,887,604	101,035,700
1895.....	2,254,760	46,610,000	1916.....	4,465,807	92,316,400
1896.....	2,568,132	53,088,000	1917.....	4,051,440	83,750,700
1897.....	2,774,935	57,363,000	1918.....	3,313,373	68,493,500
1898.....	3,118,398	64,463,000	1919.....	2,918,628	60,333,400
1899.....	3,437,210	71,053,400	1920.....	2,476,166	51,186,900
1900.....	3,829,987	79,171,000	Total.	124,965,733	$2,493,279,000

The following table, compiled by the Bureau of the Mint, shows the American production of gold during 1920:

State or Territory	Fine ounces	Value
Alaska	412,915	$8,535,700
Alabama	10	200
Arizona	240,032	4,961,900
California	716,477	14,810,900
Colorado	363,218	7,508,400
Georgia	34	700
Idaho	22,668	468,600
Massachusetts	10	200
Missouri	14	300
Montana	91,802	1,897,700
Nevada	175,451	3,626,900
New Mexico	21,720	449,000
North Carolina	54	1,100
Oregon	49,714	1,027,700
Philippine Islands	61,756	1,276,600
South Carolina	14	300
South Dakota	209,842	4,337,800
Tennessee	285	5,900
Texas	5	100
Utah	102,975	2,128,700
Washington	7,160	148,000
Wyoming	10	200
Total	2,476,166	$51,186,900

The above total may be compared with previous years in the table preceding this one.

WORLD'S PRODUCTION OF GOLD (U. S. G. S.)

1860..	$134,083,000	1875..	$97,500,000	1890..	$118,848,700	1905..	$380,288,700
1861..	122,989,000	1876..	103,700,000	1891..	130,650,000	1906..	402,503,000
1962..	122,989,000	1877..	113,947,200	1892..	146,651,500	1907..	412,966,600
1863..	122,989,000	1878..	119,092,800	1893..	157,494,800	1908..	442,476,900
1864..	122,989,000	1879..	108,778,800	1894..	181,175,600	1909..	454,059,100
1865..	122,989,000	1880..	106,436,800	1895..	198,763,600	1910..	455,239,100
1866..	129,614,000	1881..	103,023,100	1896..	202,251,600	1911..	461,939,700
1867..	129,614,000	1882..	101,996,600	1897..	236,083,700	1912..	466,136,100
1868..	129,614,000	1883..	95,392,000	1898..	286,879,700	1913..	454,942,211
1869..	129,614,000	1884..	101,729,600	1899..	306,724,100	1914..	453,000,000
1870..	129,614,000	1885..	108,435,600	1900..	254,576,300	1915..	478,500,000
1871..	115,577,000	1886..	106,163,900	1901	260,992,900	1916..	454,000,000
1872..	115,577,000	1887..	105,774,900	1902..	296,737,600	1917..	424,000,000
1873..	96,200,000	1888..	110,196,900	1903..	327,702,700	1918..	373,000,000
1874..	90,750,000	1889..	123,489,200	1904..	347,377,200	1919..	365,166,000
						1920..	337,759,000
						Total	$13,689,745,811

IRIDOSMINE AND IRIDIUM—See Platinum.

IRON

The United States produced more pig iron than the remainder of the world combined in 1918; while in a normal year, say 1913, the domestic output is 40% of the total. From 1820 to 1865, production increased irregularly from 20,000 to 1,000,000 ton per annum; from 1886 to 1898 it gained from 1,205,663 to 11,773,934 tons per annum, after which were the following yields:

Year	Long Tons	Year	Long Tons
1899	13,620,703	1910	27,303,567
1900	13,789,242	1911	33,649,547
1901	15,878,354	1912	29,726,937
1902	17,821,307	1913	30,966,301
1903	18,009,252	1914	23,332,244
1904	16,497,033	1915	29,916,213
1905	22,992,380	1916	39,434,797
1906	25,307,191	1917	38,612,546
1907	25,781,361	1918	38,230,440
1908	15,936,018	1919	30,130,231
1909	25,795,471	1920	35,710,227

Pig iron production is generally considered a good barometer of a country's prosperity, as the above table will show.

Prices of Bessemer pig iron at Pittsburg ranged from $18.96 to $9.98 per long ton from 1886 to 1897, then:

Year	Per ton	Year	Per ton
1898	$10.31	1910	$16.20
1899	18.89	1911	14.81
1900	18.84	1912	15.09
1901	15.73	1913	16.19
1902	20.07	1914	13.98
1903	18.64	1915	14.87
1904	13.66	1916	22.93
1905	15.48	1917	42.63
1906	18.48	1918	35.48
1907	21.74	1919	29.91
1908	16.14	1920	44.45
1909	16.53	1921	25.15

Steel production of the United States, including all grades, is as follows for 15 years:

Year	Long Tons	Year	Long Tons
1906	23,398,136	1914	23,513,030
1907	23,361,946	1915	32,151,036
1908	14,023,247	1916	42,773,680
1909	26,094,919	1917	45,060,607
1910	26,094,919	1918	44,462,432
1911	23,676,106	1919	34,671,232
1912	31,251,303	1920	42,132,934
1913	31,300,874		

The U. S. Steel Corporation produced 40% of the pig iron and 45% of the steel made in 1920.

Principal producing countries are as under:

Iron production of the World in metric tons:

Country	1914	1915	1916	1917	1918	1919	1920
Australia	76,352	77,539	128,616	148,762	210,266	237,446	.....
Austria	2,020,000	1,960,000	2,418,322	.....	.....	60,000	120,000
Belgium	1,560,000	68,150	127,825	7,990	.....	250,570	1,116,220
Canada	710,481	828,920	1,060,727	1,061,836	1,084,580	832,593	989,115
France	5,025,000	4,750,000	1,310,756	1,408,283	1,292,958	2,447,295	3,433,791
Germany	14,389,547	11,790,199	13,284,738	13,142,247	11,758,967	.....	.....
India	.....	.....	279,734	254,407	285,817	360,037	.....
Italy	385,114	377,510	467,005	471,188	313,576	239,710	.....
Japan	.....	.....	385,647	122,782	180,930	209,005	377,616
Russia	4,261,008	3,696,560	4,350,000	3,215,000	.....	.....	.....
Spain	435,000	419,000	501,667	357,699	386,550	294,167	251,412
Sweden	635,100	767,600	743,031	838,948	767,922	494,033	452,300
United Kingdom	9,005,898	8,793,659	9,062,181	9,487,514	9,253,558	7,536,450	8,136,827
United States	23,721,115	30,414,817	40,065,754	39,239,155	39,679,518	31,513,161	37,518,649

Iron-ore production of the United States from 1810 to the end of the 1919 season approximated 1,400,000,000 long tons. By 1886 the year's output was 10,000,000 tons, then a gradual increase to 19,433,716 in 1898, followed by considerable gains to 28,887,479 in 1901. From then the figures were as follows:

Year	Gross Tons	Year	Gross Tons
1902	35,554,135	1912	55,150,147
1903	35,019,308	1913	61,980,437
1904	27,644,330	1914	41,439,761
1905	42,526,133	1915	55,526,490
1906	47,749,728	1916	77,870,553
1907	51,720,619	1917	75,573,207
1908	35,983,336	1918	72,021,202
1909	51,294,271	1919	56,372,784
1910	57,014,906	1920	69,281,341
1911	43,786,552	1921	29,547,000

The Lake Superior region (Michigan, Minnesota, and Wisconsin) contributes 80% of the American total output of iron ore, followed by Alabama with 10%. The U. S. Steel Corporation produces about 60% of the country's iron ore, through its subsidiary, the Oliver Iron Mining Co., whose operations, with other iron companies, are described in the Minnesota section of this Volume.

Prices of Mesabi ore were $2.50 per ton for Bessemer and $1.75 for non-Bessemer at Lake Erie docks, in 1894. Up to 1903 prices rose irregularly to $4 and $3.50 per ton, after which were the following:

Year	Bessemer	Non-Bessemer	Year	Bessemer	Non-Bessemer
1904	$2.75	$2.35	1912	$3.50	$2.85
1905	3.50	3.00	1913	4.15	3.40
1906	4.00	3.50	1914	3.50	2.85
1907	4.75	4.00	1915	3.45	2.80
1908	4.25	3.50	1916	4.20	3.55
1909	4.25	3.50	1917	5.70	5.05
1910	4.75	4.00	1918	6.08	5.43
1911	4.25	3.50	1919	6.20	5.55
			1920	7.20	6.55

LEAD

The lead production of the United States comes largely from the Tri-state field of Missouri, Oklahoma and Kansas, with notable amounts from the mountainous region of Idaho and from Utah.

The great bulk of Missouri's output comes from the south-eastern part of that State, where a half-dozen companies work on 3 to 4% disseminated ore. The characteristic of this district is that lead alone, without zinc, is produced. Idaho's production comes from the lead-silver-zinc ores of the Coeur d'Alene district, which in some years leads all others. Utah's production comes mainly from the silver-lead ores of Park City, Alta-Cottonwood, and Bingham, and the mixed ores of the Tintic district.

Next to the United States, the two important lead-producing countries of the world are Spain and Australia.

The vital figures of the industry are given in the following tables:

U. S. LEAD PRODUCTION, (in short tons) PRICE AND VALUE

Year	Desilverized Lead	Soft Lead	Total Prod'n	Base Bullion	foreign ores	foreign Bullion	N. Y. Price	Value
1720-1868.	.....	755,400	755,400	755,400	.....	.....	.....	$79,829,200
1869.....	.....	17,500	17,500	17,500	.....	.....	$0.065	2,275,000
1870.....	.....	17,830	17,830	17,830	.....	.....	.063	2,246,580
1871.....	970	19,000	19,970	19,790	.....	.....	.061	2,436,340
1872....	5,220	20,500	25,720	25,720	.....	.....	.063	3,240,720
1873.....	19,559	22,381	41,940	41,940	.....	.....	.063	5,284,440
1874.....	27,674	23,556	51,230	51,230	.....	.....	.060	6,147,600
1875.....	33,859	24,731	58,590	58,590	.....	.....	.059	6,913,620
1876.....	36,519	26,421	62,940	62,940	.....	.....	.061	7,678,680
1877.....	49,228	31,152	80,380	80,380	.....	.....	.055	8,841,800
1878.....	62,360	26,770	89,130	89,130	.....	.....	.036	6,417,360
1879.....	62,710	28,130	90,840	90,840	.....	.....	.041	7,448,880
1880.....	68,035	27,690	95,725	95,725	.....	.....	.050	9,572,500
1881.....	83,725	30,770	114,495	114,495	.....	.....	.048	10,991,520
1882.....	100,765	29,015	129,780	129,780	.....	.....	.049	12,718,440
1883.....	118,497	21,800	140,297	140,297	.....	.....	.043	12,065,452
1884.....	116,365	19,932	136,297	136,297	.....	.....	.037	10,085,978
1885.....	104,217	21,975	126,192	126,192	.....	.....	.040	10,095,360
1886.....	111,389	20,800	132,189	127,189	5,000	.....	.046	12,161,388
1887.....	131,482	25,148	156,630	141,630	15,000	.....	.045	14,096,700
1888.....	146,925	29,090	176,015	147,379	28,636	.....	.044	15,489,320
1889.....	149,099	29.258	178,357	151,787	26,570	.....	.039	13,911,846
1890.....	126,493	31,351	157,844	139,720	18,124	.....	.045	14,205,960
1891.....	166,966	31,397	198,363	174,511	23,852	.....	.043	17,059,218
1892.....	176,545	31,678	208,223	168,266	39,957	.....	.041	17,074,286
1893.....	191,807	32,513	224,320	158,969	65,351	.....	.037	16,599,680
1894.....	175,964	37,686	213,650	153,911	59,739	.....	.033	14,100,900
1895.....	195,932	39,890	235,822	159,649	76,173	.....	.032	15,092,608
1896.....	213,950	43,537	257,487	179,749	77,738	Lowest	.030	15,449,220
1897.....	238,616	43,553	282,169	198,498	83,671	.....	.036	20,316,168
1898.....	259,369	42,779	302,148	202,203	99,945	.....	.038	22,963,248
1899.....	257,481	40,566	298.047	202,121	95,926	.....	.045	26,824,230
1900.....	319,752	48,021	367,773	260,918	106,855	.....	.044	32,364,024
1901.....	313,134	57,898	371,032	258,610	112,422	.....	.043	30,908,752
1902.....	293,842	74,050	367,892	267,286	100,606	.....	.041	30,167,144
1903.....	285,495	83,444	368,939	280,615	88,324	.....	.042	30,990,876
1904.....	304,283	89,169	393,452	297,602	95,850	.....	.043	33,836,872
1905.....	302,852	85,455	388,307	307,514	80,793	.....	.047	36,500,858
1906.....	313,886	90,860	404,746	336,200	28,803	39.743	.057	46,141,044
1907.....	313,588	99,801	413,389	352,381	24,041	36,967	.053	43,819,234
1908.....	295,552	101,012	396,564	311,666	11,509	73,389	.042	33,311,376
1909.....	329,751	117,158	446,909	352,839	21,754	72,316	.043	38,434,174
1910.....	328,954	141,318	470,272	375,402	18,965	76,805	.044	41,383,936
1911.....	331,032	155,947	486,979	391,996	10,764	84,220	.045	43,828,110
1912.....	339,646	141,248	480,894	392,517	11,572	76,805	.045	43,280,460

U. S. LEAD PRODUCTION, PRICE AND VALUE—Continued.

Year	Desilverized Lead	Soft Lead	Total Prod'n	Base Bullion	foreign ores	foreign Bullion	N. Y. Price	Value
1913.....	330,593	131,867	462,460	411,878	13,223	37,356	.044	40,696,480
1914.....	383,903	158,219	542,122	512,794	7,639	21,689	.039	42,285,516
1915.....	388,594	161,461	550,055	507,026	9,853	33,176	.047	51,705,000
1916.....	406,119	165,015	571,134	558,200	7,157	11,598	.068	78,817,000
1917.....	422,266	188,503	610,769	548,450	15,872	46,447	.087	105,052,000
1918.....	429,732	210,463	640,195	539,686	15,052	84,956	.075	90,908,000
1919.....	334,476	147,744	482,220	424,433	7,656	50,131	.053	51,115,000
1920.....	339,803	189,854	529,657	476,849	8,414	44,394	.080	84,745,000
1921.....	295,000	145,000	440,000	390,000	50,000	.....	.047	.....

LEAD PRICES (in cents per lb.)

Yearly highest, lowest and average prices of pig lead in New York.

Year	High	Low	Average	Year	High	Low	Average
1886....	4.95	4.00	4.63	1904....	4.60	4.10	4.32
1887....	5.15	4.15	4.50	1905....	6.25	4.45	4.70½
1888....	5.25	3.60	4.42	1906....	6.35	5.35	5.66
1889....	4.10	3.62½	3.93	1907....	6.35	3.50	5.35
1890....	5.25	3.77½	4.48	1908....	4.60	3.65	4.23½
1891....	4.62½	4.05	4.35	1909....	4.75	3.95	4.30
1892....	4.22½	3.72½	4.09	1910....	4.75	4.37½	4.49
1893....	4.15	3.22½	3.73	1911....	4.60	4.25	4.46
1894....	3.65	3.02½	3.29	1912....	5.15	4.00	4.48½
1895....	3.55	3.02½	3.23	1913....	4.85	4.00	4.40
1896Lowest	4.25	2.67½	2.98	1914....	4.15	3.50	3.87
1897....	4.40	3.00	3.58	1915....	7.62½	3.70	4.67½
1898....	4.12½	3.55	3.78	1916....	7.67	5.80	6.80
1899....	4.77½	3.92½	4.47	1917....	12.25	5.50	8.71
1900....	4.75	3.75	4.41½	1918....	8.05	6.25	7.46
1901....	4.37½	4.00	4.36	1919....	7.50	5.00	5.81
1902....	4.15	4.00	4.10	1920....	9.50	4.45	8.20
1903....	4.70	4.10	4.26	1921....	4.95	5.08	4.55

Average price for 36 years.....4.69

LEAD SMELTERS AND REFINERIES

UNITED STATES.

Mowry—Consolidated Mines, Smelter & Transportation Co. (Idle.)

California:

Keeler—Four Metals Mining & Smelting Co. (Idle.)

Selby—Selby Smelting Works. Refinery also. American Smelters Securities Co., controlled by A. S. & R. Co.

Colorado:

Durango—Durango plant, American Smelting & Refining Co.

Georgetown—Western Metals Co. Malm dry chlorination process.

Leadville—Arkansas Valley plant, American Smelting & Refining Co.

Pueblo—Pueblo plant, American Smelting & Refining Co.

Salida—The Ohio & Colorado plant.

Idaho:

Kellogg—Bunker Hill & Sullivan Mining & Concentrating Co.

Clayton—Clayton Mining & Smelting Co.

Illinois:

Aurora—Aurora Metal Co. Secondary Metals, but some ore also.

Chicago—Goldsmith Bros. Smelting Refining Co. Secondary lead, but some ore.

Chicago—Great Western Smelting & Refining Co. Secondary lead, but some ore.
Collinsville—St. Louis Smelting & Refining Co. Refinery also. Nat'l lead Co.
Federal—Federal Lead Co. Am. Smelters Sec. Co., controlled by A. S. & R. Co.
Granite City—Hoyt Metal Co. Smelts secondary lead, but also some ore.

Indiana:
East Chicago—International Lead Refining Co. Refinery only. Anaconda Copper Mng. Co.
East Chicago—U. S. Reduction Co. Smelts secondary lead and some ore.
Grasselli—U. S. S. Lead Refinery, Inc. Refinery only. Betts electrolytic process. Controlled by U. S. S. R. & M. Co.

Kansas:
Galena—Galena Smelting & Manufacturing Co. Controlled by Eagle-Picher Lead Co.

Missouri:
Desloge—Desloge Consolidated Lead Co.
Granby—Granby Mining & Smelting Co., controlled by A. Z. L. & S. Co.
Herculaneum—St. Joseph Lead Co.
Joplin—Eagle-Picher Lead Co.
Webb City—Webb City Smelting & Manufacturing Co. Controlled by Eagle-Picher Lead Co.

Montana:
Cooke—Western Smelting & Power Co. (Idle.)
East Helena—East Helena plant, American Smelting & Refining Co.

Nebraska:
Omaha—Omaha & Grant Smelting Co. Converters and refinery only. Betts electrolytic process. Am. Sm. & Ref. Co.

Nevada:
Spruce Mtn.—Bullshead Mining & Smelting Co.
Tybo—Louisiana Cons. Mng. Co.

New Jersey:
Newark—Balbach Smelting & Refining Co. Refinery also.
Perth Amboy—Perth Amboy plant, American Smelting & Refining Co Refinery also.

Oklahoma:
St. Louis—Ontario Smelting Co.

Pennsylvania:
Carnegie—Pennsylvania Smelting Co. Refinery also.

Texas:
El Paso—Cons. Kansas City Smelting & Refining Co. (Am. Sm. & Ref. Co.)

Utah:
Midvale—U. S. Sm., Ref. & Mng. Co.
Murray—Murray plant, American Smelting & Refining Co.
Tooele—International Smelting Co.

Washington:
Northport—Northport Smelting & Refining Co.

CANADA

British Columbia:
Trail—Consolidated Mining & Cmelting Co. of Canada, Ltd. Refinery also. Betts electrolytic process.

Ontario:
Kingston—North American Smelting Co., Ltd.

MEXICO

Chihuahua:
Chihuahua—American Smelting & Refining Co.
Uruachic—Uruachic Mining & Smelting Co., Ltd.
Coahuila:
Saltillo—Mazapil Copper Co., Ltd.
Torreon—Compania Metalurgica de Torreon.
Durango:
Velardena (Asarco)—American Smelters Securities Co., controlled by A. S. & R. Co.
Mapimi—Compania Minera de Penoles (American Metal Co.)
Guerro:
Campo Morado—Reforma Mining & Milling Co. (Idle.)
Nuevo Leon:
Cerralvo—Cia. Min. de Penoles, controlled by Cia de M. & M. (Am. Metal Co.
Guadalupe—Cia. Min. de Penoles, controlled by Cia. de M. & M. (Am. Metal Co.
Monterrey—Cia. Min. de Penoles, controlled by Cia. de M. & M. (Am. Metal Co.
Monterrey—American Smelting & Refining Co.
San Luis Potosi:
San Luis Potosi—Compania Metalurgica Mexicana.
Sonora:
Guaymas—Pacific Smelting & Refining Co. (Mexican-American Smelting & Refining Co., Ltd.) (Idle and never operated.)

MANGANESE

Manganese ore, to be saleable, must contain 35% or more **manganese**, and for ferro-manganese or ferro, 4% or better, with less than 8% silica, and not over 0.2% phosphorus. As 90% of the manganese ore used in the United States goes into ferro, the demand is chiefly for high-grade ore. For dry batteries, the ore must contain a minimum of 50% manganese, present as the dioxide, and less than 1% iron or ½% copper, nickel or cobalt.

MANGANESE ORE PRODUCTION OF THE UNITED STATES

	Long tons		Long tons		Long tons
1838-1879	43,860	1894	6,308	1909	1,544
1880	5,761	1895	9,547	1910	2,258
1881	4,895	1896	10,088	1911	2,457
1882	4,532	1897	11,108	1912	1,664
1883	6,155	1898	15,957	1913	4.048
1884	10,180	1899	9,935	1914	2,635
1885	23,258	1900	11,771	1915	9,709
1886	30,193	1901	11,995	1916	27,000
1887	34,524	1902	7,477	1917	129,405
1888	29,198	1903	2,825	1918	305,869
1889	24,197	1904	3,146	1919	55,322
1890	19,287	1905	4,118	1920	94,420
1891	22,452	1906	6,921	1921 (prel.)	13,000
1892	13.613	1907	5,604	Total	1,083,572
1893	7,718	1908	6,144		

The above does not include ferruginous-manganese manganiferous-iron, manganiferous-silver, or manganiferous-residuum ores. In 1920, production of the first named class was 481,249 tons and of the second class, 286,415 tons, and in 1921, 72,000 and 14,000 tons, respectively.

MOLYBDENUM

The amount of molybdenum produced in the U. S. never exceeded a few tons a year until 1915, but from thence onward, due to war needs, the output increased rapidly until 1918; since then the return to normal conditions has been even more rapid. The records for 1920 show that one U. S. producer only was operating.

Year	Sales lb.	Value	Price per lb.
1914	1,297	$1,297	$1.00
1915	181,769	114,866	0.63
1916	206,740	205,000	0.98
1917	350,200	495,350	1.41
1918	861,637	1,257,000	1.46
1919	297,926	341,814	1.14

In U. S. Bureau of Mines Bulletin 111, by F. W. Horton, the American deposits are fully described. Six Western States contain large low-grade deposits that can be concentrated.

Uses: Molybdenum has rather limited uses and while it can be used instead of tungsten in high speed steels and in the manufacture of ordinance, such use was practically prohibited in the U. S. by the Halcomb patent. The metal is also used in electric resistance furnaces, as supports for filaments in electric light bulbs, and Roentgen ray tubes and in alloys. The salts have a limited use in chemical technology.

As noted above the use of molybdenum by American steel manufacturers has been greatly retarded if not prohibited by the Halcomb patent, issued in 1903, and held by the Crucible Steel Co. This controls the manufacture of the best grades of molybdenum-steel, using quantities of 6 to 15% molybdenum, less than 1.2% carbon and 2% silicon; the patent also controls the use of chromium in practicable amounts in conjunction with steels of the composition specified. France and Germany make large quantities of molybdenum steel. The results in those countries make it certain that when the Halcomb patent expires, the use of molybdenum in America will be quickly extended and its production receive a sudden stimulus. The metal is more abundant than tungsten.

NICKEL

Nickel ore, as such was not mined in the United States until 1919, but in that and the following year, the Missouri Cobalt Co. produced shot nickel and nickel hydrate from mixed sulphide ores. Much the larger part of the nickel output however is derived as a by-product in electrolytic refining of copper, and marketed both in the form of sulphate and as the metal; it collects in the electrolyte slime and is obtained from there.

The world's supply comes mainly from Ontario and is imported into the United States, in the form of copper nickel matte, or as Monel metal from the International Nickel Co.'s smelter at Copper Cliff, Ont., from ores mined at Sudbury, Ont. The refineries are at Constable Hook, Bayonne N. J., and Port Colborne, Ont. A much smaller quantity of rich matte has also been imported from Belgium and refined at New Brunswick N. J., by the United States Nickel Co. The British-American Nickel Corporation had its reduction works and refinery near Sudbury, Ont.

Canada also produces nickel from the silver ores of the Cobalt district and those of the Alexo mine at Temiskaming.

Use: large amounts of nickel are usde in the manufacture of armor plate, which requires 3 to 4% nickel; it is used in bridge and structural steel; in automobile manufacture, in axles, steering gear, etc.; in the manufacture of German silver, and is a constituent of Monel metal, the con-

verter product of the Sudbury ores which carries 67% nickel, 28% copper, and 5% other metals. Coinage also consumes a large amount of the metal.

NICKEL PRODUCTION OF CANADA (ONTARIO) IN TONS

(2,000 POUNDS)

	Ore mined	Ore Smelted	Bess. matte	Copper in matte	Nickel in matte	Value of matte
1911.....	611,511	610,834	32,607	8,966	17,049	$4,945,592
1912.....	737,584	725,065	41,925	11,116	22,421	6,303,102
1913.....	784,697	823,403	47,150	12,938	24,838	7,076,945
1914.....	1,000,364	947,053	46,396	14,448	22,759	7,189,031
1915.....	1,364,048	1,272,283	67,703	19,608	34,039	10,352,344
1916.....	1,566,333	1,521,689	80,010	22,450	41,298	12,116,333
1917.....	1,518,783	1,453,661	78,897	21,196	41,887	12,004,141
1918.....	1,641,617	1,559,892	87,184	23,482	45,886	.....
1919.....	572,400	754,567	42,736	12,099	22,035	.....
1920.....	1,135,792	1,086,159	57,938	16,000	30,557	.....

NICKEL PRODUCERS

Alexo Mining Co.....Ontario
American Smelting & Refinery Co.
Athabasca Mining Co.....Canada
Baltimore Copper Smelting & Rolling Co (Refinery)..Maryland
British American Nickel Corp. Canada
Coniagas Reduction Co., Ltd.
Coniagas Mines, Ltd.....Ontario
Deloro Smelting & Refinery Co. Ltd. .....Ontario
Independence Mining Co. (small quantities) .....Wyoming
International Nickel Co. U. S. and Canada
Metals Chemical Co.....Ontario
Missouri Cobalt Co.....Missouri
Missouri Metals Corp.....Missouri
Mond Nickel Co.....Ontario
Nipissing Mining Co., Ltd.

PLATINUM (AND PALLADIUM)

The United States production of platinum is very small; Russia and Colombia are the largest producers. The domestic output of crude metal was 390 oz. in 1910; 628 in 1911; 721 in 1912; 483 in 1913; 570 in 1914; 742 in 1915; 750 in 1916; 605 oz. in 1917; 647 oz. in 1918; 742 oz. in 1919; 613 oz. in 1920. Prices for the corresponding years were: $32.70 per oz.; $43.12; $45.55; $44.88; $45.14; $49.63; $83.40; $102.82; $105.95; $114.60; $111.58. The average price in 1921 was $75.03.

Use: One of the most important uses of platinum is as a catalyzer in the manufacture of fuming sulphuric trioxide; in this use it is technically known as "contact mass," some of which contains as much as 7 to 8% of platinum. The loss in good practice is small. Platinum dishes and utensils are a necessity in chemical laboratories. Its use in the electric industry and in dentistry is becoming less each year, nichrome replacing it in electrical appliances. The increased use of silica-ware is also reducing the consumption of platinum in concentration of sulphuric acid and for other purposes. The consumption of platinum in jewelry is increasing fast, especially in recent years.

The embargo placed upon the export of platinum from Russia at the beginning of the war and the revolution were the cause of the greatly reduced imports since 1914.

PLATINUM IMPORTS

	Quantity, Troy, oz.	Value	Retorts, etc.	Total
1905	93,912	$1,985,107	$188,156	$2,173,263
1906	137,928	3,601,120	187,639	3,788,759
1907	74,292	2,508,991	175,651	2,684,642
1908	50,844	1,095,754	134,119	1,229,873
1909	118,853	2,557,596	416,352	2,973,948
1910	118,280	3,320,699	333,965	3,654,664
1911 Ore or crude	34,412	1,278,239		
1911 Unmanufactured, etc.	88,339	3,445,250	142,718	4,866,207
1912 Ore or crude	45,280	1,781,585		
1912 Unmanufactured, etc.	59,526	2,552,978	169,119	4,503,682
1913 Ore or crude	48,942	1,863,406		
1913 Unmanufactured, etc.	69,551	3,086,110	90,694	5,040,210
1914 Ore or crude, Unmanufactured, etc.	72,032	.....	.....	2,934,080
1915	61,438	2,341,476	.....	.....
1916	53,484	3,138,396	18,923	3,157,319
1917	30,316	2,414,773	382	2,415,155
1918	54,962	4,949,755	14,225	4,963,980
1919	54,550	5,229,309	2,672	5,246,522
1920	80,955	8,474,499	78,697	8,568,907

THE PLATINUM METALS

Iridium. The price of iridium remains much higher than that of platinum. It is a mistake to speak of iridosmine as "iridium." Iridosmine is an alloy of osmium and iridium, with osmium varying from 17 to 49%. There is practically no market for osmium, except for use in pen points; iridosmine is valuable for the iridium content only. The extraction of osmium is both very costly and dangerous, on account of the poisonous character of the osmium vapor. In 1920, the price of iridium reached $450 per ounce.

Palladium: The marketable supply increased on account of the greater care taken by the copper refineries in extracting it from the electrolytic slimes in which it occurs with gold, silver, etc., particularly in the slime of Canadian matte, and the base bullion from Australia and elsewhere. The use of plalladium, as a catalyzer is well known, and is largely used as an alloy for platinum, as it renders the platinum lighter and of a more brilliant white. In 1920, the price was but $75 per ounce.

Osmium: The supply of this metal of the platinum group exceeds the demand, tungsten having replaced it in electric light bulbs, and its use in medicine and in silk dyeing being slight.

PYRITE

Pyrite mining is an important industry at several localities in the United States, its sole use being for sulphuric acid manufacture. The market is limited by transportation costs and by the competition of the copper and zinc smelting plants, at which such acid is made, the principal ones being at Anaconda, Montana; Garfield, Utah; Douglas, Arizona; Trail, B. C.; Ducktown, Tenn., and Hillsboro, Danville, Peru, La Salle, Springfield and East St. Louis, all in Illinois; Langeloth and Donora, Penn.; Argentine, Kansas, and Clarksburg, and Moundvills, W. Va. The bulk of the pyrite consumed in America still comes from Spain. Domestic pyrite and pyrrhotite deposits, and the use of "coal brasses," were exploited during the war, but production from these sources has since materially decreased.

PRODUCTION IN LONG TONS

1882	12,000	$72,000	1895	99,549	$322,845	1908	222,598	$857,113
1883	25,000	137,500	1896	115,483	320,163	1909	247,070	1,028,157
1884	35,000	175,000	1897	143,201	391,541	1910	241,612	977,978
1885	49,000	220,500	1898	193,364	593,801	1911	301,458	1,164,871
1886	55,000	220,000	1899	174,734	543,249	1912	350,928	1,334,259
1887	52,000	210,000	1900	204,615	749,991	1913	341,338	1,286,084
1888	54,331	167,658	1901	*244,691	1,257,579	1914	336,662	1,283,346
1889	93,705	202,119	1902	*207,874	947,089	1915	394,124	1,674,933
1890	99,854	273,745	1903	*233,127	1,109,818	1916	439,132	2,038,002
1891	196,536	338,880	1904	207,081	814,808	1917	482,662	2,593,035
1892	109,788	305,191	1905	253,000	938,492	1918	464,494	2,644,515
1893	75,777	256,552	1906	261,422	931,305	1919	420,647	2,558,172
1894	105,940	363,134	1907	247,387	794,949	†1920	275,000	1,450,000

* Includes production of natural sulphur. † Estimated.

IMPORTS OF PYRITE, CARRYING LESS THAN 3½% COPPER

1910.....	803,551	long tons	1916.....	1,244,662	long tons
1911.....	1,006,310	" "	1917.....	967,340	" "
1912.....	970,785	" "	1918.....	496,792	" "
1913.....	850,592	" "	1919.....	388,973	" "
1914.....	1,026,617	" "	1920.....	332.606	" "
1915.....	964,634	" "			

QUICKSILVER

Most of the domestic supply of quicksilver comes from California and Texas, Nevada producing the remainder, as Arizona has as yet only a small output. In recent years much of the Californian output has been from old mines, whose richest ore was extracted long ago, and which are now difficult to operate profitably, except when the price is high.

Beside the new supply each year there is also recovered an annual output of old quicksilver in the clean-up of old amalgamation mills, and from other sources; this supply has but little effect on the market. Austria, Italy, and Spain furnish 5/6 of the world's supply.

Quicksilver is used mainly in the manufacture of fulminate of mercury for explosive caps, of scientific and electric apparatus, of drugs and in the recovery of precious metals; the latter use is gradually diminishing. It is also used in manufacturing paints for protective coatings.

The primary domestic market for quicksilver is San Francisco; the price is averaged from the market quotations published in the **Mining and Scientific Press.** Prices are given in dollars per flask of 75 lb.

Production and prices in this country have been as under:

Year	Flasks	Average Price
1914	16,548	$49.05
1915	21,033	85.79
1916	29,932	125.89
1917	36,159	106.34
1918	32,883	123.46
1919	21,415	90.29
1920	13,392	79.66
1921	6,339	45.46

QUICKSILVER PRODUCERS

Black Butte Q Mng. Co....Oregon
Chisos Mining Co.....Texas
New Guadalupe Mng. Co. California
Kings Quicksilver Mining Co., Ltd. California
Mercury Mining Co.....Nevada
Mina Mercury Co. (lessee)..Nevada
New Alamaden Quicksilver Mines Corp. .....California
New Idria Quicksilver Mining Co. California
Oceanic Mine.....California
Patriquin Mng. Co.....California
Ruby King Copper Co...California
St. Johns Mines Co.....California
War Eagle Mng. Co.....Oregon
Western Mercury Co.....California

RADIUM—(See Uranium Vanadium)

Radium, uranium, and vanadium are closely connected in occurrence and always found together in an ore. Colorado and Utah contain the largest known radium-bearing deposits of the world, but Europe has been the chief market for the ore, which accounts for the greatly reduced output for 1915.

PRODUCTION FROM CARNOTITE ORES

Year	Uranium oxide tons	Radium, grams	Vanadium, tons
1920	159.6	30.9	510
1919	137.6	35.2	247
1918	105.5	21.7	276
1917	.....	....	484
1916	.....	8 to 10	460
1915	23.4	6	635
1914	87.2	22.3	435
1913	41	10.5	432
1912	26	6.7	...

Carnotite is a complex ore consisting essentially of vanadium oxide or with potassium as double silicate, and associated with or loosely combined with uranium oxide. A ton of ordinary carnotite ore assaying about 2½% uranium oxide contains only 12.5 milligrams radium, or one part out of a hundred million recoverable radium. The following firms are producers of radium:

Standard Chemical Co., Pittsburg, Pa.
W. L. Cummings Chemical Co., Lansdowne, Pa.
Radium Company of America, Sellersville, Pa.
Radium Co. of Colorado, Box 1316, Denver, Colo.
Radium Luminous Materials Corp.
National Radium Institute, Denver, Colo.
Pittsburgh Radium Co., Denver, Colo.
Ore Products Corp., Denver, Colo.

SELENIUM

The commercial supply of selenium is obtained from the slime or mud resulting from the electrolytic refining of blister copper. In 1919-20, its recovery as a by-product was reported by A. S. & R. Co., Nichols Copper Co., Raritan Copper Works and U. S. S. R. & M. Co. The total U. S. output was 60,025 lb. in 1919 and 92,411 lb. in 1920. The principal use of selenium is as a red coloring for glass and the like.

SILVER

Average monthly prices of silver per ounce, as published by The American Metal Market:

	1912	1913	1914	1915	1916	1917	1918	1919	1920	*1921
January	56.22	62.93	57.56	48.89½	56.77	75.14	88.72	101.12	132.83	65.95
February	59.04	61.64	57.50½	48.48	56.75	77.54	85.79	101.12	131.30	59.23
March	58.37	57.87	58.07	50.24	57.93	74.13	88.11	101.12	125.55	56.02
April	59.23	59.49	58.52	50.25	64.41	72.51	95.35	101.12	119.53	59.34
May	60.88	60.36	58.18	49.91½	74.27	74.61	99.50	107.23	102.59	59.81
June	61.29	58.99	56.47	49.03	65.02	76.44	99.50	110.50	90.82	58.51
July	60.66	58.72	54.68	47.52	62.94	78.92	99.62	106.36	91.93	60.26
August	61.61	59.29	54.34	47.18	66.08	85.40	100.31	111.35	96.18	61.60
September	63.08	60.64	53.29	48.68	68.51	100.73	101.12	113.92	93.66	66.16
October	63.47	60.79	50.65	49.38½	67.85	87.38	101.12	119.10	83.48	70.97
November	62.79	58.99	49.10	51.71	71.00	85.97	101.12	127.57	77.64	68.23
December	63.37	57.76	49.38	54.97	75.76	85.94	101.12	131.97	64.78	65.76
Average	60.83	59.79½	54.81	49.69	65.66	81.40	96.77	111.11	100.86	62.65

* From Eng. & Mng. Journal.

Beginning Jan. 17, 1920, average monthly quotations are based on foreign prices; after that date the Pittman Act. became effective and price of silver of domestic origin is retained at $1.00 per ounce.

The silver output in fine ounces of this country during the past 4 years as compiled by the Bureau of the Mint, is as follows:

State or Territory	1918	1919	1920	1921
Alaska	802,743	690,151	822,410	742,000
Alabama	2	.....	5	.....
Arizona	6,831,465	5,702,911	5,431,637	2,179,000
California	1,432,812	1,153,614	1,654,653	3,514,276
Colorado	6,900,266	5,966,606	5,166,873	5,408,273
Georgia	45	8	4	.....
Idaho	9,396,009	5,935,076	7,364,785	5,720,000
Illinois	8,218	6,000	8,625	.....
Maine	6,338	4,142	.....	.....
Maryland	164	.....	.....	.....
Massachusetts	.....	.....	1,160	.....
Michigan	516,294	425,610	511,664	.....
Missouri	42,214	75,991	123,094	.....
Montana	16,378,263	15,012,258	13,263,356	6,233,000
Nevada	9,931,969	7,045,395	7,481,866	6,681,000
New Hampshire	691	.....	.....	.....
New Mexico	773,662	851,821	699,745	671,000
North Carolina	100	19	10	.....
Oregon	129,150	236,620	101,658	43,720
Pennsylvania	.....	.....	90	.....
Philippine Islands	13,000	15,715	22,118	.....
South Carolina	.....	2	1	.....
South Dakota	161,232	122,068	87,623	111,000
Tennessee	105,829	97,554	107,250	.....
Texas	579,158	539,483	522,818	544,000
Utah	13,492,555	12,542,623	11,755,411	12,366,000
Vermont	4,891	2,200	.....	.....
Virginia	1,814	8	.....	.....
Washington	300,000	258,270	177,758	132,000
Wyoming	1,255	300	56,959	.....
Est. for those missing above				706,000
Totals	67,810,139	56,682,445	55,361,573	45,051,269

SILVER PRODUCTION OF THE UNITED STATES, IN OUNCES

Year	Quantity	Commercial Value	Year	Quantity	Commercial Value
1880	30,318,700	$34,717,000	1901	55,214,000	$33,128,400
1881	33,257,800	37,657,500	1902	55,500,000	29,415,000
1882	36,196,900	41,105,900	1903	54,300,000	29,322,000
1883	35,732,800	39,618,400	1904	57,682,800	33,456,000
1884	37,743,800	41,921,300	1905	56,101,600	34,222,000
1885	39,909,400	42,503,500	1906	56,517,900	38,256,400
1886	39,694,000	39,482,400	1907	56,514,700	37,299,700
1887	41,721,600	40,887,200	1908	52,440,800	28,050,600
1888	45,792,700	43,045,100	1909	54,721,500	28,455,200
1889	50,094,500	46,838,400	1910	57,137,900	30,854,500
1890	54,516,300	57,242,100	1911	60,399,400	32,615,700
1891	58,330,000	57,630,000	1912	63,766,800	39,197,500
1892	63,500,000	55,662,500	1913	66,801,500	40,348,100
1893	60,000,000	46,800,000	1914	72,455,100	40,067,700
1894	49,500,000	31,422,100	1915	74,961,075	37,397,300
1895	55,727,000	36,445,500	1916	74,414,802	48,953,000
1896	58,834,800	39,654,600	1917	71,740,362	59,078,100
1897	53,860,000	32,316,000	1918	67,879,206	67,879,206
1898	54,438,000	32,118,400	1919	56,682,445	63,533,652
1899	54,764,500	32,858,700	1920	55,361,573	60,801,955
1900	57,647,000	35,741,100	Total	2,287,458,459	$1,739,966,125

A complete list of smelters and refineries in North America will be found under "Lead" in this chapter.

SILVER PRODUCTION OF THE WORLD

(Report of the Director U. S. Mint)

	Quantity	Value		Quantity	Value
1882	86,472,091	$98,232,300	1901	173,011,283	$103,806,700
1883	89,175,023	98,984,300	1902	162,763,483	86,264,700
1884	81,567,801	90,785,000	1903	167,689,322	90,552,200
1885	91,609,959	97,518,800	1904	164,195,266	95,233,300
1886	93,297,290	92,793,500	1905	172,317,688	105,113,700
1887	96,123,586	94,031,000	1906	165,054,497	111,721,100
1888	108,827,606	102,185,900	1907	184,206,984	121,577,100
1889	120,213,611	112,414,100	1908	203,131,404	108,655,100
1890	126,095,062	131,937,000	1909	212,149,023	110,364,400
1891	137,170,000	135,500,200	1910	221,715,763	119,727,000
1892	153,151,762	133,404,400	1911	226,192,923	122,143,800
1893	165,472,621	129,119,900	1912	224,310,654	137,883,800
1894	164,610,394	104,493,000	1913	223,907,845	135,246,400
1895	167,500,960	109,545,600	1914	211,339,749	116,849,900
1896	157,061,370	105,859,300	1915	179,753,987	93,292,315
1897	160,421,082	96,252,700	1916	175,933,000	115,763,914
1898	169,055,253	99,742,600	1917	174,187,800	155,941,600
1899	168,337,452	101,002,600	1918	197,394,900	194,327,400
1900	173,591,364	107,626,400	1919	174,517,400	195,611,300
			* 1920	168,474,400	.....

* Am. Bur. of Metal Statistics.

TIN

Very little tin is produced in this country, and the most of it comes from Alaska, which yielded 68 tons metal during 1918. In 1914 South Dakota furnished a few hundred pounds of stream tin, and there are

promises of a revival in lode mining in that State. Tin occurs also in a few other states, but hardly in commercial quantities. Practically all the tin used in the United States is brought from the Straits Settlements and Bolivia, the latter ranking second to the former as a tin producer.

UNITED STATES TIN PRODUCTION (U. S. GEOL. SURVEY)

Year	Tons Concentrates	Percent Tin	Value
1920(approx)	31	65	$20,000
1919	86	65	72,000
1918	130	60	118,000
1917	141	60	111,000
1916	232	66	122,000
1915	200	66	.... ..
1914	157.5	66	66,560
1913	84	60	36,970
1912	147	60	124,800

Secondary tin recovered in the United States:

Year	Tons	Value
1920	23,500	$22,705,700
1919	24,033	29,868,200
1918	23,837	41,381,000
1917	19,400	23,920,200
1916	17,400	15,131,040
1915	13,650	10,544,180
1914	12,447	8,887,158

The United States is the largest user (50% of the world's output) of tin among the countries of the world, and hence a large importer of the metal. The U. S. Steel Corporation is the greatest single user of the metal.

TIN PRICES IN NEW YORK

Extreme fluctuations and yearly average prices (from the Am. Metal Market) of Pig Tin in New York:

Year	Highest	Lowest	Aver.	Year	Highest	Lowest	Aver.
1885	23.50	16.10	19.50	1904	30.12½	25.75	28.08
1886	23.25	20.45	21.55	1905	36.45	28.65	31.55
1887	37.25	21.90	24.85	1906	50.00	35.65	39.82
1888	37.25	16.90	26.20	1907	44.10	26.00	38.43
1889	22.25	19.50	20.93	1908	32.37½	26.45	29.54
1890	25.10	19.50	21.42	1909	34.12½	27.30	29.76
1891	22.00	19.50	20.25	1910	38.75	31.75	34.27
1892	22.15	19.40	20.60	1911	48.50	37.60	42.68
1893	21.25	18.15	20.14	1912	51.05	42.05	46.43
1894	20.45	13.45	18.08	1913	51.00	36.75	44.32
1895	15.15	13.00	14.06	1914	65.00	28.50	35.70
1896	13.70	12.62½	13.24	1915	57.00	32.00	38.66
1897	14.12½	13.00	13.60	1916	56.00	37.50	43.48
1898	19.00	13.70	15.64	1917	86.00	42.50	61.65
1899	33.12½	19.87½	27.19	1918	110.00	70.00	86.80
1900	35.00	25.20	30.00	1919	72.50	52.75	65.54
1901	33.50	23.12½	26.94	1920	65.00	32.50	50.36
1902	30.62½	22.60	26.95	1921	32.11	25.66	28.58
1903	30.80	24.95	28.19	Average price for 41 years			31.03

During 1919, owing to Government restriction, the price of tin was held at around 72 cents, but by October it had dropped to 55 cents.

TITANIUM

Titanium is obtained from the two minerals; rutile, titanic oxide 60% titanium; and ilmenite or titanic iron, $FeOTiO_2$, with 31.6% titanium. The supply of rutile comes from Virginia, being mined by the American Rutile Co. at Roseland, Nelson county. Its output in 1919 was 102 tons of rutile, containing 95% oxide, and 106 tons of ilmenite, with 49% oxide. Beginning with 1919, ilmenite was recovered by the Titanium Alloy Mfg. Co. from beach sands at Pablo Beach, Fla, but no production figures were available for 1919. Total U. S. production for 1920 was 277 tons of rutile and 268 tons of ilmenite concentrates.

Rutile is used for making ferro-titanium, used in cast iron and steel, in electrodes for arc lamps, in dyeing leather and wool and in chemicals. A little ilmenite has been used in making ferro-titanium and arc lamp electrodes.

TUNGSTEN

Prior to 1914, the domestic output of this valuable metal, used mainly in tool-steel and incandescent lamps, varied from 1,100 to 1,800 tons of concentrate (carrying 60%WO_3) per annum, since when the yield has been as below:

Year	Tons	Per Unit	Total Value
1910	1,821	$7.62	$832,992
1911	1,139	5.97	407,985
1912	1,330	6.28	502.158
1913	1,537	7.30	672,118
1914	900	7.31	435,000
1915	2,332	29.33	4,100,000
1916	5,923	33.97	12,074,000
1917	6,144	18.40	6,783,000
1918	5,061	23.24	7,049,300
1919	330	18.02	357,000
1920	216	6.00	77,760

Wolframite, the most important tungsten ore, is obtained in Korea and in the United States. Extraction from the ore is comparatively simple. Metallic tungsten in the form of powder of various densities is obtained, which is formed into ingots by great hydraulic pressure—not by fusion. The melting point of tungsten is about 3350° C.; higher than that of any other known metal. From ingots to fine wire there are many steps, every one important, in the complicated process.

The tungsten filament has doubled the efficiency of incandescent lamps and provides a white light of far purer quality than any lamp heretofore known. It has provided new targets for X-ray tubes, phonograph needles 50 times as efficient as any that preceeded them, better ignition contacts for automobiles, and many other new articles and improvements of old ones.

URANIUM

As uranium is the source of radium, the production of uranium has already been given under radium. Uranium ores occur in many places in the United States, but are found in greatest abundance in the Paradox Valley region of Colorado and Utah.

Ore production in U. S. was 16,839 tons in 1918, 10,146 in 1919—compared with 18,125 in 1916 and 41,964 in 1915.

VANADIUM

Vanadium occurs with uranium in carnotite, the mineral of greatest commercial importance. When vanadium is 14% and uranium but 3% the

mineral is a dark olive green; when the uranium content is 20%, the mineral is a beautiful yellow. The ore is usually low-grade, 2 to 4%, but of widespread occurrence, the sandstone looking as if dusted with sulphur.

The Vanadium Corporation of America is said to control 92% of the world's vanadium supply. The demand is for vanadium steel, used in airplane construction, in automobiles, for military helmets, and wherever extreme strength and lightness are required. For the U. S. production of metallic vanadium see under radium.

The two principal producers are:

Standard Chemical Co., Pittsburgh, Pa.

Vanadium Corporation of America, Pittsburgh, Pa. Minas-ragra, Peru.

VANADIUM MINES

Vanadium Corporation at Minas-ragra, Peru, and Vanadium, San Miguel Co., Colo.

Shattuck-Arizona C. Co., Arizona, Standard Chemical Co., Colorado.

Production of metallic vanadium was 411 tons in U. S. and 689 in Peru in 1916; 432 in U. S. and 733 in Peru in 1917; 246 in U. S. and 209 in Peru in 1918; 221 in U. S. in 1919 and 1,000 tons for both countries in 1920.

ZINC (Spelter)

The United States is a large producer of zinc and contains several of the largest zinc mines in the world.

ZINC PRICES IN NEW YORK

Highest, lowest and average yearly prices of spelter in New York:

Year	Highest	Lowest	Average	Year	Highest	Lowest	Average
1885	4.62½c	4.00c	4.34c	1904	6.12½c	4.75c	5.17c
1886	4.60	4.25	4.40	1905	6.65	5.30	6.00
1887	5.62½	4.40	4.62½	1906	6.85	6.00	6.27½
1888	5.50	4.50	4.91	1907	7.25	4.35	6.20½
1889	5.40	4.62½	5.02	1908	5.17½	4.35	4.74
1890	6.17½	5.00	5.55	1909	6.50	4.75	5.52
1891	6.00	4.65	5.02	1910	6.35	5.25	5.66
1892	4.90	4.35	4.63	1911	7.00	5.50	5.91
1893	4.50	3.55	4.08	1912	7.65	6.45	7.11
1894	4.00	3.25	3.52	1913	7.35	5.10	5.80
1895	4.35	3.10	3.63	1914	6.20	4.75	5.30
1896	4.25	3.60	3.94	1915	27.50	5.70	14.44
1897	4.35	3.75	4.12	1916	21.17	8.37½	13.75
1898	5.30	3.87½	4.57	1917	11.05	7.67½	9.11
1899	7.00	4.45	5.75	1918	9.85	6.82½	8.31
1900	4.80	4.10	4.40	1919	9.30	6.35	7.39
1901	4.50	3.90	4.08½	1920	9.85	6.00	8.13
1902	5.62½	4.10	4.90	1921	5.93	4.69	5.15
1903	6.25	4.70	5.62	Average Price for 31 years,			6.08

From American Metal Market.

ANNUAL SMELTER PRODUCTION OF ZINC*
(In short tons)

Year	From Domestic Ore	Total	Year	From Foreign Ore	From Domestic Ore	Total
1873	7,343	7.343	1901	.....	140,822	140,822
1875	15,833	15,833	1902	.....	156,927	156,927
1880(Census)	23,239	23.239	1903	.....	159,219	159,219
1882	33,765	33.765	1904	.....	186,702	186,702
1883	36,872	36,872	1905	.....	203,849	203,849

ANNUAL SMELTER PRODUCTION OF ZINC—Continued

1884	38,544	38,544	1906	25,076	199,694	224,770
1885	40,688	40,688	1907	26,115	223,745	249,860
1886	42,641	42,641	1908	19,675	190,749	210,424
1887	50,340	50,340	1909	25,535	230,225	255,760
1888	55,903	55,903	1910	16,705	252,479	269,184
1889	58,860	58,860	1911	14,905	271,621	286,526
1890	63,683	63,683	1912	14,899	323,907	338,806
1891	80,873	80,873	1913	9,424	337,252	346,676
1892	87,260	87,260	1914	9,631	343,418	353,049
1893	78,832	78,832	1915	31,384	458,135	489,519
1894	75,328	75,328	1916	104,005	563,451	667,456
1895	89,686	89,686	1917	84,976	584,597	669,573
1896	81,499	81,499	1918	25,522	492,405	517,927
1897	99,980	99,980	1919	13,471	452,272	465,743
1898	115,399	115,399	1920	13,332	450,045	463,377
1899	129,051	129,051	1921	2,500	194,000	196,500
1900	123,886	123,886				

* U. S. Geological Survey.

CHAPTER IV

THE MINING COMPANIES AND MINES OF THE UNITED STATES

Those of other countries are in separate chapters. See alphabetical index in front of book.

The descriptions of the active and most of the inactive mining corporations, and operating mines of the various States are arranged by States. The arrangement permits ready identification of companies whose exact titles may often be difficult to recall and it enables the reader to tell what companies are operating in each state.

The descriptions of foreign mining companies are grouped under the name of each country, arranged alphabetically by countries and by companies.

UNITED STATES

A complete index in the front of the book makes quick reference possible if the name of the company is known.

The companies given under this general heading, operate properties in so many places that the descriptions cannot be properly given under any one State. References are, however, given in the appropriate places to the local holdings

ALUMINUM COMPANY OF AMERICA.

Offices: Oliver Bldg., Pittsburgh, Pa., and 120 Broadway, New York.

Officers: Arthur V. Davis, pres.; G. R. Gibbons, v. p.-sec.-asst. treas.; R. E. Withers, v. p.-treas.-asst. sec.; Roy A. Hunt, E. K. Davis, E. S. Fickes and C. H. Moritz, additional vice-presidents, Hy. K. Spalding, mgr. in New York.

Directors: Geo. H. Clapp, A. V. Davis, D. L. Gillespie, R. A. Hunt, Alvah K. Lawrie and R. B. Mellon.

Inc. 1888 in Pa., as the Pittsburgh Reduction Co.; name changed to present title, Jan. 1, 1907. Cap. authorized, $20,000,000; $100 par; outstanding, $18,729,600. Transfers made at company's Pittsburgh office. Annual meeting, 3rd Thursday in February.

Debentures : $12,000,000, 6% serial gold notes dated March 1, 1919, $4,000,000 maturing annually from March 1, 1921 to 1923 inclusive. These notes are a direct obligation of the company. Also $12,000,000, 5-year, 7% gold notes, due Nov. 1, 1925. Bankers Trust Co., New York, trustees. Proceeds are to retire current debts and for repayment of $4,000,000 6% notes maturing March 1, 1921. Also $18,000,000, 12- year, 7% bonds sold Sept. 30, 1921, to Guaranty Trust Co., New York, and Union Trust Co., Pittsburgh, proceeds to retire loans and increase working capital.

In a statement made by the president on Oct. 29, 1921, it was shown that in no year since 1915 have the company's earnings after payment of interest, taxes, etc., been less than $10,000,000; while in 1920 they were over that sum. In no year has more than $2,350,000 been paid as cash dividends.

On July 1, 1921, current assets exceeded liabilities by $18,000,000, including 1920 notes.

Company does not issue an annual report.

Dividends: 1906, 3⅓%; 1907, 11%; 1908, 1%; 1909, 2%; 1910-1913, 4% yearly: 1914, 6%; 1915, 6½%; 1916, 10%; 1917, 8%; 1918, 10%; 1919, 10%.

The St. Lawrence Securities Co. was formed in 1906 to take over St. Lawrence River Power Co., St. Lawrence Transmission Co. and 2 other companies, all at Massena, N. Y. On Nov. 1, 1915, acquired control of the Southern Aluminum Co. and organized the Tallassee Power Co., with $1,000,000 capital, to complete its unfinished hydro-electric and aluminum manufacturing plants at Badin, N. C. This company was controlled by French interests until the outbreak of the European war in 1914. The plants were to have cost upward of $10,000,000.

Also owns **Northern Aluminum Co., Demerara Bauxite Co.** (q. v.), of British Guiana, and U. S. Aluminum Co. Is reported to control Aluminum Manufacturers, Inc.

Property: Extensive bauxite deposits in Saline county, Ark., from which it secures most of its aluminum ore. About 6 tons of ore yields one ton of metal. Equipment at the property consists of crushing and drying machinery. The bauxite is shipped to a refining plant at East St. Louis, Ill., where the impurities are removed. There are also reduction works at Niagara Falls and Massena, N. Y., where there is also a wire and cable mill, at Maryville, Tenn., and at Badin, N. C. The company has a general fabricating plant at New Kensington, Pa., also a plant for the manufacture of aluminum bronze powder and aluminum foil. Also, there are rolling mills at Niagara Falls, N. Y. and Edgewater, N. J.

The Northern Aluminum Co. is a Canadian corporation, which has a reduction plant and wire mill at Shawinigan Falls, Que., and a fabricating plant at Toronto, Ont.

Production: about 80% of the total aluminum product of the U. S. which, in 1919 was about 130,000,000 lb. Annual capacity of all plants estimated at 175,000,000 lb.

In 1919, all of the bauxite used in America in the manufacture of aluminum, amounting to 272,270 tons, came from Arkansas, so probably this company consumed 220,000 tons. The average price for ore was $5.85 per long ton, and for aluminum 32.30c. per lb.

AMALGAMATED COPPER CO.

Company dissolved in 1916. Fully described in previous issues of this book. Vols. XI and XII.

AMERICAN FINANCE & SECURITIES CO. (THE)

Involuntary petition in bankruptcy filed June 22, 1915. Adjudicated bankrupt, May 15, 1916. Henry J. West, Camden, N. J., trustee. See Mines Handbook, Vol. XII.

AMERICAN METAL CO., LTD., THE

Home office: 61 Broadway, New York. Branch offices: Oliver Bldg., Pittsburgh, Pa.; Boatman's Bank Bldg., St. Louis, Mo.

Offices in foreign countries: care Marshall Bros. & Co., London; L. Lamy, 6 Ave. du Coq, Paris; Cia. de Minerales y Metales, S. A., Mexico City, and Monterrey, Chih., Mexico; Picart & Beer, 224 Rue Royale, Brussels, Belgium; The South American Metal Co., Valparaiso, Chile and Lima, Peru.

Officers: Berthold Hochschild, New York, Chairman of the Board; C. M. Loeb, pres.; Otto Sussman, Henry Bruére, Julius Loeb, Ludwig Vogelstein, and Harold K. Hochschild, v. p's.; Julian B. Beaty, sec.-treas.; with Julius Goldman, Henry V. Putzel, L. T. Haggin, E. H. Clark, J. P. Grier, Theo. Stanfield, and H. Bernstorff, directors. Moritz Roos, asst. treas.

Voting Trustees: Berthold Hochschild, J. P. Grier, Ludwig Vogelstein, John T. Morrow, J. F. Pauley, Direlle Chaney and Daniel J. Layton.

Inc. May, 1887, in New York, as producers, refiners, exporters, import-

ers and dealers in metals and chemicals. **Cap.** $25,000,000; $100 par; 140,000 shares issued, 70,000 being subscribed in June, 1920. The capital in 1891 was $200,000.

For an analysis of the ramifications and connections of this company, reference should be made to the report made by the Alien Property Custodian in April 1919. This includes the partnerships with Aron Hirsch & Sohn; Beer, Sondheimer & Co.; The Metallgesellschaft and Vogelstein & Co., the last-named being absorbed by American Metal Co. in December, 1919, thereby controlling the U. S. Metals Refining Co., which see below.

When the Alien Property Custodian seized the 34,644 shares of German-owned stock, these shares and all but 200 of the American held shares were put into a five-year voting trust. This voting trust does not include 16,736 shares formerly belonging to the old firm of H. R. Merton & Co., recently dissolved. The German-owned shares sold at public auction for $5,750.904, were bought by a syndicate, in which Ludwig Vogelstein acquired a 20% interest, making him one of the largest individual stockholders. The Cerro de Pasco Copper Corporation owns 4,500 shares; L. T. Haggin, 1,000; J. Horace Harding, 1,000; H C. Frick, est., 1,000; C. D. Barney, 1,200, and E. H. Clark, 1,500 shares.

The American Metal Co. owns or controls the following companies: **American Zinc & Chemical Co.**, Langeloth, Pa.; **U. S. Metals Refining Co.**, Chrome, N. J.; **Arkansas Zinc & Smelting Corp.**, Van Buren, Ark.; **Bartlesville Zinc Co.**, Bartlesville and Blackwell, Oklahoma; **Chanute Spelter Co.**, Joplin, Mo.; **International Metals Selling Co.**; **South American Metal Co.** of Chile, which in turn controls the **Fundicion de Guayacan**, at Guayacan, Chile; and **South American Co.** of Peru. Company also owns entire share capital of the **Cia. de Minerales y Metales, S. A.**, of Mexico, which in 1920 sold all mines, reduction works and railroads to **Cia. Minera de Penoles, S. A.**, and thereby become a holding company for Penoles shares, and for certain real estate and leases. All of the above corporations are described herein, either under their individual title, or under the controlling company, with such information concerning them as is obtainable.

Company also owns the **American Metal Transport Co.**, which in turn owns the So. American, No. American and Columbus Steamship companies and is associated with the Climax Molybdenum Co. (q. v.) of Colorado. Former subsidiaries, Metallurgical Co. of America and Ohio & Colorado Sm. & Ref. Co. have been dissolved. The latter's Salida smelter (q. v.) was acquired in 1920 by Everly M. Davis of the Chemical Industries Corp. The **Clarkesburg Clinkering Co.** and **International Metals Selling Co.** are to be dissolved: former discontinued operations in 1920, and the latter has been inactive for several years. At time of taking over interests of the U. S. Metals Rfg. Co., American Metal sold to U. S. S. R. & M. C., the Grasselli refinery at East Chicago, Ind.

Also among other investments, it owns ⅓ of the capital stock of the **Balbach S. & R. Co.**, and a substantial interest in Cerro de Pasco Copper Corp'n and Granby Cons. Mng., Sm. & Power Co., Anyox, B. C.

The corporation, through its subsidiaries and allied companies, owns or controls the following products, the average annual quantities produced being as indicated below:

Electrolytic copper, pounds	125,000,000	to	150,000,000
Zinc (Spelter), all grades, tons	75,000	"	100,000
Lead, bonded (Mexican), tons	60,000	"	75,000
Lead, domestic, tons	12,000	"	15,000
Sulphuric acid, tons	80,000	"	100,000
White arsenic, tons	4,000	"	6,000
Coal in Pennsylvania, tons	500,000	"	600,000
Coal in Mexico, tons	350,000	"	400,000
Silver, ounces	12,000,000	"	15,000,000
Zinc oxide (Polar and Arctic brands), tons	7,000	"	10,000

Zinc-dust (American extra pure and Zenith brands),	3,000	"	4,000
Antimonial lead, tons	1,000	"	1,500
Molybdenum concentrate, tons	500	"	1,000

In addition to its own production of metals, the company buys and sells metals in the open market and also contracts to take the entire output of various mines, smelters and refineries in the United States, Canada, Mexico and South America.

The company has contracts with large mines in North America calling for their entire production, totaling 159,000,000 lbs. of copper per annum. Copper received during 1918 from these and others amounted to 141,398,982 lb. Refineries in which the company has an interest, treated this metal. The entire yearly turnover of the company, in copper, is 250,000,000 lb. In 1920 a contract was made for the sale of Cerro de Pasco copper.

Contracts with zinc mines called for 546,919,000 lb of ore during the year ended June 30, 1917. This was treated at the company's smelters. In 2 years, ended June 30, 1917, the zinc ore purchased amounted to 1,700,000,000 lb., plus 585,000,000 lb. of spelter bought in the open market.

The lead turnover in 1917 was 168,000,000 lbs.

The growth of the company is indicated by the following statistics:

Total sales and net earnings of the corporation, after deducting all expenses, profit-sharing, taxes, fixed charges, etc., during the past 10 years, have been as follows (year ending July 1):

Year	Cap. Stk. Issued	Total Sales	Net Earnings	Year	Cap. Stk. Issued	Total Sales	Net Earnings
1909	$3,120,000	$64,274,040	$ 854,719	1919	7,000,000	29,268,252	330,004
1910	3,500,000	84,402,083	685,334	1918	7,000,000	106,166,089	832,157
1911	3,500,000	68,519,484	842,780	1917	7,000,000	149,216,409	2,892,387
1912	3,500,000	57,060,048	1,365,816	1916(b)	3,500,000	82,615,281	4,899,750
1913	3,500,000	79,243,602	1,001,895	1916(a)	3,500,000	153,796,848	7,638,336
1914	3,500,000	68,835,488	1,088,770	1915	$3,500,000	$68,468,179	$2,498,639

(a) Half year ending June 30.
(b) Half year ending Dec. 31.

Current assests at the end of June, 1919, amounted to $13,963,830, and current liabilities, $7,265,339.

The company's operating reports have hitherto been kept closely guarded, but a more liberal policy is apparently now to be followed. The company is really one of the few big metal companies of the world, and although its shares are closely held and not listed on any exchange, its operations are matters of great public importance.

United States Metals Refining Co.

Formerly owned by U. S. S. R. & M. Co., but control secured by American Metal Co., in Dec. 1919.

Officers: Ludwig Vogelstein, pres., F. Y. Robertson, v. p. and gen. mgr.; Otto Sussman, v. p.; J. B. Beaty, sec. treas., with J. A. Schloss, C. V. Drew, and A. G. Todd, directors. R. E. Empey, comptroller; J. A. Schloss, asst. sec.

Staff: R. W. Deacon, gen. supt.; B. B. Hood, asst.; supt.; F. R. Pyne, asst. plant supt.; C. L. Colbert, smelter supt.; M. A. Koechert, production supt.; J. C. Clark, supt. of silver refinery; August Marks, supt. of casting dept. C. E. Smith, purch. agt.

Inc. Nov. 16, 1903, in New Jersey. **Cap.** $2,000,000 7% cumulative pfd. and $2,000,000 com., both $100 par value. 15,500 shares of each kind are issued, all owned by Am. Metal So., except 1,400 pfd. shares. Annual meeting, 2nd Tuesday in May.

Works: the U. S. M. R. Co. owns electrolytic copper refinery, having

a capacity of refining 240,000,000lb of copper annually, a copper smelter, consisting of two blast-furnaces, with an annual capacity of smelting 200,000 tons of charge. The copper smelter purchases its ores under long contracts with mines in Canada, Spain, Cuba, and the western coast of South America; and consequently is assured a long life, as it is not dependent on any one mine. The refinery enters into long time contracts for the refining of other copper besides that produced by the U. S. S. R. & M. Co. These two plants are located on 159 acres of ground at Chrome, N. J.. This property is at tide water, permitting ocean going steamers to discharge direct into the plant and is also connected with the Central Railroad of New Jersey.

The **smelter** has two 42x186" blast furnaces, 3 converter stands using 84x120" basic lined converters, two 60x6' rotary kilns sintering fine material, and one Dwight-Lloyd sintering machine. The smelter is further equipped with a 500' steamship dock, with berth for 2 steamers, the most modern type of Fairbank scales, having a sensitiveness of 10 lb. on a load of 200,000 lbs., and a very complete automatic sampling mill equipped with Brunton samplers.

The **refinery** has two 225-ton and two 175-ton anode furnaces and three 225-ton wire-bar furnaces, equipped with charging cranes, casting wheels, waste heat boilers and the most modern devices for mechanical handling. The tank house has 1,228 tanks arranged on the Walker system. The weighing is done on tandem Fairbanks scales, sensitive to 1 lb. in 15,000 lbs.

The power house is steam-driven and arranged for highest economy with economizer and superheater equipment, 3 compound condensing units and 2 triple expansion units, using exhaust steam turbines for the third expansion. Current is generated at the rate of 11,000 amperes. Three circuits are carried in the tank house with a voltage of 115 volts each, 1 power unit being carried in reserve.

The anode slimes are refined by the usual processes, the doré bullion produced being parted electrolytically. Some of the rarer elements are recovered as by-products. A Cottrell plant is used to precipitate fumes from the silver refinery.

A new $100,000 laboratory with the most modern equipment completed in 1917, is described in the "Eng. & Min. Jour." of March 9, 1918.

The plants of the United States Metals Refining Co. are strictly modern in design and equipment and are noted for the technical excellence of their practice and the purity of their commercial products.

Arkansas Zinc & Smelting Corp.

American Metal owns 85% of common, and has under contract about the same percentage of pfd. stock.

Operates a zinc smelter 1 mile E. of Van Buren, between St. L., I. M. & S. R. R. and St. L. and San F. R. R. Plant includes ore storage bins of 4,000 tons capacity, weighing apparatus, 2 Ropp type kilns of 20 to 25 ton daily capacity, crusher and mixing house, sampler, 4 blocks of 800 retorts each, pottery, electric power plant, and necessary buildings.

The ore and concentrate supply for this plant comes from northern Arkansas and Oklahoma mines.

AMERICAN SMELTING & REFINING CO.

Gen. Offices: 120 Broadway, New York; Corporate office: 15 Exchange Place, Jersey City, N. J.; City of Mexico office: Edificio 'La Mutua' Despacho No. 200, Mexico, D. F. Valparaiso office: Casilia 12, Valparaiso, Chile.

General Officers: Simon Guggenheim, pres.; F. H. Brownell, William Loeb, Jr., H. A. Guess and H. A. Prosser, v. p.'s; R. W. Straus, asst. to pres.; J. C. Emison, treas.; F. W. Hills, compt.; L. A. Chapin, asst. compt.-asst. treas.; W. E. Merriss, sec.; Chas. Earl, asst. sec.; R. P. Reese, aud.

Directors: E. L. Newhouse, chrm.; Daniel and Simon Guggenheim, G. P. Bartholomew, F. H. Brownell, H. M. Brush, Lyman Candee, Merrel P. Callaway, Chas. Earl, J. C. Emison, H. A. Guess, F. W. Hills, E. C.

Jameson, Benj. Joy, F. Y. Leary, Wm. Loeb, Jr., W. S. McCornic, W. S. Morse W. T. Page, H. A. Prosser, F. R. Raiff, C. A. H. de Saulles, E. B. Schley, Wilfred Shore, John N. Steele, R. W. Straus, and Fred T. Walker.

Executive Committee: Simon Guggenheim, chrm.; Chas. Earl, F. W. Hills, Wm. Loeb, Jr., E. L. Newhouse, H. A. Prosser, F. H. Brownell, H. A. Guess, C. A. H. de Saulles, R. W. Straus, H. M. Brush, L. Candee, J. C. Emison, E. C. Jameson, F. R. Raiff, W. Shore and F. T. Walker.

Finance Committee: F. H. Brownell, chrm.; Simon Guggenheim, E. L. Newhouse, M. P. Calaway, J. C. Emison, Benj. Joy and F. J. Leary.

Operating Officials.

Metal sales: H. M. Brush, mgr.; L. Nachmann, asst. mgr.; E. A. Behr, lead and tin sales agt.; W. E. Merriss, silver sales agt.

Smelting and Refining Department—United States: H. H. Alexander and L. G. Eakins, cons. mets.; C. A. H. de Saulles, in charge of zinc operations.

Smelting Department—Mexico and South America: H. A. Prosser, v. p.; C. L. Baker, gen. mgr. and J. R. Woodul, asst. gen. mgr., Mex. Dept., El Paso, Texas; R. E. Mora, gen. rep., City of Mexico; J. P. Chadwick, rep. in Chile, Antofagasta, Chile.

Mining Department: H. A. Guess, v. p.; W. M. Drury, mgr., Mex. Mng. Dept., El Paso, Texas; J. Kruttschnitt, mgr. Southwestern Dept., Tucson, Ariz.

Coal Mining Department: G. P. Bartholomew, mgr.

Financial Department: Francis H. Brownell, v. p.; Frank W. Hills, compt.; John C. Emison, treas.; Lucius A. Chapin, asst. compt.-asst. treas.

Legal Department: John N. Steele, cons. counsel; Francis H. Brownell, v. p.; Charles Earl, gen. counsel; Rafael Pardo, Mexican counsel, City of Mexico.

Labor, Safety and Welfare Department: William Loeb, Jr., man. dir.; J. F. Belford, sec.

Traffic Department: F. R. Raiff, mgr.; G. H. Cole, asst. mgr.

Purchasing Department: Edgar R. Reets, dir. of pur.

Engineering Department: Herbert W. York, cons. engr.

Insurance Department: Samuel Metzger, mgr.

Foreign representatives: Geo. T. Ewart, fin. agt., El Paso, Texas; R. E. Mora, gen. rep., and W. A. Price, asst. treas. for Mexico.

On January 15, 1919, Murry Guggenheim and S. R. Guggenheim retired from the directorate, after 18 years' active participation in the company's varied operations. Since 1901, when they became connected with the company, the annual turn-over increased from $82,000,000 to $390,000,000, and the profit and loss account from $2,900,000 to $27,000,000.

Incorporated. April 4, 1899, in New Jersey. **Cap.,** $115,000,000, with $65,000,000 common and $50,000,000 cumulative 7% preferred stock, $100 par. Original capitalization was $54,600,000, increased to $100,000,000 and again increased Jan., 1911, by $15,000,000 common stock authorized to exchange for 6% debenture bonds of American Smelters Securities Co.. Annual meeting, first Wednesday in April. Has about 19,000 shareholders.

Sales on N. Y. Stock Exchange in 1920 were 761,050 com., range from $72 in January to $29¼ in December; 78,025 pfd., range from $100¼ in January to $64½ in December, and $6,482,000 first 5s, range from $86½ in January to $70 in December. In 1921 to November, range of common was $44¾ to $29⅝ and of pfd., $83 to $63¼.

Transfer agt., D. A. Crockett, 140 Broadway, New York; registrar, Chase National Bank, New York.

The A. S. & R. Co. owns all the common stock of the American Smelters Securities Co. and, $35,000,000, 90% of pfd. B and 35% of pfd. A. This was acquired by giving its 1st mtge. 5% bonds in exchange for the series B,

5% preferred stock of the Securities Co., par for par. The 5% cumulative preferred stock, series B, of the Securities Co. is guaranteed by the Smelting Co., both as to interest and principal, and is, therefore, an obligation of the Smelting Co., prior to its preferred stock.

The company owns also the entire capital stock of the **Cons. Kansas City Sm. & Ref Co.** with reduction works at El Paso, Texas; **United States Zinc Co.** with the zinc smelters at Sand Springs, Henryetta, Okla, and at Pueblo, Colo., and a lease on one at Kusa, Okla.; **National Metallurgical Co.** (Cia. Metalurgica Nacional) holding title to the Tiro General Mines and Matehuala Smelter, both in Mexico; and **Soc. de Minas Y Fundiciones de Carrizal,** of Chile. It owns also an equal interest with the Utah Copper Co. in the **Garfield Chemical & Mfg. Corp.** Through Am. Sm. Sec. Co., it owns the **Federal Lead Co., Baltimore Copper Sm. & Rolling Co.,** and **Garfield Sm. Co.**; the smelting plants at Tacoma and Selby; the Velardena, Tecolotes, Veta Colorado, Veta Grande mines, and the Asarco smelter, in Mexico. Through the same source, it holds controlling interest in the Western Mng. Co., of Colorado, and Dairy Farm Mng. Co., of California. Many of these subsidiaries, or their plants, are separately described.

The United Sm. & Rfg. Co. and San Juan Sm. & Rfg. Co., former subsidiaries, have been dissolved.

In Feb., 1921, the A. S. & R. Co. took a 5% interest, $2,000,000 total amount, in the $40,000,000—8% note issue of the Copper Export Association.

The following financial statements cover both **A. S. & R. Co.** and **A. S. S. Co.**:

Consolidated Income Account

	1920	1919	1918
Net earnings, smelters, etc.....	$11,933,494	$11,569,384	$13,234,711
Net earnings, mining properties	2,242,199	1,816,869	2,686,840
Other income, net	1,572,022	1,309,489	2,390,017
Gross income	$15,747,715	$14,695,742	$18,311,568

Charges Against Gross Income

	1920	1919	1918
Administ., research, exam., exp.....	$1,478,637	$1,016,452	$1,305,934
Corporate taxes	979,459	814,276	1,252,356
Interest, amort., discount bonds....	1,663,970	1,617,363	1,616,109
Deprec., deplet., ore res.....	4,465,229	5,201,980	5,439,631
Appropriation, bonus, pension	.....	.....	250,000
Miscellaneous	485,642	450,087	740,038
Total charges	$9,072,937	$9,100,158	$10,604,068
Net Income	$6,674,779	$5,595,585	$7,707,500
Dividends on pfd. stock	4,222,137	4,241,322	4,247,774
Balance	$2,452,642	$1,354,263	$3,459,726
Dividends on com. stock	2,439,920	2,439,920	3,354,890
Balance transferred to surplus†	$12,722	$1,085,657	$104,834
Previous surplus	25,974,571	27,060,229	26,955,394
Profit and loss surplus	$25,987,293	$25,974,572	$27,060,228

† Deficit .....

The semi-annual income account for June 30, 1921, shows profit of $1,001,838 before depreciation and depletion; and a net deficit of $1,100,298 after paying pfd. dividends.

Consolidated General Balance Sheet

ASSETS

Year	Property	Investments	Net Value Metal stocks	Working Assets	Current Assets	Special Funds	Total
1920.....	$131,225,157	$1,786,256	$53,814,012	$8,531,009	$17,615,973	$1,366,104	$214,338,511
1919.....	131,364,898	1,826,615	48,761,108	7,128,342	24,302,924	1,367,513	215,251,400
1918.....	133,245,835	1,742,604	40,921,155	9,070,477	35,530,676	1,369,338	221,886,085
1917.....	136,797,476	1,057,313	36,339,500	8,009,234	32,280,808	1,373,423	221,857,754
1916.....	141,165,684	827,277	27,477,650	4,601,312	42,430,207	823,003	217,325,133
1915.....	141,442,998	638		3,312,877	31,147,388	1,654,559	201,816,351

Current assets and special funds are mostly cash; working assets are mostly supplies.

LIABILITIES

Year	Pfd.Stock Outstanding	Com.Stock Outstanding	Bonds Outstanding	Current Liabilities	Res. & Sus. Acc't.	P. & L. Surplus	Total
1920...	$62,300,000	$60,998,000	$32,574,700	$26,372,710	$6,105,808	$25,987,293	$214,338,511
1919...	62,748,000	60,998,000	33,046,600	25,705,580	6,778,649	25,974,571	215,251
1918...	63,175,000	60,998,000	31,961,700	30,654,731	8,036,324	27,060,228	221,886,085
1917...	63,674,800	60,998,000	31,881,400	27,694,865	10,653,294	26,955,395	221,857,754
1916...	96,458,800	54,299,000	6,699,000	27,468,288	8,957,750	23,442,295	217,325,133
1915...	96,649,800	50,108,000	12,612,500	16,750,117	6,135,497	19,560,339	201,816,351

Current liabilities are mostly accounts payable, and dividends payable.

Profit and loss surplus on June 30, 1921, was $22,783,326.

Dividends—Common Shares:

Year	%	Year	%	Year	%
1920.....	4	1915.....	4	1909.....	4
1919.....	4	1914.....	4	1908.....	5
1918.....	6	1913.....	4	1907	7½
1917.....	7	1912.....	4	1906.....	7
1916.....	6½	1911.....	4	1905.....	5½
		1910.....	4	1904.....	5

Preferred shares received 7% per annum from Oct., 1899, up to the current year. In 1900, an additional ⅞ of 1% was paid to cover the period of April 11 to 30, 1899.

Volume of Business

Receipts

	1920	1919	1918
Balance from previous year: Cash, loans, Liberty bonds	$10,766,336	$18,491,022	$18,320,968
Sales of metals	266,033,368	225,107,151	360,060,487
From mining profits.....	11,737,192	7,682,394	10,117,969
From manufactured products	12,519,497	8,255,465	14,006,145
Miscellaneous	1,572,022	1,309,489	2,390,017
Bankers' accep., special funds, dec. net current, assets, etc	5,590,280	1,488,865	5,426,537
Total cash to be accounted for	$308,218,695	$262,334,389	$410,322,123

Payments

For ore and bullion purchased, expenses, taxes	$285,984,935	$235,675,447	$376,970,009
Expended on property, net.....	3,850,064	5,234,665	4,887,990
For investments acquired, etc., net	272,042	281,051	325,569
For A. S. C. Co. pfd. stock bought, net	147,900	138,400	129,400
A. S. & R. bonds purchased, interest, etc.....	2,435,970	2,111,163	1,915,469
Dividends paid	6,662,057	6,681,242	7,602,664
Bankers' accep., inc. in net assets, advances	1,425,527	1,446,084	.....
Balance at end of year: Cash and Liberty bonds	7,440,200	10,766,336	18,491,022
Total	$308,218,695	$262,334,389	$410,322,123

Operating Statistics

	1920	1919	1918	1917
Men employed, excluding Mexico and S. A.	13,300	13,939	21,765	24,698
Total wages and salaries, exclud. Mexico and S. A.	$20,164,508	$18,146,548	$25,516,467	$24,497,836
Average per 8-hour day	$5.04	$4.34	$3.91	$3.31
Charge smelted, tons	505,535	545,782	680,099	706,875
Bullion refined, tons	4,050,751	3,835,864	5,658,232	5,918,924
Coal used, tons	499,713	582,083	765,124	787,890
Coke used, tons	394,014	397,729	545,063	592,765
Fuel-oil used, bbls.	1,294,299	915,892	1,659,337	1,560,535
Gas used, cubic ft.	2,674,177,277	1,295,870,403	2,372,000,103	3,032,908,373
Ore mined, tons	2,311,946	1,735,046	2,525,280	2,318,925
Coal mined, tons	59,424	163,978	168,140	259,499
Coke produced, tons	181,664	94,236	171,245	186,107

Metal Products

Gold, oz.	1,849,048	2,191,041	1,994,015	2,496,693
Silver, oz.	77,732,911	78,200,298	72,572,506	69,841,061
Platinum and paladium, oz.	936	1,824	1,516	1,597
Lead, tons	205,249	208,439	260,192	275,266
Copper, lb.	590,850,000	705,676,000	868,540,000	916,974,000
Spelter, lb.	44,106,253	33,375,301	41,238,000	52,522,000
Nickel, lb.	375,167	662,637	626,085	682,715
Tin, lb.	18,511,160	15,340,000	19,868,000	12,130,000
Sulphuric acid, lb	51,688,000	40,362,000	87,338,000	66,174,000
Arsenic, lb.	17,695,266	9,359,541	7,837,063	9,132,000
Copper sulphate, lb.	3,618,172	3,675,499	5,164,000	7,598,000
By-product metals lb	1,549,426	884,438	1,870,662	4,131,709
Copper and brass mfd., lb.	.....	.....	.....	39,767,274
Test lead and lithargе sold, lb.	.....	.....	.....	426,472
Loaded cartridges sold, number	.....	.....	.....	14,180,000
Sheet lead, pipe, etc., sold, lb.	.....	.....	.....	13,678,245
Mixed metals sold, lb	.....	.....	.....	5,188,045
Sulphur dioxide, lb.	8,154,734	4,988,000	.....	.....

The business of the company is so varied that it almost defies analysis, save by a certified accountant. It mines gold, silver, copper, lead, zinc ores and coal. It smelts its own ores of all these metals, and also most of the ore produced by the lesser mines of America. It refines not only these five metals, but manufactures them into copper sheets, rods, tubes, etc., at Baltimore; makes white lead, sheet lead, etc., at Selby; zinc white, etc., at its zinc smelters; sulphuric acid at Perth Amboy, N. J., and Garfield, Utah, and coke at its mines. It refines and sells bismuth, cadmium, arsenic, nickel and platinum, palladium and selenium largely from the slime of its electrolytic refineries, and makes blue vitriol; also smelts tin ore and concentrate from Bolivia.

It owns and operates over 30 mines in Mexico and a number of railways under the title of the Mine Lines of Mexico, and the Mexican Union R. R., and owns and operates the following smelting plants, etc.

Lead Smelters

Plant	Location	Manager	Superintendent	Furnaces	(c) Tons
Pueblo	Pueblo, Colo.	F. C. Gilbert	F. G. Hills	7	1,300
Durango	Durango, Colo.	F. C. Gilbert	R. P. Raynolds	4	700
Ark. Valley	Leadville, Colo.	F. C. Gilbert	Edw. P. Chapman	8	1,700
Murray	Murray, Utah.	J. M. Bidwell	W. W. Norton	8	1,900
East Helena	East Helena, Mont.	C. W. Adams	R. L. Strobel	4	1,100
Perth Amboy	Maurer, N. J.	J. F. Austin	G. G. Griswold	4	600
Omaha	Omaha, Neb.	R. F. McElvenny	W. P. Olds	2	270
El Paso	El Paso, Texas.	Kuno Doerr	N. A. Ferguson	6	1,300
Selby	San Francisco, Cal.	E. B. Braden	C. A. Thomas	3	400
Federal	Federal, Ill.	Rudolph Porter	O. Ohnsorg	14	560
Monterrey	Monterrey, Mex.	C. L. Baker	L. B. Harrison	7	1,300
Chihuahua	Chihuahua, Mex.	C. L. Baker	J. R. Enlow	7	1,300
Asarco	Velardena, Mex.	C. L. Baker	G. P. Robinson	3	500

Copper Smelters

					(c)
Durango	Durango, Colo.	F. C. Gilbert	R. P. Raynolds	..	
Garfield	Garfield, Utah.	J. M. Bidwell	A. H. Richards	4 (a) 7 (b)	7,000
Perth Amboy	Maurer, N. J.	J. F. Austin	.....	1	300
Omaha	Omaha, Neb.	R. F. McElvenny	.....	(e)	....
El Paso	El Paso, Texas.	Kuno Doerr	N. A. Ferguson	4 (a)	4,000
Hayden	Hayden, Ariz.	Kuno Doerr	H. A. Eye	4 (b)	1,900
Tacoma	Tacoma, Wash.	H. Y. Walker	R. F. Barker	3 (a) 1 (b)	2,500
Aguascalientes	Aguascalientes, Mex	C. L. Baker	F. H. Peyton	6	1,600
Matehuala	Matehuala, Mex.	C. L. Baker	R. T. Wilder	4	1,300
Asarco	Velardena, Mex.	C. L. Baker	G. P. Robinson	3	750
Carrizal (d)	Carrizal, Chile.	J. P. Chadwick	.....	..	....
Caldera (d)	Caldera, Chile.	J. P. Chadwick	.....	..	....

Zinc Smelters

				(f)	
Blende	Pueblo, Colo.	F. C. Gilbert	J. D. Thomas	2,320	....
Sand Springs	Sand Springs, Okla.	F. P. Lannon, Jr.	.....	5,936	....
Henryetta	Henryetta, Okla.	.....	C. E. Gregg	3,200	....
Kusa (g)	Kusa, Okla.	.....	C. W. Morrison	5,360	....

(a) Blast furnaces. (b) Reverberatories. (c) Daily capacity. (d) Not operating in 1920. (e) Has converters only. (f) Retorts. (g) Under lease to U. S. Zinc Co. from Kusa Spelter Co.

Tin Smelters

		Yearly Cap.
Perth Amboy	Maurer, N. J.	18,000 tons

Refining Plants

Plant—		Yearly Cap. Gold Oz.	Silver Oz.	Lead Tons	Copper Tons
Omaha	Omaha, Neb. W. P. McElvenny, mgr.; E. B. Lefferts, supt.	500,000	36,000,000	180,000	.....
Perth Amboy	Maurer, N. J. J. F. Austin, gen. mgr.; G. Griswold, supt.	500,000	48,000,000	108,000	120,000
Selby	Selby, Calif. E. B. Braden, gen. mgr.; C. A. Thomas, mgr.	2,400,000	18,000,000	36,000	.....
Baltimore	Baltimore, Md. W. H. Peirce, gen. mgr.; C. N. Sappington, supt.	300,000	30,000,000	.....	360,000
Tacoma	Tacoma, Wash. H. Y. Walker, mgr.; R. F. Barker, supt.	.....	.....	.....	102,000

The smelting and refining capacity of the company is equal to 1,175,000,000 lb of electrolytic copper per annum.

The Globe plant at Denver, Colo., produces refined arsenic and cadmium; the Tacoma and Omaha plants produce arsenic and bismuth, respectively. The Sasco smelter at Sasco, Ariz., was dismantled in 1920. The more important smelters are described under individual titles.

The Mining Properties.

The company's mineral holdings are widespread, covering both American continents, but Mexico has been its particular field of operations, the mines owned or controlled in that country having a possible productive capacity of 2,500,000 tons of ore per annum. The mines owned by the company, and operating 1920-21, follow:

Mine	Location	Metal	Mgr. or Supt.
Federal Lead	Flat River, Missouri.	Lead	H. G. Washburn
Dolores	Matehuala, S.L. P., Mex.	Copper	E. E. Reyer
Bonanza	Bonanza, Zac., Mex.	Lead	M. P. Wylie
Sta. Eulalia	Sta. Eulalia, Chih., Mex.	Silver, Lead, Zinc	W. J. Deavitt
Tecolotes	Sta. Barbara, Chih., Mex.	Silver, Lead, Zinc	W. P. Schumacher
Veta Grande & Veta Colorado	Parral, Chih., Mex.	Silver	Bernard MacDonald
Velardena	Velardena, Dgo., Mex.	Silver, Lead, Copper	R. E. Adams
Durango	Durango, Dgo., Mex.	Iron	R. E. Adams
Sierra Mojada	Sierra Mojada, Coah., Mex.	Silver, Copper, Lead	W. B. Gates
Tiro General	Charcas, S. L. P., Mex.	Silver, Copper	S. H. Sherman

Operating mines leased, or owned in part, but managed by the A. S. & R. Co.

Mine	Location	Metal	Manager
Yak	Leadville, Colo.	Silver, Lead, Zinc	E. L. Hartwell
Premier	Stewart, B. C., Can.	Silver, Gold	D. L. Pitt
Jesus Maria (a)	Sierra Mojada, Coah., Mex.	.....	W. B. Gates
Angangueo	Angangueo, Mich., Mex.	Silver	A. W. Edelen

(a) Under lease from Negociacion Minera da Jesus Maria, S. A.

Mines owned or controlled by the A. S. & R. Co., but not operating 1920-21:

Mine	Location	Metal
Orizaba, etc.	Magistral, Chih., Mex.	.....
Prieta, etc.	Calera, Chih., Mex.	.....
La Luz, etc.	Cordero, Chih., Mex.	.....
Sta. Francisca	Asientos, Ags., Mex.	Copper
Guadalupe	Parral, Chih., Mex.	.....
Imperial	Silver Bell, Ariz.	Copper
Aspen	Silverton, Colo.	.....
Silver Lake	Silverton. Colo.	Silver, lead
Douglas	Blue Hill, Maine	Copper

The Tecolotes, Velardena and Veta Colorado are all equipped with mills, the latter having perhaps the largest cyanide plant in Chihuahua. The Yak, Premier, Federal Lead and Dolores are more completely described under their respective titles, as are a number of the non-operating mines.

Company owns also 5 coal mines, situated in Colorado and Washington and in Mexico.

American Smelters Securities Co.'s properties and those of all other subsidiaries are included in the above.

The Federal Smelter is supplied with ores principally from the company's mining operations in southeast Missouri. At present the output of ore is, roughly speaking, 1,500,000 tons per annum, which is concentrated into approximately 75,000 tons of concentrates, containing about 60,000 tons of lead. About $750,000 has been spent in enlarging the milling and smelting works, and extending the development of the company's mines in Missouri.

The installation of an electrolytic zinc plant at the Murray, Utah, smelter, and construction of a 200-ton sulphuric acid plant, using the chamber process, at Garfield, Utah, show that the company is still in the fore in its metallurgical practice.

None of the Mexican smelters were operated during 1916. In the first half of 1917, the Aguascalientes, Matehuala, and Monterrey plants were started, continuing through 1918. Four out of the five were in blast early in 1919, and were sufficient to smelt the product of the mines listed above ex-

cepting copper ores at Chihuahua. By August, 1919, all smelters were in blast and continued so throughout 1920 at about 90% capacity, but early in 1921, two Mexican plants were closed down for the remainder of the year, the other continuing on a curtailed basis. In the United States the smelting situation during 1920-21 was far less satisfactory largely because of the depressed copper market; and by mid-1921, the company's operations were about 40% of normal.

The company, during 1916, entered the mining and smelting business in Chile and bought the Caldera smelter including many mines—imperfectly developed—and the stock of the Carrizal smelter.

The American Smelting & Refining Co. is the largest general smelting and metallurgical enterprise in the world. The company will continue to expand and prosper because of its superior metallurgical and business ability, backed by large and modern works and adequate capital.

In 1917 the company suffered from the entire lack of economic law, as the value of its metal products were fixed by the Government, while the cost of labor and supplies mounted high, the latter from 50 to 150% above normal. In 1918, the company obtained no direct advantage from the increased value of the metals, and, on account of the complexities of the ore and metal markets, a conservative program had to be maintained, so that dividends were not increased beyond 6%. The high costs of smelting and refining have been discouraging, but these items have lately been lowered; and although pre-war costs may never be realized again, the directors expect that pre-war profits per ton of ore smelted will obtain as soon as normal business is resumed. In 1919, the business was affected seriously by (1) less ore for smelters and metal for refineries; (2) lack of demand for metals locked up in company's liquid capital; and (3) the burden of long-time contracts.

The company is keen on safety and welfare work among employees. The accident rate for 1919 was 19% less than in 1918, which itself was 28% less than in 1917.

The company is a dominating factor in the lead business of the United States, handling nearly 50% of the domestic output of primary lead. The company practically makes the price of lead, the St. Joseph Lead Co. being the only other concern that makes an independent price. The company's policy is to make exclusive contracts for the smelting of lead ores. In April, 1918, a bitter dispute over smelting contracts with the Bunker Hill & Sullivan company was settled out of court, after the B. H. & S. company had erected a large smelter at Kellogg, Idaho.

The A. S. & R. Co. also smelts a great deal of custom copper ores in various States, but many mine-owners protest against its methods of payment, especially when the market is erratic. On Jan. 1, 1921, the company discontinued marketing the copper of other companies treated in its refineries, this being undertaken by the new firm of Guggenheim Bros., which see.

For some time there have been rumors of internal dissension among the directorate and others of the A. S. & R. Co. In May, 1920, Karl Eilers, Sr., vice president, dropped out of the directorate. In December he was granted permission, by the Supreme Court of New York, to examine and copy the list of shareholders, in order to circularize them and obtain sufficient backing to overthrow the present management by the Guggenheims. Mr. Eilers alleges that the company is losing money by selling copper for future delivery; it should sell all metals as fast as refined; copper has been withheld from sale in a falling market; at least $5,000,000 was lost to stockholders of the Braden, Chile, Chino, Kennecott, Nevada, Ray and Utah companies by this practice; in April, 1920, the A. S. & R. had 1,600,000 tons of copper on hand; and other charges were made. To these allegations Simon Guggenheim made a general denial. In Jan., 1921, the A. S. & R. Co.'s statement to shareholders repudiated the use of the word 'gambling' in copper in Mr. Eiler's charges; claimed 'marketing' as the correct term.

The management claims it has been faithful to the interests of shareholders, and that the influence and value of services of the Messrs. Guggenheim has been coincident with the great growth and signal success of the corporate enterprise. The statement was signed by all of the directors. On Jan. 6, 1921, Mr. Eilers addressed a letter to fellow stockholders, urging that a board of directors be elected at the annual meeting, April 6, whose interests will be only those of the A. S. & R. Co. When the Guggenheims first joined the company, their interest was about thirty-five millions; now it is only about one-tenth of that sum. Mr. Eilers also mentioned that the selling agency of seven of the largest copper producers had recently been transferred to Guggenheim Bros., Inc., thus depriving the A. S. & R. Co. of up to $1,000,000 per annum in commissions. At the annual meeting, the Guggenheim management was endorsed by a vote of 3 to 1.

Apart from the Eilers-Guggenheim controversy, an impartial committee was formed in March, 1921, by a large number of stockholders to investigate the management and affairs of the company. This committee, with Ernest Sturm as secretary, at 80 Maiden Lane, N. Y. City, is composed of Henry Evans, Chrm.; Clarence H. Kelsey, Henry K. Pomroy, Willis D. Wood and Henry Whiton. In a published statement, the committee mentions the following as among the matters which need investigation: (a) that practically the entire directorate draw salaries from the company, (b) that those in control are interested in conflicting or competing companies, and (c) that the selling agency has been transferred to Guggenheim Bros. without consideration to the company.

American Smelters Securities Co. United States & Mexico.

Office: 120 Broadway, New York.

The directorate and executive committee are nearly the same as those of the A. S. &. R. Co.

Inc. March 25, 1905, in New Jersey, and name changed to present title, May, 1905. **Cap.** $65,000,000 reduced in 1919 from $77,000,000; $100 par; in $17,000,000 Series A cumulative 6% pfd. stock; outsanding. Jan. 1, 1921, $9,451,800; $30,000,000 series B cum., 5% pfd. stock; $2,848,200 outstanding, and $18,000,000 (reduced from $30,000,0000) com. stock, all outstanding. Series A has preference as to dividends, and both preference series have equal rights as to assets, both having priority rights to assets and dividends over common stock. A sinking fund, started July 1, 1914, provides for the calling each year of 1% of the original $17,000,000 preferred A shares outstanding, and an additional sum equal to 6% of the aggregate amount of the issue previously retired. Financial statement is consolidated with that of the A. S. & R. Co.

Company owns, in fee, mines in different districts in Mexico, and copper and lead smelting and refining plants in the United States. It also owns all or a controlling part of the stock of a number of subsidiary companies. These mines, smelting plants and subsidiaries are noted under A. S. & R. Co.

For economic reasons, the A. S. & R. Co. is apparently endeavoring to absorb the A. S. S. Co., of which it already owns the entire common stock, 90% of pfd. "B" and 40% of pfd. "A"; to this end pfd. "A" stockholders are given the opportunity to exchange stock for A. S. & R. Co. 1st mortgage 5% bonds on a par for par basis.

AMERICAN ZINC, LEAD AND SMELTING CO.

General Offices. 55 Congress St., Boston, Mass. Sales office: 120 Broadway, New York. Operating office: 1012 Pierce Bldg., St. Louis, Mo. Corporate office: 85 Exchange St., Portland, Maine, H. P. Sweetser, clerk.

Officers: C. W. Baker, chairman of directors; W. A. Ogg, pres.; L. A. Coolidge, C. A. Hight, P. E. Coyle, W. F. Rossman and H. A. Wentworth, v. p.'s; H. L. Smith, v. p.-compt.; F. W. Batchelder, sec.-treas.; M. A. Donovan, asst. sec.-treas.; A. W. Dod, mgr of sales; L. E. Wemple, mgr. oxide

dept.; H. I. Young, mgr. of mines; W. E. Wampler, mgr. Missouri mines; C. B. Strachan, supt. Tennessee mines.

Directors: term expires 1921—C. W. Baker, W. H. Coolidge, J. N. Lovell, F. W. Batchelder, and C. D. Spalding. Term expires 1922—L. A. Coolidge, B. P. Bole, C. A. Hight, F. H. Goff, and H. S. Kimball. Term expires 1923—E. P. Brown, E. A. Clark, G. L. Stone, and W. A. Ogg.

Inc. Jan. 26, 1899, in Maine. **Cap.** $500,000; $25 par; increased on April 22, 1889, to $2,500,000; on October 16, 1906, decreased to $1,250,000; on December 18, 1906, increased to $3,750,000; on April 10, 1912, increased to $7,500,000; outstanding December 31, 1915, $4,828,000. At the annual meeting in April, 1916, the authorized capital stock consisting of $7,500,000, divided into 300,000 shares of the par value of $25, was classified as follows: 100,000 of the authorized shares unissued and in the treasury at that date were classified a pfd. stock, and the remaining 200,000 shares were classified as common stock, so that the present authorized capital consists of 100,000 shares of pfd. stock and 200,000 shares of common stock, of which 96,560 and 193,120, respectively are outstanding. Stock is listed on Boston and New York Stock Exchanges. Annual meeting, second Wednesday in April.

Transfer agents: the company, at 55 Congress St., Boston, and Guaranty Trust Co., New York. Registrars: First National Bank, Boston, and Bankers Trust Co., New York.

Sales on N. Y. Stock Exchange during 1920 were 167,500 com., ranging from $21⅜ in January to $5¾ in December; and 20,400 pfd. ranging from $59½ in January to $25½ in December. Range for com. in 1921 to November was $10½ to $7⅜.

Bonds: $1,481,700 of Granby M. & S. 5s due June 1, 1926; $2,000,000 authorized, but $518,300 retired.

Earnings

	1920	1919	1918
Price of spelter, cents		6.99	7.89
Net profits from operations—			
Sale of zinc and lead ores and metals, oxide, acid, and royalties	$92,409*	19,266*	$854,193
Miscellaneous profit	39,625	451,304†	54,223
Total profits	$132,034*	$432,037	$911,416
Surplus at end of previous year	3,695,152	4,358,263††	4,546,943
Total	$3,563,117	$4,790,300	$5,458,359
Less dividends on pfd. shares	482,037	482,037	482,637
Depletion and deprec. reserves	403,885	613,111	554,000
Surplus at end of year	$2,677,195	$3,695,152	$4,421,722

*Loss. †Profit from Loan to Carson Hill Gold M. Co. ††Adjusted. A deficit of $126,913 resulted from first 6 months operations of 1921.

Consolidated balance sheet:

Assets

Year	Property	Investments	Advances to Subsidiaries	Current	Deferred Charges	Sinking Fund	Total
1920.....	$12,516,518	$1,369,193	$13,000	$3,284,011	$66,561	$5,337	$17,254,620
1919.....	11,443,633	1,412,475	.....	5,438,965	86,163	36,220	18,417,455
1918.....	11,552,060	2,206,393	.....	5,112,156	159,798	27,350	19,057,757
1917.....	11,993,732	2,477,896	.....	5,748,092	141,660	.....	20,361,380
1916.....	12,310,404	1,679,569	300,000	6,230,781	71,087	.....	20,591,841

Liabilities

Year	Cap. Stock	Bonds	Reserve Fund	Current	Net Surplus	Total
1920.....	$7,242,000	$1,481,700	$5,474,218	$379,507	$2,677,195	$17,254,620
1919.....	7,242,000	1,632,100	5,108,312	722,507	4,421,721	19,057,757
1918.....	7,242,000	1,782,500	4,889,038	739,891	3,695,152	18,417,455
1917.....	7,242,000	1,900,000	5,203,413	1,421,469	4,594,497	20,361,380
1916.....	7,242,000	2,000,000	4,603,864	1,841,661	4,904,316	20,591,841

Dividends: $2 in 1899, $1 in 1900, $1.25 in 1907, $1.50 in 1910, $2 in 1911 and 1912, and $1 in 1913. In June, 1916, a stock dividend was declared, each share of com. stock issued received one-half share of pfd. stock, equivalent at par to $12.50. In 1917 the com. shares received $2; none since. The pfd. stock is entitled to cumulative dividends of $6 per annum. In the event of any liquidation or dissolution of the company, holders of the pfd. stock are entitled to be paid $100 per share and accrued dividends. During 1916, $3 per share was paid on the pfd., $6 in 1917, 1918, 1919, and 1920; none in 1921.

The A. Z. L. & S. Co. is an operating and holding company, owning the following: American Zinc Co. of Tenn., American Zinc Co. of Ill., American Limestone Co., American Zinc Ore Separating Co., American Zinc Co. of Arkansas, American Zinc Oxide Co., American Zinc Sales Co., and 649,774 shares of the 925,000 shares issued of the Wisconsin Zinc Co.; all described below.

The American Pipeline Co., another subsidiary, was sold in 1917 with its lands, wells, pipelines, etc., to the Cities Service Co. of Kansas, for $870,000 of its 6% cum. pfd. stock.

In 1916, company purchased all the assets of the Granby Mining & Smelting Co., consisting of mineral and coal lands and reduction plants as described below.

Company is a purchaser of zinc and lead ores and has an Exploration Department at Boston address for the purchase of metal mines and companies.

In August, 1919, company sold at a profit of $430,000 the 28,000 shares of Carson Hill Gold Mining Co. it held, having received this as a bonus for the loan of $600,000 made to the Carson Hill for its development. The latter paid off the loan in October.

Property: in the Joplin district, Mo., the company owns 2,160 acres of mineral land. The principal operations are at the Davey mines on the 655-acre Davey property and at the Vogey mine on a 40-acre tract in the Porto Rico district. There are 4 mines in the Davey group, 2 worked out and 2 producing.

The ore, sulphides of lead and zinc, occurs in bands between the barren zones of flint that comprise the Grand Falls chert. It is from this formation that the term 'sheet-ground mines' is derived, and in it the ore is generally uniform in character and covers large areas. In the Davey mines, 124 acres have been mined out in one continuous chamber. Ore faces are from 14 to 20′ in height.

Development: by 6 vertical 2-compartment shafts, all in the ore formation. Two shafts are used for mining purposes, and 4 for ventilation. The ore level is at 250′ depth. The ore is very low grade, zinc concentrates recovered representing 1.79% and the lead concentrates 0.67% of ore treated. Ore output has been approximately 50,000 tons ore per acre, from 15 to 20% ore being left as pillars. Reserves are about 1,500,000 tons. Timbering is not necessary. The blanket formation permits of development, in wide areas, average yearly advance on all faces in the mine is 125′.

There are two mills on the property, No. 3 mill of 1,200 tons, and No. 4 of 1,000 tons daily capacity.

The Vogey mine is similar to the Davey. Operations have been irregular, depending on price of zinc and lead concentrates. Zinc concentrates recovered represent 1.76% and lead concentrates 0.20% of rock hoisted. There is a mill on the property, with daily capacity of 1,000 tons.

Reported that a long-term option was taken in fall of 1921 on the High Five mine (q. v.) at Waco, Mo.

Company has a zinc smelter in the gas belt at Caney, Kan., comprising 6,080 retorts with a yearly charge capacity of 60,000 tons of concentrate. The plant at Dearing has been dismantled because of the limited gas supply.

American Zinc Co. of Tennessee

H. I. Young, mgr., Mascot, Tenn.

Inc. Feb. 24, 1911, in Maine. **Cap.** $10,000; $1 par; all issued and owned by A. Z. L. & S. Co.

Principal mining operations of the Tennessee Co. are at Mascot, Knox county, where the company owns 2,400 acres, and in Jefferson county, adjoining Knox on the east, where company owns 400 acres of land.

Orebodies of the Mascot and Roseberry mines occur in the Knox dolomite, in lenses of varying sizes and in well-defined brecciated areas which lie in certain recognized zones or bedding planes. The ore is a light colored sphalerite. The zinc formation may be followed for many miles from Knoxville, in an easterly direction. In 1910 the comuany obtained an option on the Holston property, started drilling and proved up a large tonnage of pay ore.

Development: by 3 shafts; Nos. 1 and 2,300 and 800′ deep, at the Mascot, and one 200′ deep at the Roseberry. A 3-compartment shaft. (No. 1) was sunk in 1911 and the orebody developed in 1912. The main orebody is developed on the 280′ level, and, as exposed, is 1,300′ long, 700′ to 880′ wide, and 30′ to 40′ thick. Limits of the orebody have not been reached. In 1913, a 4-compartment shaft (No. 2) was sunk 2,000′ east of No. 1, and a second orebody developed with length of 1,500′, thickness of 40′ to 125′, width of 300′ and limits not yet reached. Average grade of ore as shown by drill records is 5% to 5½% zinc. Greatest depth of workings, 800′, is at mine No. 2. A tramway connects No. 2 mine with No. 1 mill. Development has shown the ore to be continuous between No. 1 and No. 2 orebodies. Further drilling 3,000′ east of eastern limits of mine No. 2 has indicated a third orebody; this will not be developed until some future time.

Mining methods at the Mascot mines are described by H. A. Coy and H. B. Henegar in Vol. 58, Trans., A. I. M. E.

From the east to west the ore development as now shown is 7,900′ in length. There has been blocked out 4,000,000 to 5,000,000 tons of ore, which will average 4% zinc. Ore reserves were materially increased in 1919 and maintained in 1920.

In May, 1913, the Mascot mill with 1,000 tons daily capacity, was completed. Additions to this mill were finished in July, 1915, bringing its daily capacity up to 2,400 tons; equipment consists of crushers, rolls, jigs, and tables, followed by flotation treatment of slime and fine sand. Power is obtained from the Tennessee Power Co. The company has developed the town of Mascot, owning 350 houses, a company store, and hotel.

Mascot concentrate averages about 60% zinc, is of high quality and is in fact the lowest in lead and iron of any produced in quantity in the U. S.; spelter produced therefrom commands a substantial premium over Prime Western.

These mines were steady producers throughout 1919, but in 1920 the Roseberry was abandoned and its 500-ton mill dismantled.

Wisconsin Zinc Co.

A. M. Plumb, mgr., Platteville, Wis.

Inc. June 27, 1908, in Maine. **Cap.** $1,000,000; $1 par; issued 925,000; 649,774 owned by A. Z. L. & S. Co.

Property: in S. W. part of the State. The ore deposits exist in the forms of flats and pitches, the flats being horizontal deposits along the bedding planes of the rocks, while the pitches are dipping crevices. The chief deposits lie in the lower part of the Galena limestone at a depth of 100′ to 200′ and vary in length from 1,000′ to 5,000′, in width from 30′ to 300′, and in height from 12′ to 60′. The ores consist of the sulphides of zinc, lead and iron, the latter in the form of marcasite; 6% is average zinc content.

The principal operations in the Wisconsin field are as follows:

The C. A. T. at New Diggings is opened by 2 shafts, Nos. 1 and 2, connected in 1919 by a drift.

Champion property, 434 acres at New Diggings, on which there has been developed an orebody 1,500′ long, 800′ wide, and 40′ high. A mill of 500 tons daily capacity is in operation. The life of this property, with surrounding leases is, as estimated at present, from 5 to 10 years. In 1920, the Black stone property was acquired and extension of Champion orebody will be opened through its shaft.

Longhorn property, at New Diggings, operated on leased land on 10% royalty, has ore reserves of 175,000 tons high grade ore. A 350-ton mill is in operation.

The Thompson mine, at New Diggings, operated on leased land on 10% royalty, has ore reserves of 200,000 tons high grade ore; equipped with 350-ton mill.

The Copeland mine in the Shullsburg district, equipped with a 200-ton mill erected in 1917. The Winskell property, in the same district was exhausted and abandoned in spring of 1919, and its 450-ton mill dismantled. A 170′ shaft was sunk on the Booty lease, ½ mile to the W.

Company owns a number of other leases in the district in which valuable ore reserves have been proved by drilling. The policy of the company is to maintain a drilling campaign for new orebodies, with the purpose of keeping 5 to 10 years' production in sight.

In Wisconsin, the grade of zinc wet-concentrate is low and necessitates treatment by means of part roast and magnetic separation. The company has a plant for this purpose, equipped with a 7-hearth roaster of the Skinner type near the Champion property. This plant has 200 tons daily capacity, producing a finished concentrate assaying 58 to 60% zinc. Cleveland-Knowles and Dings separators are largely employed in this plant, also the McDougall furnace. A wet mill was erected during the summer of 1917 to wash out fine and slime. The Overstrom sludge-table is mostly used. Power supplied by the Inter-state Light and Power Co. of Galena, Ill., is steady and good.

The C. A. T., Champion and Longhorn can produce from 800 to 1,000 tons of green blende concentrate per week. The output of the Champion alone was 15,727 tons in 1917, and 17,004 tons in 1919, making it for the latter year the second largest producer of blende in Wisconsin.

Company is one or the largest zinc-ore producers of this country, operating a number of mines and an industrial railway that connects its several properties with the main line of the Galena Division of the Chicago & Northwestern railroad. It also combined with the Vinegar Hill Zinc and New Jersey Zinc companies to construct and operate at their own expense an industrial spur that is of great benefit to all.

Sales of dressed ore are made in open market to the highest bidder, although the Wisconsin Zinc Co. is a subsidiary of the American Zinc, Lead & Smelting Co., and is in this manner affiliated with the latter's smelter, at Hillsboro, Ill., to which point much of the finished ore finds its way. Heavy shipments are made at intervals of pyrite saved as by-product in the separation of zinc ore. The pyrite carries 30 to 35% sulphur.

Mining operations were suspended in January, 1921.

American Zinc Co. of Illinois.

Inc. Aug. 15, 1911, in Maine. **Cap.** $10,000; $1 par; all issued and owned by the A. Z. L. & S. Co.

Property: at Hillsboro, Ill., consists of 600 acres, on which has been built a modern smelter plant of 48,164 retorts furnace capacity, capable of distilling 48,000 tons of concentrate per year; 3 Hegeler muffle kilns pottery, machine-shop, warehouse, ore storage bins and sulphuric acid plant producing 45,000 tons of 60° acid annually; also a zinc-oxide plant of 24 furnaces, enlarged during 1918.

American Zinc Ore Separating Co.

Address: Platteville, Wis.

Inc. Oct. 13, 1908, in Maine. **Cap.** $25,000; $5 par; all issued and owned by A. Z. L. & S. Co. This company owns certain patents for the separating of zinc ores by the Huff electrostatic method. Its business is to lease machines constructed under these patents on a royalty basis.

It also owns and operates a plant using this method, and by which iron is removed from semi-roasted mill concentrate.

American Limestone Co.

Inc. Nov. 9, 1911. **Cap.** $2,000; $1 par; 5 shares issued and owned by A. Z. L. & S. Co. A modern plant was built in 1916 to dispose of the tailing of the Mascot mill of the American Zinc Co. of Tenn. Table and flotation tailings are pulverized and sold for fertilizing purposes; other tailings are sold for railroad ballast, road construction, etc.

American Zinc Oxide Co.

Inc. Sept. 9, 1919, in Maine. **Cap.** $1,000,000; $100 par; $500,000 issued and owned by the A. Z. L. & S. Co.

Property: a zinc oxide plant at Columbus, Ohio, with a capacity of 9,000 tons of lead-free zinc oxide per year from ores supplied by the Mascot mines of the A. Z. Co. of Tenn. Reported that another unit is to be added. In 1921, operations were conducted on a 50% basis.

American Zinc Co. of Arkansas.

Inc. Aug 8, 1917, in Maine. **Cap.** $10,000; $5 par; all issued and owned by the A. Z. L. & S. Co.

Property: 1,700 acres of zinc lands in Newton county, Arkansas.

American Zinc Sales Co.

Inc. March 1, 1919, in Maine. **Cap.** $10,000; $10 par; all issued and owned by the A. Z. L. & S. Co.

This company sells zinc oxide produced by the American Zinc Co. of Illinois and American Zinc Oxide Co.

Granby Mining & Smelting Co. of Missouri

Address: Granby, Newton Co., Mo.

Inc. in 1864. In June, 1916, net quick assets exceeded $2,750,000, of which nearly $1,000,000 was in cash; current liabilities, less than $300,000. Reported in June that company had declared a dividend of $2,000,000 in the form of 10-year, 5% bonds, secured by mortgage of its real estate, and the company subject to this mortgage, had been taken over by the Granby M. & S. Co. of Maine, to be then taken over by the American Zinc, Lead & Smelting Co. Purchase price, $8,000,000. The $2,000,000 bond issue has been taken as part payment; and it is proposed to furnish $2,000,000 additional by an issue of 40,000 shares of common stock of the A. Z. L. & S. Co., to be offered stockholders at $50, stock to be underwritten without commission; remaining $4,000,000 to be paid for out of earnings. Value and earning capacities of properties based on a 5-ct. spelter market.

Property: owns in fee simple about 30,000 acres of land in the zinc district of southwestern Missouri. For nearly 50 years its revenue has come from royalties paid by lessees operating on these lands. It has developed a large tonnage of rich ore near Granby. Company has been a dividend payer almost from its inception.

The Klondike, Mascot, and Golden Rule mines, near Granby, Mo., are in sheet-ground formation. Recovery in zinc concentrates represents from 2

to 4% of rock hoisted. The Klondike is developed by 3 shafts and equipped with a 1,000-ton mill; the Mascot, by 3 shafts, and a 350-ton mill; the Golden Rule by 1 shaft and a 300-ton mill; the B. & H. mine, near Joplin, by 1 shaft and a 250-ton mill. All mills are operated by electric power, with the exception of the B. & H., which has a steam plant.

There are also many mines being operated under lease on a royalty basis on the company's lands in the Granby district. An extensive drilling campaign has been carried on to determine values and possibilities on these holdings.

In East St. Louis, Ill., occupying 143 acres, there is a modern smelter of 5,620 retorts capacity, capable of treating 54,000 tons of zinc concentrate annually; a Hegeler & De Spirlet roasting kiln, pottery, sulphuric acid plant, 8 furnace oxide plant, with auxiliary buildings. The zinc plant at Neodesha, Kansas, has been dismantled. Company has also a lead smelter at Granby with a yearly capacity of 20,000 tons of ore. It also owns 10,000 acres of coal land in Illinois.

Operations of the smelting properties purchased from Granby M. & S. met expectations during 1919, but production and ore developments were not satisfactory.

ANACONDA COPPER MINING CO.

Office: 25 Broadway, New York City. **Butte Office:** Hennessy Bldg., Butte, Mont.

Officers: John D. Ryan, chairman of board of directors; C. F. Kelley, pres.; B. B. Thayer, v. p.; A. H. Melin, sec-treas.; R. D. Cole, asst.-sec.; J. T. Roberts, gen. aud.; D. B. Hennessy, asst. treas.

Directors: John D. Ryan, B. B. Thayer, George H. Church, Nicholas F. Brady, Wm. Rockefeller, C. F. Kelley, J. Horace Harding, Andrew J. Miller and A. H. Melin.

Inc. June 18, 1895, in Montana, as successor of Anaconda Mining Co. **Cap.** $150,000,000; shares $50 par; 2,564,375 issued.

Funded debt: $16,000,000 2-year 5% gold notes, due March 1, 1917, were paid off in cash at maturity.

On December 31, 1918, an issue of $50,000,000 ten-year secured gold bonds was authorized. Of these, $25,000,000, designated as Series A, bearing 6% interest, were issued on January 2, 1919, under a trust agreement with the Guaranty Trust Co. of New York. The issue was sold to bankers. The amount of this loan is for equipment of the Andes Copper Mining Co. and Santiago Mining Co., and to replace in current account part of the earnings which have been invested by the company. It was deemed best to raise money this way rather than add permanently to the capitalization.

In a statement issued at the time this loan was raised, company reported that on September 30, 1918, its current assets totaled $73,000,000, and current liabilities $41,000,000. The excess of assets increased by $11,200,000 from Jan. 1, 1913, to Sept. 30, 1918. Fixed assets of company and subsidiaries aggregated $155,687,253, an increase of $59,109,458. During that period, earnings totaled $165,060,981, and dividends $82,687,500.

In Oct., 1920, the balance of the 10-year bonds, namely, $25,000,000, was offered. They are designated as Series B, bearing 7%, and due Jan. 1, 1929. The sum of $1,500,000 annually is to be set aside as a sinking fund to repay the Series A and B notes.

In a statement issued at the time of this second issue, current assets as of June 30, 1920, were $79,838,011, and current liabilities, $18,023,738, leaving an excess of $61,814,273.

In December, 1921, 233,155 shares of Anaconda were offered to stockholders at $50 each, the entire amount being underwritten by a syndicate. The $11,656,250 thus raised, together with a like amount of cash was used to acquire a 51% interest in the capital stock of the American Brass Co., shares being bought at $300 each.

The Anaconda company has a very broad charter, permitting it to acquire mortgage, lease, assign and transfer the capital stock, bonds or securities of

any other corporation. Transfer agent, National City Bank, N. Y.; registrar, Bankers Trust Co., N. Y. Pogson, Peloubet Co., auditors. Annual meeting, third Wednesday in May at Anaconda. Stock listed in New York, Boston, London exchanges.

Copper Export Association: in Feb., 1921, company took a 12.26% interest, $4,904,000 total amount, in the Copper Export Association's $40,000,000 8% note issue.

Balance Sheet, including subsidiaries, years ended December 31:

Assets.

Year	Mines, timber lands, etc.	Buildings and works	Investments in companies not owned	Supplies, etc.	Metals	Cash and accounts	Total
1920...	$118,364,459	$75,019,735	$15,975,377	$24,050,299	$36,516,880	$24,868,982	$294,795,732
1919...	80,881,992	57,458,373	38,487,026	12,020,580	30,103,772	35,242,891	254,194,634
1918...	80,214,613	56,416,775	28,592,856	13,411,134	27,865,266	30,702,053	237,203,698
1917...	80,102,398	51,881,399	22,545,610	11,252,240	32,966,589	27,109,809	225 858,647
1916...	80,186,011	47,303,134	18,936,376	8,295,662	37,225,804	32,065,854	224,013,841
1915...	78,179,422	40,074,652	11,153,959	6,601,050	18 944,075	19,832,368	174,785,526
1914...	77,376,204	31,896,252	5,211,727	5,918,139	17,554,757	3,443,719	141,400,789

Liabilities.

Year	Capital Stock	Notes	Reserve for depreciation	Current	Dividend payable	Surplus	Total
1920...	$116,562,500	$50,000,000	$22,310,820	$17,574,860	.....	$84.753,462	$294,795,732
1919...	116,562,500	25,000,000	17,630,968	30,658,791	$2,331,250	62,011.125	254,194,634
1918...	116,562,500	.....	15,476.482	35,435,357	3,496,875	66,232,484	237.203.698
1917...	116,562,500	.....	10,316,446	31,402,619	4,662,500	62,913,989	225,858,647
1916...	116,562,500	16,000,000	5,278.269	33,114,710	4,662,500	48,395.863	224,013,841
1915...	116,562,500	16,000,000	1,900,578	21,743,997	3 526,586	15,051,865	174,785,526
1914...	116,562,500	.....	.....	15,974,835	1,182,404	7,681,059	141,400,789

Income Account, including subsidiaries:

	1920	1919	1918	1917	1916
Sales of metals (deliveries)	$53,227,278	$52,633,640	$102,586,542	$109,055,593	$96,097,709
Sales of merchandise	7,716,976	11,937,531	6,918,202	7,514,591	7,191,366
Royalties, etc.	6,814,730	7,436.953	10,248,791	6,668,384	7,675,167
Metals in process and on hand	32,536,183	28,705,375	27,865,266	32,966,589	37,225,804
Total	$101,610,254	$100,713,499	$147,618,802	$156,205,157	$148,190,046
Metals in process and on hand	$28,705,375	$27,865,266	$32,966,589	$37,225,804	$18,944,075
Mining and development .	17,943,879	17,968,644	19,474,604	21.156,715	15,227,457
Ore purchase	13,813,410	12,294,929	29,844,525	24,591,950	24.709,071
Treatment and transportation	19,248,563	16,216,916	23,695,832	18,960,026	19,183,023
Transport, refining and selling metals	4,963,639	6,247,392	8,552,862	6 956,883	6,760,480
Cost of merchandise sold..	5,664 682	11,186,550	5,845,701	6,419,289	5,210,178
Administration and taxes..	1,935,452	1,518,566	2,522.616	3,396,110	1,613,424
Balance	.....	7,415,236	24,716,073	37,498,380	56,542.339
Total	$92,275,000	$100,713,499	$147,618,802	$156,205,157	$148,190,046

Profit and Loss:

Operating profit	$8,020,166	$7,415,236	$24,716,073	$37,498,380	$56,542,339
Income from companies not entirely owned.....	1,315,087	$1,892,788	2,867,515	2,749,083	2,350,642
Total available	$9,335,254	$9,308,024	$27,583,588	$40,247,463	$58,892.980
Depreciation	$4,300,349	$2,928,237	$6,104,185	$5,387.436	$7,113,463
Interest	2,343,244	1,276,146	676,533	526,275	951.145
Dividends paid	6,993,750	9,325,000	17,484,375	19,815,625	17,484,375
Balance	$4,302,089	*$4,221,359	$3,318,495	$14,518,127	$33,343,997

* Deficit.

Current assets Dec. 31, 1920 totaled $77,367,243, and current liabilities, $32,990,041. Net working capital Dec. 31, 1920, $67,861,301.

Taxes paid to Silver Bow county during the past 5 years were $429,224; $982,428; $420,377; $76,031; and $148,396.

Dividends: paid quarterly; 13% in 1901, 4% in 1902, 1903, 1904; 11½ in 1905, 19½% in 1906, 26% in 1907, 8% in 1908 to 1911, inclusive; 9% in 1912, 12% in 1913, 10% in 1914, 6% in 1915, 14% in 1916, 17% in 1917, 16% in 1918, 9% in 1919, 4% in 1920. The total is $170,835,625. The distribution for the last quarter in 1920 and all of 1921 was passed on account of the metal markets.

Investments made in 1916 amounted to $7,968,836. This includes total cost of the Andes Copper Co. stock acquired to Dec. 31, 1916; 20,740 shares of Alice Gold & Silver Mining Co.; 26,100 shares of Greene Cananea; 50,000 share of Inspiration Cons., and 188,300 shares of Butte Copper & Zinc.

In 1917, investments with $4,550,600 of Liberty Bonds, totalled $9,066,389, this amount including the cost of stock issued during the year by the South American companies to reimburse Anaconda for advances made; 28,740 shares of Butte Copper & Zinc; 50,900 shares of Inspiration Cons., and 2,700 shares of Greene-Cananea.

In 1918, the sum of $8,883,628 was invested. Aside from advances made to the South American companies, the International Smelting Co. (a subsidiary), exercised its option on 630,000 of the total of 1,250,000 shares of the Walker Copper Co. in California (which see), and $794,668 in purchasing land and organizing the Arizona Oil Co., which has producing wells in California.

In 1921, company owned 285,300 shares of Inspiration Con. Cop. Co.

In the suit of minority shareholders of the Alice G. & S. M. Co., the U. S. Supreme Court in Jan., 1921, set aside the previous decision in favor of Anaconda, ruling that the price paid was not enough. As Anaconda holds 95% of the Alice shares, the status will not be much altered.

The Anaconda company has become a large holding company, owning or controlling a considerable number of industrial and mining corporations, not merely in the United States, but also in South America. These widespread and varied interests, have been gradually acquired, and are held by stock ownership, often exclusive ownership of the various subsidiary corporations mentioned hereunder.

Anaconda now owns a 51% interest in the American Brass Co., controlling 40% of the brass trade of the United States, as described farther on, and owns the entire stock issue of the **International Smelting Co.**, which holds all the Utah and Arizona properties of the former International Smelting & Refining Co., bought by the Anaconda and transferred to its subsidiary in May 1914. All other assets, including stock of the **Raritan Copper Works** and **International Lead Refining Co.** were taken over by the Anaconda company itself. The International Smelting Co. and the two works just named are described under their own titles farther on in this description.

Company also owns **Anaconda Lead Products Co.** formed in 1919 to engage in the production of white lead by electrolytic methods. A plant put up at East Chicago, Ind., near that of the International Lead Ref. Co. was started Jan. 25, 1920, producing 18 tons of white lead per day up to Dec. 31, 1920.

The Anaconda also has a substantial interest in the **Copper Export** Association described elsewhere, and in the various subsidiaries described below.

The **Montana Holdings** include: 36 mines, covering a very large part of the productive area of Butte, Montana, including former holdings of the Boston-Montana, United Copper, Butte & Boston, etc., also, former **Pilot Butte Co.** properties acquired by purchase in 1916, the **Alice Gold & Silver Mining Co.** properties, controlled by ownership of 95% of the entire issued capital stock of that company, a lease till July 8, 1931 on the Butte Copper & Zinc Co. mines terminable on 6 months notice to that company, and providing for equal division of profits. As of Dec. 31, 1920, the Ana-

conda Co. owned $1,085,200 out of the 3,000,000 stock of the Butte Copper & Zinc Co. These properties are described in the following pages.

The Zinc Plant at Great Falls is part of the smelting plant at that place, completed Sept., 1916 and outputs 150 tons per day. Operations suspended Feb., 1921.

Electrolytic Copper Refinery at Great Falls, a plant completed 1916, with a capacity of 16,000,000 lb. per month.

Wire and Rod Mill at Great Falls is capable of rolling 100 tons copper rods, or drawing into wire 80 tons of copper per day.

Phosphate Mines, include a large acreage of rich phosphatic limestone at Conda near Soda Springs, Ida., with 480 acre plant and townsite area. In 1920 Anaconda built 7½ mile railroad to the property, from Strahan station on the Oregon Short Line R. R.

The Northern Montana Natural Gas Co. formed 1918, was dissolved Sept., 1919, gas wells proving too small for profit.

The Washoe Reduction Works at Anaconda, and its various industrial appendages, and the Great Falls Plant, at Great Falls, Montana, are described in the succeeding pages.

The **California Holdings** include:

Walker Mining Co.

The Anaconda Co. through its subsidiary the International Smelting Co. holds 630,000 shares out of a total of 1,250,000 shares of the Walker Mining Co. stock. For description of property see under this title in California section of this book.

Arizona Oil Co.

To ensure an adequate oil supply for its Miami smelter (of the International Sm. Co.), company purchased jointly with Inspiration Cons. Mining Co., 160 acres of producing oil land in the Bakersfield district, Calif. The Arizona Oil Co. was formed with a captitalization of $2,500,000; par $100; of which $1,632,000 has been issued, half of it to Anaconda and half to Inspiration Cons. Copper Co. In 1920, the oil company made a profit of $40 per share, on an output of 395,641 barrels of oil Anaconda receiving $326,400 in dividends.

SOUTH AMERICAN HOLDINGS

The Anaconda company owns several large producing properties and various others under exploration and development, in South America. In 1916, the Andes Copper Co. was organized as a holding company, with a capitalization of $50,000,000; par $25; all owned by the Anaconda company. The Andes Copper Co. owns all the stock of the Andes Copper Mining Co., the operating subsidiary and of the Potrerillos Railway Co. (See description in Chilean section of this book).

Santiago Mining Co. organized 1917 in Delaware. Cap. $10,000,000; par $25; is controlled by the Anaconda Co. The Santiago company took over various properties which Anaconda had acquired and developed, issuing stock in payment for cost of lands, equipment and development.

Properties: Lo Aguirre Mines, 5 groups 500 acres, 12 miles from Santiago, Chile; **Africana Mines,** 3 miles east of Lo Aguirre and **Lo Aguirre** and **Farfana Farms.** See under Chile in this volume.

The Anaconda company will advance funds for development of above properties taking stock of the Santiago company in payment therefor. When financing is completed the Anaconda company will own 80% of the issued stock and Wm. Braden and associates 20%. The Africana is to be developed to give a production of 500 tons per day and Lo Aguirre of 750 tons per day. Development was continued 1920, 1921. Mining and metallurgical construction has been deferred until normal conditions prevail in the copper mining industry.

MONTANA PROPERTIES

Office: Hennessy Block, Butte, Montana.

Operating officials:

Mining Department

General: John Gillie, gen. mgr. of mines; W. B. Daly, asst. gen. mgr.; C. W. Goodale, chairman Safety First committee. C. L. Berrien, gen. supt. of mines; John O'Neill and E. M. Norris, asst. gen. supts.; C. D. Woodward, chief, elec. engr.; A. S. Richardson, ventilation engr.; Reno H. Sales, chief geologist; F. A. Linforth, asst. geol. The mine superintendents are as follows:

Anaconda Group

Ed. Renouard, Badger State mine.
Roy Hughes, Badger State mine.
Jas. S. Egan, Mountain Con. mine
E. G. Kane, Bell-Diamond mine.
T. H. Oass, High Ore mine.
D. H. Crowley, St. Lawrence mine.
Wm. Nevin, Anaconda mine.
Dan Cronin, Never Sweat mine.
Dan. P. Sullivan, Original mine.
Charles Bonner, Steward mine.
Jos. Merrick, Moonlight mine.
Thos.. McGrath, Gray Rock mine.
Jas. L. Quinn, Belmont mine.
J. L. Boardman, Safety engr.

Boston & Montana Group

John Varker, Mountain View mine.
Herbert R. Tunnell, Penn. mine.
K. P. Krueger, West Colusa mine.
G. E. Moulthrop, Tramway mine.
Jas. W. Tippett, East Colusa mine.
J. L. Boardman, Safety engr.
John Bartlett, Tramway mine.
Geo. Bennett, Leonard mine.
John C. Gaul, Berkeley mine.
J. H. Rogers, Silver Bow mine.
Jas. McQuay, Tropic mine.

Zinc Group of Mines

J. J. Carrigan, gen. supt.
Herbert Tonkin, Poulin mine.
J. F. Dugan, Nettie mine.
J. L. Boardman, Safety engr.
Jas. Brennan, Emma mine.
Leo McGrath, Alice mine.
H. J. Rahilly, Reins shaft.
John Berkin, Orphan Boy mine.

Great Falls Reduction Works

A. E. Wiggin, supt.
J. O. Elton, asst. supt.
E. S. Bardwell, metallurgist.
W. H. Gunniss, mgr. brick dept.
A. T. Elliott, gen. smelter foreman.
Edgar C. Maclay, chemist.
Edwin Young, Safety eng.
W. T. Burns, supt, elec. refinery.
P. Cudahy, supt. furnace refinery.
Peter Thill, cons. engr.
James Moore, supt. surface dept.
A. McDonald, supt. tramming dept.
George Tryon, mech. supt.

Coal Department

F. W. C. Whyte, mgr., Anaconda.
T. C. Russell, supt. Diamond Coal & Coke Co., Diamondville, Wyo.
Thos. Good, supt. A. C. M. Co., Coal Department, Washoe.
C. A. Sederholm, supt. A. C. M. Co., Coal Department, Sand Coulee, Mont.

Lumber Department

Kenneth Ross, mgr., Missoula, Mont.
M. M. Ross, supt.. St. Regis.
J. E. Totman, Hamilton.

B. A. & P. Railway

H. A. Gallwey, mgr., Anaconda.
C. H. Spengler, master mechanic.
C. F. Murphy, supt.
J. H. Schuch, chief engr.

Labor Commissioner Thomas J. Chope

Reduction Departments

Washoe Reduction Works, Anaconda

Fred. Laist, manager
L. V. Bender, gen. supt.
H. S. Ware, asst. supt.
L. E. Jones, supt. elec. dept.
R. B. Kelly, Engr.
H. H. Nell, Sec. of Safety Com.
W. M. Kelly, gen. smelter foreman.
W. N. Tanner, chief engr.
W. C. Capron, asst. chief engr.
B. S. Morrow, supt. of Concentration.

Department.	Superintendent.
Converting and casting	Pat Dalton
	R. E. Howe, asst.
Carpenter shop	Carl Johnson
Boiler shop	John Casey
Blacksmith	J. A. McDonald
Laboratory	J.A. Root
Sampling mill	Rod Munn
Local terminal and weighing	W .H. Nutting
Concentrator	B. S. Morrow
Blast	P. Barker
	G. Brolin, asst.
Surface	W. C. Cadwell
Power house	M. M. Adams
	P. J. Grush, asst.
Arsenic plant	E. M. Dunn
Foundry	H. N. Blake
	S. T. Blair, asst.
Testing department	C. D. Demond
Research	F. F. Frick
Stock bins	Thos. Marron
Leaching plant	H. T. Maguire
Reverberatory	Ed. O'Brien
Briquette	H. S. Ware
Acid plant	M. R. Hoyt
Masons	A. N. Jette
Roaster No. 2 and McDougalls	J. K. Murphy
Coal dust	H. I. Silvester
Zinc concentrator	S. S. Rodgers
Brick plant	H. H. Coe
Electric department	L. E. Jones
Mechanical	H. N. Blake, asst.
Machine-shop	Clarence Bardon
Pipe-shop	John Bills
Paint-shop	James Sweeney
Lead burning	G. C. Detrich
Water works and Street Railway	H. M. Johnson
Chief clerk	Geo. C. Jackson

The Butte Property: consists of 1,168 acres mineral claims at Butte, including all the claims formerly held by the following companies: (1) **Boston & Mont. Cons. C. & S. Mng. Co.**; (2) **Butte & Boston Cons. Mng. Co.**; (3) **Red Metal Mng. Co.**; (4) **Washoe Copper Co.**; (5) **Parrot Silver & Copper Co.**; (6) **Alice Gold & Silver Mng Co.**; (7) **Trenton** (formerly Colorado) **Mng. & Dev. Co.**; (8) **Big Blackfoot Lumber Co.**; (9) **Diamond Coal & Coke Co.**; **(10) Original Cons. Mng. Co.**; (11) **Colusa Parrot Mng. & Sm. Co.** (12) **Alex Scott Mining Co.** at Butte, and the (13) **Pilot Butte Mining Co.**

Company owns 1,100,000 acres lumber land (**Big Blackfoot Lumber Co.**) and sawmills at Bonner, Hamilton, Hope, St. Regis, Mont.; and 13,280 acres coal lands at Diamondville, Wyo.; Washoe, Belt, and Sand Coulee, Mont.

The Raven mine was bought August 4, 1915, for $65,000. Company has a 5-year lease on the Emma mine (Butte Copper & Zinc Co.) operated as a zinc producer, and bought the Czarroma claim fraction, containing the continuation of the Emma vein for $225,000 late in 1915. Options were secured on several placer claims in the S. W. part of Butte. The E. portion of the Alex Scott claim, and the Little Annie claim, were purchased for $750,000. Company has stopped work on the low-grade gold property, called the Porphyry Dike, near Rimini, Mont.; also on the Bonanza claims in the S. W. part of Butte, because of failure to find zinc-silver ore in commercial amount. The Gambrinus mine was purchased in July, 1918; and company bought a half interest in the Kit Carson claim for $48,000, the ground lying

between the company's Orphan Girl mine and Hibernian of the Davis-Daly Co.

Geology: Butte hill is a network of metalliferous veins, the older lodes with nearly east and west strike being displaced by a number of northwest fault veins cut in turn by still later northeast fault veins and these all cut by the Rarus fault. The geology is fully described by Walter Harvey Weed in Prof. Paper 74 (1912) of the U. S. Geological Survey, which can be had free of charge from that Bureau. Briefly, the Butte ores, consist of a mixture of chalcocite, bornite and sometimes covellite, with a gangue of quartz sericite and altered granite. On the outskirts of the district, zinc sulphide occurs. These ores are contained in fissure veins in granite (quartz-monzonite), ranging from 5′ to 20′ wide. These veins are cut by at least 4 successive series of faults, the earlier of which also contain ore shoots. The matter of clearly defining apex and extra lateral rights, under the present Federal mining laws, is one of the greatest possible difficulty, and in the past has led to litigation costing millions of dollars, all of which ultimately had to be paid out of the profits from copper produced. The last dispute of this kind was settled in Aug., 1920, Anaconda reaching a compromise with the Elm Orlu M. Co. concerning the Emily vein in the Pilot-Butte claim. Early in 1920 Anaconda claimed that part of one of the David-Daly s main veins apexed in its ground, but this has not yet been proven by developmnet work, and will be the subject of mutual work and friendly negotiations.

The mine waters of certain properties are highly charged with copper, and precipitation tanks have been built at practically all of the big mines. Old scrap iron, tin cans and wire rope are used as precipitating agents, these articles commanding a standard price of 1 cent per pound. The flow of the water in the precipitation tanks and launders is much more rapid than is the case in the large Spanish lixiviation plants. The principal plant, at the Leonard mine, cost about $20,000 and treats water from all of the Boston & Montana mines. It has a building for drying and shipping the copper precipitate.

Mines and shaft equipment: by the merger of the Anaconda and Boston & Montana, both among the six largest copper producers of the world, and the addition of a number of other mines of second and third rank in productive capacity, the Anaconda became the largest copper company in the world. Employment is normally given to over 10,000 men in all departments, and a payroll in Butte alone of over $1,000,000 monthly, with large additional payrolls at its works in Anaconda and Great Falls. In Feb., 1921, there were only 4,500 men employed. The company's interest in its employees is genuine, and in addition to a department of labor, and a safety-first organization, a large area of ground near Anaconda called "Opportunity" has been drained and cut up into large lots for farming and residences.

As property lines have been practically eliminated, so far as underground work is concerned, by the merging of various companies, and workings have been connected, the property can be most usefully described in sections called by the familiar names used under former ownership, or by the names of the 22 operating shafts of the company.

Development: for 1920 totaled 22.5 miles.

Engineering features at the company's mines are described in 'The Anode' for Nov., 1920, by W. J. McMahon, surveyor of the Steward mine. The system is based on that in use for many years at the Boston & Montana mines.

Reserves: The many mines of the Anaconda Company have immense reserves of ore of all grades, and each year's development maintains the required tonnage.

It is currently reported that, during the period 1920-21, reserves have been enormously increased, that of the Mountain Con mine alone, being said to amount to over 1,000,000 tons of 3.5% copper ore. Production from all the mines of the company, during 1920 was 2,152,763 tons of ore and 7,557 tons of precipitates.

The **Anaconda** mine was opened, 1880, as a silver producer, but at about 150′ depth the oxidized silver ores were succeeded by high-grade copper ores, mainly chalcocite and bornite, while at depth there is a large amount of enargite. Net earnings of the mine, during the 15 years, 1880-1894, are unknown, but may be safely estimated at not less than $50,000,000. At a depth of about 1,600′ quartz pyrite veins of the Anaconda showed impoverished values, there being considerable pyrite, but the fault veins showed large ore-bodies at depths of 1,200′ to the deepest level yet reached in mining which is 3,400′ in the High Ore mine.

The **Anaconda mine** proper has a 3-compartment shaft, 2,800′ deep, connected underground with the Never Sweat, St. Lawrence, Bell, Belmont and Moonlight mines. The mine has electric locomotives for tramming on several levels. Hoisting is by 8-ton skips, swung under double-deck cages and worked in counter balance. The main shaft was re-timbered in 1919.

The **St. Lawrence mine** has a 2,600′ three-compartment main shaft, connected underground with the Anaconda, Never Sweat, Mountain View and Pennsylvania mines. The St. Lawrence has been on fire since 1889, in an extensive area above the 1,100′ level. The fire has been fought constantly, and walled off by cement bulkheads, and while it cannot be extinguished and is troublesome, it does not result in the loss of copper, as the sintered ore remaining after the burning of the sulphur can be mined later, and the mine waters are strongly charged with copper, much of which is recovered by precipitation on surface whese it is run over scrap iron and cement copper is made. The hoist has 32″x72″ cylinders, raising 5-ton skips swung under single-deck cages. The main shaft and stations were partly retimbered during 1919.

The **Never Sweat mine** has a 2,500′ three-compartment main shaft. Square-set timbering is used in stoping, as well as back filling. Some trouble has been had with fire from the St. Lawrence. The surface plant includes a 28″x48″ double drum hoist, raising 3-ton skips swung under single-deck cages; also a 7,500 cu. ft. compressor. During 1919, the Ramsdell-Parrot shaft was retimbered, also deepened from 900 to 1,200′. The Parrot shaft was partly retimbered. A head-frame and hoist were erected.

The **Belmont mine**, about 1 mile south of the main shaft of the Anaconda, and 375′ lower, has a 2,400′ four-compartment working shaft, the largest in the district. Connections have been made with other mines and a 1,500-ton ore bin erected. Equipment includes a hoist, with capacity of 3,500′, taken from the Corra mine.

The Diamond mine has a 3,400′ three-compartment shaft, developing the Corra vein and other veins to the bottom level. Equipment includes a 34″x72″ hoist, operating single-deck cages with 5-ton skips; and 2 electrically-driven compressors of 7,500 cu. ft. capacity each. Part of the main and Cora shafts were re-timbered in 1919.

The **High Ore** mine is one of the deepest in Butte, having a 3,600′ three-compartment shaft, producing high-grade chalcocite. The High Ore does the pumping for a number of connecting mines of the Anaconda, handling all water from the Anaconda, Washoe and Parrot properties. The mine has 9 electric pumps, each good for 600 gals. per min., with 1,200′ lift. These are located on the 1,200′, 2,200′ and 2,800′ levels. Relief pumps to run by steam or air are also installed on different levels.

The **Modoc** mine has a 2,500′ three-compartment shaft, connected with the 2,800′ level of the High Ore mine. The Modoc has several veins besides the one of this name, its chief ore supply coming from the veins, which are stoped up to the North Butte Co.'s boundaries on the north and to the Ballaklava mine on the south.

The **Mountain Chief** mine, area 1.15 acres, lies north of the Butte-Ballaklava, and is said to have produced about $1,500,000 worth of ore from a shallow shaft. The Mountain Chief is developed to 500′ by its own shaft, but its deeper levels are worked through the High Ore mine.

The **Parrot** group of properties includes the former holdings of the Parrot Silver & Copper Co., 19 fractional claims, area 40.6 acres, embracing

the Parrot, Little Mina, Bellona, Original No. 6 and the Oro Butte, Champion and Copper Reef mines, and various other small properties. Main shaft of the Parrot mine is now used as an air shaft, and the ground is worked from the West Steward and Never Sweat shafts.

The **Little Mina** 1,200′ shaft is now used for air only.

The **Original, Steward and Gagnon** shafts are on a western continuation of the Anaconda and Steward veins, and in 1912 a continuous ore shoot of good grade, over 2,700′ long, was opened in the bottom level of these mines.

The **Original mine** has a 3,100′ shaft with three compartments below 1,100′. The mine was located, 1864, in the first stampede to the new Silver Bow diggings and was the first mine patented in Butte. During 1919, part of the shaft was retimbered.

The **Steward** mine has a 3,800′ vertical shaft, showing, in the bottom workings, a 30′ vein, carrying good copper ore, with silver. By mid-1920, a large vein of high-grade copper ore was opened at 3,740′ in this shaft. Assays yielded up to 40%. This is a probable downward extension of the orebody developed 200′ north of the shaft on the 2,800′ level, where assays gave 25%.

Equipment includes a 120′ steel headgear and a 34″x72″ first-motion duplex hoist, good for 3,500′.

The **Pilot mine**, purchased for $1,125,000 cash, in 1916, is now part of the **Badger State mine**. The Emily shaft of the **Badger State mine** is 1,600′ deep.

The **Gagnon** is the westernmost of the productive copper mines of Butte. Its ores have carried more silver than those of the mines farther east and have held a number of minerals such as hubnerite unusual elsewhere in the camp.

The **Gagnon** old 2,800′ three-compartment incline shaft, sunk at an angle of 74°, is now used as an auxiliary shaft, ore being hoisted through the Original shaft. The new vertical 2,800′ shaft, near the west end of the property, is as yet used for ventilation only. Equipment includes a 22″x48″ hoist.

The **Moonlight** mine, once the principal producer of the Washoe Co., has ore averaging about 1 oz. silver for each unit of copper. The Moonlight has a 1,700′ three-compartment shaft, connected underground, with the Blue Jay, Never Sweat and Anaconda. All the stations were re-timbered during 1919.

The **Poulin** mine, formerly owned by the Washoe Co., has a 1,200′ shaft, but is operated through the 1,500 Buffalo shaft, and is to be operated for zinc ore. A new hoist and buildings were erected in 1919.

The **Silver Bow** No. 1 mine has a 1,100′ shaft, connected with the Pennsylvania, Berkeley and No. 3 mines. It has been a good producer for many years.

The **Berkeley** 1,500′ three-compartment shaft has a 28″x48″ double drum hoist, handling 3-ton skips in each compartment.

The **Rarus** mine has a 2,800′ three-compartment shaft, connected with the Tramway mine. The veins have divergent branches, and constitute a sort of stockwork, with an ore zone up to 300′ in width, in places. It has been equipped with steel head-frame and 34 by 72 in. air-operated hoist.

The **Tramway** mine, lying between the Minnie Healy and Rarus, formerly owned one-third by Butte Coalition, and two-thirds by Butte & Boston, has a shaft that is the central shaft for the Minnie Healy-Rarus group. The Tramway shaft, 2,800′ deep, has 3 compartments, each 5′x4 2″ in the clear. The first of the new levels in the Minnie Healy is the thirteenth, about 50′, below the old 1,500′ level, in which fire was burning, 1908-1909. The Tramway has numerous bodies of 5 to 6% copper ore, with good gold and silver values, the really great ore-bodies coming in between the 1,300′ and 1,400′ levels, and on the 1,700′ level there is an orebody up to 75′ in width, averaging nearly or quite 7% copper.

At the **Tramway** mine equipment includes a 92′ steel head-gear with 12′ sheave wheels. A 34″x72″ Allis-Chalmers 2-cylinder Corliss hoist, with 12′

drums, using 1½" round wire cables, has capacity to raise 7-ton skips from a depth of 3,500'. Each compartment has 5-ton skips changeable to 4-deck cages, for lowering men, an auxiliary hoist being used for sinking and handling supplies through the third compartment. The main surface plant of the department, at the Tramway shaft, includes a boiler house, engine house, carpenter shop, machine shop, office buildings, warehouse and changing house with hot and cold water and shower baths.

The **Nipper** mine of the Red Metal group, includes the Nipper, Chief Joseph, Balm and L. E. R. claims. The Nipper mine, area 15.18 acres, has 2 shafts, of 1,000' and 1,200' depth, with 12 exits, being connected underground with the Parrot, Never Sweat and Little Mina mines, and has been operated to some extent through the Parrot shaft.

The **Green Mountain** mine has a 2,200' three-compartment shaft, not deepened for several years.

The **Mountain Consolidated** mine has a 2,500' three-compartment shaft, with a good ore showing on the 1,400' level and below, and an especially good showing on the bottom level, at 2,500'. A Nordberg first-motion hoist was erected in 1918. The East Grey Rock shaft is used for ventilation only.

The **West Grey Rock** mine, producing ore carrying values mainly in gold and silver, with a small percentage of copper, has a 1,826' shaft, the 1,800' being the deepest level open in 1916. The veins, though small, carry good ore, rich in silver. The Corra shaft is kept open for ventilation.

The **Leonard** has an old 1,800' shaft, used for men and supplies, and the main, or No. 2, a new shaft of 4 compartments, 2,800' deep. Mine is timbered with 12x12" and 14x14" square sets, requiring monthly an average of about 1,000,000' of mine timber, board measure. The 2,000' level shows equally large and good orebodies. Water from the Mountain View, Pennsylvania, Tramway, East Colusa and West Colusa mines drains to the 1,200' level of the Leonard and is forced thence to surface by 4 electric pumps. Valves are of pot form, and the entire water end is phosphor-bronze, columns being lined with wood, thoroughly soaked in oil, to withstand the corrosive action of the mine waters. Part of the main shaft was re-timbered during 1919.

The Leonard surface equipment is the show plant of Butte, and is very complete, including a 152' steel headgear and 2,000-ton ore bins. The power plant has ten 250-h. p. boilers, and a 34x72" hoist, good for 3,500' depth, raising cages with 5-ton skips swung under, with 1½" round cable. There also is a 12x14" sinking engine. Plant includes 3 air compressors of 3,000, 4,000 and 5,000 cu. ft. capacity per minute, respectively, and 2 of 7,500 cu. ft. each.

The **West Colusa** mine has a 2,200' three-compartment shaft, with levels at 100' intervals to depth of 1,200', and thereafter at 200' intervals. Shaft retimbered, early in 1910, and cut down to 3 compartments, being given false sets, to obviate squeezing, which caused much trouble in the past. Mine is timbered with 10x10" and 12x12" square sets, and shows vein matter up to 400' in width. Connection is had underground with the Mountain View and Leonard mines. Surface equipment includes a 23x60" hoist, operating 2 double-deck cages, a tramway and a 28x48" single drum auxiliary hoist.

The **East Colusa** mine has a 2,000' three-compartment shaft with levels opened at 100' intervals from 300' to 700'. The mine has a vein of about 65' width, formerly averaging 3 to 4% copper, but mine is now an important producer of zinc ore for the new electrolytic zinc plant. Production is about 200 tons daily.

The **Pennsylvania** mine has a 2,800' three-compartment shaft, with levels at 100' intervals from 100' to 1,000', and at 200' intervals below. This property has extensive stopes above the 600' level, ore lying nearer surface than in most of the Butte mines. Equipment includes a 350-gal. electric pump on the 1,800' level, forcing water to a crosscut to the Leonard mine, whence it goes to the precipitation plant. Surface equipment includes 2,000-ton ore bins, a 34x72" Allis hoist, operating two 5-ton skips and a 28x48" single drum hoist sinking engine.

The **Badger State** mine in the northwestern part of the camp, develops

the Badger State, Jessie, Edith May, Emily and several other veins. Mine has a 2,800′ four-compartment shaft with extensive orebodies opened up on the 1,100′, 1,300′, 1,400′, 1,600′, 2,000′ and 2,200′ levels. The Emily shaft auxiliary to the Badger, was deepened from 400′ to 817′, or 1,000′ level of the Badger and connection made in 1912. Property is now an important producer of copper and zinc ore.

The **Mountain View** mine has a 2,249′ three-compartment shaft, and a 2,000′ air shaft . The Mountain View shows 6 veins of 8′ to 60′ width, ore averaging nearly 5% in copper tenor, being among the richest mines in the camp. Equipment includes 4,500-ton ore bins, a hoist good for 3,000′ depth, and a 28x48″ single drum auxiliary hoist.

The **Tropic shaft** on one of the most easterly claims of the company is 900′ deep and mine is now a producing property.

The **Greenleaf** mine, located east of the proven ore zone of Butte, has a 1,000′ shaft, with about 800′ of lateral workings. Work was suspended, July, 1908, but the property is by no means devoid of promise.

The **Southern Cross** mine, situated in the Georgetown district, west of Anaconda, purchased 1912, for $370,800, is a gold property developed by a 500′ shaft, equipped with electrical machinery. It was extensively worked because its oxidized ore is good iron flux, but was closed permanently Dec., 1919, on account of exhaustion of orebodies.

The air-compression plant at the High Ore mine has eight 1,200-h. p. air compressors, each with a capacity of 7,500 cu. ft. of free air per mniute. The air is compressed to 90 lb. and is used in the hoisting engines in place of steam. A building 300′ long contains 25 receivers each 10x30′ on the ground, for the compressed air, this air-storage plant having reserve power for 8 hours. In connection with this plant is the largest steel water-tank in the world, 100′ in diameter.

Electric power, supplied by the Montana Power Co., is brought from Great Falls, 130 miles, and from Canyon Ferry, near Helena, 70 miles distant, current being wired to the mine with a primary voltage of 50,000 volts, reduced to 2,000 volts in a transformer station, just outside of Butte, power being distributed to the various workings from a main station at the Never Sweat mine, the current being used at 440 volts.

Ventilation and fire protection have been given much attention by Anaconda engineers, and in 1917 a systematic plan covering all underground workings was adopted, electrically-driven surface fans with a capacity of 696,100 cu. ft. of free air per minute being installed. In 1918, five Sirocco double and single-inlet fans, of 228,000 cu. ft. capacity, were put in. To increase the velocity of air currents in shafts, experiments were made at the Parnell shaft, inserting concrete slabs between the timbers. Results were so good that all shafts will be so arranged. During 1919, ten motor-driven fans were erected on the surface, having a capacity of 1,100,000 cu. ft. Six fans were installed underground, while 87 blowers were put in the different mines.

As a protection against fire, shaft and station timbers are covered by metal laths and cement coating at the Belmont, High Ore, Leonard, Moonlight, Mountain View, Parnell, Pennsylvania, Rarus, and Tramway shafts. At other points underground, timbers are covered with cement by the "Gunite" method.

New development—the total at all mines:

Year	All work miles	Shafts deepened, feet	Ore mined, tons	Cost of Mining per ton
1920.....	22.55	829	2,152,763	....
1919.....	20.39	1,749	2,103,099	$8.22
1918.....	41.85	4,991	4,918,468	6.07
1917.....	34.60	2,809	4,193,624	5.86
1916.....	42.10	2,879	5,582,077	4.42
1915.....	35.33	....	4,383,339	3.93

The normal daily output of ore is 16,500 tons.

A feature of work in 1917 and 1918 was the mining of pink manganese ore (rhodochrosite) from the Emma and other mines. This was concentrated, and partly sold or used in making ferro-manganese at Great Falls.

Coal mining—the quantity raised and its disposition.

	Mined tons	Used at coal mine, tons	Used by Anaconda, tons	Sold tons
1920	895,334	56,144	458,881	380,309
1919	717,410	50,972	359,082	311,346
1918	1,065,743	56,589	632,012	374,138
1917	1,054,510	66,238	551,533	436,740
1916	964,122	64,733	616,910	282,418

Lumber Department—the mills at Bonner, Hamilton, Hope, and St. Regis had the following record:

Year	Timber cut, feet	Purchased, feet	Used at mills, feet	Sent to mines, feet	Used at factory, ft.	Sold, feet	Stock, feet
1920	92,856,620	358,115	1,318,034	38,185,389	2,003,362	32,027,243	48 451,078
1919	29,793,693	18,058,369	2,119,374	36,010.965	1,788,389	33,199,523	28,761 371
1918	82,950,859	41,219,939	1,415,915	72 162,891	2,208,966	35,765,541	54,027,560
1917	87,330,500	16,476,014	1,455,703	57,205,887	4,172,414	50,534,133	41,410,075
1916	105,495,846	30,005,910	1,361,549	91,321,061	6,215,378	80,800,144	50,971,698

Profits from the coal and lumber departments were $1,295,119 in 1916; $363,312 in 1917; $354,187 in 1918; $203,140 in 1919.

The **Washoe sampler** at Butte, a $150,000 steel-concrete custom ore plant, is on the main line of the B. A. & P. R. R. The Taylor & Brunton system is used, and handles 1,200 tons in 24 hours. (See H. B. Pulsifer, Bull. 3, Nov., 1920, of the University of Montana.)

The Washoe Smelter

The Washoe smelter, where all the Anaconda company's copper ore is concentrated and smelted, is about 2 miles from Anaconda and 26 miles from Butte, all ore being hauled by electric power over the Butte, Anaconda & Pacific R. R., owned by the company. In 1914-15 the entire plant was remodeled, the capacity increased to 15,600 tons per day, leaching and flotation plants installed, an acid plant erected, a zinc plant put in operation and brick works built, the improvements costing, it is said, over $6,000,000. The saving of the remodeled plant was due to coal-dust firing of reverberatory furnaces with greatly increased capacity (583 compared with 239 tons per day) with less slag loss; the abandonment of briquetting and blast furnace smelting in favor of the new reverberatory practice; the treatment of all ore in the Anaconda concentrator, instead of sending it to Great Falls; the introduction of Minerals Separation flotation and the operation of the leaching plant. The saving increased from 75 to 96%, the tailings formerly carrying 0.62% copper now carry but 10.2% copper—that is, 14 lb. of copper to the ton. The saving amounts to 8.4 lb. copper per ton, and paid the entire cost of reconstruction in the first half year of operation. This work has put the Anaconda company in the ranks of low cost producers and was a great triumph for its metallurgists.

The **Washoe Smelter:** can treat 16,000 tons of ore per day using 500 tons coke, 900 tons coal for reverberatory furnaces, 3000 tons limestone flux and 260 tons coal for power and heating. Sixty millions gallons of water are used each day and 42,000 gals. per min. Three thousand, two hundred men are employed at a monthly wage of $400,000 in and around the works.

From the storage bins the ore passes through a sampling plant having a capacity of 2,000 tons in 8 hours. Then it goes to the concentrator plant of 2 great buildings, each housing 4 units comprising Blake crushers, Harz jigs for coarse and Evans jigs for medium and fine concentrates, 4 sets of 55x24" rolls, 8 Wilfley tables using Butchart riffles, six 8' Anaconda classi-

fiers, six 7½'x72" Hardinge mills, each with 225-h. p. motors and using steel linings and steel balls; 6 Dorr classifiers, 4 Minerals Separation flotation machines, each having 15 agitators and 14 spitzkasten with 150-h. p. motors. Anaconda operates under license from Minerals Separation, the royalty being from 4 to 12 cents per ton of ore treated, depending on quantity.

No. 1 section differs from the other 7 in having Hancock instead of Evans jigs, and 8x12' tube mills using Forbes liners and pebbles.

The coarse concentrate goes to the blast furnace, the fine to settling tank, the flotation concentrate to Dorr thickeners, 12x50', discharging 60% solids to Oliver filters.

There are 2 roaster divisions, one having Evans-Klepetko type of McDougal roasters, each handling 215 tons per day of fine concentrate, fine lime rock and first-class screenings. A Ruggles-Coles dryer prepares concentrate for the acid plant and for converter. Roaster No. 2 contains 28 Anaconda roasters, a modified Wedge-McDougal furnace and treats material from the tank house and Oliver filter cake.

The reverberatory furnace plant is in 2 buildings, each with 4 furnaces and 5 boiler sets. Each furnace is 143x23' and handles 700 tons material per day when burning 100 tons coal in 24 hours. The coal previously ground in Raymond Bros. 5-roller pulverizer to 100-mesh, is blown into furnaces through Warford burners under 16 ounces pressure. Coal dust firing is much more efficient than grate firing, and each furnace develops 6½ boiler h. p. per ton coal burned, hot gases passing through Stirling boilers. Furnaces are fed from top, banking concentrates against side walls. Slag flows off continuously instead of being intermittently skimmed and matte is tapped at intervals, runing into 10-ton ladles trammed direct to converters.

The blast furnace building contains two 51' furnaces, and one 87' long, each 56" wide at tuyeres, the latter handles 3,000 tons per day, the others 1,600.

Converter building contains 7 stands for Great Falls type converters. Latter are 20' diam., 17' high, and weigh 450,000lbs. with magnesite brick lining. The charge for each converter is 85 tons matte, 35 tons ore, blown to blister copper in one converter. Blister copper is poured into 2 casting furnaces, each of 140 tons capacity, with one in reserve. Air at 15 lbs. pressure oxidizes copper which is then skimmed and poled and poured into a casting machine. All handling of material is done by electricity.

The sand leaching plant, 2,000 tons capacity, recovers the copper from sands of the old tailing dump. These sands are roasted in McDougal furnaces, cooled in a rotating drum, wetted to lay dust and conveyed to tanks 50' in diam. and 14' deep, each holding 1,050 tons, where it is leached by hot solution of salt and sulphuric acid and copper precipitated from solution by scrap iron.

The arsenic plant treats flue dust in White-Howell rotary furnace, the dust-laden gas going to a Cottrell electrical treater for removal of dusts, then cooled and condensed arsenic trioxide removed by a second Cottrell treatment, the fine powder being discharged by a screw conveyor into barrels. The new arsenic refining plant, completed during 1920, can produce 400 tons per month.

A brick plant making 11,000 standard fire brick per day and another making 50,000 building brick from retreated tailings is one of the newer features of the works.

In 1917, work was started on a new stack at Anaconda, 585' high, with an inside diameter of 70' at bottom and 60' at top. This was finished and connected with the 20 Cottrell electric precipitators in May, 1919.

The reverberatory costs have been reduced from $1.75 to $1.25 per ton of ore by coal firing and other changes in practice, as compared with $1.35

per ton of charge for the blast furnaces, but so much limestone has to be used in the blast furnaces charge that the cost, per ton of copper ore, is higher.

It has been found that leaching produces cleaner tailings than flotation, though other factors equalize the 2 processes, since for leaching the roasting costs are 25 to 30c., excavating 14c., hauling 8c., and other costs 33c., a total of 80c. per ton, using 65 lb. of 60% acid for 9 lb. copper. Over 500,000 tons of tailing and ore are leached annually.

Full description of the Washoe smelter plant and the technical treatment have been published in the Trans. Am. Inst. M. E. and in Mining & Scientific Press. Feb. 26.1916. and Mining World, March 4. 1916.

The acid plant produces 200 tons a day of 60% acid, but a much bigger plant will be built in the next few years to supply acid for the zinc plant and phosphate rock.

The Great Falls Plant

The Great Falls Plant, originally operated as a concentrator and smelter, has been so remodelled and rebuilt to meet changing conditions, that it is no longer a smelter, but an electrolytic copper refinery, an electrolytic zinc reduction works, Rod and Wire mill and general industrial plant.

The wire mill, the first to be built in the West, has alone drawn into rods and copper wire, a total of 166,000,000 lb. of copper and made a manufacturing net profit from June, 1918 to Dec. 30, 1921, of $850,000 on an investment of $1,057,730. In 1919, 43,241,497 lb. of copper were rolled into rods, of which 13,914,008 lb. were drawn into wire.

The refinery can now turn out 200,000,000 lb. of refined copper per year.

Probably the most important event of recent years was the production on a large scale of high-grade electrolytic zinc. The 10-ton test plant showed such good results that a 2,000-ton concentrator, using flotation, was erected at Anaconda, and a refinery of 100-ton capacity of metal per day at Great Falls. Both company and custom ore is treated. The refinery was increased to 150 tons of spelter daily. Changes in practice are ably described by Frederick Laist in "Eng. & Min. Jour." of October 7, 1916. The works are described by Mr. Laist, F. F. Frick, J. O. Elton, and R. B. Caples in a paper presented to the A. I. M. & M. E. in Feb., 1921.

Five electric furnaces, for the manufacture of ferro-manganese, were erected in October, 1918, but were closed on account of lack of demand resulting from the end of the war. In 1919, this plant was re-modeled for the production of calcium carbide. In January, 1920, manganese ore was again being sent to this plant. The manufacture of fertilizer is also under way, utilizing acid from the reduction works and a deposit containing 25,000,000 tons of phosphate rock near Maiden Rock, 45 miles from Anaconda.

The product is marketed as Treble Acid Phosphate and contains 48% of soluble phosphoric acid. By Dec., 1920, a 250-ton brass furnace had been erected.

The production of aluminum from bauxite is also under consideration, a large deposit of this ore in Washington, having been purchased.

In order to secure additional roasting capacity for the zinc plant at Great Falls, 14 of the 28 furnaces for the copper-leaching plant were remodeled for roasting zinc concentrates.

The zinc plant at Great Falls was closed in Feb., 1921, on account of large accumulations of spelter.

Production of the other smelters and refineries will be found under the proper headings below.

The Anaconda properties have for years produced one-third of the copper output of the United States and one-sixth of the world's production. The splendid technical force and equipment of the company and the excellent showing of its mines indicate that it will maintain its pre-eminence for years to come. The cost of producing copper is never published, but it is thought that in normal times the cost was around 9 cents per pound.

Production—omitting outside ore and metal, excepting zinc:

Year	Copper ore treated, tons	Copper output, lb.	Gold, oz.	Silver, oz.	Zinc ore treated, tons	Zinc, lb.
1921*	.....	30,300,000	.....	.....	.....	.....
1920	1,828,379	138,760,065	32,530	6,420,026	443,582	101,332,458
1919	1,794,358	129,781,031	42,525	6,744,262	284,599	52,453,978
1918	4,350,446	272,923,031	64,317	10,076,748	393,193	72,131,238
1917	3,906,901	239,014,880	58,545	8,368,180	326,479	50,624,524
1916	5,273,066	307,395,092	92,099	10,790,706	196,680	20,906,439
1915	.....	253,311,574	106,702	9,005,618	.....	.....
1914	.....	223,720,292	99,651	8,314,116	.....	.....
1913	.....	270,303,644	64,898	10,321,296	.....	.....
1912	.....	294,474,161	61,314	11,014,737	.....	.....
1911	.....	259,407,092	48,950	9,731,561	.....	.....
1910	.....	266,608,461	57,260	9,534,888	.....	.....
1895-1919	.....	3,767,564,570	857,057	134,149,646	.....	.....

*3 mo's. Closed down since April 1st.

Electrolytic Refinery at Great Falls

	Cathodes produced, lb.	Melted into shapes, lb.	Zinc produced, lb.
1920	145,149,892	145,149,892	106,587,910
1919	129,022,057	121,338,737	52,453,978
1918	191,404,125	189,067,167	72,131,238
1917	141,517,768	132,089,914	50,624,524
1916	127,620,000	56,062,000	20,906,439

INTERNATIONAL SMELTING CO.

Subsidiary of the Anaconda Copper Mng. Co.

General office: 25 Broadway, New York. Ore purchasing dept.: J. B. Whitehill, agt., 618 Kearns Bldg., Salt Lake City.

Officers: Cornelius F. Kelley, pres.; Wm. D. Thornton, 1st v. p.; L. D. Ricketts, 2nd v. p.; Albert H. Melin, treas.; with C. E. Mills, Benj. B. Thayer and John D. Ryan, directors. David B. Hennessy, sec.

Inc. May, 1914, in Montana. Cap. $15,000,000. Stock entirely owned by Anaconda Copper Mining Co. Company is a reorganization of the International Sm. & Ref. Co.

Company operates smelters at Tooele, Utah, and Miami, Ariz. The Raritan Copper refinery at Perth Amboy, N. J., and the International Lead Refinery Co., at East Chicago, Ind, although managed by International, are actually subsidiaries of Anaconda.

The Miami Smelter.

Smelter address: Miami, Ariz. Officials:

T. H. O'Brien, gen. mgr.; L. O. Howard, supt. This copper smeltery built primarily to smelt the concentrates produced by the mills of the Inspiration Cons. Copper Co. and the Miami Copper Co., is equipped to handle custom ores. The plant is situated about a mile E. of Miami and 6 miles W. of Globe, on the Inspiration Co.'s industrial railway connecting with the Arizona Eastern R. R. at Miami.

The smelter is essentially a reverberatory plant, which on account of the high copper content of the concentrates treated has been built to minimize losses in the handling of material from one department to another, and the prevention of dust losses, as far as possible.

Material from both Miami and Inspiration mills which is flotation concentrate is hauled to the smelting plant in 60-ton steel cars especially designed to handle sticky, fine material of this nature. The smelter also treats the flotation concentrate of the Iron Cap Copper Co., and flotation concentrate, gravity concentrate and flue dust of the Old Dominion Co.

Bins: concentrates are first bedded in three 3,000-ton V-shaped bins with the necessary limestone, pyrite, first-class ore and secondaries to give a proper smelting mixture. First-class ores go to receiving bins with capacity of 2,700 tons.

Crushing and Sampling Plant: 22'x40', 5-stories high, contains: 18"x30" Blake crusher: 1 set 54"x16" rolls; 3 sets 42"x16" rolls; 16" Snyder sampler; three 27" Snyder samplers; two 24"x8" rolls.

Steel storage bins of 1,500 tons capacity are provided for the storage of crushed ore and fluxing material.

Roaster and Dryer Plant: 67'x150' and 93' high, contains 10 Wedge roasting furnaces, 22'6" in diam., each having 5 regular hearths and a dryer hearth. Two oil burners on the 4th and 1 on the 5th hearth supply the heat for drying. Roasting has not been found necessary, and in some cases pyrite is added to give the proper grade of matte.

Each furance is fed from a 190-ton storage bin directly over it. The gases pass directly to a header flue, and then into Cottrell treaters located above the charge floor. The Cottrell treaters in this plant practically prevent the loss of any flue dust.

Reverberatory Plant: the reverberatory building, 134'x234', contains reverberatory furnaces, 1 with a 25x120' and 3 with 21x120' hearth areas. The furnaces are oil fired and discharge their gases through Stirling boilers. There are eight 713-h. p. and one 850-h. p. waste heat Stirling boilers.

Converter Plant: is 58'x380'x49' to the top of crane rail. Two 40-ton magnet-switch-controlled electric traveling cranes are provided.

The plant contains 5 converter stands of 12' electrically operated Great Falls type converters; 2 straight line casting machines with 5'6"x16'6" tilting furnaces, 1 skullbreaker, etc. Silica bins filled by belt conveyors discharge into weighing hoppers, which measure out a pre-determined charge, delivering it directly into the mouth of the converter through pivoted spout.

The gases from the converters are passed through Cottrell treaters before being discharged into the chimney, which give a high recovery of the precious metals contained in the gases.

Power Plant: at the smelting works is operated by the Inspiration Co., the smelting plant selling its steam to, and purchasing its power from the Inspiration company. The power plant buildings are of steel and reinforced concrete construction throughout. The main units consist of three 6,000-k. w. turbogenerators, and 4 cross-compound 15,000 cu. ft. blowing engines, switchboard, etc. Modern auxiliary apparatus is provided for condensing, automatically measuring steam and feed water, recording temperatures, pressures, etc. The boiler houses contain twelve 713-h. p. oil fired Stirling boilers equipped with superheater and economizer.

Shops, Offices, Etc.: a steel shop building; equipped with traveling crane, is divided into departments, viz., machine, blacksmith, boiler, electrical and carpenter shops, all well equipped with modern tools. The warehouse, general office and laboratory buildings, and 8 staff cottages at the smelting plant are of reinforced concrete throughout. Water for the plant is obtained from the Inspiration Co.

On account of the high copper content of the concentrates which the plant receives, it has a production capacity of 20,000,000 lbs. of copper per month, not including two spare reverberatory furnaces.

Production:

Year	Concentrate tons	Ore tons	Copper lb.	Gold oz.	Silver oz.
1920	298,211	47,157	166,001,982	5,727	378,647
1919	295,318	46,137	160,621,734	5,461	279,893
1918	332,644	45,290	173,043,136	4,256	252,437
1917	242,936	26,839	138,762,411	2,954	201,860
1916	295,075	37,891	181,518,396	2,882	257,543

Operations were suspended in March, 1921, but one reverberatory was reported blown in on Dec. 1, to take care of accumulated Miami concentrate.

The Tooele Smelter

Addresses : Wm. Wraith, gen. mgr., 25 Broadway, New York; Utah office J. O. Elton, mgr. Kearns Bldg., Salt Lake City., Works address: Tooele, Utah; A. B. Young, supt.; B. L. Sackett, asst. supt.

This lead and copper smelter is 6½ miles from Warner on main line of the Los Angeles & Salt Lake R. R., where connection is made with the Tooele Valley Ry. Co., and plants and yards cover one-half square mile.

Crushing and sampling 5-story building, 2 complete sections using the Brunton system and sampling, contains 8 Blake type crushers, 9 to 12"x15"x 15" to 24" in size and 8 rolls, 12 to 15" wide and 26", 42" and 48" diameter. Each sampling section contains 4 Brunton sample cutters. In the copper plant ore is crushed to ⅜", conveyed from sample mill to roaster storage bins (5,000 tons capacity) by belt conveyor, thence to roaster feed hoppers by belt conveyor .

Copper Department: The McDougall roaster building contains 2 sections, each 64x162' holding 32 furnaces. These furnaces are 16' in diameter, 18' high and have 6 hearths. Roaster gases passing thru 120x140' hopper-bottom brick dust-chambers 30' high above the hopper, thence to flue type Cottrell treater, thence thru brick flue to stack. Each unit of the Cottrell treater has an effective electrode length of 40' and effective cross section of 113.5 sq. ft. The brick stack is 350' high and 25' inside diameter at the top. The reverberatory plant receives the calcine by electric tram system. It contains 5 coal-fired furnaces, Anaconda type, 1 with 19'x90' hearth, 4 with 19'x102' hearth. Each furnace is equipped with 750-h. p. waste-heat Stirling boiler. Gases go through a brick flue 1,360' long to stack.

The converter plant has 5 electric-driven stands for 96x150" shells and a 60-ton crane. Converter shells are basic lined. Gases from plant go through a steel flue to a 50x126' brick baghouse containing 960 31x1'6" woolen bags. From the baghouse the gas is discharged through a 150' stack 15' in diameter at the top.

The power house contains 2 Corliss engines direct-connected to 250-k. w. 500 v. d. c. generators; one 350 k. w. 500 v. d. c. turbo generator set; 2 vertical triple-expansion engines direct-connected to 750-kva. 2,200-v. generators; one 750 k. w. 2,200 v. turbo generator set; 2 converter blowing engines, 15 lbs. air; 1 steam-driven 90 lb. air compressor; 1 electric-driven 90 lb. air compressor; 2 No. 10 Roots blowers, direct-connected to tandem compound Corliss engines; and 2 Leblanc condensers and necessary auxiliaries. Condensing water is cooled in natural draft cooling tower. In addition to the waste-heat boilers, there are 3 hand-fired 350-h. p. Stirling boilers.

Lead Department: The lead plant contains blast furnaces, sinter plant and charge bins. There are 26 double steel bins with a capacity of 10,000 tons of ore and concentrate, receiving material from the crushing plant by belt conveyor. Fine concentrates and ores already sampled can be dumped direct. Charges for blast furnaces are weighed in scale hoppers dropped into charge cars, going direct to furnaces.

Copper is cast in steel moulds by 30-ton electric crane. Slag is granulated in an inverted cone-type granulating tank, from which it is withdrawn by a bucket elevator, loaded into railroad cars, and sent to the lead blast furnaces.

Charges for sintering plant are made up by rotating table feeders underneath each bin, and are discharged onto belt conveyor, which delivers material into continuous mixer, whence it is taken by other conveyors to sintering machines.

The sinter plant contains 10 Dwight-Lloyd machines, 42x164", capacity 225 tons per day per machine. Sinter from machines goes to blast-furnace charge bins by standard railway cars. Gases from this plant pass through standard Cottrell treater of 4 units of 220-15'x12" diameter pipes each.

The blast-furnace plant is a steel and concrete building with five 52x180" furnaces whose daily capacity is 250 tons of charge. Gases pass through balloon flue to brick bag house containing 1,440 bags, lead to drossing plant and the lead-copper matte to the converter plant. The drossing plant has four 30-ton kettles and uses a Howard press.

Industrial equipment includes four 18-ton and four 12-ton eletcric locomotives, with necessary slag trucks, matte trucks, calcine and coal cars, a fully-equipped assay office and laboratory, shops, weather observation department, emergency hospital, office, etc. All buildings are of steel and concrete construction.

The smelting practice of copper ores largely follows Anaconda methods. The sulphide fines are roasted with a certain amount of silicious ore added upon the fifth hearth of the roaster to heat the ore and keep the temperature at the right point. The ore is roasted down to 0.7% sulphur corresponding to a matte fall of 15 to 18 tons per day. The reverberatory slag, carrying 40 to 42% silica, is tapped at the back of the furnace and the matte, carrying 20 to 30% copper, conveyed in ladles to the converters. The converters, when operated only on day shift, are kept hot over night by filling them with cinders from the reverberatory furnaces. Silica is applied to the converter in lump ore, 2 boats to each 8-ton charge. The bag-house dust from the smelter fumes is removed by reversing the fan and direction of current, drawing the dust into the chamber beneath.

Direct connection with the mines at Bingham, is made through the Utah Metal & Tunnel Co.'s 11,500' tunnel, completed in 1913.

Production:

	Copper ore tons	Lead ore tons	Copper lb.	Lead lb.	Gold oz.	Silver oz.
1920.....	104,210	200,788	9,901,906	46,136,951	22,580	4,180,890
1919.....	131,395	237,164	13,699,506	62,189,472	28,431	5,485,424
1918.....	262,723	297,847	21,821,657	62,034,920	36,317	5,827,135
1917.....	320,510	334,274	17,385,090	84,726,315	31,495	4,439,290
1916.....	442,756	421,197	20,041,089	117,976,091	40,009	5,549,777

Raritan Copper Works

Subsidiary of the Anaconda Copper Mng. Co.

Local address: E. C. Clark, supt., Perth Amboy, N. J.

The works on New York harbor, completed 1899, and since enlarged repeatedly, is one of the largest and most modern electrolytic copper refineries in the world.

The smelting department consists of one 200-ton, one 150-ton and one 100-ton furnaces for casting anodes, and two 225-ton, one 150-ton and two 100-ton furnaces for casting wire bars, ingots and cakes.

The electrolytic refinery includes 2 tank houses with their respective power houses; power consumption being about 7,000 k. w. The department has special shears for trimming cathode sheets and Morrow loop machines for attaching copper lugs to the cathode starting-sheets.

No. 2 tank house, 210x582', has 3 bays running lengthwise, with two 10-ton 3-motor Whiting cranes in each bay, equipped with special devices for handling an entire tankful of anodes or cathodes at 1 load. There are 3 electric circuits running lengthwise, 1 in each bay, each circuit of 396 tanks being handled from the power house by an electric generator. Current is 7,500 amperes, giving a current density of 20 amperes per sq. ft. The main conductor has a cross sectional area of 12¾". There are 1,188 depositing tanks arranged in 108 nests of 11 cells each, with electrode arrangement on the Walker system. Tank house No. 1 has 1,800 tanks and a capacity

of 22,000,000 lb. of copper per month; its general arrangement, and method of operation, is very similar to that in No. 2.

No. 1 power house, which furnishes power for No. 1 tank room, contains four 1,000 k. w. triple expansion Corliss engines and barometric condensers. The engines are direct-connected to four 1,000 k. w. electric generators. Beginning with 1920, fuel oil was substituted for coal throughout the plant; two 55,000 bbl. storage tanks were installed.

Production:

Year	Bullion Treated, copper, tons	silver, oz.	Copper lb.	Gold oz.	Silver oz.
1920.....	124,463	4,338,617	* 245,473,190	76,746	14,320,832
1919.....	165,443	6,514,988	326,671,962	120,629	19,503,574
1918.....	222,628	7,016,213	394,968,011	132,254	21,440,611
1917.....	209,557	5,806,924	411,933,742	137,465	19,938,375
1916.....	233,956	4,531,771	462,666,262	167,024	18,606,866

* Production 46.3% only of plant's capacity.

International Lead Refining Co.

Subsidiary of the Anaconda Copper Mng. Co.

Address: East Chicago, Ind. Wm. Wraith, gen. mgr.; G. P. Hulst, supt.

An extensive plant located at 151st St. and McCook Ave., East Chicago, Ind., on 64 acres of ground. Construction work started April 20, 1912, and plant was in operation Oct. 3, 1912. Plant comprises main refinery building, all steel and concrete, with 3 standard-gauge tracks entering the building. There are 2 crane runways running the full length of the building, with 3 traveling cranes. A change-house, of brick, is equipped with toilets, shower-baths, steel lockers, and a dining room. Bag-house is constructed of brick and concrete, divided into 4 compartments of 114 bags, 30'x18".

Equipment: consists of one 12,000-ton battery Parkes process, two 300-ton softeners, four 60-ton desilverizing kettles, one 300-ton refining furnace, and one 200-ton molding furnace. The bullion comes in on a high track, is charged into furnace with charging machine and flows by gravity through the plant. Lead is hand-molded and trucked into cars. Sampling is done in two 40-ton kettles and bullion pumped into softeners with centrifugal pump. Residues are worked up in three 30-ton reverberatory furnaces. There are two 40-ton blast furnaces, 1 for antimonial slag, and 1 for by-products and ores; 8 retort furnaces for treating zinc skim and two 5-ton cupels for treating high-grade retort metal.

Common lead is double refined by crystallization in kettles in the corroding lead plant. All furnace gases except from softeners and retorts are drawn through a sheet flue 700' long and passed through the bag house.

According to Mr. Hulst (Bull. 153 Sept., 1919, A. I. M. & M. E.) the works are able to treat both oxide and sulphide ores of antimony. All silver-bearing antimony ore is heated in the residue furnace, while antimony slag produced was low enough in silver to warrant being smelted in two 42" round blast furnaces to antimonial lead. When the domestic output of antimony ore increased in 1916, the International was ready to treat it. The two furnaces reduced from 60 to 90 tons of lead and antimonial material daily, producing 30 to 35 tons of metal carrying 13% antimony, 86.1% lead, 0.15% copper, and 0.75% arsenic.

Power is supplied by the Northern Indiana Gas & Electric Co. Two waste-heat boilers supply steam for compressors and refinery. High-pressure air is supplied by centrifugal air compressors and air for blast furnaces is supplied by a Connersville blower. Water is supplied by East Chicago Water Co. to 50,000 gal. tank, to which waste water also is pumped from a 100,000 gal. sump-tank. Oil storage capacity, two 12,000-gal. oil tanks.

Production:

Year	Lead bullion treated tons	Other ore and bullion tons	Com. and cor'd'g lead lb.	Antimonial lead lb.	Gold oz.	Silver oz.
1920.....	23,457	4,267	49,173,237	2,811,008	11,897	3,438,371
1919.....	32,238	6,536	69,884,930	6,402,350	24,428	6,311,227
1918.....	31,766	34,119	113,074,263	13,018,043	36,361	7,004,176
1917.....	41,682	23,558	117,922,724	11,525,365	24,673	5,259,738
1916.....	58,769	6,148	108,009,116	15,682,151	20,580	4,468,775

The International is not burdened by old smelters acquired at exorbitant prices, but has new and up-to-date plants, capable of handling ore as cheap, if not cheaper, than any of its competitors and is a big factor in the mining world. It is in strong and competent hands, both technical and financial, and its profitable operation is assured.

AMERICAN BRASS CO.

(Controlled by Anaconda Copper Mining Co.)

Control of this company was acquired by the Anaconda company because the company officials found that "in order to place the business of the company upon a sound foundation it would be necessary for the company to acquire manufacturing and fabricating plants through which the product of the Company in refined copper and zinc might find an outlet to the various industries which utilize such products in their respective lines of manufacture and distribution." It was stated that 32 concerns with a total output of 1,800,000,000 pounds annually, were engaged in manufacturing and fabricating copper products from raw material. As this is more than twice as much as pre-war consumption, and 80% more than 1919 or 1920 needs, new plants are not warranted and as the American Brass Co. dominated the industry, controlling 40% of the business, co-operation with that company was advisable. For that purpose the Anaconda Co. acquired 51% interest in American Brass, paying $300 per share therefor.

American Brass Co. is a consolidation made in 1912 of the Ansonia Brass & Copper Co., Benedict & Burnham Mfg. Co., Coe Brass Mfg. Co., Waterbury Brass Co., Chicago Brass Co., Holmes, Booth & Haydens Co. and in 1917 of Buffalo Copper & Brass Rolling Mill.

Company has an authorized capital of $15,000,000; par $100. Assets on Dec. 31, 1920 were $49,064,112, with accounts payable of but $632,811, or a net value of $323 per share, mostly in live quick assets. On Sept. 30, 1921, liquid assets were $24,335,176 and plant value $20,664,823, with good will, patents, etc., valued at merely $1,000. In past 20 years' operations, company earned an average of $18.88 per share or $59.68 per share for past five years.

BEER, SONDHEIMER & CO., INC.

Succeeded by International Mineral and Metals Corp., which see.

Was a branch of Beer, Sondheimer & Co. of Frankfort, Germany, which was a large shareholder in and acted as agent for Minerals Separation American Syndicate, succeeded in 1916 by Minerals Separation North American Corp. (q. v.). Principal business was trading in metals. Owned entire capital stock of Cuba Leasing Co. and Norfolk Smelting Co., and a 49% interest in the National Zinc Co. Assets, except interest in Minerals Separation, sold in June, 1920, by alien property custodian to James B. Colgate & Co. for $1,202,000, equalling outstanding capital stock at par.

COPPER EXPORT ASSOCIATION, INC.

Office: 60 Broadway, New York City.

Officers: F. H. Brownell, chairman of the board; R. L. Agassiz, pres.; Walter Douglas, 1st v. p.; C. W. Welch, sec.—treas.

Directors: Murry Guggenheim, Simon Guggenheim and F. H. Brownell for A. S. & R. Co.; John D. Ryan, Cornelius F. Kelley and Benj. B.

Thayer for Anaconda Copper Mng. Co. and Inspiration Cons. Copper Co.; Chas. Hayden, Chas. M. MacNeill and D. C. Jackling for Utah Copper Co., Nevada Cons. Copper Co., Ray Cons. Copper Co. and Chino Copper Co.; Walter Douglas and C. A. Austin for Phelps Dodge Corporation; R. L. Agassiz and Jas. MacNaughton for Calumet and Hecla Mng. Co.; Stephen Birch, for Kennecott Copper Corporation; Wm. A. Clark for United Verde Copper Co; Archibald Douglas for United Verde Extension Mng. Co.; Gordon R. Campbell for Calumet & Arizona Mng. Co.; Murry Guggenheim and Jos. Clendenin for Guggenheim Bros.; Sherwood Aldrich for Chino Copper Co. and W. D. Thornton, for Inspiration Cons. Copper Co.

Executive Committee: F. H. Brownell, R. L. Agassiz, C. A. Austin, W. A. Clark, Jos. Clendenin, W. Douglas, M. Guggenheim, C. F. Kelley, Jas. MacNaughton J. D. Ryan.

Selling Committee: Jos. Clendenin, Guggenheim Bros.; T. Wolfson, United Metals Selling Co.; C. A. Austin, Phelps Dodge Corp.; F. S. Gourley, Calumet & Hecla Mng. Co.; H. M. Brush, A. S. & R.

Inc. December, 1918, in Delaware. **Cap.** 2,500 shares, 7 per cent Pfd., par $100, also 500 shares common, no par value. Annual meeting 2nd Tuesday in May.

Funded debt: $40,000,000—8% gold notes issued Feb. 15, 1921, $6,000,000 maturing in 1 year, $10,000,000 in 2 years, $12,000,000 each in 3 and 4 years; interest Feb. 15 and Aug. 15; redeemable at par value 1% premium for each year. These notes are secured by 400,000,000lb. of refined copper purchased (10c. per pound) by the Association from its members, or copper producing companies, payment being guaranteed to the Guaranty Trust Co. of New York, Trustee, by the members in their several proportions. The Association agrees that it will not create other funded obligations during life of gold notes.

The notes are guaranteed as to principal and interest by the following producing companies in the proportions as stated:

	Proportion,%	Proportionate Principal Sums	Allotment lb.
Am. Sm. & Ref. Co.	$5.00	$2,000,000	$20,000,000
Anaconda Copper	12.26	4,904,000	49,040,000
Braden Copper M. Co. †	5.95	2,380,000	23,800,000
Calumet & Hecla	6.00	2,400,000	24,000,000
Chile Exploration*	7.58	3,032,000	30,320,000
Chino Copper	3.66	1,464,000	14,640,000
Greene-Cananea	4.63	1,852,000	18,520,000
Inspiration Copper	8.45	3,380,000	33,800,000
Kennecott Copper	5.06	2,024,000	20,340,000
Nevada Cons. Copper	4.45	1,780,000	17,800,000
New Cornelia Copper	4.07	1,628,000	16,280,000
No. Butte M. Co.	1.75	700,000	7,000,000
Phelps-Dodge Corp.	10.90	4,360,000	43,600,000
Ray Cons. Copper	4.00	1,600,000	16,000,000
United Verde Copper	5.00	2,000,000	20,000,000
United Verde Ext. M. Co.	2.70	1,080,000	10,800,000
Utah Cons. M. Co.	.34	136,000	1,360,000
Utah Copper Co.	8.20	5,280,000	32,800,000
Total	$100.00	$40,000,000	$400,000,000

* Chile Copper Company owns all outstanding stock of Chile Exploration Company. †Stock all owned by Kennecott Copper Corporation.

The object (permissable by the Webb export trade act of 1918) of this corporation is to handle export sales of copper on a basis whereby orders for export copper will be allocated to members according to production and at the same price f. o. b. seaboard. All producers of copper, large or small,

are invited to join on the same terms. It is stated 75% of the U. S. production, amounting to 1,200,000,000 lb. copper during 1920, is represented by membership in this corporation.

In Feb. 1921, there was a surplus of 600,000,000 lb. of refined copper in America, and the Association arranged for the financing of 400,000,000lb. of copper and for giving ample time (4 years) for marketing it in the export trade only, thus relieving "the producers of the financial burden of carrying it and the neccesity of pressing it for sale." These words are from a statement of John D. Ryan, which continues as follows:

"The 400,000,000 pounds is only about three-fourths of the export trade done by this country last year and if marketed over a reasonable period will be easily absorbed. The present rate of production being below the rate of deliveries of copper in 1919 and 1920 should not result in any accumulation." Exports during 1920 totaled 551,000,000 lb. compared with 438,000,000lb in 1919 and 690,000,000 in 1918.

The above described note issue was the outcome of this plan, the notes being underwritten by a syndicate headed by the National City Co. and Guaranty Co. of New York. Withdrawals of copper from the pool are permissible upon payment to the trustee of 12½c. per pound in cash or notes.

GENERAL DEVELOPMENT COMPANY

Office: 61 Broadway, New York.

Inc. Jan. 6, 1906, for the purpose of exploring and developing mining properties in the United States, Canada, Mexico, etc. The company has extensive stock interests in **Miami Copper Co., South American Gold & Platinum Co. (in Columbia, S. A.), Kerr Lake Mines, Limited, Rimu Gold Dredging Co. (in New Zealand), San Cayetano Mines,** Limited, with other mining interests in the United States, Canada and Mexico.

Capital Stock: authorized and outstanding $3,000,000; $25 par, fully paid.

Transfer Agent: company's office; Registrar: Equitable Trust Company of New York. Annual meeting, 2nd Wednesday in February.

Officers: Adolph Lewisohn, pres.; J. Parke Channing, v. p.—con-engr.; Sam A. Lewisohn, v. p.—treas.; E. H. Westlake, v. p. Theo, L, Herrman, sec.; with Alvin Untermyer, D. M. Hyman, W. T. Rosen, A. S. Rossin, J. H. Susmann, Arthur Lehman, B. Hochschild, and F. W. Estabrook, directors. Herman Cook, asst. sec.

Dividends: paid 1½% in 1908; 90% in 1909; 15% in 1910; 1½% in 1913; 6% in 1915; 23% in 1916; 28% in 1917; 11% in 1918; nil in 1919; 6% in 1920 to Aug.; none since.

The **General Development Co.** is a parent corporation examining, developing and financing mining properties which, when they have reached the self-supporting producing stage, are turned over to operating companies.

GOLD FIELDS AMERICAN DEVELOPMENT CO., LTD.

Offices: 233 Broadway, New York, and 8 Old-Jewry, London, E. C. England.

Officers: S. Christopherson, chairman; E. S. Birkenruth, Lord Brabourne, Lord Harris, J. C. Prinsep, and H. L. Sapte, directors. Managers: The Cons. Gold Fields of South Africa, Ltd. New York advisory committee: J. McDougall (mgr.), Amor F. Keene (cons. engr.) and L. A. G. Dru.

Inc. March 10, 1911, in England. **Cap.** £2,500,000; £1 par; 2,000,000 issued. 1,000,000 being fully paid and 1,000,000 with 10s. paid; Cons. Gold Fields of So. Africa owns all of former and 800,000 shares of latter. Reports are issued to shareholders only.

Dividends: 5% paid in 1918, 1919 and 1920.

Company acquired from Consolidated Gold Fields of South Africa, Ltd. (which see) latter's interests in America, including shares in **Nato-**

mas Consolidated, Oroville Dredging, Sierra Pacific Electric, Mississippi River Power Co., Yuba Consolidated Gold Fields, Granville Mining, North West Corp., Ltd., Canadian Klondyke Mng. Co., Ltd., South American Gold & Platinum Corp., American Trono Corp., and others. The mining companies named herein will be found described under their respective titles. The last named is essentially a chemical producer, extracting potash, borax, and other salts from the brine of Searles Lake, California.

In the year ending June 30, 1920, many mining propositions were given consideration and a syndicate was formed to take over oil leases.

GRASSELLI CHEMICAL CO., THE

Office: Guardian Bldg., Cleveland, Ohio.

Officers: C. A. Grasselli, chairman; T. S. Grasselli, pres.; E. R. Grasselli, 1st. v. p.—treas.; G. E. Fisher, E. W. Furst and A. C. Bailey, v. p. s; E. R. Bailey, sec.; W. T. Cashman, asst. sec. with W. J. Bever, H. P. Mansfield, J. H. D. Rodier, Andrew Squire, J. H. Wade and J. H. Dunbar, directors.

Inc. 1885 in Ohio. **Cap.** $35,000,000 com. and $15,000,000 6% cum. pfd., $100 par. of which $19,393,452 com. and $8,224,220 pfd. is outstanding. No funded debt.

Financial statement: profit was $1,680,000 in 1914; $4,895,000 in 1915; $9,935,000 in 1916; $4,340,602 in 1917; $4,000,018 in 1918; $3,970,297 in 1919; $3,181,441 in 1920.

Dividends: regular on pfd. shares, while com. shares now get 6% per annum; previously it was 8%. Extra dividends, paid since 1915, total 29% in cash and 49% in stock.

Business: company is listed in The Mines Handbook as its operations are of importance to the mining industry. It has 17 treatment and manufacturing plants east of Chicago, and is a large buyer of zinc ores and concentrates from Wisconsin, the Tri-State region, and Western States. The two largest smelters are at Meadowbrook and Clarksburg, W. Va. with 8,544 and 5,760 retorts, respectively; the aggregate annual capacity is over 55,000 tons of spelter. A third smelter, at Terre Haute, Ind., has 4,200 retorts.

Company also operates pyrite mines in Virginia and at Lanark, Ont.; for the former, see Arminius Chemical Co., and for the latter, The Grasselli Chemical Co., Ltd.

GUGGENHEIM BROS.

Office: 120 Broadway, New York. Joseph Clendenin, mgr. of selling department, and who, with Murry Guggenheim, represents Guggenheim Bros. in the Copper Export Association.

This new metal-selling agency, which commenced operations on Jan. 1, 1921, has control of the selling of the entire copper production of Braden, Chile, Chino, Kennecott, Nevada, Ray, and Utah companies, formerly handled by the American Smelting & Refining Co.

GUGGENHEIM EXPLORATION CO.

Dissolution completed in 1916. See Vol. XII and Yukon-Alaska Trust in this volume.

INTERNATIONAL AGRICULTURAL CORPORATION

Office: 61 Broadway, New York City.

Officers: S. B. Fleming, pres. Albert French, v. p.; J. J. Watson, Jr., v. p.-treas.; J. R. Floyd, sec.-asst. treas.; with E. B. Sweezy, W. Schmidtmann, D. E. Pomeroy, F. M. Weld, Douglas I. McKay, E. R. Stettinius and A. H. Wiggin, directors. F. F. Ward, v. p.-asst. sec.

Inc. June 14, 1909, in New York. **Cap.** authorized 7% cumulative preferred $18,000,000 and $18,000,000 common; $100 par. Issued $13,055,500 pfd., $7,260,000 com., and $9,476,900 in bonds.

Results have been as follows, years ending June 30:

Year	Gross profit	Operating profit	Net profit	Surplus for year	Current assets	Current liabilities
1920.....	$5,735,652	$3,031,062	$2,549,887	$2,129,490	$14,621,128	$6,789,302
1919.....	4,734,553	2,764,844	721,889*	721,889	12,657,029	5,584,092
1918.....	4,504,583	2,595,723	1,944,933	1,168,270	10,336,947	4,961,641
1917.....	2,851,408	1,894,003	.....	636,812	7,075,523	3,845,338
1916.....	2,793,898	2,051,303	1,034,054	1,279,832	5,201,549	1,863,274

* After paying interest, amortization reserves, and dividend.

Dividends: Pfd. shares recieved 7% per annum until January, 1913; then 2½% in 1918; and 1¼% quarterly since Oct., 1918; none paid on common.

Company has 16 large acidulating and fertilizer plants, mostly in the South, a large number of distributing plants, and holds considerable interests in 27 phosphate and fertilizer companies, also a 50% interest in some German potash mines.

Property: 42,226 acres of phosphate lands in Florida; also extensive areas in Tennessee. In 17,000 acres explored, reserves are estimated at 41,500,000 tons. In all properties there is supposed to be nearly 100,000,000 tons. To make this rock soluble, sulphuric acid, bought from the Tennessee G. & C. Co., and Ducktown Copper, Sulphur & Iron Co., is mixed with it. A contract with the former runs for 3 years from Jan. 1, 1921.

Production: the annual output of phosphate rock is now 900,000 tons.

The company is included herein, because it is carrying on extensive mining operations, and has important relations with large mining companies.

INTERNATIONAL METALS SELLING CO.

Subsidiary of American Metal Co., Ltd.

Office: 61 Broadway, New York.

Officers: L. Vogelstein, pres.; H. K. Hochschild, v. p.; Julian B. Beaty, treas.; J. A. Schloss, sec.; R. E. Empey, asst. treas.

Originally a subsidiary of L. Vogelstein & Co., incorporated to handle importations of copper ores from Chile, was taken over by American Metal Co. (q. v.), when it absorbed the Vogelstein company. Company is dormant and is to be dissolved after expiration of pending contracts.

INTERNATIONAL MINERALS AND METALS CORP.

Successor to Beer, Sondeimer & Co., Inc., (q. v.).

Office: 61 Broadway, New York.

Officers: Jas. S. Colgate, pres.; Benno Elkan, 1st v. p.; Otto Frohnknecht, 2nd v. p.; Jas. S. Dennis, sec., with Edw. W. Harden, directors. Martin Weil, treas.

Inc. in New York. **Cap.** $1,202,000; par $100. Annual meeting, 2nd Monday in February.

In taking over properties and assets of Beer, Sondheimer, the corporation became the holding company of the **National Zinc Co., Inc., Norfolk Smelting Co.** and **Cuba Copper Leasing Co.** The **Anselmo Mining Corporation** is also a subsidiary. The two latter companies are described in this volume, under their own titles.

Beer, Sondheimer, which held 49% of **National Zinc** share capital, is reported to have brought suit in May, 1920, to recover $873,342, alleged to have been loaned to the latter.

National Zinc Co., Inc.

Office: 61 Broadway, New York.

Officers: Benno Elkan, pres.; Jas. S. Colgate, 1st v. p.; other officers and directors the same as above.

Inc. in New York. **Cap.** $300,000; $100 par; all owned by parent company. On June 27, 1921, National Zinc Co., Inc., took over all properties of **National Zinc Co.** in consideration of the satisfaction of a $1,010,946 judgment vs. National Zinc Co. and held by National Zinc Co., Inc. as assigner

of International Minerals & Metals Corp. Annual meeting, 2nd Monday in January.

Works: comprise zinc smelters at Bartlesville, Okla, Argentine, Kans., and Springfield, Ill., which see under those states. These are custom plants; company is not in the mining business.

INTERNATIONAL SMELTING AND REFINING CO.

Properties and assets purchased 1914 by Anaconda Copper Mng. Co. for $10,392,709. Company dissolved and properties transferred to International Smelting Co., which see.

METALLURGICAL COMPANY OF AMERICA

Dead; see Vol. XIV for description. Wsa a subsidiary of Am. Metal Co. (q. v.).

MINERALS SEPARATION NORTH AMERICAN CORPORATION

Succeeding Minerals Separation American Syndicate.

Offices: 61 Broadway, New York; engineering office and testing laboratories, 220 Battery Street, San Francisco; experimental and research laboratories, Long Island City, New York.

Officers: John Ballot, pres.; S. Gregory, v. p.; with Frank Altschul, Alfred A. Cook and F. Perry, directors; Chester B. Allen, sec.; Edward H. Nutter, chief engr.

Inc. in Maryland, Dec. 1, 1916. **Cap.** 500,000 shares of no par value; all stock placed in voting trust. The voting trustees are J. Ballot, S. Gregory and F. Altschul.

Dividends: May 29, 1918, $1.50 out of capital assets and 50c out of current earnings; July 1, 1919, $1.50 out of capital assets and 50c out of current earnings; Dec. 31, 1920, 75c. out of capital assets and 25 c. out of earnings; all distributions made in U. S. Government Liberty Loan bonds.

For 5 years beginning 1911, Minerals Separation American Syndicate was represented in the U. S. by Beer, Sondheimer & Co., Inc. (q. v.), a branch of company of same name of Frankfort, Germany.

Company owns all United States, Canadian, Mexican and Cuban patents for flotation processes of ore concentration originally owned by Minerals Separation, Ltd., of England. Rights to use processes are licensed on a royalty basis, licensees being given privilege of electing any one of four different methods of royalty payments applicable to their ores, namely. (1) Flat Rate—based on payments per ton of total ore milled (this is limited to straight copper ores); (2) Unitage Rate—based on payments per unit of various metals recovered from total ore milled; (3) Percentage Rate—based on percentage of value of all metals recovered from total ore milled; (4) Poundage Rate—based on payments per pound (or per ounce, in case of precious metals) of all metals recovered from any material treated by flotation. Details of these royalty payments will be found in a 24-page booklet published by the company in 1919. The Scott patents were acquired early in 1920, but no royalties are collectible on this from the Jackling-Hayden, Stone companies.

Ore treated by licensees in North America during 1915, was about 4,500,000 tons; in 1916, about 12,000,000 tons; in 1917, about 22,000,000 tons; in 1918, about 28,000,000 tons. It is estimated that during 1918 between 55,000,000 and 60,000,000 tons of ore was treated in whole or in part by flotation, of which about one-half was treated by 110 licensees of Minerals Separation, the remaining one-half by some 400 users of flotation methods. Licensees of the company include Anaconda, Inspiration, Arizona Copper, New Cornelia, Greene Cananea, Consolidated Copper mines, Calumet & Hecla and affiliated companies, Phelps Dodge Corp., Federal Mining & Smelting, American Zinc Lead & Smelting, Elm Orlu, St. Joseph Lead, Doe Run Lead, Britannia Copper (B. C.), and many others, totaling about 140 active users in 1920.

The flotation processes are now used extensively throughout the world for treating various ores of copper, zinc, lead, gold, silver, graphite and molybdenum. Their economic value for treatment of base-metal ores is firmly established and, although not universally applicable, flotation is an

invaluable adjunct to almost every concentrating plant. At Calumet & Hecla it has insured the recovery of the very fine metallic copper and combined with a special method of leaching, it has practically created a large new and profitable source of copper in that company's old dumps. In several important mills, notably Inspiration, substantially all sulphide recoveries are effected by means of flotation. In other mills the coarser minerals are rougned out by gravity concentration methods and the fines recovered by flotation. Differential flotation is finding a wider range of application in the treatment of complex sulphide ores, close separations being made as between exceedingly fine lead and zinc sulphides, or between valuable copper pyrite and relatively worthless iron pyrite. The Callahan Zinc & Lead (Idaho) and the Sunnyside (Colorado) mills afford excellent examples of the great economic value of this development of the process.

If the various methods of flotation now in use should prove to be infringements of its patents, large sums would be due to Minerals Separation as royalty.

Litigation over United States patents was first provoked by the installation made in 1911 by James M. Hyde (formerly an employee of Minerals Separation, Ltd.) at the mill of the Butte & Superior Mining Co. In that suit (Minerals Separation v. Hyde) the Dis rict Court at Butte, Montana, sustained U. S. Patent No. 835,120 and found infringement as to 7 claims. In 1914, the Ninth Circuit Court of Appeals, at San Francisco, reversed this decision, but on writ of certiorari the U. S. Supreme Court on Dec. 11, 1916, unanimously adjudged this basic patent for air-froth flotation valid as to 10 of its 13 claims. The remaining 3 claims, which specified the use of "a small quantity of oil," and which the court held to be invalid, have since, by disclaimer, been brought within the scope of the Supreme Court's decision.

Following this decision of the Supreme Court in the Hyde case, the Butte & Superior began using oil in minimum quantities of ½ of 1%, contending that this relieved it of liability for infringement. This issue was tried in the suit of Minerals Separation v. Butte & Superior, and on May 4, 1917, the United States District Court at Butte, Mont., found validity and infringement as to the 10 claims (3 modified by disclaimer) previously litigated. On May 13, 1918, the Ninth Circuit Court of Appeals at San Francisco partly reversed this decision, holding the patent limited to ½ of 1% of oil on the ore. The United States Supreme Court reviewed this case on writ of certiorari, and on June 2, 1919, partly reversed the decision of the Circuit Court of Appeals, holding that the patent extended to and covered the use of oils in amounts equal to any and every fraction of 1% on the ore. Pursuant to this decision, the District Court of Montana entered its decree on July 19, 1919,, issued a permanent injunction against the Butte & Superior, and held it to account for all profits made by reason of its infringements. This accounting was set for October 27, 1919, but settlement has not been reached.

In the suit of Minerals Separation v. Miami Copper Co., before United States District Court at Wilmington, Del., three patents were involved, namely 835,120 for air-froth flotation, 962,678 for soluble frothing agents, and 1,099,699 for the use of aromatic hydroxy compounds in cold circuit. In September, 1916, the Court found the first two patents valid and infringed, except as to one claim of 835,120, which has since been modified by disclaimer, but held the third patent to be void. On appeal to the Third Circuit Court of Appeals at Philadelphia, this decision was affirmed except as to the third patent, which was also held to be valid and infringed. Miami did not appeal from this decision, and the District Court issued a permanent injunction against that company. Accounting proceedings are now being held before a Master who is also trying out numerous variations of alleged infringements which the Miami company has used since being placed under injunction.

It results from these litigations that infringement of Minerals Separation's main patent, No. 835,120, cannot be avoided by any variation in the form of apparatus so long as a mineral-bearing froth is produced by the use, at any stage of the operations, of less than 1% of oil on the ore. The type of apparatus, character and extent of agitation are held to be immaterial. In addition to this, the validity of patent No. 962,678 precludes the use of soluble frothing agents in any form or amount whatsoever, except under license from Minerals Separation, as the Third Circuit Court of Appeals held that the Miami company infringed this patent when using oils that were partly soluble in water. This point is especially important because most of the effective oils used in flotation operations have soluble components. This seems to place Minerals Separation in an exceedingly strong position and appears to exhaust the possibilities of successfully evading its patents.

In September, 1919, Minerals Separation brought suit against Nevada Consolidated Copper Co., alleging infringement of its patents claiming damages, and seeking an injunction against further infringement. In August, 1920, defendant admitted infringement, but only of that patent governing the use of oil in amounts less than 1 %. Minerals Separation has brought suit also against Ray Hercules Copper Co., Magma Copper Co., Ray Cons. Copper Co., Chino Copper Co., Utah Copper Co., John M. Callow and General Engineering Co. In a further case against the Miami Co. in Dec., 1920, the ruling dismissing applications by Minerals Separation for supplemental bills was affirmed and no injunction was granted enjoining Miami from using flotation.

During 1920, there was a widespread interest in flotation processes, and a great deal was published concerning the legal status of patents. Minerals Separation was the center of interest, and came in for considerable criticism during hearings of the Federal Trade Commission and at the meeting of the American Mining Congress at Denver in November.

On May 10, 1922, Mineral Separation Corporation settled out of court with those mining companies it was suing for patent infringement "without penalties of any kind for past use," but requiring payment of regular license fee upon tonnages milled in past by flotation. Companies will operate hereafter under license, and fee will be as low as that of other companies, that have not fought the patent. This gives Mineral Separation a practical monopoly in the froth flotation field.

MINES EXPLORATION SYNDICATE

Office: Makeever Bros., Mgrs., 170 Broadway New York. Operating dept.,, 1553 Harvard Ave., Salt Lake City. Walter Neal, engr.

Inc. Aug., 1916, "to investigate and develop worthy mining properties." Over 200 mines were examined but only 3 taken over for development, at last accounts.

Property: Lookout mines in Montana, the Herb Lake (Rex) mines in Northern Manitoba, Can., and the Candelaria mines in Jalisco, Mex.

See Herb Lake Gold Mines, Ltd., in this volume and Vol. XIV. for description of other properties.

MINES HOLDING & OPERATING CORP.

Address: 50 Broad St., New York City.

Officers: Wm. R. Jones, pres.; Jackson B. Sells, 1st v. p.; E. L. Kerstetter, sec.-treas., with B. Brown Barker and E. F. Carlson, directors.

Inc. July 3, 1919, in Delaware. **Cap.** $3,000,000; $1 par; 1,090,836 issued.

Organized for the purpose of developing and operating promising mining properties either by direct purchase or by stock ownership. It may also hold securities for investment.

Company controls through stock ownership the following companies: Midnight Mining Co., a silver-lead property at Mullan, Idaho (1,345,104

shares), and Snake & Opportunity Mines Co., a gold property at Hillsboro, New Mexico (650,000 shares).

Corporation Trust Co., New York, registrar and transfer agent. Annual meeting second Tuesday in February. The companies are in the development stage and are described under their respective titles, in the Idaho and New Mexico sections of this volume.

MINING & DEVELOPMENT CORPORATION

Address. E. O. Holter, 60 Broadway, New York.

Officers: Edwin O. Holter, pres.; Howard D. Smith, v. p.; Robert Frese, sec.-treas., with Norman B. Holter, directors.

Inc. Feb., 1918, in Maine. **Cap.** 3,000 shares of no par value.

Is an exploration and development company having varied interests in many parts of the United States. Mexico, and South America.

In October, 1919, obtained a 3-year lease and bond on mines of the Richmond-Eureka Mng. Co. (q. v.), which was then assigned to the Ruby Hill Development Co. (q. v.) Report of H. P. Henderson on the Richmond-Eureka made for the corporation was favorable, but property is now idle owing to excessive railroad rates. Company has spent a large sum investigating and bonding properties, but its operations are suspended until political conditions in Mexico are settled.

NATIONAL LEAD CO.

Main office: 1 Montgomery St. Jersey City, N. J. Executive and transfer office: 111 Broadway, New York.

Officers E. J. Cornish, pres.; Geo. O. Carpenter, R. P. Rowe and N. B. Gregg, v. p's.; M. D. Cole, sec.; Henry O. Bates asst. sec.; Fred R. Fortmeyer, treas.; Chas. Simon, asst. treas.; H. T. Warshow, compt..; Harry W. Dickerson, asst. compt.

Executive committee: E. J. Cornish, chairman; E. F. Beale, R. P. Rowe, N. B. Gregg, J. R. Wettstein and G. D. Dorsey.

Directors: Edward F. Beale, Geo. O. Carpenter, Fred M. Carter, R. R. Colgate, E. J. Cornish, G. D. Dorsey, Chas. E. Field, Geo. W. Fortmeyer, E. C. Goshorn, Norris B. Gregg, R. P. Rowe, W. N. Taylor, Walter Tufts, J. R. Wettstein, and G. W. Thompson.

Committees:

Manufacturing—C. P. Tolman, chairman; L. T. Beale, H. P. Cavarly, Evans McCarty and G. W. Thompson.

Metal: E. J. Cornish, chairman; W. H. Baker, L. T. Beale, W. C. Beschorman, A. F. Curtis, G. D. Dorsey, S. E. Lindsley, H. J. McBirney, Sheldon Thompson, C. F Wells, Jr. and J. R. Wettstein.

Metal department: A. B. Hall, manager; J. P. Wilson, asst. mgr.

Branches of National Lead Co.:

Atlantic, R. P. Rowe, mgr, 111 Broadway, New York, N. Y. Buffalo, Sheldon Thompson, mgr., Buffalo, N. Y. Cleveland, C. C. Foerstner, mgr., Cleveland, Ohio. Cincinnati, E. C. Goshorn, mgr., Cincinnati, Ohio. Chicago, Chas. E. Field, mgr., Chicago, Ill. St. Louis, Geo. O. Carpenter, mgr., St. Louis, Mo. John T. Lewis & Bros. Co., Edward F. Beale, pres., Philadelphia, Pa. National Lead & Oil Co., of Pennsylvania, W. N. Taylor, pres, 316 Fourth Avenue, Pittsburgh, Pa. National Lead Co., of Massachusetts, Walter Tufts, treas., 131 State Street, Boston, Mass. National Lead Co., of California, Jas. B. Keister, v. p., Merchants Exchange Building, San Francisco, Cal. National Lead Co., of Argentina, G. D. Dorsey, pres., 25 de Mayo No. 158, Buenos Aires, Argentina. Hirst & Begley Linseed Wks., John W. Hirst, mgr., Chicago, Ill. and St. Louis Sm. & Rfg. Wks., J. A. Caselton, asst. mgr., 722 Chestnut St., St. Louis, Mo. The last named is described separately.

The National Lead Co. is interested through ownership of all or part of the capital stock in the following:

Baker Castor Oil Co., F. C. Marsh, pres., New York. Bass-Hueter Paint Co., Norris B. Gregg, pres., manufacturers of mixed paints, varnishes, and paint specialties, San Francisco, Cal. Carter White Lead Co., Fred. M. Carter, pres., white lead corroders, Chicago and Omaha. Cinch Expansion

Bolt & Engineering Co., Grafton D. Dorsey, pres., manufacturers of expansion bolts, New York. Magnus Co., Inc., H. H. Hewitt, pres., brass founders' New York. Matheson Lead Co., W. J. Matheson, pres., white lead corroders and manufacturers of oxides of lead, Long Island City, N. Y. River Smelting & Refining Co., Edward J. Cornish, pres., smelters and refiners of range of $87 on Dec. 22 and $67¾ in July; and 9,200 pfd., 108½ in Dec. and v. p. and sec., miners, smelters, and refiners of lead, St. Louis, Mo. United Lead Co., J. R. Wettstein, pres., manufacturers of all products of lead, smelters of drosses and residues New York. Titanium Pigment Co., Inc., Wm. F. Meredith, pres., manufacturers of titanium oxide pigment, New York. United States Cartridge Co., E. J. Cornish, pres., manufacturers of metallic and sporting ammunition, Lowell, Mass. Williams Harvey & Co., Ltd., Fred. W. Thomas, managing director, smelters and refiners of tin, Liverpool, England. Williams Harvey Corp., Edward J. Cornish, pres., smelters and refiners of tin, New York. A number of these companies are separately described.

Inc. Dec. 7, 1891, in New Jersey. **Cap.** $25,000,000 common and $25,000,000 preferred stock; $100 par; $20,655,400 common stock and $24,367,600 preferred stock outstanding. Listed on New York Stock Exchange. Bankers Trust Co., New York, registrar. Annual meeting, third Thursday in April. Company had 6,640 stockholders in 1916; 7,152 in 1917; 7,286 in 1918; 7263 in 1919; 7636 in 1920.

Sales on N. Y. Stock Exchange during 1921 were 64,950 com., with range of $88 in December and $63¾ in July; 9,200 pfd. at 108½ in Dec. and 100 in January. To November of 1920, range of com. was 93-63½.

Comparative General Balance Sheet for year ending Dec. 31:

	Assets				
Year	Plant Invest.	Other Invest's.	Stock On Hand	Other Current	Total
1920.....	$43,283,693	$7,685,312	$19,602,195	$22,765,828	$93,337,028
1919.....	41,510,506	11,789,208	16,044,316	18,737,346	88,081,377
1918.....	41,933,059	10,153,095	15,027,156	20,263,936	87,376,245
1917.....	25,229,672	18,753,768	8,222,782	6,517,408	58,722,630
1916.....	23,805,234	17,982,307	7,320,170	6,058,190	55,163,901
1915.....	23,785,822	17,520,916	6,267,772	5,884,460	53,458,970
1914.....	23,768,789	16,963,718	7,164,475	4,467,083	52,364,065

	LIABILITIES						
Year	Capital Stock	Insurance Fund	Bonds of Sub's	Reserves	Current*	Surplus	Total
1920..	$45,023,000	$2,013,094	$9,030,000	$8,000,000	$8,926,516	$20,344,418	$93,337,028
1919..	45,023,000	1,817,441	9,403,000	9,347,192	3,936,780	18,553,965	88 081,377
1918..	45,023,000	1,400 000	9,715,000	8,103,467	7,874,871	16,659,907	87,376,245
1917..	45,023,000	1,400,000	.....	3.293,241	664.826	8,341.564	58,722.630
1916..	45,023.000	1.200,000	.....	700.000	2,057,788	6,183 113	55,163,901
1915..	45,023,000	1,100.000	.....	300,000	1,298.608	5.737.362	53.458,970
1914..	45.023,000	1,000,000	.....	.....	988,835	5,352,230	52,364,065

* Includes accounts audited but not due subsidiaries.

Comparative Income Account:

	Net Income	—— Dividends —— Pfd.	Com.	Surplus Year	P. & L. Surplus
1920.....	$4,735,509	$1,705,732	$1,239,324	$1,790,453	$20,344,418
1919.....	4,632,560	1,705.732	1,032,770	1,894,058	18,553,965
1918.....	4,692,815	1,705,732	1,342,601	1,644,482	16,659,907
1917.....	4,896,953	1,705,732	1,032,770	2,158,450	8,341,564
1916.....	2,977,699	1,705.732	826,216	445,751	6,183,113
1915.....	2,710,526	1,705,732	619,662	385,132	5,737,362
1914.....	2,476,293	1,705,732	619,662	150,899	5,352,230
1913.....	2,458,306	1,705,732	619,662	132,912	5,201,331

The foregoing is a consolidated financial statement of National Lead and of subsidiaries of which entire capital stock is owned. Stock holdings in other subsidiaries are included under "other investments".

Dividends.

	1918	1917	1916	1911-15	1910	1908-9	1907	1906	1901-5	1898-00	1896-7
	%	%	%	%	%	%	%	%	%	%	%
Common.....	6½	5	4	3	4	5	4¾	2	..	1	..
Preferred.....	7	7	7	7	7	7	7	7	7	7	7

Present rate. preferred 7%, payable quarterly, March 15, etc.; common 5% in 1919; 6% in 1920 and 1921, payable quarterly March 30, etc.

Company is said to do about 50% of the lead business of America.

NEW JERSEY ZINC CO., THE

Offices: 160 Front St., New York; 810 Broad St., Newark, N. J.

Officers: Edgar Palmer, pres.; A. P. Cobb, J. E. Hayes, Edwin S. Marston, v. p.'s; A. B. Schultz, sec.; R. G. Hudson and F. P. Nolan, asst. secs.; H. S. Wardner, treas.; W. P. Sutphen, asst. treas. G. F. Wolff, comp; F. H. Baxter, asst. comp.

Directors: Edgar Palmer, C. W. Cox, August Heckscher, T. D. Jones, E. S. Marston, J. J. Riker, E. M. Squier, W. P. Hardenbergh and Walter Douglas. E. V. Peters, gen. sales mgr.; H. Hardenbergh, gen. purch, agt.

Inc. Oct. 30, 1880, in New Jersey as the New Jersey Zinc & Iron Co. Name changed 1897 to present title and capital increased from $3,000,000 to $10,000,000. Stock increased to $35,000,000 by payment of stock dividend of 250% July 7, 1915 and again increased by stock dividend in June 1920 to $42,000,000; $100 par, all outstanding. Stockholders received the right of subscribing at par to $7,000,000 new stock on the basis of one share of new stock for each five shares held; and in addition $1,000,000 of stock was authorized for sale to employes. When all stock has been disposed of, there will be issued and outstanding a total of $50,000,000. Transfer office: 160 Front St., New York. Registrar: Farmers' Loan & Trust Co., N. Y. Annual meeting, last Wednesday in February.

Bonded debt: the unretired balance of bonds authorized Oct. 1, 1901, due Oct. 1, 1926, First Gold, 4%. Original authorized issue, $10,000,000, of which $4,000,000 were issued, the balance to be issued only for the purchase of new property, stock of new corporations, the erection of new plants, etc. Of the $6,000,000 of unissued bonds, $3,800,000 had been retired up to Jan. 1, 1921, leaving a present authorized amount $6,200,000. The mortgage provides for the cancellation of $200,000 of unissued bonds yearly on Oct. 1, beginning 1902, the authorized amount of bonds to be reduced accordingly, and after all such unissued bonds have been canceled, the company is required to pay to the trustee, annually, on Oct. 1, $200,000 as a sinking fund for the purchase or redemption of outstanding bonds at not exceeding par and interest.

Dividends: regular quarterly at rate of 20% per annum have been paid from 1907 to May, 1915, and quarterly at rate of 2½% in Aug. and Nov. 1915. On Feb. 10, 1916, until Dec., 1920, quarterly at rate of 16% per annum. In 1921, the rate was reduced to 2% quarterly.

Extra distributions: 10% in 1907, 5% in 1909, 10% each in 1910 and 1911, 10% each 3 times in 1912, 10% each 3 times in 1913, 10% each twice in 1914 5% each twice in 1914, 2%, 10% and 30% in 1915. 250% stock dividend in July, 1915, 10% each 4 times and 5% 4 times in 1916, 10% in Jan., and 4% each Mar., April June, July, and Sept., 1917; 4% June, 1918; 2% each July and Dec. 1919; 20% stock dividend in June, 1920.

Balance sheets are not available, but table below will give a general idea of financial conditions:

Year	Net Income	Dividends	Surplus
1920.....	$7,583,863	$5,600,000	$1,983,863
1919.....	8,580,095	7,000,000	1,580,095
1918.....	10,954,292	7,000,000	3,954,292
1917.....	14,704,952	12,600,000	2,104,952
1916.....	32,668,240	26,600,000	6,068,240

Net income for 9 months of 1921 was $1,525,141 and surplus was $615,813 after one 2% dividend; 2 previous dividends were paid from total surplus as of Dec. 31, 1920.

Property: the Mine Hill and Sterling mines at Franklin, New Jersey. The different original holdings were consolidated as a result of litigation and to effect better mine operations. It was upon the economies due to a single control of the great orebody and to the discovery by J. P. Wetherill of a process for treating the manganese-zinc ores that the fortunes of the company were built. For geology of mine see Lindgrens "Ore Deposits," p. 709; also U. S. Geological Survey Folio, No. 161.

In Carrol county, New Hampshire, the company operated the Silver Lake mine until 1919, when work was suspended.

Company owns **The New Jersey Zinc Co.** (of Pa.), with a 7,192-retort zinc smelter at Palmerton, Pa. and another plant at Freemansburgh, Pa.; **Mineral Point Zinc Co.**, which see; **Prime Western Spelter Co.; Tulsa Fuel & Mfg. Co.** with a 6,232 retort zinc furnace at Collinsville, Okla; **Bertha Mineral Co.**; (q. v.) **Hyatt Ore Corporation**; the **Empire Zinc Co.** (of Missouri), not at present active; and **The Empire Zinc Co. (of Colorado)**, which see. The spelter plants of the Prime Western at Gas and Iola, Kansas, are no longer operated.

The mines in New Jersey produce the high-grade ore from which the Horsehead brand of spelter is made. Custom ores are bought for treatment. The products include oxide of zinc, slab zinc, sheet zinc, zinc dust, spiegeleisen, sulphuric acid, lithopone, and zinc chloride.

Production: no reports are published, but it is known that the company has a yearly smelting capacity of 160,000,000 to 170,000,000 lb. of slab zinc. In 1919 the output from New Jersey mines was 615,680 tons of ore, containing 185,824,000lb. of zinc; in 1920, 535,207 tons containing 154,742,000lb.

Company apparently carefully conceals its vast financial operations from a curious public, but it is well if somewhat "closely" managed, and is doing excellent educational work in spreading knowledge of the uses and properties of zinc.

PHELPS DODGE CORPORATION

Office: 99 John St., New York.

Officers: Walter Douglas, pres.; Cleveland H. Dodge, Arthur Curtiss James, v. p.'s.; Geo. Notman, sec.-treas., with Geo. B. Agnew, Francis L. Hine, Wm. Church Osborn, Matthew C. Fleming and E. Hayward Ferry, directors; C. W. Parsons, asst. sec- asst. treas.; W. K. Flora, ass't sec.; A. T. Thomson asst. to president; John Macnair, comptroller; P. G. Beckett, gen. mgr. (Douglas, Ariz.); H. Kenyon Burch, cons. eng.; Gerald Sherman, cons. min. eng. J. S. Williams, gen. repres. in Mexico.

James Douglas, through whose efforts and foresight the company attained its present importance as a metal producer, died in 1918, a loss to the entire mining profession. James McLean, an important member of the firm who held 18,500 shares died in 1920.

Phelps Dodge Corporation assumed all the assets and liabilities on April 1, 1917, of Phelps, Dodge & Co., Inc., and continued the business of the former company with the same board of directors and official staff.

Phelps, Dodge & Co., Inc., was the holding company for its subsidiary companies. Under the new plan the name of the **Copper Queen Cons. Mining Co.** was changed to the Phelps Dodge Corporation, its capital stock increased, and the properities of the **Detroit Copper Mining Co.** the**Burro Mountain Copper Co.**, and the **Stag Canon Fuel Co.** were transferred to it, also stocks of the **Moctezuma Copper Co., Bunker Hill Mines Co** and the **Phelps Dodge Mercantile Co.**, together with the remaining asset of **Phelps Dodge & Co., Inc.** This gives direct ownership and operation by a single company.

Phelps, Dodge & Co., Inc., was organized as the successor of the firm of Phelps, Dodge & Co., which had a history of nearly a century

its founder, Wm. Earle Dodge, having been one of the great pioneer merchants of America and a noted philanthropist.

On Oct. 3, 1921, Phelps Dodge purchased for 50,000 of i s shares, the entire holdings of **Arizona Copper Co.**, which see, for full description, Property in part adjoins that of the Morenci Branch, and includes holdings of **Coronado Mng. Co.** (q. v.) in which Phelps Dodge held already a substantial interest.

In Feb., 1921, the Corporation took a 10.9% interest, $4,360,000 total amount, in the Copper Export Association's $40,000,000 8% note issue.

Inc. Aug. 10, 1885, in New York. **Cap.** $2,000,000; $10 par; increased to $50,000,000 in March, 1917; $100 par; $45,000,000 of which is now outstanding, having been exchanged share for share for stock of Phelps, Dodge & Co., incorporated, Dec. 14, 1908, in New York. The capital stock was issued for the purchase of the entire stock of the Copper Queen Consolidated Mining Co., at $135 for each $10 share, $27,000,000; Moctezuma Copper Co., at $307 9/13 for each $100 share, $8,000,000; Detroit Copper Mining Co. of Arizona, at $150 for each $25 share, $6,000,000; Stag Cañon Fuel Co., at $800 for each $100 share, $4,000,000; held for future issue, $5,000,000. Total $50,000,000 Stock listed on New York Stock Exchange. Annual meeting, first Tuesday after first Monday in April, at 99 John St., New York. Books close 10 days before and reopen day after annual meeting. Stock transferred at office of the company. Farmers' Loan & Trust Co., New York registrar.

Twenty Phelps Dodge shares were sold for $230 each at public auction in New York on March 3, 1920.

Comparative General Balance Sheet:

ASSETS

Year	Property and Equip.	Investments	Deferred	Cash	Other Current	Total
1920..	$213,460,574	$3,803,883	.....	$4,435,007	$29,994,333	$251,693,797
1919..	204,899,444	3,690,401	.....	7,425,754	31,256,113	247,271,712
1918..	198,551,420	3,657,214	.....	12,985,403	26,238,391	241,432,428
1917..	195,405,392	3,129,481	.....	13,775,628	20,057,238	232,367,739
1916..	39,268,558	.....	$2,763,213	7,746,519	15,735,612	66,513,903
1915..	38,550,942	.....	2,130,583	5,889,305	11,375,526	57,946,356
1914..	49,392,281	.....	264,076	4,891,697	4,687,999	59,236,053

LIABILITIES

Year	Capital Stock	Current	Reserve for deplet. and deprec.	Surplus	Total
1920.....	$45,000,000	$20,939,183	$65,727,441	$120,027,173	$251,693,797
1919.....	45,000,000	17,682,550	60,795,100	123,794,061	247,271,712
1918.....	45,000,000	15,463,003	49,589,707	131,379,717	241,432,428
1917.....	45,000,000	9,523,198	45,947,694	131,896,846	232,367,739
1916.....	45,000,000	5,826,777	.....	15,687,126	66,513,903
1915.....	45,000,000	4,608,492	.....	8,337,864	57,946,356
1914.....	45,000,000	7,224,944	.....	7,011,109	59,236,053

Recent net earnings: $6,025,740 in 1909; $9,099,910 in 1910; $7,283,509 in 1911; $10,411,535 in 1912; $9,581,494 in 1913; $6,891,651 in 1914; $10,981,512 in 1915; $24,030,904 in 1916.

Income Account:

Year	Gross Income	** Expenses; taxes includ.	Profit	Dividends	Surplus for year
1920....	$35,930,178	$35,197,066	$733,112	$4,500,000	$3,766,888*
1919.....	28,366,438	25,152,093	3,214,344	4,500,000	1,285,656*
1918.....	59,483,208	43,537,525	15,456,906	10,800,000	5,145,683
1917.....	62,262,186	39,805,279	22,456,906	10,800,000	11,656,906

* Deficit. ** Depletion and depreciation included from 1919 on.

Dividends: company pays a regular quarterly dividend of $2.50 per share and also extra dividends; these were $2 per share in 1909, 1910, 1911; $5 in 1912; $6.50 in 1913; $4 in 1914; $10 in 1915; $22.50 in 1916: $14 in 1917: $14 in 1918. In 1919 and 1920, no extra dividends were paid, but regular rate continued to Jan. 3, 1921; thereafter at the rate of $1 per quarter. A total of 216% has been paid to the end of 1920.

Company controls through personal holdings of its officers, the **Old Dominion Co.** Members of the old firm also control the **El Pasco & Southwestern Ry.,** a road that, while built originally as an outlet for the Copper Queen mine, has expanded steadily and bids fair to develop eventually into a transcontinental trunk line. The same interests are very large shareholders in the Rock Island and Great Northern railways. It controls also some of the richest and most productive copper mines in existence, all able to make copper at unusually low cost.

Production: Comparative statement of total production, of company's branches, years ending Dec. 31—

	Tons of Ore				From Co. Ores			
Year	Extracted	Milled	Charge Smelted	Co. Ore Smelted	Copper, lb.	Silver, oz.	Gold oz.	Lead. lb.
1920..	1 565,547	968,360	787,985*	.....	95,652,508	1,372,765	14 357	445,215
1919..	1,571,162	923,820	804,146	742.317	103,930,558	1,296,938	16,269	141,269
1918..	2,684 701	1,797,161	1,400,911	1,168,882	169,035,687	1,772,119	30,434	1.683,113
1917..	2,756.587	1,581,293	1,339,464	.....	153,974,692	1,524,632	24,423	8.136.356
1916..	2,305,072	1,422,468	1.389,192	1,200,090	152,263.729	1 642,055	28.873	10,404.341
1915..	1,583.364	800,600	1,129,766	1,016,746	140,478,003	1,655,669	31,696	9 525,584
1914..	1,777,243	1,046,728	917,204	855,594	131,662,324	1,769,626	28.518	8,936.074
1913..	1,978,892	1,122,372	1,035,367	856,520	155,665,712	1,870,162	31,141	5,701,628
1912..	1,893,244	.....	1,051,315	953,741	148,678,889	1,689,152	27,687	.....
1911..	1,841,210	1,017,352	930,331	822,647	134,149,627	1,794,895	27,154	.....

*Excepting 77,988 tons of Copper Queen ore smelted by Calumet & Arizona.

Company also took over the metals selling agency of the old firm, and in addition to marketing the product of its own mines, acts as sales agent for the Calumet & Arizona and other producers.

Comparative Statement of Copper Sales (given in lbs.):

Year	Total	Own Product	Outside Product	Domestic Trade	Foreign Trade	Aver. Price Cents
1920..	227,584,468	106,400,409	121,184,059	199,849,668	27,734,800	18.34
1918..	294,237,716	153,541,647	140,977,101	214,237,716	80,281,032	24.55
1919..	149,284,465	77,144,162	72,140,303	137,923,091	11,361,374	17.13
1917..	290,522,569	156,114,518	134,408,051	185,131.891	105,390,678	26.67
1916..	247,303,587	138,968,320	108,335,267	176,468,527	70,835,060	24.48
1915..	194,925,668	139,351,785	55,573,883	97,122,436	97,803,232	16.079
1914..	188,687,378	134,553,404	54,133,974	80,978.884	107,708,494	13.57
1913..	201,489,796	151,080,018	50,409,778	83,552,432	117,937,364	15.37
1912..	192,297,374	139,759,515	52,537,859	98,267,037	94,030,337	15.51
1911..	180,301,965	131,327,002	48,974,963	69,483,782	110,818,183	12.36
1910..	194,138,698	139,297,409	54,841,289	100,819.254	93,319,444	12.826

Phelps Dodge Corporation, is one of the few new companies in the copper mining industry that is under-capitalized rather than over-capitalized, and this is but a detail in a general business policy that, while thoroughly progressive and abreast with the times, retains the fundamentally sound and conservative policies developed by the old firm in nearly a century of honorable and markedly successful business life.

Branches and Subsidiaries

Burro Mountain Branch.
Bunker Hill Mines Co.
Copper Basin Branch.

Copper Queen Branch.
Moctezuma Copper Co.
Morenci Branch.
Phelps Dodge Mercantile Co.
Stag Canyon Branch.

Bunker Hill Mines Co.

Mine office: Tombstone, Cochise county, Ariz. John H. Davis, supt. **Inc.** to take over the property of the old **Tombstone Cons. Mines Co.** at Tombstone, discovered in 1878, and at one time one of the largest producers of gold-silver-lead ore in the Southwest. At a depth of 560' the volume of water became so great all attempts to handle it were unsuccessful and operations were discontinued until Phelps Dodge Corp. acquired possession.

The Tombstone company had been a subsidiary of the Development Co. of America.

Development: extensions were 5,049' in 1915; 8,177' in 1916; 11,598' in 1917; and 2,996' in 1918. Results from prospecting in the old workinge and in new ground have not yet shown orebodies of great size or commercial importance. Lessees were granted blocks of ground in 1918, shipping 1,000 tons monthly. The leasing system has been extended, work being confined largely to the extension of known orebodies.

The Oregon mine, 1½ miles S. W. of Tombstone, has produced upwards of 50,000 tons of argentiferous manganese ore.

The old cyanide plant of the Tombstone Cons. was converted into an experimental plant for the testing of Tombstone ores and was put into operation in June, 1915. Flotation of the gold-silver-lead ore was unsatisfactory. Half of the plant was utilized in concentrating manganese ore, and silver-bearing tailing is still shipped to the smelter at Douglas.

Power is supplied by a central plant.

Production:

Year	Tons	Gold Oz.	Silver Oz.	Lead lb.	Copper lb.	Manganese lb.
1920.....	28,456	1,516	398,263	201,379	125,861	.....
1919.....	26,413	1,796	401,683	131,897	75,876	.....
1918....	19,312	1,335	276,007	448,616	39,209	834,337
1917.....	69,418	2,872	397,253	1,049,445	13,357	3,930,901
1916.....	59,299	3,950	343,453	983,983	131,546	1,061,409
1915.....	10,746	1,373	109,783	269,303	23,760	1,171,509

BURRO MOUNTAIN BRANCH

Mine office: Tyrone, Grant Co., New Mexico. E. M. Sawyer, mgr.; E. F. Pelton, supt.

Property: 60 claims, 1,000 acres, owned formerly by Burro Mtn. Copper Co. and acquired by Phelps Dodge about 1909. In 1912, the 55 claims, 953 acres, of the **Chemung Copper Co.** were added and in 1916, 150 claims, 2,577 acres, of **Savanna Copper Co.'s** holdings were acquired, bringing the total acreage up to 4,530 acres. Property shows 36 porphyry dikes, carrying 5 orebodies of disseminated ore having 2 to 5% copper. The old St. Louis mine, 15 claims, is said to have produced under former ownership, $1,000,000 worth of ore; shipping ore ranging 15 to 25% in copper.

Geology: property contains a number of large orebodies of disseminated chalcocite, so-called porphyry ore, that are genetically dependent upon intrusions of monzonite, in pre-Cambrian granite, both rocks being shattered and faulted. The largest orebody is entirely in porphyry, the next largest in a brecciated zone, associated with dikes of aplite and dark felsite (phases of the porphyry), cutting through granite.

Development: in 1914-15, work consisted mainly in completing opening by underground work and churn drilling of orebodies already known. At the end of 1914, thirteen holes, with an aggregate of 11,571', had been

drilled. This work continued throughout 1915 and 1916. The orebodies on the Mohawk and Thistle claims were considerably extended in the latter year. An unusual feature is the prospecting of the Mangas valley where several holes passed through as much as 1,000′ of recent valley gravel before reaching bed rock.

Ore from the East orebody goes to the 4,700′ Niagara tunnel, where it is loaded directly into standard gauge railway cars. The Breccia orebody is mined through No. 3 shaft.

The Burro Mountain and Chemung mines have been united by the Niagara haulage tunnel, starting at the Tyrone terminus of the Burro Mountain branch of the A. T. & S. Fe railroad; this tunnel, 8x9′, was driven to Leopold, a distance of about 1 mile, and serves the double purpose of drainage and haulage. While driving this tunnel the so-called Bison orebody was found. Development increases its size, but the oxide content is high.

In 1917, there were 52 holes drilled an average depth of 587′. Discoveries were satisfactory. The Azure Mining Co.'s ground, held under option, was also partly drilled, without encouraging results. To open the Thistle and Mohawk deposits, widely separated, considerable work was started for their extraction.

In 1918, drilling was done in 23 holes to an average depth of 489′. Nothing important was found. Although development decreased by 7,519′, reserves were increased by 235,000 tons. The cost of ore extraction was reduced by the better condition of stopes and to increased drawing from the broken ore reserves in shrinkage stopes. The caving system is employed successfully.

In 1919, 26 drill-holes were completed to an average depth of 468′. A few discoveries, warranting further exploration were made. Other development amounted to 71,079′, resulting in important extensions to the Thistle and Michigan ore-blocks. In 1920, development work was curtailed but ore reserves were slightly increased. Of the 34 drill-holes sunk that on the Racket claim disclosed 125′ of good grade ore.

Equipment: the old concentrator, built 1905, and twice remodeled, has been dismantled. A standard-gauge 18-mile spur was built in 1913, at a cost of $350,000, from the main line of the Santa Fe railroad to the mine and mill. A central power plant equipped with four 1,000-h. p. Diesel engines was built at Tyrone, near the collar of No. 2 shaft. There are also two 4,000′ Diesel compressors, three 350-gal. triplex and 1 centrifugal pumps. The labor is almost exclusively Mexican, only the bosses being Americans. The concentrator at Tyrone of daily capacity of 1,700 tons, with flotation equipment, went into operation April 12, 1916; remodeled 1919-1920, the daily capacity is now 2,000 tons It is an all-steel 5-floor concrete structure covering 500 sq. ft., 3 miles from portal of haulage tunnel; it is equipped throughout with Kohn ventilating system. J. T. Hall is mill supt.

Lands include a complete town, improved with waterworks, electric light, substantial buildings, numerous dwellings, bank, store, theatre, etc.

Production:

	Ore m'lld. tons	Copper, %	Conc. tons	Cop. %	Recovery, %	Copper lb.	Silver oz.
1920.....	231,152	2.043	25,669	13.182	72.241	6,480,384	22,36
1919 (5 mos.)	184,946	2.087	18,965	14.869	73.042	5,482,834	13,23
1918.....	585,083	1.928	53,146	14.875	70.232	15,188,619	43,15
1917.....	473,443	1.972	45,681	14.775	72.258	13,139,053	39,40
1916.....	253,782	2.117	26,362	13.937	68.390	7,510,674	20,76

Leaching of old partly sulphatized dump ore was started early in 1917. During that year, 280,090 lb. of copper, equal to 25% of the original metal was extracted, while in 1918, another 8.9% was extracted, making 33.9% in two years.

Operations were indefinitely suspended on April 1, 1921.

COPPER BASIN BRANCH

A. B. Peach, acting manager, Prescott, Arizona.

Property: acquired from **Commercial Mng. Co.**, consists of **Copper Basin, Senator** and **Snoozer** mines in Yavapai county, 18 patented claims, 6 miles from the railroad; also the **Copper World** mine in Cedar Valley district, Mohave county, 14 miles E. of Yucca. The Senator mine yields high grade copper sulphide ore from fissure veins; in the Copper Basin disseminated ores are found as segregations in monzonite, but despite a promising outcrop, no great amount of commercial ore has been uncovered; the Copper World produces copper ore, with lead and a little silver.

Year	Development ft.	Ore shipped, tons	Copper, lb.
1919		2,264	112,795
1918	1,320	38,323	1,907,205
1917	1,250	17,299	934,781

COPPER QUEEN BRANCH

Operating and works office: Douglas, Cochise Co., Ariz. **Mine office:** Bisbee, Ariz.

Officials: G. H. Dowell, mgr.; W. H. Webster, asst. mgr.; H. H. Stout, supt. of reduction works; P. B. Butler, asst. supt. of works; Arthur Notman, supt. of mines; R. R. Boyd, asst. supt.; G. B. Lyman, geologis..

The Copper Queen Consolidated Mining Co., retaining its charter, has changed its name to Phelps Dodge Corporation. Its properties in Bisbee and Douglas, Ariz., are now known as the Copper Queen Branch of that corporation. The company was operated for many years as a close corporation, but is said to have paid from 1888 to 1907, inclusive, dividends aggregating $30,000,000 or more. Recent dividends, $3,000,000 in 1908; $4,025,000 in 1909; $6,300,000 in 1910; $5,200,000 in 1911; $5,707,351 in 1912; $5,700,000 in 1913; $4,500,000 in 1914; and $7,000,000 in 1915.

Property: comprises the Copper Queen and other mines at Bisbee, a large smelting plant at Douglas, on the Mexican border, 30 miles from mines. Mineral lands in the Warren, or Bisbee district, comprise 176 patented claims, 2,298 acres. Reported that 5 claims and 7 fractions, additional, were acquired in mid-1921.

The Copper Queen, one of the best known copper mines of the world, was opened 1880, on an outcrop of oxidized copper ore in massive limestone, opposite the Copper Queen hotel in Bisbee. The original orebody, now represented by a large cave, averaged 23% copper. The ore was smelted in a 30" water-jacket furnace, with English coke, brought via San Francisco. This orebody was exhausted in 3 or 4 years and the mine experienced many vicissitudes, until additional orebodies were developed, by following seams and stringers of ore leading to further large and rich deposits.

Geology: the ore-bearing formation of the Copper Queen and other mines of the Bisbee district, consists of thickly bedded limestone beds, dipping to the southward and cut by intrusive porphyritic dikes. Until 1902, the principal orebodies were found at the base of the Carboniferous limestone beds, which are broken by igneous rocks, that evidently have a strong genetic bearing upon deposition. The ore deposits occur as pockets, lenses, chimneys, bunches, shoots, veins, stringers and seams, the larger bodies being connected in most cases, by small veins, or mere knife-blade seams. The limestone and its included orebodies have a general gentle dip to the southeast, necessitating deeper shafts as dis ance is made toward the southeast. Extensive bodies of high-grade ore have been found, since 1902, in the deeper levels driven in the older limestones (Cambrian), and developments prove these underlying orebodies to be persistent to great depth. The oxidized part of the mine shows beautiful caves, lined with calcite crystals and stalactites and wonderfully fine crusts of azurite, mal-

achite and cuprite; some of these caves are of considerable size. Many of the shafts are bottomed in suphide ores of high-grade, but like the oxide orebodies, they are flat or have a gentle S. E. dip, and a thickness of 50 to 200′ or so. New orebodies are developed yearly and the ultimate lateral limits of payable ore are unknown.

In the Copper Queen mine, much of the ore has occurred in a zone encircling the west boundary of the porphyry intrusion of Sacramento hill. It has a width varying from 800 to 1,200′, and a thickness of about 400′. It reaches the surface in the older part of the mine to the N. W., but dips to the S. E., where it is reached at 1,400′ below the Czar collar, in its farthest extension at present developed on Copper Queen around. There is one major extension from the N. W. end of the zone toward the west along the Czar fault, and others of minor importance.

Individual orebodies are scattered through the zone in an eccentric manner, only matched by their own irregularities of form and size. Their most general characteristics are the softness of the ore and their great horizontal rather than vertical extent. It has been estimated that the average vertical thickness of ore in the Czar and Lowell divisions is between 30 and 35′. It is calculated by assuming it to be uniformly distributed over its horizontally projected area.

In this zone, and for some distance above it, the ground has been subjected to intense alteration and intense but irregular oxidation. It has resulted in an enormous quantity of earthy or clayey material, which may be either ore or waste, which, when wet, is both heavy and tenacious. Below alteration, the ground is fairly hard, and the limestones contain primary ores differing from those heretofore considered typical of the camp, and which have not yet been thoroughly exploited.

Development: the Copper Queen mine has 7 shafts, all connected on the even numbered levels. The mines are opened ahead for several years, development averaging about 1 mile monthly of new workings, or at the rate of 1 linear foot of new work for 10 tons of ore extracted, which figure is proven by past experience to maintain practically constant ore reserves while avoiding excessive advance openings that require useless maintenance cost. In 1920, 11.73 tons of ore were mined per development-foot as compared with 11.16 tons in 1919. The stopes are filled throughout and the mines are timbered with square sets, mainly Washington fir, an average of 30′ in timber, board measure, being required for each ton of ore won in the oxidized zone.

The 4-compartment Sacramento shaft, 1,700′ deep, concreted, handles the entire output of the mines. There are loading bins on the even-numbered levels from 400 to 1,600′, reached by the electric haulage lines from all other workings of the mine; ore from intermediate levels being dropped through chutes. To complete the underground traction system many drifts and crosscuts, in solid ground wherever possible, have been opened. The shaft was sunk in rock for practically its entire depth, insuring as great a degree of immunity from drawing as is possible in this district. The Sacramento shows some rich ore, discovered 1913, on the 1,500′ level near the Hoatson claim line.

The Uncle Sam mine has an old shaft, and a new shaft, sunk in 1908 of 224′ depth. This mine is connected with the Czar, Holbrook, and Sacramento shafts, and has a large orebody, discovered 1913, that compares favorably with the bonanza deposits of the adjoining Shattuck mine. The **White Tail Deer** mine lies across the range on the edge of the mesa near Don Luis, being reached by wagon road through a detour of several miles. Development by the Boras and Night Hawk leasing companies indicates that ground surrounding this mine may become an important factor. Near the White Tail Deer a manganese deposit of some size has been worked.

The **Dallas** shaft is to be sunk from 1,400 to 1,800′, and connected

by drifts with the Sacramento shaft and winze at that level. It is being concreted, and will eventually be the main outlet for the mines, as the Sacramento will be put out of commission by steam-shovel operations.

Sacramento Hill: exploratory work in the porphyry stock of Sacramento Hill, which is the geological keystone of the Bisbee ore deposits, has during the past few years revealed a large tonnage of concentrating ore and churn drilling has developed what are known as the East and West orebodies, containing respectively, over 14,000,000 and 7,660,000 tons. The latter carries 2.2% copper. The West orebody, because of its nearness to the surface will be mined by steam-shovel. The ore being of concentrating grade, tests on a working scale have demonstrated that the best saving is effected by a combined roughing table and flotation flow sheet. Ore with a 1.3% copper content was found to be workable and it is probable that 1% material can be worked. A 4,000 ton mill under erection is to be completed by mid-1922.

Removal of overburden commenced in Jan., 1917; there were 290,771 cu. yd. stripped in that year, 1,099,660 yd. in 1918; 2,056,700 yd. in 1919 and 2,500,889 in 1920. By Sept., 1920, about $5,000,000 had been spent on this project, while before production commences, the total will be $8,000,000.

Geology: the ore is disseminated and lies in the intrusion of the porphyry between the Pinal schist on the north and the limestone on the south. The two orebodies separated by a strip of ore are too low-grade to be worked.

The following articles describe mine operations: Arthur Notman, on drilling, in Trans. A. I. M. E., Vol. 52, Sept., 1915; and R. T. Banks, drilling, 'Eng. and Mine. Jour.,' April 19, 1919.

New work in the Limestone mines, i. e. exclusive of Sacramento hill, was 80,853′ in 1916; 55,518′ in 1917; 58,360′ in 1918; 48,907′ in 1919; 48,271′ in 1920. Reserves were maintained in 1919-20.

Equipment: the hoist at the Sacramento is a powerful tandem-compound engine, having 7′ drums with 5′ face, operated by steam, with 6 auxiliary engines, actuated by oil, under 150 lbs. pressure. Hoisting is done in 3-ton skips, and the hoist can raise a skip each minute, giving the shaft a capacity of fully 4,000 tons daily.

The Sacramento shaft has, perhaps, the most elaborate and ingenious system for mixing and loading ores to be found at any copper mine. The ventilation of the whole property with its 6 downcast and one upcast (Lowell) shafts is well described by Chas. A. Mitke, in Bull. A. I. M. E., Sept., 1915, p. 1941.

The central power plant near the Sacramento shaft, includes a boiler house, having four 400-h. p. Stirling water-tube boilers, furnishing steam direct to the hoists at the nearby Sacramento and Gardner shafts, the hoists at the other shafts being operated by compressed air. Equipment of the engine house includes three 500-k. w. turbo-generators, 3 air compressors, of about 100 drills aggregate capacity, a 70-drill air compressor, the largest in the Southwest, and a 7,000 cu. ft. compressor. Fuel is Texas and California petroleum, with large tanks for oil storage. All of the shafts, and the principal mine buildings, are reached by spurs of the El Paso & Southwestern railway.

The underground haulage system is very extensive, with 21 miles of tracks, covering every second level from the 4th to the 16th, and includes electric locomotives and side-dumping ore cars. The system is fully described by Gerald Sherman, supt., in Trans. A. I. M. E., Sept., 1915, p. 1837.

Great attention is paid to fire prevention and ventilation, these systems being improved continually.

The 4,000 ton all-steel concentrator, situated on the flat west of Doug-

las, was designed by H. Kenyon Burch and will have 4 equal units. The coarse-crushing plant includes a 66x84" jaw crusher, 2 No. 9 gyratories and four 48" disk crushers, and has a capacity of 4,000 tons of milling ore, to 1¼", per 8 hour shift. Plant will also handle smelting and leaching ores. Each concentrating unit will have four 6½x12' Marcy roller mills, one 6x18' Dorr classifier, 10 Plato roughing tables, one Dorr duplex classifier, two 4½x18' Dorr classifiers, two 22 cell and two 6 cell Callow machines. Flotation tails will be treated on 20 Plato finishing tables. After rewatering, both flotation and finishing-table concentrate will pass to five 14x14' Oliver filters.

Each ton of ore treated requires 1,516 gal. of water of which 376 gal. are fresh obtained from the C. & C. shaft. The Douglas smelter will supply power but an emergency 6,000 h. p. Diesel plant has been installed.

THE DOUGLAS SMELTER

The **Reduction Works,** at Douglas, Ariz., 28 miles from the mine and one-half mile from the Mexican border, treat 3,000 tons daily, handling the output of the Copper Queen mines, that of the Burro Mountain branch and that of the Moctezuma Copper Co., as well as doing a general custom-smelting business. The works occupy a site of 320 acres and are served by a very complete standard-gauge railroad system, reaching every building. The plant was blown in March, 1904, since which time there has been almost continuous enlargement, the works costing fully $4,000,000, smelting about 3,000 tons daily, there being no concentrator to eliminate part of the tonnage from the final furnace charges. The plant is described by J. Moore Samuel, in Bull. A. I. M. E., June, 1916, p. 1079, in a paper on dust losses.

Water for the works is secured from artesian wells, of about 300' average depth, the water rising nearly to the surface, with 1 well, of about 1,000' depth, flowing 200 gal. per minute. A large reservoir and cooling tower have been built in connection with the water supply.

The ore-bedding system consists of 5 pits, each 40x800' in size, and 11' deep, having an aggregate storage capacity of 900,000 tons. Ore, received from the mine in sidedumping steel cars, is discharged into the pits, which are lined with white tufa rock. The pits are filled with the different grades of ore required to constitute a normal furnace mixture, and the ores mixed by a mechanical plow. Ore is removed, as required by the furnaces, with steam shovels, running on permanent tracks laid upon the floor of the pits.

The blast-furnace building, 150x900' in size, of steel frame, also covers the converter department. Three 60-ton traveling cranes, 60' span, run the entire length of the building. There are ten 400-ton blast furnaces, each 44x240" with forty 4" tuyeres, and 16' in height from the tuyeres to the charging floor. The 10 furnaces are set 15' apart, in a single row, with a 10x20' settler between each pair, the lower half lined with chrome brick and the upper half with ordinary brick. Ore is charged on either side, alternately, charging being done from trains of twenty 2,500-lb. cars, hauled by 13-ton electric locomotives. Slag flows from the settlers into 18-ton slag cars, hauled by electric locomotives. The slag dump is 1,700' long, and is kept trim by a special leveling machine, operated by electric power. The blast-furnaces consume 350 to 400 tons of coke daily.

The dust chamber is of steel frame with brick and tile walls, roofed with reinforced concrete supported by steel trusses and has a bottom of tiled hoppers.

Molten matte is taken from the blast furnace to the converters by 60-ton electric traveling cranes, each having two 15-ton auxiliary hoists. The converter department has 7 stands, operated hydraulically, with 10 shells, of the Great Falls type, basic lined. Copper is poured in a Walker

casting machine, and product is blister copper of abou: 99% tenor, with considerable gold and silver values. The converter plant has a flue, taking the gases from the 7 stands to a dust flue 11′ in diameter at the hoods and 13′ at the dust chamber.

The 260′ steel stack of the blast furnace building is 30′ in diameter at the base and 25′ at the top.

The calcining and reverberatory plant is 100x850′ in size, of steel frame. Ore is brought in over an elevated railway track on steel trestles. 400′ in length, and dumped into concrete storage bins, and drawn from the bins to the roasters by belt conveyors. There are three 100′ reverberatory furnaces and sixteen 75-ton McDougall calciners. A slag tunnel, 30′ wide, 15′ deep and 276′ long, has electric cars, connecting with the slag tracks. The tunnel is lined with 4′ concrete walls, with a 2′ separating wall in the center. The reverberatory furnaces are next to the old building, succeeded by the slag tunnel, on top of which there is a battery of four 400-h. p. water-tube boilers, followed by a dust chamber; the McDougall roasters occupy the northern end of the building. The reverberatory department has a separate 300′ stack, of 22′ inside diame er, built of special hollow bricks, with walls 42″ thick at the bottom and 12″ at the top, requiring 1,250,000 brick and standing on a base of 60′ diameter requiring 1,100 cu. yd. of concrete. A pulverizing plant, for making powdered coal for one reverberatory was finished early in 1919.

Investigations concluded in 1920 indicate that a decided economy would result by converting the smelter into an all-reverberatory plant.

The power house, of steel and brick, was enlarged to transmit electric energy 72 miles to El Tigre mine, in northern Mexico. The power plant has about 20 units, of various sizes and types, aggregating more than 6,000 h. p. Equipment includes 4 cross-compound blowing engines, each direct connected to a 400-k. w. 250-volt direct current generator; Nos. 9 and 10 Connersville blowers, set staggering; a cross-compound 2-stage condensing air compressor, with piston capacity of 2,000 cu. ft. of free air per minute, at 100 lbs. pressure, for running the pneumatic tamping devices, operating charging doors of the blast furnaces and pumping water; 3 triplex motor-driven pumps, delivering water into compression tanks, at 350 lbs. per square inch, with automatic regulation; four 400-k. w. 250-volt direct-current generators, supplying power for cranes, slag locomotives and electric lights; two 750-k. w. turbo-generators and a number of minor engines and dynamos. The power plant is equipped with a complete set of gauges and meters, keeping record of the distribution of power to every department and sub-department. During 1919, two new turbo-generators of 5,000 k. w. each, and a transmission-line to Bisbee, were erected to furnish power for the mining department, but the mine power plant will not be completely abandoned until 1923.

The steel boiler house has six 500-h. p. and four 1,000-h. p. Stirling water-tube boilers, with a Green fuel economizer, and a Foster superheater with capacity of 90,000 lb. of steam per hour. The stack of the boiler house is of brick, 177′ high and 13′ in diameter at the base. Boilers are arranged to burn either coal or petroleum, but latter is used exclusively, consumption of Californian and Texan petroleum, at the mine and works, amounting to about 500,000 gal. monthly. Oil for fuel is at present cheaper in first cost, easier and cleaner to handle, and effects a great saving in the wages of 3 daily shifts of stokers, formerly required at every boiler plant.

A limestone quarry, at Lee station, 7 miles east of Douglas, has a large crusher and storage bins, the smelter requiring 400 to 500 tons of limestone daily for flux. A saw mill is operated, in the forests of the Chiricahua mountains, though the bulk of timber and lumber requirements of the mine and works are met by importation from the Pacific coast.

Production:

Year	Tons Mined	Lb. Copper	Oz. Silver	Oz. Gold	Lb. Lead
1920.....	*831,411	71,116,115	486,638	8,846	243,836
1919.....	602,184	68,614,002	492,326	10,813	9,372
1918.....	770,524	90,988,156	558,433	16,409	1,234,497
1917.....	800,585	93,618,409	828,665	19,156	6,870,128
1916.....	951,978	102,685,722	1,096,136	24,030	9,421,562
1915.....	783,211	88,551,180	943,368	18,974	9,388,418
1914.....	732,829	86,066,143	1,036,672	15,769	8,889,175
1913.....	867,481	97,181,725	919,138	16,213	5,701,628
1912.....	786,368	88,280,908	1,027,130	18,023	2,953,685
1911.....	619,132	74,489,728	1,227,453	16,895	5,658,930
1910.....	596,193	76,428,908	608,096	12,430	696,118
1909.....	.....	84,802,147	601,828	8,674	437,601
1908.....	.....	82,533,145	530,492	8,352	182,677
1907.....	.....	66,916,972	338,723	4,197	.....
1906.....	.....	79,536,416	332,723	7,573	.....

* Includes the first steam-shovel ore, 261,277 tons, of which 27,363 tons averaged above 2% copper and the remainder over 0.9%.

Smelter production, including custom ores:

Year	Ore treated, tons	Gold, oz.	Silver, oz.	Copper, lb.
1921 (2 mos.).....	.....	.....	.....	16,283,000
1920.....	787,985	17,269	1,643,115	95,182,165
1919.....	746,107	18,440	1,504,387	97,640,857
1918.....	1,311,742	32,709	2,307,307	192,063,212
1917.....	1,276,817	32,331	2,042,263	191,581,131
1916.....	1,304,523	32,832	1,794,854	171,893,880
1915.....	1,063,329	29,840	1,388,149	125,144,027
1914.....	835,016	26,259	1,405,301	119,957,017

There were employed 3,671 men in 1916; 3,773 in 1917; 3,910 in 1918; 3,272 in 1919; 3,505 in 1920.

Although development and construction have continued, both mine and smelter were closed down on April 15, 1921.

MOCTEZUMA COPPER CO.

Mine office: Nacozari, Sonora, Mexico. H. T. Hamilton, mgr.; C. I. Schultz, gen. supt.

Inc. 1896, in West Virginia. **Cap.** $3,000,000; issued, $2,600,000. Is controlled through entire stock ownership by Phelps Dodge Corporation, and holds direct title to lands through Moctezuma Copper Co., S. A.

Inc. Feb. 4, 1896, in Mexico. **Cap.** 500,000 pesos. **Dividends:** were 77% or $2,262,000, 1902-07; none in 1908; $998,000 in 1909; $468,000, in 1910; $754,000 in 1911; $2,118,569 in 1912; $1,950,000 in 1913; $1,170,000 in 1914.

Property: about 2,500 acres of mineral land in the Moctezuma and Arizpe districts of Sonora, including the Pilares de Nacozari mine 6 miles E. of Nacozari. Company also owns the Juarez and Nicolas ranches of about 35,000 acres, which carry considerable valuable timber.

Geology: the Pilares mine lies in a high and precipitous country near the divide of the Yaqui and Oposura rivers. The ore deposit is an oval shaped brecciated mass of latite having a major axis of 2,000′ and a minor axis of 1,000′, formed by two parallel systems of faults, one coursing nearly N. and S. and the other nearly E. and W. The N. and S. faults dip about 80° to the east. There were two flows of latite the first while cooling was interrupted by the second causing the partly cooled mass to break up into the bombs and fragments which are barren of mineral and which are cemented together by

the second and mineral bearing flow. The latite gives way to andesite and this to monzonite with depth. A "caliche" dike from 4′ to 10′ wide runs through the entire west side of the mine. The ore occurs mainly on the border of the breccia "pipe," but lesser bodies are found inside it as well. The ore carries chalcopyrite with pyrite and some bornite, chalcocite and some covellite, the ore being mostly of concentrating grade, averaged about 3.39% copper as mined, in 1918. There is a "chimney" outcrop with carbonate ore, but croppings are mainly brown, a dull red-stained porphyry, carrying hematite. The leached zone is about 20′ in depth only, with payable ore coming in at depth of about 60′.

Geology and mining methods at the Pilares mine were discussed by W. R. Wade and Alfred Wandtke in Bull. 152 of the A. I. M. & M. E., Aug., 1919. They summarize by saying that the Pilares ore deposit is of the pyrite-chalcopyrite type, and occurs in latite and andesite breccias, perhaps of early Tertiary age The ores are genetically related to monzonitic intrusives. Enrichment of commercial importance is confined to the upper 200′ of workings, but primary ore of excellent grade continues downward to the deepest workings.

In addition to the Pilares mine, the company owns a number of other properties that have been operated for several years past by lessees, including the Churunibabi, Bella Union, Fortuna, San Francisco, El Vaquero, El Promontorio (about exhausted), La Caridad, and San Pedro. The Bella Union has highgrade ore, including oxides and native copper, shipments assaying up to 39% copper, with small value in gold and silver. The Churunibabi property, yielding $100,000 worth of silver ore to the lessees, from a rich gold-silver-copper orebody struck July, 1913, has been operated by the company for the past few years.

Development: at Pilares mine includes 4 shafts; three 3-compartment main working shafts, the Guadalupe 918′, Pilares 1,200′ and Esperanza 1,355′ deep. The Guadalupe shaft is an underground shaft running from the 500′ level to the 1,400′ level. The Pilares and the Esperanza shafts are on the extreme ends of the orebody and run from the surface, 100′ level to the 1,300′ level. The new 5-compartment Pilares shaft is 400′ S. W. of the old one, and is down 1,000′, fully equipped with electrically-driven hoist, compressors, etc., similar to that at the Esperanza. During 1919, sinking of Pilares shaft was continued, and in 1920, all efforts were concentrated in placing mine in condition, at a cost of $168,000, for larger production and in exhausting the ores remaining in upper levels.

The mile long Porvenir tunnel opens the deposit 600′ below surface; 25-ton narrow gauge railway cars run from Nacozari into the tunnel direct to the mine ore chutes. The tunnel has storage bins in a 25x100′ chamber, to which ore is milled down from the upper workings, no ore being hoisted.

The mine has some enormous stopes, the 646 stope is 60′ wide by 600′ long. The ground stands very well and the systems of extraction used give minimum timber requirements at a cost of only a few cents per tons of ore mined. No water is hoisted above the Porvenir tunnel level and very little water is raised from the workings below. The mine is well ventilated and is equipped with electric lights. Two methods of ore extraction are employed, the room-and-pillar with waste filling as work progresses, and shrinkage stoping with waste filling after all the ore has been extracted.

New work in the mines totaled 23,252′ in 1916; 33,823′ in 1917, 33,833′ in 1918; 24,228′ in 1919; 45,734′ in 1920.

Ore reserves in the Pilares deposit were estimated Jan. 1, 1916, as 3,220,000 tons; for Jan. 1, 1917, a decrease was reported due to inadequacy of hoisting facilities on lower levels; reserves increased both in 1917 and 1918; decreased somewhat in 1919 and increased again in 1920

At the outside properties, extensions in 1918 were 4,938′, the major part of which was at Churunibabi. Operations on the latter were limited in 1919 and in 1920 it was reported that but little ore was in sight. No work of importance was done at the other properties in the last 3 years.

Equipment: includes electric hoists, two 25-drill air compressors, and two blacksmith shops, one at Pilares and one at Esperanza. Two 4,000 cu. ft. compressors were erected at Pilares in 1920. There is an emergency steam plant at the mine having 2 boilers held in reserve in case of accident, but electricity is used throughout.

The power plant, at Nacozari, built in 1908, has 435-h. p. Stirling water-tube boilers, equipped with Green fuel economizers, Foster super-heaters and Rooney stokers (burning New Mexican coal), and a 196′ reinforced concrete stack. The plant has three 1,000-k. w. Curtis turbo-generators giving a 6,600-volt current, and an auxiliary 50-k. w. steam turbo-generator set is used as an exciter. Current is transmitted at 6,600 volts to the mine and mill and at the mine is stepped down to 230 volts for the pumps, while the hoists and electric locomotives use a 250-volt direct current. During 1919-20, an extension to the power plant was completed to house two 1,200 h. p. and three 1,800 h. p. Diesel engines, additional.

The mine is connected with the mill by a 6-mile 30″ gauge railway. Rolling stock includes four 60-ton locomotives and twenty 30-ton Ingoldsby steel side-dumping cars .

The 2,000-ton concentrator, designed and built by H. Kenyon Burch, at a cost of about $1,000,000, was one of the most complete and efficient in existence. During 1920-21, it was remodeled, and now has a daily capacity of 3,000 tons. The crushing plant receives ore from the mine in 6,000-ton bins, whence it is fed by 2 automatic ore feeders, of special design, to grizzlies, with bars set 2½″ apart, oversize, going to a No. 8 gyratory crusher, and undersize to a belt-conveyor, meeting material from the crusher, and going by belt conveyor to two 4x10″ manganese trommels, with 1⅓″ perforations. Undersize from the trommels goes to belt conveyors and oversize from the trommel goes to No. 5 gyratory crushers, breaking the material to 1″ cubes, which joins the material from the trommels and is sent by belt conveyors to 4,000-ton storage bins.

Each 1,000-ton unit of the mill is equipped with 6 coarse and 12 fine jigs, 3 sets of rolls, Swain classifiers, Callow screens, 44 Wilfley tables and 72 Johnson vanners. From the storage bins the ore is fed by a portable ore feeder to a belt conveyor, passing over an automatic weighing machine and sampler, delivering it to an 18-mm. trommel. This trommel screens the ore, the coarse pieces going to bull jigs and undersize to 11-mm. trommels; the latter feed oversize to coarse jigs and undersize to 7-mm. trommels. These trommels in turn feed oversize to intermediate jigs and undersize to 4mm. trommels, whose oversize goes in its turn to 2-mm. trommels; oversize from latter goes to fine jigs. The undersize from the 2-mm. trommels goes to 22-mesh Callow screens and thence to Wilfley tables handling oversize and undersize.

Slimes from the Wilfleys go to the vanner settling tanks and middlings from the Wilfleys go to the Chilean mills by elevators. Tailings from the bull jigs, coarse jigs and intermediate jigs go to either of 3 sets of 42x16″ rolls, then by elevator to the mixing-box at the head of the trommels. Tailings from the fine jigs go to dewatering machines, and overflow from dewatering machines goes to vanner settling tanks, dewatered material going to the jig tailings bin and thence to Chilean mills, crushing to pass a 2½-mm. screen and thence to Callow screens of 22-mesh. Product is a concentrate of about 12% copper, about 85% of the assay value being saved.

Regrinding, flotation, and filtering machines were first installed during 1916, and have been added to each year since, a large pneumatic unit being erected in 1919. Flotation has improved the recovery.

An aerial tramway carries tailings from the concentra or to a dump on the hillside, far above the river level.

Water is pumped from a well sunk at the side of the river by 1 triplex and 3 Worthington pumps, of 500 gal. capacity per minute, to 500,000-gal. tanks at the mill. Wash water from the concentrates is settled and re-used.

A large dam 3 miles east of Nacozari, 90′ in height, stores water sufficient for 2 years steady operation of the mill.

The company built and owns the town of Nacozari, and a town at the Pilares mine. At Nacozari the company maintains both English and Spanish schools for the children of employees, a well-equipped hospital, free library, and amusement hall.

Production:

Year	Milled, tons	Copper, %	Concen. tons	Rec. %	Copper, lb.	Gold, oz.	Silver, oz.	Molybdenum, lb.
1920....	453,880	3.120	99,744	86.490	24,451,817	3,643	472,245	.....
1919....	445,871	3.438	106,234	90.600	27,943,012	2,211	432,001	.....
1918....	762,089	3.392	173,128	85.575	42,875,355	11,103	923,922	7,024
1917....	750,897	3.179	156,067	81.190	38,186,451	2,677	511,738	35,630
1916....	715,070	3.273	143,939	80.500	37,709,310	1,310	471,867	6,162
1915....	.....	....	.....	.....	22,889,885	599	331,836	.....
1914....	.....	....	.....	.....	29,591,658	1,006	435,482	.....
1913....	.....	....	.....	.....	36,598,132	.....	.....	.....

Forces normally are 1,750 men at the mine and mill, of which the great majority are Mexicans, with a few Japanese, no American labor being employed at the mine aside from shift-bosses and timbermen. Mining and much of the tramming is done by contract.

The Moctezuma is one of the world's really great copper mines and the management is of the best.

MORENCI BRANCH
(formerly known as Detroit Copper Mng. Co.)

Mine and works office. Morenci, Greenlee County, Arizona.

Officers: J. P. Hodgson, mgr..; W. M. Saben, asst. mgr.; John Kiddie, mine supt., Morenci; W. G. Scott, mine supt., Metcalf. Arthur Crowell, mill supt.; J. Owen Ambler, smelter supt.; J. A. McDougall, power supt.; C. J. Bury, purch. agt.

Property: is extensive, including the Ryerson, Arizona Central, Copper Mountain, Yankee, W. Yankee, Montezuma and Santa Rosa mines, at and near Morenci.

Geology: these mines cover varied types of copper deposits, all dependent upon and co-extensive with a big intrusive body of quartz porphyry and its dikes. The ores are chalcocite, chalcopyrite and pyrite with various oxidized products occurring either in altered limestones, or as fissure veins in the impregnated rocks adjacent to them, or in large masses of altered, impregnated, shattered porphyry. The geologic relations are fully reated in a monograph by Waldemar Lindgren, Prof. Paper 43, U. S. Geol. Surv.; see also Weed, "Copper Mines of the World," page 287.

Ores are mainly sulphide with a little gold and silver, and high silica and alumina content. The oxidized and limestone ores are still produced in small quantities, but 98.8% of the ores mined consists of small particles of chalcocite, associated with chalcopyrite and pyrite, in a leached and whitened, decomposed porphyry, averaging 2.39% copper. The high-grade ore from fissure veins carries 6 to 18% copper.

Development: is very extensive, with numerous shafts and long cross-country connections. The earlier workings were shallow, 400′ being for many years the greatest depth. In 1912, development on the 600 and 700′ levels of the Yankee mine, north of the Yankee fault, opened 194,939 tons of 2.36% ore and similar deep exploration in the Arizona Central mine upset previous ideas that ores would not go deeper. Total amount of development work in 1914 was 26,375′; in 1915, 14,709′; in 1916, 20,513′; while abnormal conditions in 1917 and 1918 prevented much being accomplished. The new footage in 1919 was 24,850, and in 1920, 54,193.

About 90% of the output is now mined by the slicing system, costing about 21% of the square set and fill cost, which is necessarily still used in some parts of the mine. Block caving is still cheaper, uses but little timber, and costs but 54.8% of the square set and fill method, but like the gopher and fill method, which is slightly cheaper, can only be used where favorable conditions prevail.

The New England mine has 2 shafts, deepest 750′, and a 2,000′ tunnel. The Clifton mine has 7 shafts, of 70 to 315′ depth, with tunnels of 220′, 450′, 700′, 800′, 1,000′ and 1,700′.

The Copper King mine is as yet but slightly developed, but was reported to show 40,000 tons of ore. An aerial tram from the Copper King mine was completed in 1909.

Of the 465,807 tons mined in 1918, the Ryerson contributed 43%; the Yankee, 20%; the Copper Mountain, 11%, and the Arizona Central, 20%. In 1919, a total of 494,480 tons was mined, and the respective percentages were 17, 27, 18, and 39. In 1920, the prospect and development campaign begun the year before was continued and important extensions of the higher grade ore bodies were found on Colorada, Montana and Wellington claims; large tonnages of low grade ore also were proven; 29,200 tons of ore were mined.

Equipment: includes steel-frame power house, with one steam-driven blowing engine, 9,000 cu. ft. per min., one gas-driven blowing engine, 6,000 cu. ft. per min., one motor-driven No. 10 Connersville blower and one No. 9 Connersville blower driven by a 200-h. p. gas engine, two steam-driven air compressors, one of 4,000 cu. ft. capacity, the other of 1,300 cu. ft., one 600-k. w. turbo generator delivering 2,300 v., 2-phase, 60-cycle current, four 250-k. w. and one 100-k. w. belted generators driven by gas engines, delivering 230 v., 2 phase, 60-cycle current, running in parallel with turbo generators through transformers. Recent additions to the power-plant were three 1,000-h. p. Diesel engines, direct connected to generators, and one 3,700 cu. ft. Diesel air compressor.

The concentrator, designed by H. Kenyon Burch, has proved remarkably successful, running 95% of the time. It consists of two 650-ton units, is 166x240′ in size, and cost about $1,000,000. Equipment includes Chilian mills, 6 sets of 16x42″ rolls, 28 revolving screens, 80 Frue vanners, 40 Wilfley tables, and Deister tables, the mill putting about 7 tons into 1.

A re-grinding and flotation plant was started in 1916, being enlarged in successive years. The mill power plant has 3 gas engins of 200-h. p. and 2 of 175-h. p. each, in conjunction with electric motors driven from the smelter power house.

The concentrator uses about 500 gal. of new water per ton of ore treated, the balance being obtained by reclamation of water from the tailings in a series of concrete tanks with Dorr mechanism. The water is purchased from the Morenci Water Co., which has a pumping plant about 6 miles distant on Eagle river. This also supplies the town and practically all of the mines of the district. Tailings are conducted from a slag lined launder along the walls of Chase Creek canyon to a point below bunkers 14,000′ away where it is stored in impounding reservoirs in the small canyons which empty into Morenci canyon.

The smelter has one 44x396″ blast furnace, and 3 stands of small basic lined converters. Flue dust is mixed with concentrate residue before being re-charged into the furnace. About 70% of the total charge of new metal bearing material in 1918 was concentrates. The smelter has 2,000-ton ore bins, surmounted by a steel railroad trestle.

A 36″ gauge railway connects the mines and smelters with the Arizona & New Mexico railroad, at Guthrie. A tunnel through Longfellow hill, completed 1909, gives direct rail connection with the mill.

The company operates an excellent hotel, and main ains a library and club room for its normal force of 1,200 employees.

Production:

Year	Tons Milled	% Copper	% Recovery	Tons Smelted	Copper, lb.
1919.....	223,135	2.37	80.22	54,346	11,414,031
1918.....	449,990	1.91	76.22	154,216	17,130,209
1917.....	312,225	2.33	70.78	118,596	13,203,401
1916.....	451,395	2.39	71.25	140,938	17,541,258
1915.....	376,604	2.83	....	.....	15,333,976

Both the concentrator and smelter were closed down in September, 1919, and remained so throughout 1920, because of the depressed copper market.

PHELPS DODGE MERCANTILE CO.

Office: Bisbee, Ariz. W. A. Meyer, gen. mgr.; T. L. Houston in charge at Tyrone; C. H. Hyde at Morenci; J. B. Winfrey at Bisbee; C. A. Lindsay at Douglas, and A. Maas at Nacozari.

Production:

Year	Gross Sales	Merch. on Hand	Net Profit, %
1920.....	$10,020,716	$2,073,662	2.44
1919.....	9,723,706	2,438,669	5.01
1918.....	10,408,913	2,622,161	7.98
1917.....	9,789,639	2,123,820	8.42
1916.....	8,406,636	1,648,355	10.38

STAG CAÑON BRANCH

Office: Dawson, New Mexico. W. D. Brennan, mgr.; J. B. Morrow, supt. of coke department.

Year	Coal mined, tons	Coke made, tons
1920.....	1,114,330	155,254
1919.....	893,585	140,913
1918.....	1,339,292	281,916
1917.....	1,406,079	306,455
1916.....	1,439,904	300,571

REPUBLIC IRON & STEEL CO.

Offices: 15 Exchange Place, Jersey City, N. J.; 17 Battery Place, New York; Republic Bldg., Youngstown, Ohio; Duluth, Minn., and Birmingham, Ala.

Officers: J. A. Topping, chairman; T. J. Bray, pres.; H. L. Rownd and J. W. Deetrick, v. p's.; R. Jones, Jr., sec.; H. M. Hurd, treas.; Francis J. Webb, gen. mgr. of the northern, and C. T. Fairbairn, mgr. of southern, divisions; L. L. Wilcox, chief engineer.

Inc. May 3, 1899, in New Jersey. **Cap.** $30,000,000 com., $25,000,000 pfd.; $100 par; all outstanding. Funded debt outstanding, $12,510,000 ten to thirty-year sinking fund mortgage gold 5s; and $964,000 mortgage bonds of associated companies. The New York Trust Co., New York, transfer agt.; Chase National Bank, New York, registrar.

Dividends: 1¾% quarterly on pfd. and 1½% on com. stock.

Among the many properties which are owned entirely, or in part, are those of the **Antoine Ore Co., Mahoning O. & Co., Vermillion Mng. Co., Townsite Mng. Co.** and **Union Ore Co.,** each described under its title.

Property: includes the following iron mines in Michigan, Minnesota and Alabama, which yielded a total of 1,693,450 tons in 1916; 1,706,555 tons in 1917; 1,512,071 tons in 1918; 1,272,707 tons in 1919; 1,677,699 in 1920.

Mine	Range	Mine	Range
Cambria No. 1...	Negaunee, Mich.	Pettit.....	Gilbert, Minn.
Cambria No. 2...	" "	Schley.....	" "
Lillie.....	" "	Victoria.....	Virginia, Minn.

Mine	Range	Mine	Range
Franklin	Virginia, Min.	Alfretta Group	Birmingham, Ala.
Minckler	Iron River, Mich.	Houston	" "
Sherwood	" " "	Raimund Group	" "
Bray	Keewatin, Minn.	Spaulding	" "
Gordon	" "	Tannehill	" "
Kinney	Kinney, Minn.		

Ore reserves: 47,325,343 tons in the northern mines and 79,442,211 tons in the southern group, a total of 127,067,554 tons. Lands in Wisconsin, near Hurley, have been under investigation by drilling and shafts.

In December, 1920, the Spaulding mine was closed down, and all Minnesota mines were closed early in 1921, to await better market conditions.

UNITED COPPER CO.

Dead. Stock valueless. Fully described Vol. XI, Copper Handbook, See also Vol. XIV., 1920 Mines Handbook.

UNITED METALS SELLING CO.

Office: 25 Broadway, New York.

Officers: John D. Ryan, pres., T. Wolfson, v. p.; C. W. Welch, sec.-treas.; with Wm. Rockefeller and C. F. Kelley, directors.

Inc. Jan. 29, 1900, in New Jersey, **Cap.** $5,000,000; shares $100 par; dissolved in 1915 and reorganized March 15, 1915, in Delaware. Is controlled by the Anaconda Copper Mng. Co., through ownership of entire share capital.

The company does a general commission business in metals, mainly in copper, and is the largest copper broker in the world, being the sales agent for the Anaconda Copper Mng. Co. and affiliated corporations, and for a number of other producers, having the marketing of upwards of 600,000,000lb of copper yearly.

UNITED MINES CO.

Address C. J. Walker, Boatman's Bank Bldg., St. Louis, Mo.

Officers: C. J. Walker, pres.; Jesse F. McDonald, 1st v. p.; J. C. C. Waldeck, 2nd v. p.; E. T. Cash, sec.; H. W. Mann, treas., with T. T. Nardin, directors.

Inc. Aug. 23, 1919, in Delaware. **Cap.** 115,000 pfd. shares, $10 par, and 235,000 com. shares of no par value, of which 15,000 and 35,000 respectively, have been issued. No public offering is to be made.

President advises us, company represents the "efforts of a group of men that is mainly interested in the Down Town Mines Co. at Leadville, Colorado, to find something worth-while in the way of metal mines, on which effort considerable work has been done with fair promise of satisfactory results."

UNITED STATES SMELTING CO.

Fully described under U. S. S. R. & M. Co. in Vol. XIII. Was a subsidiary of latter company until absorbed, December, 1917.

U. S .SMELTING, REFINING & MINING CO.

General office: 55 Congress St., Boston. **Operating offices:** 120 Broadway, New York City· Kennett, Calif.; Goldroad, Ariz.; Eureka, Colo.; 912 Newhouse Bldg., Salt Lake City; Baxter Springs, Kans.; Pachuca, Hidalgo, Mexico. **Corporate office:** 85 Exchange Pl., Portland, Maine.

Officers: C. G. Rice, pres.; S. J. Jennings, v. p. in charge of exploration and min. investments; G. W. Heintz, v. p. in charge of western operations; C. F. Moore, v. p. in charge of foreign operations and cons. engr.; D. S. Calland, v. p. and gen. mgr. of operations in Mexico; F. Y. Robertson, v. p. and mgr. of metal sales; N. W. Rice, 2nd v. p.; F. W. Batchelder, sec.-treas.; John Laurie, comptroller.

Directors: S. L. Bartlett, R. J. Edwards, J. J. Phelan, C. G. Rice, E. P. Brown C. F. Brooker, B. P. Clark, C. A. Hight, S. J. Jennings, R. T. Paine 2nd, E. B. Bayley, A. W. Preston, D. A. Ritchie, S. W. Winslow, Jr., R. S. Bradley, J. J. Storrow, N. W. Rice, R. F. Herrick, E. V. R. Thayer, and D. G. Wing.

Executive committee: B. P. Clark, C. G. Rice, J. J. Storrow, D. C. Wing, E. P. Brown, R. F. Herrick, and S. W. Winslow, Jr.

General officials: A. P. Anderson, cons. mng. engr.; L. D. Anderson, chief engr.; G. H. Clevenger, cons. metallurgist; G. W. Cushing, traffic mgr.; G. W. Metcalfe, metallurgist.

Inc. Jan. 9, 1906, in Maine. **Cap.** $75,000,000; $50 par, in $37,500,000 of 7% pfd. cum. stock and $37,500,000 com. stock; 486,350 pfd. and 351,115 com. shares issued; 160,000 of com. in reserve for conversion purposes.

Sales on N. Y. Stock Exchange during 1920 were 129,200 com., at 76 in January and 29½ in December; and 15,190 pfd. at 47⅝ in March and 39½ in December. In 1921, to mid-October, range for common was 35½ to 24, and for pfd. 44½ to 37¼.

National Shawmut Bank, Boston, and Guaranty Trust Co., New York, registrars; Old Colony Trust Co., Boston, and Bankers Trust Co., New York, transfer agents. Annual meeting in May. Listed on Boston and New York Exchanges. Company had 9,499 pfd., and 2,634 com. stock holders at end of 1918; 9,765 and 2,613 for 1919; 10,077 and 3,052 for 1920.

Bonded debt: $12,000,000 six per cent convertible gold notes, dated Feb. 1, 1916, due same date in 1926, interest payable Feb. 1 and Aug. 1 of each year. First National Bank, Boston, trustee; First National Bank, Boston, and Guaranty Trust Co., New York, registrars. Principal and interest payable at first mentioned and Hanover National Bank, New York. There is no other bonded indebtedness except $200,000, as of Dec. 31, 1920, "joint first mortgage bonds" against Cons. Fuel Co., which includes $150,000 against So. Utah R. R. Co. and for which these two companies are jointly liable.

In December, 1917, the **U. S. Smelting Co.**, with smelter at Midvale, Utah, was absorbed. The **U. S. Metals Refining Co.** was acquired by the **American Metal Co.** in December, 1919. During 1919 company purchased a half interest with the Sinclair Oil Co. in some oil-land in Louisiana.

Dividends: rate is 7% on preferred stock, payable quarterly (Jan., April, July, and Oct.), first dividend paid April 15, 1906. Dividends on common stock are given in the table below.

Year	%	Year	%	Year	%
1921 (10 mos.)...	1	1915.....	1½	1909.....	4
1920.....	10	1914.....	3	1908.....	4
1919.....	11	1913.....	6	1907.....	6¼
1918.....	10	1912.....	5	1906.....	None
1917.....	10	1911.....	4		
1916.....	8½	1910.....	4		

Financial Statement:

Year	Net Earnings	Deprec. & Reserve	Previous Surplus	Pfd. Dividend	Com. Dividend	Net Final Surplus
1921*	$1,053,000	$1,083,000	.....	$1,702,225	.....	$16,500,000
1920	6,777,000	3,867,725	$17,330,116	1,702,225	$1,755,575	16,781,591
1919	9,465,395	2,824,181	14,322,260	1,702,225	1,931,133	17,330,116
1918	7,249,533	2,474,443	13,004,970	1,702,225	1,755,575	14,322,260
1917	5,769,391	1,571,576	12,957,455	1,702,225	1,755,575	13,004,970
1916	9,737,664	2,839,200	8,253,455	1,702,225	1,492,239	12,957,455
1915	7,579,184	986,859	.....	1,702,225	.....	.....
1914	2,932,519	666,878	.....	1,702,222	.....	.....
1913	4,555,122	969,536	.....	1,702,145	.....	.....
1912	5,497,965	1,265,000	.....	1,702,120	.....	.....
1911	3,961,103	1,120,690	.....	1,702,120	.....	.....
1910	3,551,387	1,067,069	.....	1,701,701	.....	.....
1909	3,956,608	810,248	.....	1,700,963	.....	.....
1908	3,359,222	311,632	.....	1,700,801	.....	.....

* Estimated for 11 months.

Comparison of current assets and liabilities of all companies:

Assets

Year	Cash,	Notes and Accts. Rec.	Metals, Ores Supplies, Etc.	Stocks and Bonds	To al
1920.....	$1,143,023	$3,646,993	$11,997,188	$2,167,626	$18,954,830
1919.....	2,362,921	5,094,589	11,716,780	1,619,262	20,793,552
1918.....	2,045,948	3,100,533	13,329,710	.....	18,476,191
1917.....	1,641,126	2,967,837	12,884,424	.....	17,493,387
1916.....	5,105,678	3,794,475	10,852,098	.....	19,752,251

Liabilities

Year	Notes Payable	Accounts, Drafts Payable	General Reserves	Dividends Payable	Total
1920....	$2,500,000	$2,632,374	$1,866,027	$601,114	$7,599,515
1919....	1,000,000	1,805,428	2,355,168	952,229	6,122,825
1918....	1,470,000	2,091,145	3,568,746	864,450	7,995,341
1917....	900,000	3,125,765	3,897,828	864,450	8,788,043
1916....	5,000	2,609,648	3,116,301	864,450	6,595,399

Production: ore from all properties, including Mexico, was as under.

Year	Tons	Value of Metal Contents: Copper, %	Lead, %	Zinc, %	Silver, %	Gold, %
1920....	1,434,970	0.9	10.4	6.3	72.0	10.4
1919....	1,299,105	2.7	5.1	2.8	77.9	11.5
1918....	1,220,722	10.0	10.0	7.0	61.0	12.0
1917....	1,129,678	28.0	10.0	13.0	39.0	10.0
1916....	1,022,306	39.0	8.0	15.0	28.0	10.0

Year	Zinc, lb.	Copper, lb.	Lead, lb.	Silver, oz.	Gold, oz.
1920.....	16,852,918	1,391,116	77,545,368	18,227,889	123,175
1919.....	7,680,548	8,919,044	68,648,864	17,758,498	146,749
1918.....	18,771,684	20,359,378	96,567,485	15,337,465	137,315
1917.....	53,590,446	29,043,242	107,519,570	13,000,187	109,612
1916.....	64,584,001	28,888,093	103,855,451	11,647,205	129,273
1915.....	34,105,471	26,923,674	87,102,179	12,071,863	196,481
1914.....	.....	17,946,659	64,443,260	9,936,237	124,719
1913.....	.....	20,239,973	58,116,504	13,089,708	148,372
1912.....	.....	21,152,620	56,385,769	12,059,829	140,183
1911.....	.....	22,199,141	49,022,791	10,285,150	118,703
1910.....	.....	28,430,423	51,450,985	10,776,465	113,246
1909.....	.....	36,672,605	41,627,995	9,637,119	128,393
1908.....	.....	32,803,603	27,304,347	8,340,566	128,208

Average prices received:

Year	Copper, cents per lb.	Lead, cents per lb.	Silver, cents per oz.	Zinc, cents per lb.
1920.....	.....	....	.....	....
1919.....	18.610	5.829	112.160	7.876
1918.....	25.273	7.424	97.081	8.289
1917.....	27.201	8.558	81.765	9.353
1916.....	27.297	6.676	65.386	12.327
1915.....	18.183	4.546	49.965	14.964
1914.....	13.404	3.827	55.564	.....
1913.....	15.433	4.396	60.503	.....
1912.....	16.237	4.529	61.291	.....

The United States Smelting, Refining & Mining Co. owns or controls through affiliated companies, and operates, the following properties and reduction plants, and railroads:

UTAH PROPERTIES.

Address: 912 Newhouse Bldg., Salt Lake City.

Operating officials: Geo. W. Heintz, v. p. in charge C. E. Allen, gen. mgr.; D. D. Muir, Jr., mgr. of mines; W. A. Howard, smelter mgr.; J. C. Brumblay, field representative.

Near Bingham: a large number of patented and unpatented claims in one block, producing lead, silver, copper, gold, and zinc ores. They are connected by means of the Niagara tunnel with the Garfield-Bingham railway, which permits the delivery of ore to any of the smelters in Utah. These mines have been operated since 1899 under the present control, and since about 1870 by earlier ownership. In 1920, they produced 99,698 tons of ore, as against 138,626 tons in 1919 and 177,921 tons in 1918. The 1919 output yielded 21,814 oz. gold, 575,868 oz. silver, 20,061.757lb lead, 1,045,060lb copper and 130,911lb zinc, with gross value $2,438,385 and net $156,307. There are large unexplored areas and mines are susceptible to development at a much lower horizon.

At **Topliff:** a quarry producing lime rock for the smelters in Utah valley.

At **Midvale:** a lead smelter and a lead and zinc concentrating mill. These plants are situated on an area of 235 acres, and are connected with the Denver & Rio Grande and the Oregon Short Line railway systems. The smelter and mill not only treat the ores produced from company mines, but purchase ores in the open market and by contract in all the inter-mountain states, thus making of this unit a permanent custom lead-smelter and concentrator.

The smelter has 7 blast-furnaces with a capacity of 481,800 tons of charge per year. It is equipped with the most modern type of blast and roasting furnaces and charging apparatus, and a system of baghouses to filter the smelter fumes. The primary object of the baghouses was to prevent the smoke becoming a nuisance, but their installation has permitted the company to recover as by-products arsenic and cadmium on a profitable scale. The smelter treated 222,666 tons of ore during 1919, yielding 32,580 tons of bullion; in 1920, 215,757 tons yielded 31,740 tons of bullion.

The concentrating mill has a capacity of 210,000 tons of ore per year. It produces lead concentrate containing gold and silver, which is reduced in the adjoining lead smelter, and a zinc-iron middlings product. This latter is separated in the dry mill by means of the Huff electrostatic process into a zinc concentrate and an iron-silver-gold concentrate. The latter is smelted at Midvale; the former is sold to zinc smelters. By means of this concentrating plant, complex ores, which formerly could not be profitably handled, are now treated so as to yield a profit both to the mine and smelter. In 1919, 135,782 tons of ore were treated; in 1920, 106,874.

At **Eureka:** a number of patented and unpatented claims of the old **Centennial-Eureka Mng. Co.** (fully described in Vol. XIII) and 85 acres of agricultural ground for water rights. The ore is essentially a replacement deposit in limestone, the oreshoots making along N. S. and also N. W. and S. E. fracture zones. The claims have been worked since 1887, and have produced a large quantity of high-grade ore. Recent developments have shown the new ore to be of much lower grade, and although the possibilities of finding more ore have not been exhausted, this mine can no longer be depended upon as a large source of ore supply for the Midvale smelter.

It is opened by a 2,300′ shaft with levels at about 100′ intervals and is equipped with a plant sufficient for an annual production of 120,000 tons. Exploration was under way on the 1,800′ level during 1920; upper levels are worked by lessees. Absorbed by the U. S. S. R. & M. Co. Dec. 31, 1917, the mine has been a steady small producer, output in 1920 being 10,679 tons of copper and lead ore compared with 21,288 tons in 1919. The 1919 output yielded 7,458 oz. gold, 230,007 oz. silver, 54,712lb lead, and 601,567lb copper, with gross value of $514,017 and net, $19,223. Majority interest of Centennial in the Bullion Beck (see below) was automatically transferred to the U. S. company. Operations were suspended for first six months of 1921.

Bullion-Beck and Champion Mining Co.

Mine office: John Enlund, supt., Eureka, Utah.

Officers: Geo. W. Heintz, pres.; C. E. Allen, v. p.; W. W. Rager, sec.-treas., with J. H. Horlick, J. Fewson Smith and M. C. Morris, directors. D. D. Muir, Jr., mgr. of mines.

Inc. in Utah. **Cap.** $1,000,000; shares $10 par; 63,787 issued; last assessment of 20c called in April, 1914. Dividends: to end of 1909, were $2,738,400, last dividend being 10c. July 11, 1908. Listed on Salt Lake City Exchange. Company is a veteran of the Tintic district and a close corporation, the U. S. S. R. & M. Co. holding 54,824 shares through its absorption of the Centennial-Eureka Mng. Co.

Property: 31 claims, adjoining the Centennial-Eureka. Mine was discovered, 1876, and has been a producer since 1880.

Development: 1,300′ shaft, with 200′ winze below the bottom level. Ore is mainly carbonate and chloride in limestone formation, carrying copper, gold, silver, lead and zinc values. Operations are conducted almost entirely by lessees.

Production: in 1919, 2,018 tons and in 1920, 5,575 tons of silver-lead-copper ore.

Niagara Mining Co.

Officers: C. A. Hight and G. W. Heintz, v. ps.; F. W. Batchelder, sec.-treas.; with N. W. Rice, F. Y. Robertson, C. H. Schermerhorn and Geo. H. Sherwood, directors.

Inc. in Maine. **Cap.** 1,000,000 shares; $1 par; 650,005 shares issued. Of these, the U. S. S. R. & M. Co. owns $574,605 shares; of the balance, 36,958 are held by other shareholders, and 38,442 are treasury shares.

Property: several patented and unpatented mining claims adjoining mines of the U. S. S. R. & M. Co. at Bingham, Utah. The property is being worked through the Niagara tunnel, which connects at its portal with the Bingham & Garfield Railroad for delivery of ores to the Salt Lake Valley smelters. The property is fully equipped for mining operations and is a continuous small producer; output for 1920 was 3,144 tons.

United States Fuel Co.

Officials: S. J. Jennings, pres.; Moroni Heiner, v. p.; R. M. Magraw, gen. supt.

Inc. in Utah. **Cap.** $10,000,000, of which $3,000,000 is pfd. $1 par, and $7,000, 000 com., $10 par; 2,355,690 pfd. and 700,000 com. issued, of which U. S. S. R. & M. owns 1,361,442½ pfd. and all of common.

Bonds: this company has outstanding $3,636,900 first and refunding 6% bonds, of which $3,424,400 are owned by the U. S. S. R. & M. Co.

The U. S. Fuel Co. has acquired the properties of the **Castle Valley Coal Co., Black Hawk Coal Co., Consolidated Fuel Co., Panther Coal Co.,** and has assumed the joint first mortgage bonds of the **Consolidated Fuel Co.** and **Southern Utah Railroad Co.,** par value $200,000.

The U. S. Fuel Co. also owns all the outstanding capital of the following companies:

	Shares.
Utah Coal Sales Agency	7,500
Mohrland Mercantile Co.	18,000
Southern Utah Railroad Co.	749
Price Reservoir & Irrigation Co.	20,000
King Coal Co	100

The Utah Coal Sales Agency owns all the outstanding capital of the Western Fuel Co—361 shares.

By acquisition of the above properties, the U. S. Fuel Co. owns and controls four coal mines, each equipped with haulage system and separate tipples. The joint output of these mines in 1920 was 1,548,216 of coal as against 1,058,833 in 1919.

Utah Railway Co.

Officers: G. W. Heintz, pres.; G. S. Anderson, v. p. and gen. mgr.

Inc. in Utah. **Cap.** $3,500,000; $100 par; 30,652 issued and owned by the U. S. S. R. & M. Co.

The funded debt of Utah Railway Co. is $4,500,000 in 5% gold coupon notes, maturing April 1, 1922, all owned by the U. S. S. R. & M. Co.

Property: company owns and operates 46.56 miles of track, and has trackage rights over 52 miles of road (double track entire distance) of the Denver & Rio Grande company, between Thistle, Utah, and Utah Railway Junction, Utah, aggregating 98.56 miles of road operated exclusive of other trackage rights, yard tracks, and sidings. All the coal produced by the U. S. Fuel Co. and other coal mines along the road is hauled by the company which is fully equipped with the latest type of engines and coal cars. Tonnage of all kinds carried in 1919 was 1,196,314, with an expense of 55% of revenue; in 1920, 1,762,538 tons and 56%.

United States Stores Co.

Officers: J. H. Horlick, mgr.; A. K. Bell, asst. mgr.

Inc. in Utah. **Cap.** 500 shares, all issued and owned by U. S. S. R. & M.

Operates the stores and supply department of U. S. S. R. & M. and its subsidiaries, including stores at Gold Road, Ariz. and Kennett, Calif.

Carbon-Emery Stores Co.

Inc. in Utah. **Cap.** $150,000; par $5; 27,000 shares issued and owned by U. S. S. R. & M. Co.

San Pete Valley Coal Co.

Inc. in Utah. **Cap.** $20,000; par $10; 1,877 shares owned by U. S. S. R. & M. Co.

NEVADA PROPERTIES

Address: 912 Newhouse Bldg.; Salt Lake City.

Operating officials: the same as under Utah.

Richmond-Eureka Mining Co.

Officers: C. A. Hight, pres.; F. Y. Robertson, v. p.; F. W. Batchelder, sec.-tres.; with Albert Fries, S. J. Jennings, C. G. and N. W. Rice, A. J. Seligman and C. A. Wimpfheimer, directors.

Inc. Sept. 28, 1905, in Maine. **Cap.** $3,600,000; $10 par; all issued of which U. S. S. R. & M. Co. owns 182,213 shares. Annual meeting, 4th Wed. in September.

Property: several patented and unpatented claims, including property of old **Eureka Consolidated company,** in Eureka district, Eureka county, Nevada. Geology of the district and deposit fully described in Monograph 7 of the U. S. G. S. Mining began in 1869 and continued with interruptions up to 1910, when part of Eureka & Palisade R. R., connecting mine with the Southern Pacific and Western Pacific lines was washed away. When railroad was repaired, an increase in freight rates made extraction of available low-grade ore unprofitable.

Development: by shafts, including the Locan 1,200′ shaft, and extensive openings. Mine has not been prospected below water-level, and there remains a large unexplored section above that level.

Production: prior to 1896, reported to have been $33,283,000 net. More recently (up to 1909), the U. S. S. R. & M. Co. has shipped a large yearly tonnage of $9 to $10 ore desirable for fluxing purposes. Speiss from old slag dumps has, because of a high arsenic content, become a material asset estimated to be between 50,000 and 100,000 tons; 3,941 tons shipped in 1920.

Equipment: 1,400 h. p. steam plant, 1,500 cu. ft. compressor, hoist capable of reaching 2,200′, etc.

In October, 1919, mine was leased, with option to purchase, to the

Mining & Developing Corp. (q. v.), which assigned its interest to the Ruby Hill Development Co. Lease was for 3 years and option called for a price of $9 per share on 254,000 shares; but was reliquished in April, 1921. Mine has been closed for several years.

CALIFORNIA PROPERTIES

Addresses: Kennett, Calif. and for Needles plant, Gold Road, Ariz.

Operating officials: Geo. W. Heintz, v. p. in charge; O. J. Egleston, mgr., Mammoth plants; L. E. Hanley, gen. supt., Mammoth mines; D. R. Muir, mgr., Needles plant.

The **Kennett** Smelter in Shasta county, is equipped with 5 furnaces with a capacity of 450,000 tons of charge per year, and a converter plant from which the blister copper is shipped for refining. Besides the usual auxiliaries, the smelter has a large baghouse which renders the emissions of the smelter harmless to agricultural interests, and for this reason is the only one of the smelters in Shasta county permitted by decree of the Federal court to operate. The smelter treats the whole output of the Shasta county mining territory which the company is exploring. The smelter also treats custom copper ores from northern California, and silicious ore from California, Nevada and Oregon. It has also a sorting plant for copper-bearing ores that have a high zinc content, as frequently found in the Mammoth mines, and turns out a high-grade zinc product. The smelter is liberally equipped with a power-plant, machine-shop, boiler-shops, round-house, etc., to allow uninterrupted and economical operation. From 1905 to 1919, the smelter treated 3,420,410 tons of ore; in 1919, 113,735 tons of ore yielded 6,665,929 lb. of copper. Operations were suspended May 17, 1919.

The **Mammoth mine,** although closed in May, 1919, on account of abnormal conditions is one of the most important mines in the state. Exploration in 1920 added 25,000 tons of 4-6% copper ore to the reserves. Both it and the adjoining Keystone mine have large bodies of pyrite carrying a small copper content. Mine was originally operated by a subsidiary, the **Mammoth Copper Mng. Co.** until latter was disincorporated. See under latter in Vol. XIII for full description.

A lime quarry, with kilns and 2½ mile electric railroad to Kennett, was acquired in 1920.

The **Needles** plant at Needles, in San Bernardino county, has a lead and zinc concentrating mill of 125 tons daily capacity, equipped with crusher, jigs, tables and a flotation plant, the latter for the recovery of zinc from tailings. Plant idle in 1921.

ARIZONA PROPERTIES

Address: Gold Road, Ariz.

Operating officials: Geo. W. Heintz, v. p. in charge; D. R. Muir, mgr. of Gold Road plant.

At Gold Road: 15 patented claims and water-rights, 22 miles S. W. of Kingman, formerly held by the **Gold Road Mines Co.** until merged with U. S. S. R. & M. Co. in December, 1917. The gold-bearing quartz, ore occurs in a fissure vein, which strikes easterly and westerly, for 1¼ miles through the claims The production prior to its purchase in 1912 was large, the stoping operations having been carried down to the 500′ level. On taking control the U. S. Co. extended stoping operations on the strike of the vein and also down to the 900′ level. The assay value of the ore diminishes with depth as thus far explored, only a small percentage of the ore found on the 800′ level being of pay grade, though the vein continues strong and permanent.

The mine is worked through 2 shafts, 800 and 900′ deep, equipped with cages and skips. Values are recovered by cyanide process in a mill of 300 tons daily capacity, located within a few hundred feet of the mine.

The property is fully supplied with power house, air-compressor, shops, warehouse, dwellings, etc. Little work was done in 1917 and none in 1918, save that part of the mill was leased. During 1919 and 1920 the mine remained closed.

At Cerbat; the **Champion** mine, 4 claims, 53 acres, 12 miles N. W. of Kingman. Recent development has yielded a small tonnage of gold-silver-lead-zinc ore which was shipped to U. S. S. R. & M. plant at Needles. Reserves estimated to be 60,000 tons of $12.50 ore. Production prior to 1917 was $200,000. Closed down in 1918.

Also, the **Stockton Hill** group, including the **Banner mine,** near the Champion and formerly part of the holdings of Needles Mng. & Sm. Co., shows narrow veins of lead-zinc ores; now under lease and option to the **Kingman Cons. Mines. Co.,** which see for further details.

The two foregoing properties, together with the Needles mill were absorbed in December, 1917, by the U. S. S. R. & M. Co. from its subsidiary, the Needles Mng. & Sm. Co.

PROPERTIES IN OTHER STATES

Address: Eureka, Colo.

Officers: Geo. W. Heintz, pres.; E. L. Young, gen. mgr.; B. Marquand, mill supt.

Sunnyside Mining & Milling Co.

Inc. in Maine. **Cap.** $1,800,000; $100 par; all issued, of which the U. S. S. R. & M. Co. owns 9,001 shares, control being secured in 1917.

Property: a large group of patented and unpatented claims at Eureka, San Juan county, Colorado. The ore carries zinc, lead, silver, gold, and copper; in 1919-20, the average metal content was 6.8% zinc, 4.8% lead, 4.5 oz. silver, 0.08 oz. gold and 0.40% copper, with 3.2% iron. The adjoining Brenneman mine was leased in 1920.

Development: by two 5,000′ tunnels, 2 shafts, 300′ and 500′, and a number of levels. In 1920, at depth of 500′, orebody was of good size and values were better than the average.

Equipment: four 1,500 cu. ft. compressors, electric underground haulage, 33,000′ tramway with capacity of 50 tons per hour, and 600-ton mill. This has 2 crushers, three 1,400-ton steel bins, tube-mills, ball-mills, flotation machines, Dorr thickeners, and Portland filters. The process employs selective flotation, producing a lead concentrate and a zinc concentrate carrying gold and silver. Electric power is purchased from the Colorado Power Co.

Production: in 1918, an average of 300 tons per day for 8 months; in 1919 a fire limited ore extraction to 4 months, and mill treated only 14,524 tons; in 1920, output was 161,632 tons of ore. Active operations stopped in December, 1920.

ZINC PROPERTIES

Address: Baxter Springs, Kans.

Officials: Geo. W. Heintz, v. p. in charge; D. R. Muir, mgr.

U. S. S. No. 1: the **Ritz** mine on a 60 acre leasehold, near Cardin, Oklahoma, in which majority interest was acquired in 1916. Drilling cut good ore from 280 to 312′ and Ravenswood mill was moved to this mine from Joplin. Development in 1917 and 1918 was favorable; company operations suspended 1919 and 1920, due to low metal prices; in latter year, mine was however operated by sublessee, who produced 2,195 tons of zinc and 732 tons of lead concentrate.

U. S. S. No. 2: the **Naylor** tract, a 160 acre leasehold, 7½ mile; W. of Baxter Springs, Kansas, acquired in 1917. Covers an extension of Miami, Okla., deposits and drilling revealed enough ore to open mine and erect 400-ton mill; developments have come up to expectations, and

mill has operated steadily since erection until low prices caused suspension in 1920. Exploration work only now under way. Production in 1920, 3,608 tons of zinc and 1,367 tons of lead concentrate.

At **Checotah,** Oklahoma: D. R. Muir is manager of a zinc smelter, acquired in 1916, which uses natural gas fuel and reduces both carbonate and sulphide ore. This plant provides an outlet for U. S. S. R. & M. Co.'s mines in California, Colorado, Utah and Kansas. Idle in 1920, and much of 1921.

Company also had zinc smelters at Altoona, Iola and La Harpe, Kans. These 3 smelters at Checotah and that at Midvale, Utah, together with the Bingham properties and lease on Ritz mine in Oklahoma were held by a subsidiary, **United States Smelting Co.,** until it was merged with parent company in December, 1917. During 1916-17, supply of natural gas for fuel became so irregular that Kansas smelters were closed.

U. S. S. Lead Refinery, Inc.

Address: East Chicago, Indiana.

Officers: F. Y. Robertson, pres.; F. F. Colcord, v. p.

Inc. in Maine **Cap.** 10,000 shares of no par value, all issued and owned by U. S. S. R. & M. Co.

Operates an electrolytic lead refinery, known as the Grasselli refinery, purchased from the U. S. Metals Refinery Co. During 1919, it treated 33,637 tons of lead bullion, etc. and in 1920, 29,143 tons. Other products are antimony, bismuth and hydro fluoric acid.

Hanover-Bessemer Iron & Copper Co.

Address: S. L. Houghton, supt., Fierro, Grant county, New Mexico.

Officers: Sidney J. Jennings, pres.; N. W. Rice, v. p., with D. M. Barringer, C. F. Moore, F. Y. Robertson, J. W. Brock, directors. F. W. Batchelder, sec.-tres., L. M. Kniffen, mgr.

Inc. Nov., 1914, in Delaware **Cap.** $1,000,000; $1 par; 745,000 issued of which the U. S. S. R. & M. Co. owns 319,353. Annual meeting, in May.

Property: at Fierro, Grant county, shows shipping ore averaging 50%-60% iron and milling ore containing 1% copper and 40% iron. Company is under contract to ship 20,000-30,000 tons of high-grade iron ore per month to the Pueblo plant of the Colorado Fuel & Iron Co.; 244,410 tons were shipped in 1920. Equipped with electrostatic mill; not in operation 1920-21.

Ebner Gold Mines Co.

The U. S. S. R. & M. Co. owns all of the capital stock and for a number of years has been developing the Ebner mine, 240 acres, at Juneau, Alaska, adjoining Alaska-Juneau on N. W. Reported to have 6 veins, 15 to 60′ wide, opened by 2 tunnels. The main tunnel was 4,600′ long in 1919 and a branch is being driven from the 3,200′ point. Property was at one time controlled by **Alaska-Ebner Gold Mines Co.**

Cia de Real del Monte y Pachuca,

Address: M. W. Beckwith, gen. supt., Pachuca, Hidalgo, Mexico.

Officers: Salvador M. Cancino, pres.; D. S. Calland, director; J. E. Smith, asst. dir.

Inc. 1867, in Mexico. **Cap.** 2,554 shares of which U. S. S. R. & M. Co. owns 2,546.

Property: 180 claims, 4,270 acres, including the Barrera mines, in Pachuca and 200 acres, in extreme western part of Pachuca district, acquired in 1919 by purchase of 90% of $2,200,000 capital of the Cia. de Minas Sant'a Ana y Anexas. In September, 1920, a majority interest in the Arevalo mines at Atotomilco el Chico, 6 miles N. of Pachuca was bought for $1,250,000. Real del Monte is one of the most important mines

in Mexico; Santa Ana and Arevalo have been producers for several years, but the latter on a small scale only.

The first discovery of ore was made shortly after the Conquest of Mexico by the Spandiards, and several of the principal properties were large producers prior to 1780.

Geology: of the district is extremely simple, as the ores occur in fissure veins in andesite. The capping rocks of marl and limestone have no relation to the veins. Vein filling is quartz with a little calcite. The total mineral content of the veins is never more than 4 or 5%, almost wholly composed of iron pyrite with insignificant sprinklings of lead and zinc sulphides, carrying gold and silver. Santa Ana covers part of the famous Viscaira vein.

Development: at Real del Monte: to depth of 2,000', with over 100 miles of underground workings in 50 mines, 8 of which are producing at present time. The bulk of the ore now mined comes from below the 1,300' level. In 1917, former company opened the Purisima vein whose ore is much higher grade than that extracted from other mines; in 1919-20, development of a large ore shoot gave highly satisfactory results.

Ore reserves: of Real del Monte are not maintained at a large figure because of the great pumping expense; at end of 1920, tonnage and grade of ore were expected to exceed previous estimates. At Santa Ana, a large body of rich ore is available.

Equipment: includes 2 concentration-cyanidation mills; one of 1,000 tons daily capacity, with a 50-ton flotation unit, in Real del Monte district and the Loreto plant of 1,800 tons for the Pachuca district. The Loreto mill is connected with Santa Ana by a 5,100' aerial tram and is to be connected with Arevalo by one 6 miles in length. Approximately 90% of silver and 96% of gold is recovered, 20% of total recovered value being in form of concentrate shipped to custom smelters, the remainder is exported as bullion.

Production: prior to present management was about 390,000 tons annually, the ore averaging 13.9 oz. silver and $1.48 gold. In 1919, it was 917,982 metric tons, and in 1920, 990,849.

The proportion of the total known mineral-bearing territory developed is small and operations are assured for many years to come.

United States Smelting, Refining and Mining Exploration Co.

Offices: 55 Congress St., Boston; 120 Broadway, New York; Newhouse Bldg.; Salt Lake City; 1504 Hobart Bldg., San Francisco.

Officials: S. J. Jennings, v. p. in charge of exploration and mining investment; Geo. W. Heintz, v p. and gen. mgr. of western exploration; C. E. Allen, mgr. of inter-mountain district; D. S. Calland, mgr. in Mexico; A. P. Anderson, mgr. of Pacific Coast.

Inc. in Maine **Cap.** $50,000; par $50; 900 shares issued, all owned by U. S. S. R. & M. Co. The Exploration Co. was formed for the purpose of developing new properties, which, when acquired, would be turned over to the U. S. S. R. & M. Co.

The **Cardonal** mines, 12 miles from Ixmichilpan and 64 miles N of Pachuca were taken over in 1920; it is an old-time lead producer and there are large possibilities of developing more lead and zinc ores. Also in 1920 leased a part of the property of Dragon Cons. Mng. Co. (q. v.) at Tintic, Utah, from which it was reported to be shipping from 50 to 100 tons daily, of iron fluxing ore. A lease on claims of American Flag Mng. Co. at Park City, Utah, was relinquished late in 1920.

Options have been taken on other properties in Mexico and the U. S. including that on the Horseshoe Copper Co. in August, 1919, on which some 2,000' of work has been done and some shipments of oxidized lead ore made. Operations were suspended early in 1921.

The U. S. Sm., Ref. & Mng. Co. despite depressed conditions, has shown an operating profit for both 1919 and 1920, although not quite large enough to cover dividends in the latter year.

United States Smelting, Refining and Mining Exploration Co.

Subsidiary of U. S. S. R. & M. Co., which see for detailed description.

Office: 55 Congress St., Boston. District offices: 120 Broadway, New York; 1504 Hobart Bldg., San Francisco; Newhouse Bldg., Salt Lake City.

Business is the examination and purchase of metal mines, which, if and when acquired, are turned over to the parent company.

UNITED STATES STEEL CORPORATION.

Offices: 71 Broadway, New York and 51 Newark St., Hoboken, N. J.

Officers: Elbert H. Gary, chrm.; Jas. A. Farrel, pres.; David G. Kerr and John Reis, v. p.'s; Rich. Trimble, sec.-treas.

Inc. Feb. 25, 1901 in New Jersey. **Cap.** $508,302,500 com. and $360,281,000 pfd., outstanding; $100 par. Funded debt, $554,828,231. Transfers made by company; registrars, The New York Trust Co. for pfd. and Guaranty Trust Co. for common, both of New York.

Through its subsidiaries, the **Oliver Iron Mining Co.** and **Tennessee Coal, Iron & Railroad Co.**, which see, this company controls about 127 iron mines in Alabama, Michigan, Minnesota, and Wisconsin, of which all but about 50 were active in 1920. The most important subsidiaries are described under their respective titles. Recent production:

Year	Tons	Year	Tons
1920	27,021,009	1917	31,781,769
1919	25,423,093	1916	33,355,169
1918	28,332,939		

Also, through its subsidiary, the **Am. Steel & Wire Co.**, U. S. Steel controls the **Edgar Zinc Co.** and **Donora Zinc Co.**, which see elsewhere in this volume.

Company has recently acquired the Moro da Mina (q. v.) in the Lafayette district, Minas Geraes, Brazil, reputed to be the largest known high-grade manganese deposit.

As company is an industrial corporation, fully described in various manuals, no detailed description is needed herein.

YUKON-ALASKA TRUST.

Successor in part to Guggenheim Exploration Co.

Office: 120 Broadway, New York.

Trustees: Wm. Loeb, Jr., chrm.; W. E. Bennett, sec.; Chas. Earl and Roger W. Straus.

Cap. 208,433 shares of no par value, all outstanding; distributed among Exploration Co. shareholders on basis of ¼ share of Yukon-Alaska for each share of Exploration.

Dividends: beginning on June 30, 1916, quarterly dividends of $1 have been paid to Sept. 30, 1920. Due to the financial needs of Yukon Gold, cash distributions were indefinitely suspended on Dec. 31, 1920.

Organized Feb. 4, 1916, to take over residuary assets of **Guggenheim Expl. Co.**, comprising cash and demand loans, $11,000,000; 2,842,625 shares (out of 3,500,000) Yukon Gold Co.; eight 5% notes of $625,000 each of **Yukon Gold. Co.**, issued Feb. 1, 1916, and due one each year thereafter; this $5,000,000 covers purchase price of the property, dredges, and loans made Yukon Gold by Guggenheim Exploration Co. Also 500 shares preferred stock, series A of **American Smelters Securities Co.**; also various causes of action, interests, and miscellaneous property rights of uncertain and in part speculative value in various mining properties, prospects and contracts relating thereto. See Vol. XII for other details.

Thus far only one note has been met by Yukon Gold (q. v.), the others having been extended.

YUKON GOLD CO.

Controlled by the Yukon-Alaska Trust, (q. v.), Incorporated, 1916, to take over the residuary assets of the dissolved Guggenheim Exploration Co.

Office: 120 Broadway, New York.

Officers: Wm. Loeb, Jr., pres.; R. W. Straus, v. p.; W. E. Bennett, v. p.-sec.; O. B. Perry, gen. mgr., with Isaac, Daniel, Morris and S. R. Guggenheim, E. L. Newhouse, F. R. Foraker, and Charles Earl, directors. L. Fredrick, treas.; C. E. Moran, asst. sec.; F. R. Raiff, traffic mgr.; G. G. Thomson, purch, agt.; E. E. McCarthy, res. mgr. at Dawson; C. H. Munro, J. F. Newsom, and F. R. Short, engineers.

Inc. Feb. 28, 1907, in Maine. **Cap.** $25,000,000 reduced, Jan., 1915, to $17,500,000; $5 par; all issued; $14,213,125 stock owned by the Yukon-Alaska Trust. Guaranty Trust Co., New York, registrar; D. A. Crockett, 149 Broadway, New York, transfer agent. Listed on New York and Boston Curb. Annual meeting 2nd Monday in January, at Augusta, Me.

The Guggenheim Exploration Co. had loaned the Yukon Gold Co. $5,000,000, at 5% covered by 8 serial notes for $625,000 each, one payable each year for 8 years, from Feb. 1, 1917, to the Yukon-Alaska Trust, successor in part to the Exploration Co. When the first note was due, re-payment was extended one year from the date of maturity of the last of the series of 8 notes. In 1917, it was calculated that earnings from the holdings would be insufficient to meet the notes and continue dividends. The second note became due on Feb. 1, 1918, but was extended to 1926, No. 3 note, due Feb. 1, 1919 was paid, but note No. 4 due Feb. 1, 1920, was extended for 7 years, in order to be able to finance the project in Malaya.

Dividends: 8% quarterly from Sept., 1909, to Dec., 1911; 6% annually from April, 1912, to Dec. 31, 1917; and 1% in 1918. Payments were suspended in Sept., 1918, on account of abnormal conditions. The total amounts to $9,858,110.

Comparative General Balance Sheet:

ASSETS

Year	Property & Invest s	Equip.	Def'd Charges	Bullion & Cash	Other Current	Total
1920.....	$2,210,423*	$2,158,300	$193,921	$519,618	$2,750,730	$7,832,992
1919.....	1,506,137*	2,291,874*	373,251	1,177,396	2,427,033	7,776,692
1918.....	2,492,818*	2,857,471*	158,542	1,392,282	2,550,339	9,451,453
1817.....	2,878,416*	3,323,752*	434,144	1,279,003	2,207,454	10,551,082
1916.....	12,311,019	8,312,943	501,094	2,046,748	1,735,985	24,907,780
1915.....	11,569,474	7,039,902	548,532	469,729	1,357,015	20,984,652
1914.....	11,524,181	7,036,424	600,066	195,283	1,509,654	20,856,608

* On basis of re-valuation.

LIABILITIES

Year	Capital Stock	Yukon-Alaska Trust	Current	Deprec.	Surplus	Total
1920.....	$17,500,000	$4,575,000	$504,324	$.....	$2,753,668	$7,832,992
1919.....	17,500,000	4,375,000	254,800	.....	3,146,892	7,776,692
1918.....	17,500,000	5,000,000	195,877	.....	4,255,576*	9,451,453
1917.....	17,500,000	5,000,000	244,985	.....	5,306,097	10,551,082
1916.....	17,500,000	5,000,000	189,614	1,567,822	650,344	24,907,780
1915.....	17,500,000	1,500,000	158,078	1,223,740	602,834	20,984,652
1914.....	17,500,000	1,675,000	134,729	987,995	567,884	20,856,608

* On basis of re-valuation.

Comparative Income Account:

Year	Total Net Income	Royal-ties Paid	Amort-ization	Int. Ch's. Exp's, etc.	Total Deduct's	Year's Surplus
1920.....	$511,079	$15,603	$.....	$191,089	$206,692	$304,387
1919.....	511,158	38,058	.....	137,769	175,827	335,330
1918.....	325,455	61,020	.....	218,536	279,556	45,898

Year	Total Net Income	Royalties Paid	Amortization	Int. Ch's. Exp's. etc.	Total Deduct's	Year's Surplus
1917.....	1,738,239	119,217	.....	245,876	365,094	1,373,146
1916.....	2,101,701	362,852	250,647	390,691	994,191	1,107,510
1915.....	2,121,031	542,241	248,037	245,803	1,036,081	1,084,950
1914.....	2,213,126	489,169	534,073	61,577	1,084,819	1,128,307

Property: includes placer and lode claims in Yukon Territory, placer claims in Alaska, California and Idaho, and a tin property in the Federated Malay States, all hereinunder described. The company also holds a 60% interest in the **Elkoro Mines Co.** operating in Nevada, which see.

In Yukon and Alaska: company owns 650 placer claims near Dawson, Yukon, and 24 placer claims on Flat and Greenstone creeks, Iditarod district, Yukon Basin, Alaska, operated in part by hydraulics and in part by dredges. By 1911, there were 9 large dredges, 70 mile ditch, power plant, steam-thawing apparatus, complete machine shops, etc. As dredging area is becoming exhausted, two 7½ cu. ft. boats only were operated in 1920, others having been sold or shipped to Malaya, etc. Estimates as of Nov. 5, 1920, give a life of 3 years and net profit of $350,000 for Dawson operations. Except for that of lessees, work in Iditarod was abandoned and dredge dismantled in 1919. At Bunker Hill, 10 mines were worked by the hydraulic method, operations were completed at end of the season and plant was dismantled. A plant was installed at Gold Hill.

Production (in recent years):

	Dredging			Hydraulicking		
Year	Yardage	Yield, cents.	Cost, cents.	Yardage	Yield, cents.	Cost, cents.
1920.....	1,226,578	33.84	26.09	1,702,264	16.74	9.44
1919.....	1,985,352	34.80	25.60	2,220,656	15.05	8.69
1918.....	2,767,058	30.87	34.36	2,054,390	16.00	8.40
1917.....	4,583,326	37.87	25.81	2,143,444	21.47	11.80
1916.....	5,433,052	41.89	23.32	2,245,084	19.40	11.90
1916.....	5,041,075	48.73	26.46	3,031,647	13.60	7.00

Yukon (Keno Hill) Property.

Mine address: Jas. O. Greenan, Mayo Landing, Yukon, Canada.

Property: 7 lead- silver claims on Keno hill, Mayo district, Y. T., 40 miles by wagon-road N. E. of Mayo, on the Stewart river, between the head of Lightning creek, a tributary of Duncan creek, and Christal creek. Transportation is down the Stewart to Stewart on the Yukon, thence S. W. via rail by White Pass and Yukon route, to Whitehorse and Skagway.

Geology: the rock exposed on Keno hill consists of gneissoid quartzites, quartz-mica, schists, and mica-schists. They are cut by a dike of greenstone, considerably sheared and subjected to differential erosion, resulting in its being an important topographic feature. It forms the top of Keno hill, which has an elevation of 6,400′. Principal veins, 3 to 7′ wide, are in transverse faults, with dense argentiferous galena ore occurring in shoots.

Development: surface work has exposed rich ore, especially on the Rico claim. Estimates give a net operating profit of $1,000,000 from ore developed Oct. 1, 1920.

During the winter of 1920-21, the company expected to ship 3,000 tons of ore assaying up to 60% lead and 200 oz. silver per ton, to the Selby smelter.

To Nov., 1920, $150,000 had been spent on this property, and to July, 1921, a further expenditure of $800,000 was expected.

California Properties.

Company operates considerable acreage of placer ground on the American, Trinity and Yuba rivers, and Butte Creek, in Placer, Trinity, Yuba

and Butte counties, under the name of **Pacific Gold Dredging Co.** Work on Feather river has been suspended. During 1919 and 1920, 4 dredges, one of 7½, one of 6 and two of 9 cu. ft. capacity were operated. It is estimated that life of these placers is 4½ years.

Production: from 3 boats in 1915 and 1916; from 5 in 1917 and 1918; from 4 in 1919 and 1920.

Year	Yardage	Gross gold Value	Cents per yd.	Cost cents, p. yd.
1920	4,900,726	$494,490	10.10	7.31
1919	5,026,264	454,654	9.00	7.63
1918	4,444,404	310,008	7.00	6.00
1917	6,161,941	517,603	8.40	3.71
1916	4,032,476	414,135	10.27	3.94
1915	3,919,127	437,557	11.46	4.51

Idaho Properties.

D. H. Ferry is in charge at Murray, Shoshone county, of dredging operations on Prichard creek, on property under lease from Coeur d'Alene Mng. Co. Estimates to end of 1917 showed 10,600,000 cu. yd. of gravel, containing $1,530,000. A 7½ cu. ft. dredge, electrically driven, is employed. A few claims were acquired by purchase in 1919. A 4½ year life is the estimate for this area; including California operations, a net profit of $770,000 is expected.

Production: the 1918 figures include one month of 1917:

Year	Yardage	Gross gold value	Cents per yd.	Cost cts. per yd
1918	1,448,306	$96,332	7.43	6.42
1919	1,579,035	157,806	10.39	7.06
1920	1,295,900	187,845	12.97	7.30

Malaya Property.

In Malaya tin-bearing placer ground has been acquired, 2,892 acres of which had been developed by 5000 drill holes to Dec. 31,1920, estimated to contain 95,000,000lb recoverable tin. It is also estimated that the net profit, after allowing for depreciation, etc., will be between $10,500,000 and $16,500,000 realizable over a period of 15 years, depending on the price of tin.

Examined in 1919 by C. H. Munro and J. F. Newsom, and in 1920 by O. B. Perry; the first named is to be resident manager.

Equipment: Three 7½ cu. ft. dredges have been shipped from Yukon; also a 300-k. w. turbo-generator set, machine-shop and spare parts. Other dredges will follow as needed.

Up to Nov., 1920, $1,200,000 had been spent on this property, and a further expenditure of $1,000,000 in 1921 was comtemplated. One dredge began operating in October, 1921; reported that 2 others would be in commission a few months thereafter.

Summary.

A few years ago, company was operating 14 dredges in California, Alaska and Yukon, today because of exhaustion of placers, less than half are in operation, and in order to prolong its life the ventures in Malaya and lode mining in the Yukon have been undertaken.

Company's financial and technical direction is excellent.

ZINC CONCENTRATING CO.

Presumably dead; see Vol. XIV for description.

ALABAMA

The mining industry of Alabama is dominated by the iron and coal producers, and the non-ferrous mines are few and of no great size. As this book, though intended primarily as a manual of the non-ferrous mining companies, also gives the addresses and very often the more vital facts about the iron mining companies, a full list of the iron ore producers of the State is presented below:

IRON ORE PRODUCERS IN ALABAMA

Company & Address	Mines at
Woodstock Operating Corp., Anniston, Ala.	Woodstock, Calhoun Co. and Woodstock, Talladega Co., Ala.
Alexander Tison, Talladega, Ala.	Arizola, Talladega Co. Gadsden, Etowah Co. Farr, Shelby Co., Ala.
Alabama Co., Birmingham, Ala.	Attalla No. 1, Etowah Co., Hammond, Jefferson Co., Ironaton, Talladega Co., Attalla No. 2, Etowah Co., and Citico, Etowah Co., Ala.
Citico Furnace Co., H. S. Chamberlain, Pres., Chattanooga, Tenn.	Attalla No. 2 and Citico, Etowah Co., Ala.
Republic Iron & Steel Co., Youngstown, Ohio.	Raimond No. 1, Jefferson Co., Raimond No. 2, Jefferson Co., Raimond No. 3, Jefferson Co., Raimond-Roup, Jefferson Co., Alfretta No. 1, Jefferson Co. Spaulding, Jefferson Co., Tannehill, Tuscaloosa Co., and Houston, Tuscaloosa, Co., Ala.
Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.	Sloss Nos. 1 and 2, Jefferson Co., Irondale, Jefferson Co., Russellville, Franklin Co., and Compton, Blount Co., Ala.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.	Fossil, Ishkooda, Muscoda, Jefferson Co.; Greeley, Tuscaloosa Co.; and Champion, Blount Co., Ala.
Daniel A. Farrell, Atlanta, Ga.	Dugger, Calhoun Co., Ala.
Robinson Mining Co., American Trust Bldg., Birmingham, Ala.	Keewanee and Glen Iris, Jefferson Co.
William Siglin, Bluffton, Ala.	Bluffton, Cherokee Co., Ala.
J. C. Burt, Exec., Box 100, Talladega, Ala.	Burt, Talladega Co., Ala.
Chamblee Land & Dev. Co., Tuscaloosa, Ala.	Chamblee Land & Dev. Co., Tuscaloosa Co.
Columbiana Ore Co., 25 E. Baltimore St., Baltimore, Md.	Nelson, Shelby Co.

Company & Address	Mines at
Woodward Iron Co., Woodward, Ala.	Docray, Tuscaloosa Co. Woodward 1, 2 and 3, and Songo Jefferson Co.
Jirama Ore Co., Gadsden, Ala.	Tumlin Gap, Etowah Co.
Birmingham-Trussville Iron Co., Jefferson County Bank Bldg., Birmingham, Ala.	Crudup, Etowah Co.
Birmingham Ore & Mining Co., American Trust Bldg., Birmingham, Ala.	Helen-Bess, Jefferson Co.
Thomas Furnace Co., Niles, Ohio.	Jenifer, Talladega Co.
Bass Foundry & Machine Co., Rock Run, Ala.	Langdon and Weems, Cherokee Co.
Cambro-Clinton Mining Corp., Jefferson County Bank Bldg., Birmingham, Ala.	Watseka, Blount Co.
Alabama Fuel & Iron Co., Brown-Marx Bldg., Birmingham, Ala.	DeVaney, Franklin Co.
Pinkney Mining Co., Russellville, Ala.	Eureka, Franklin Co.
Sheffield Iron Corp., Sheffield, Ala.	Wilson, Ryde and Hurst, Franklin Co.
Shook & Fletcher Supply Co., Inc., Brown-Marx Bldg., Birmingham, Ala.	Russellville Nos. 3, 4 and 5, Franklin county.
Shelby Iron Co., Shelby, Ala.	Shelby, Shelby Co.
Clinton Mining Co., Brown-Marx Bldg., Birmingham, Ala.	Clinton (Steinman), Jefferson Co.
Central Iron & Coal Co., Holt, Ala.	Valley View, Jefferson county and Friedman, Tuscaloosa county

MANGANESE MINES OF ALABAMA.

The four Manganese producers of Alabama, are as follows:

Company & address	Mines at
Southern Manganese Corp., Anniston, Ala.	Fields, Calhoun Co. Altoona and Cave Springs, Etowah Co.
Vassar L. Allen & P. King (lessees), Birmingham, Ala.	Allen & King, Clay Co.
Hebert, Sewell & Pasquier, 612 Broad St., Gadsden, Ala.	Lodo, Etowah Co.
Nickles & Northern, Talladega, Ala.	N. & W., Talladega Co.

ALABAMA COMPANY, THE **ALABAMA**

Office: H. W. Coffin, gen. mgr., Union Trust Bldg., Birmingham, Ala.

Inc. April, 1913, in Delaware as successor to Alabama Cons. Coal & Iron Co. **Cap.** $2,000,000 common; $600,000 7% cum. 1st. pfd. and $1,500,000 7% non-cum. 2nd pfd.; $100 par; all outstanding.

Funded debt; $1,291,000 Alabama Cons. C. & I. Co., 1st consolidated gold 5s, dated May 1, 1903, due May 1, 1933; $670,000 Alabama Co. general gold 6s dated May 1, 1913, due May 1, 1933.

Financial report for year ended Dec. 31, 1920, shows gross earnings, $5,512,477; operating expenses, $3,801,703; net earnings, $1,710,774; surplus, $578,873. Current assets total, $1,273,375 and current liabilities, $1,034,918.

Dividends: initial 21% on 1st pfd., July, 1917, and quarterly thereafter. 7% on 2nd pfd. in 1917 and quarterly thereafter. Common, 3% in 1917; 6% in 1918; 7% in 1919; 9% in 1920; 3% in Jan., 1921. All dividends deferred since April, 1921.

Property: 10,984 acres of iron-ore land in Etowah, Talladega and Jefferson counties, Ala; and in Polk county, Ga. Also has coal mines and coke ovens in Alabama.

Plant, has 4 blast-furnaces, capacity 300,000 tons.

Production: ore mined was 166,582 tons in 1915; 257,958 tons in 1916: 336,135 tons in 1917; 315,229 tons in 1918; 270,889 tons in 1919; 306,829 tons in 1920.

ALABAMA SULPHUR ORE & COPPER CO. **ALABAMA**

Dead. See National Pyrites & Copper Co.

BIRMINGHAM ORE & MINING CO. **ALABAMA**

Address: American Trust Bldg., Birmingham, Ala.

Reported operating the Helen Bess mines on Red mountain, Jefferson county.

CENTRAL ALABAMA C. & I CO. **ALABAMA**

Office: Jenifer, Ala.

Reported in 1919 that company would rehabilitate the Jenifer iron furnace plant, erect hot blast stove and machine shop, install complete electrical equipment, add 50 coke ovens at coal mine, and build additional washery at brown ore mines near furnace. No recent report.

GULF STATES STEEL CO. **ALABAMA**

Offices: Brown-Marx Bldg., Birmingham, Ala.; 55 Cedar St., New York City.

Officers: James Bowron, pres.; N. Sanborn Smith, v. p.; C. A. Moffett, v. p.-gen. mgr.; A. R. Forsyth, v. p.-treas.; W. H. Moore, sec. Wm. H. Coverdale, cons. eng.

Inc. Nov. 1, 1913, in Del. as reorganization of Southern Iron & Steel Co. **Cap.,** authorized $12,500,000 com. and 6% non cum. 2d. prfd. taken together. Outstanding $11,138,150 com. and $84,100 2d pfd. Par $100. 1st pfd. 7% cum. authorized $3,000,000, issued $2,000,000. Bonds $195,000, Self Fluxing Ore & Iron Co. gold 6s, due Jan. 1, 1943, subject to call at 105.

Dividends: Feb., 1916, accumulated dividends of 15 1/6% paid on 1st pfd.; regular quarterly dividend of 1¾% paid since. On 2nd pfd. initial dividend of 1½% paid Aug., 1916, regular quarterly dividends since, also extra of 1½% paid Nov., 1916. On common, initial quarterly dividend paid Jan., 1917, continued regularly with extras. Common received a 25% stock dividend, June, 1918.

Property: owns and operates blast-furnaces, steel plants and rolling mills at Alabama City; owns entire capital stock of Clinton Mining Company operating red-ore mines 5 miles S. of Birmingham; also has 401 acres of limestone and 15,277 acres of coal land in Jefferson county;

also coal lands near Bessemer; by-product coke-ovens, etc. The Shannon mines near Birmingham have been under development since 1918. Developed to depth of 2,700′ and in Spring of 1921 were producing at rate of 400 tons of 68% iron ore daily.

L. M. MINING ASSOCIATION **ALABAMA**

Address: Pyriton, Ala

Property: the old Mattison mine, 2 miles from Pyriton, Clay county, which contains a pyrite deposit, 8′ thick near surface thinning to 2′ at 135′ below. Ore carries 42% sulphur and 2% copper. Mine was producing in 1917 and 1918.

NATIONAL PYRITES & COPPER CO. **ALABAMA**

Address: Pyriton, Ala.

Property: near Pyriton, Clay county, formerly owned by Alabama Sulphur Ore & Copper Co., contains pyrite deposits. The pyrite occurs in irregular lenses in schist, up to 300′ long and 35′ thick. Ore carries 40% sulphur and 1% copper.

Development: by 30° incline shaft, 450′ deep. Mine was reopened in 1917 and was shipping a considerable tonnage at the end of that year. Probably closed at present.

REPUBLIC IRON & STEEL CO. **ALABAMA**

See same title in U. S. section of this book.

SLOSS IRON & STEEL CO. **ALABAMA**

See Sloss-Sheffield Steel & Iron Co.

SLOSS-SHEFFIELD STEEL & IRON CO. **ALABAMA**

Office: Birmingham, Ala. Corporate office: 243 Washington St., Jersey City, N. J.

Officers: J. W. McQueen, pres.; Hugh Morrow, v. p.; with Harry Bronner, T. C. Camp, Waddill Catchings, Henry Evans, W. H. Goadby, A. H. Larkin, J. C. Maben, Henry Parsons, Geo. W. Davison, Jas. N. Jarvie, W. W. Crawford and E. W. Rucker, directors. Executive committee: Waddill Catchings, chairman, W. H. Goadby, T. C. Camp, Henry Evans, A. H. Larkin, Harry Bronner, Geo. W. Davison, Russell Hunt, sec.-treas. Central Union Trust Co., New York, transfer agen.; Lawyers Title & Trust Co., registrar.

Inc. Aug. 16, 1899, in N. J. Company is a consolidation of the Sloss Iron & Steel Co. and various other steel and iron companies in Alabama. Annual meeting 1st Wednesday after 2nd Tuesday in April.

Cap. authorized $10,000,000 com. and $10,000,000 7% non-cumulative pfd.; $100 par; issued $10,000,000 com. and $6,700,000 pfd. Funded debt: $5,700,000 ten-year 6% sinking fund gold notes dated Aug. 1, 1919, due Aug. 1 1926.

Dividends: on pfd. stock, 7% quarterly from April, 1900, to Oct., 1914. Jan. 1, 1915, 6% scrip due Jan., 1916; Oct., 1, 1915, 6% scrip due Oct., 1916; Jan., 3, 1916, 3½% cash: since April, 1916, 1¾% cash paid quarterly. On common stock, 1905, 5% cash (semi-annually); Oct. 1905, 33⅓% in com. stock; 1906, 5%; 1907, 5%; 1908, 4¼%; 1909, 5¾%; 1910, 3¾%; Feb. 1, 1917, 1½%; May 10, 1918, 1½%; June 29, 1918, 6% extra; since Aug. 10, 1918, 1½% quarterly.

Financial report for year ended Dec. 31, 1920, showed operating profit, $3,847,364; dividends, $600,000; surplus, $824,779; current assets, $4,841,376; current liabilities, $2,457,903.

Property: in Alabama, includes 43,000 acres of ore land, 62,500 acres of coal land, and blast furnaces with a total capacity of 600,000 tons of pig iron per annum.

SOUTHERN MANGANESE CORPORATION **ALABAMA**

Office: Birmingham, Ala. Theo. Swann, pres.

Was in 1918 a producer of manganese ore from mines in Georgia and Tennessee, but operations in these states have been entirely abandoned.

See Vol. XIV. The company was awarded $62,898 by the War Minerals Relief Commission in 1919, being 67% of the amount claimed.

Company owns a complete treatment plant and electric smelting furnaces at Anniston, Ala.

SOUTHERN SULPHUR ORE Co. ALABAMA

Address: 700 Broadway, Nashville, Tenn.

Property: at Pyriton, Clay county, Ala.

Conditions are similar to those of the National P. & C. Co., which see. Shipments were made in 1917 and 1918.

TENNESSEE COAL, IRON & RAILROAD CO. ALABAMA

A subsidiary of the **U. S. Steel Corp.**

Office: Brown-Marx Bldg., Birmingham, Ala.

Officers: G. C. Cramford, pres.; H. C. Ryding, v. p.-gen. mgr.; L. T. Beecher, sec.-treas. C. E. Abbott, gen. supt., of iron mines, Bessemer, Ala.

Inc. 1860, in Tenn., as Tenn. Coal & Ry. Co.; name changed 1881. **Cap.** com. $50,000,000; issued $32,528,698; and $75,900 8% cum. pfd., par $100. The **U. S. Steel Co.** owns all but $66,092 of the common stock. Authorized bonded debt, $15.000,000 general gold 5s, dated July 1, 1901, due July 1, 1951; outstanding $12,393,000, Dec. 31, 1920. Hanover Natl. Bank, transfer agent; Central Union Trust Co., registrar; both of New York.

Property: consists of many coal and iron mines, coke ovens, steel mills, etc. Company has a number of subsidiaries, including **Alabama Steel & Shipbuilding Co.** and **Fairfield Steel Co.**, with works at Eusley and Fairfield, respectively. Other works are at Bessemer, Birmingham and Oxmoor. The iron mines are in the Red Mtn. Range, near Birmingham and include the Muscoda and Ishkooda groups; and at Greeley, company mines brown-ore pockets on the Greeley and Champion groups. All but one of 12 mines were active in 1920.

Production: not published, but is probably about 3,000,000 tons; this State yields 5,000,000 tons annually.

WOODWARD IRON CO. ALABAMA

Office: Woodward, Ala.

Officers: A. H. Woodward, pres.; R. H. Banister, v. p.; D. E. Wilson, treas.; H. E. Smith, sec.

Inc. Nov., 1911, in Del. **Cap.** $10,000,000 com. and $3,000,000 6% cum. pfd.; par $100; all issued.

Property: consists of 5 blast-furnaces, with annual capacity of about 450,000 tons of pig iron, by-product coke ovens, and coal and iron mines near Birmingham. Reserves of iron ore are 296,290,000 tons. A 1,400′ shaft, 14x22′, was sunk in 1920, but is not yet in operation.

Production: 877,637 tons of iron ore in 1917.

ALASKA

Metal production of this Territory was valued at $41,000,000 in 1917; $29,000,000 in 1918; $19,620,000 in 1919; $22,070,000 in 1920. The total since 1880 is $460,000,000. It is interesting to recall that the Territory was purchased for $7,500,000. Production of the principal metals for the past seven years is as follows:

Year	Gold, value	Copper, lb.	Copper, value
1921	$8,000,000	56,214,000	$6,971,00
1920	8,365,560	70,435,363	12,960,10
1919	9,426,000	44,800,000	8,783,00
1918	9,481,000	69,225,000	17,099,00
1917	14,657,000	88,793,000	24,241,00
1916	17,242,000	119,858,000	29,484,00
1915	16,702,000	86,509,000	15,139,00
1914	15,764,000	21,450,000	2,853,00
1880-1920	$320,000,000	672,000,000	135,000,00

GOLD DREDGES OPERATING ON SEWARD PENINSULA

Nome District

Alaska Mines Corporation
Arctic Creek Dredge
Center Creek Dredging Co.
Dexter Creek Dredging Co.
Dry Creek Dredging Co
Julian Mining Co.

Council District

Crooked Creek Dredging Co.
Flume Gold Dredging Co. (2)
Northern Light Mining Co.
Wild Goose Mining & Trading Co.

Solomon District

Burness—Iverson-Johnson Dredge
Eskimo Dredging Co.
Shovel Creek Gold Dredging Co.

Kougarok District

Behring Dredging Co.
Kelliher Dredging Co.

Port Clarence District

Budd Creek Dredging Co.

ADMIRALTY-ALASKA GOLD MINING CO. ALASKA

Address: W. S. Pekovich, mgr., Juneau, Alaska. L. S. Robe, supt., Funter, Alaska.

Financed by the A. A. Sales Corporation, 115 Broadway, New York.

Officers: Henry Roden, pres.; W. S. Pekovich, v. p.; I. Friedman, v. p.; W. E. Nowell, sec., with Max G. Niman, directors.

Inc. October, 1915, in Alaska. **Cap.** $5,000.000; $1 par; 3,800,000 shares outstanding. Security Transfer & Registrar Co., registrar and transfer agent.

Property: 52 claims, 1,040 acres, at Funter Bay, Admiralty Island, South-Eastern Alaska, 15 miles W. of Juneau, discovered 1886 and operated by the Alaska Willoughby M. Co. from 1895-96 and by the Funter Bay Mng. Co. until 1904. Ore occurs in fissure veins in schist, and is said to average better than $10 per ton in gold, silver, copper and nickel. Twenty-nine veins, from 2-100′ in width, have been disclosed. Geology and early development fully given in U. S. G. S. Bull. 662.

Development: to depth of 1,400′ by 1,500′ tunnel and 280′ shaft. In 1920, work was done for 8 months. Reserves: estimated at 3,000,000 tons blocked out, averaging $10 per ton.

Equipment: includes compressor, concentrating mill of 31 tons daily capacity, 4,000′ tramway. A 500-ton reduction plant is planned.

ALASKA-CHITNA EXPLORATION CO.

Presumably dead. See Vol. XIV. of Mines Handbook.

ALASKA CONSOLIDATED COPPER CO. ALASKA

See **Alaska Copper** Corporation.

ALASKA CONSOLIDATED MINING & SMELTING CO. ALASKA

Mines at Copper Mount, Sulzer P. O., Prince of Wales Island, Alaska.

Officers: Geo. H. Crosby, pres.-gen. mgr., Lonsdale Bldg., Duluth, Minn.; A. M. Sellwood, v. p.; I. M. Lennan, sec., with A. L. Warner and Henry W. Armstrong, directors, at last accounts.

Inc. Oct., 1912, in Ariz. **Cap.** $2,500,000; $5 par; $1,500,045 outstanding.

Property: purchased of the Alaska Copper Co. at sheriff's sale. Consists of 23 claims, 18 patented and 5 being patented, with 15-acre mill site, known as the Copper Mountain group, situated on Copper Harbor, Prince of Wales Island, Alaska.

Geology: mine covers a contact metamorphic zone between granite and limestone with a porphyry intrusion along the contact. Orebodies are from 3 to 50′ wide with mineralized zone 900′ wide and quite attractive surface showings.

Development: by 4,600′ of tunnels and several shallow shafts.

Equipment: includes smelter, sawmill, tramway and many buildings, put up before sufficient ore had been developed to keep smelter in operation.

Reports made by W. H. Weed and other engineers on file in company's office. No ore shipped since 1907. Idle, but is a meritorious prospect.

ALASKA COPPER CORPORATION ALASKA

Address: F. B. Bard, Singer Bldg., New York.

Directors: Samuel D. Warriner, Alvan Markle, John W. B. Bausman, W. F. B. Stewart, George R. Bedford, Edwin Barr, Frank P. Lauer, Frederic B. Bard and D. George Dery.

Inc. November, 1912, in Delaware. **Cap.** $10,000,000; $5 par; 1,740,000 shares issued. **Bonds:** Authorized and issued in 1917, joint mortgage bond for $1,000,000 with Alaska Consolidated Copper Co. at par, of which 1,137, 6% $500 10-year Gold Bonds convertible into stock of the Alaska Copper Corporation have been subscribed and paid for to March 1919. **Proceeds** expended in and about the enterprise. Guaranty Trust Co., New York, transfer agent; Columbia Trust Co., New York, registrar.

Company controls by ownership the majority of the capital stock of the **Alaska Consolidated Copper Co.** and holds an operating lease for 99 years from the latter company.

Property: 35 claims, 700 acres; eleven claims patented and balance in process of patent. Holdings comprise Nuggett group, situated about 18 miles from railroad station of Strelna, on the Copper River and North Western R. R., at an elevation of about 3,500′.

Geology: property is crossed by a series of parallel fault fissure veins, in amygdaloidal greenstone, containing mostly bornite and some chalcopyrite, in a siliceous limestone gangue. The several parallel veins dip 83° N. W. and strike N. 40° E. One vein system has been followed on the surface along its strike for 3,500′, by means of test pits sunk at frequent intervals.

Development: by about 5,500′ of workings to depth of 420′ failed to find commercial ore and all work was discontinued.

Production: since 1916 about 160 tons of hand-sorted concentrate. Entire equipment sold to **Hubbard-Elliott Copper Co.** for a one-fourth interest in that company.

ALASKA-DANO MINING CO. ALASKA

Address W. E. Nowell, or Chas. Ottesen, Juneau, Alaska.

Property: 30 claims on Funter Bay, Admiralty Island, developed by 250′ tunnel. The main orebody, cut August, 1921, is said to show free gold.

ALASKA DOME MINING CO. ALASKA

U. G. Myers, representative, Eagle, Alaska; Rufus Buck, mgr. Placer ground on Dome Creek, Eagle district. At last account, reported completion of dam, enlarging 6-mile ditch and laying of 2,000′ of pipe preparatory to hydraulicking.

ALASKA DOUGLAS GOLD MINING CO. ALASKA

Idle. **Office:** 259 Mills Bldg., San Francisco, Calif.

Officers: F. W. Bradley, pres.; F. A. Hammersmith, sec-treas.

Cap. $100,000; $1 par; all issued.

Property on Douglas Island, Alaska. Assessment work only being done.

ALASKA EBNER GOLD MINES CO. ALASKA

Successor, 1912, to California-Nevada Copper Co.

Probably dead; see Vol. XII. Owned, among other property and assets, 100,000 shares of **Ebner Gold Mines Co.**, entire capital stock of which is now owned by the **United States Smelting, Refining & Mining Co.**, which see.

ALASKA-ENDICOTT MINING & MILLING CO. ALASKA

Address: C. W. Mason, pres.; Juneau, Alaska, or 621 W. R. Rust Bldg., Tacoma, Wash.

Property: 16 claims, 11 surveyed for patent, near William Henry Bay, Juneau district, 8 miles W. of Point St. Mary, at the entrance to Berners Bay. Ore carries copper sulphide.

About 2,000′ of development work was done in 1920 and a dock and sawmill completed. Management plans installing a 4,500′ pipe line, a tram line to connect mine and mill, compressor plant, and erecting a 30-stamp mill.

ALASKA FREE GOLD MINING CO. **ALASKA**

Described Vol. XIV. Became a part of Kelly Mines Co. (q. v.) in 1920.

ALASKA GOLD BELT MINING CO. **ALASKA**

Address: 170 Broadway, New York. **Mine office:** Juneau, Alaska.

Officers: Sanford Makeever, pres.; A. B. Dodd, v. p.; M. M. Makeever, sec.; J. Makeever, treas.; preceding officers and D. C. Bard, directors; A. B. Dodd, supt.

Inc. 1915, in Alaska. **Cap.** $1,000,000; $1 par, none outstanding Feb. 3, 1916.

Property: 93 lode claims, 13 tunnel claims and 18 wharfage claims claims, total area, 2,500 acres, located 4 miles south of Juneau and adjoining property of the Alaska Gastineau on the southeast. They cover the extension of the Juneau gold belt and the ore is supposed to be of the same general character as that of the Alaska Gastineau.

Development started 1915 on the Lott-Nelson group in upper Sheep Creek basin. Roads were built, buildings constructed, and an air compressor put in, preparatory to driving a 3,000′ exploratory and development tunnel in Sheep Creek mountain to cut upper part of orebody. In July, 1916, this tunnel had been driven 2,880′ and $100,000 spent on the development work. Diamond drilling was done to cut the Gould & Curry orebody. April, 1916, this horizontal drill hole had reached a length of 1,575′, without results. No information reported since September, 1916.

ALASKA GOLD HILL MINING CO. **ALASKA**

Address: A. E. Rucker, Valdez, Alaska.

Property: a gold mine in the Black district on west side of Valdez bay. In October, 1919, it was reported that a rich shoot had been revealed in a new tunnel.

ALASKA GOLD MINES CO. **ALASKA**

Office: 25 Broad St., New York. Mine near Juneau, Alaska.

Officers: Chas. Hayden, pres.; D. C. Jackling, v. p.; C. W. Peters, v. p.; J. R. Dillon, treas.; A. J. Ronaghan, sec.; directors, Chas. Hayden, D. C. Jackling, J. R. Dillon, C. M. MacNeill, Sherwood Aldrich, F. H. Goff, E. A. Clark, B. L. Thane, mng. directors, F. L. Ames, and J. B. Hardon.

Inc. Aug. 1912, in Maine. A holding company, owning $11,749,850 of the $12,000,000 capital stock, and $3,269,000 of the $3,500,000 bonds of the **Alaska Gastineau Mining** Co. Property is described under title of **Alaska Gastineau Mining Co.**

Cap. $7,500,000, increased Jan., 1915, to $10,000,000; $10 par, outstanding $7,500,060. Of the unissued stock, $999,940 is reserved for conversion of 10-year, 6% debentures. Transfer agents, Guaranty Trust Co., New York, and National Shawmut Bank, Boston. Registrars: Bankers Trust Co., New York, and First National Bank, Boston. Listed on the New York and Boston Stock Exchanges.

181,500 shares sold on N. Y. Stock Exchange during 1920, and the range was $2⅝ in March to $5⅛ in December; in 1921 to June, $1½ to $5⅛. The price in 1915 was $40.

Sales on N. Y. Stock Exchange during 1920 were 197,000 con. deb., 6s due 1925, with range of $11 in May to $21½ in November, and 112,000 of Series B., due 1926, with range of $10 in July to $20⅛ in November; in 1921 to June Series A ranged from $14 to $19¾ and Series B, $13½ to 19¾.

Bonded debt: $2,999,800, consists of $1,500,000 10-year, 6% convertible gold debentures, series A; dated March 1, 1915; due March 1, 1925; int. M. & S. 1, at Guaranty Trust Co., New York, Trustee, and $1,500,000 10-year 6% convertible gold debentures, Series B; dated March 1, 1916, due March 1, 1926: Coupon, $100, $500 and $1,000; principal may be registered. Authorized, $1,500,000. These bonds were sold for purpose of

providing funds for increasing the mining and milling operations of the Alaska Gastineau Mng. Co. Convertible at any time into stock of the company at $30 per share. Subject to call as a whole, or in part, at 110 and interest at any time on, or after 3 years from their date. Company agrees that it will not, while any of these debentures are outstanding, mortgage or otherwise encumber any of its assets. Company is not, however, prohibited from issuing other deben ures similar to series A and series B, at any time and to any amount, provided that said debentures shall not be given priority over series A, and series B, debentures. Normal income tax deducted from interest.

A comparative consolidated balance sheet of Alaska Gold and Alaska Gastineau shows the following, years ending Dec. 31:

Assets:	1920	1919	1918
Property	$14,371,480	$14,371,120	$14,370,921
Development, construction, plant	7,884,928	7,985,863	8,041,080
Current	714,015	859,914	692,476
Deferred charges to operation	141,403	319,252	481,420
Total assets	$23,111,826	$23,536,151	$23,585,897
Liabilities:			
Alaska Gold Mines Co.:			
Capital stock issued	$7,500,060	$7,500,060	$7,500,060
Debenture bonds A and B	2,999,800	2,999,800	2,999,800
Alaska Gastineau Mining Co.:			
Capital stock held by public	250,150	250,850	250,150
First mortgage bonds	231,000	231,000	231,000
Current	619,143	740,878	498,797
Deferred liabilities (interest accrued, etc.)	709,845	515,865	322,005
Reserves for depreciation and insurance	1,283,318	966,896	642,605
Surplus	9,518,510	10,331,500	11,141,480
Total liabilities	$23,111,826	$23,536,151	$23,585,897

Notes payable by Alaska Gold were reduced from $650,000 to $500,000 in 1917 and to $400,000 in 1918, but were $575,000 in 1919, and $475,000 in 1920. Interest due March 1, 1918, on the A and B debenture bonds was not paid, and all subsequent payments have been in default.

Comparative Consolidated Profit and Loss Account, years ending Dec. 31.

	1920	1919	1918
Revenue	$1,487,576	$1,474,490	$1,136,223
Expenditure	1,762,771	1,753,119	1,233,168
Profit or loss	—275,195	—278,628	—96,945
Sundry income	2,857	+5,231	—19,621
Operating profit or loss	—272,338	—273,397	—116,565
Interest paid and accrued	229,232	225,059	219,685
Final profit or loss	—501,570	—498,457	—336,250

ALASKA GASTINEAU MINING CO.

Operating company for **Alaska Gold Mines Co.**

Address: Thane, Alaska

Officials: G. T. Jackson, mgr.; D. J. Argall, mine supt.; Fred Hodges, mill supt.; W. T. Tolch, chief engineer; Wm. Carlberg, railroad supt. E. M. Gastonguay, chief electrician; H. E. Biggs, auditor.

Inc. Jan. 14, 1911, in New York. **Cap.** authorized and outstanding

$12,000,000; $5 par. Is controlled by the Alaska Gold Mines Co., which owns $11,749,850 of the outstanding stock.

Bonded debt: $3,500,000 (entire issue) first gold 6%; dated Feb. 1, 1911, due Feb. 1, 1931. The Alaska Gold Mines Co. owns $3,269,000 of the issue.

Properties: in the vicinity of Juneau, Alaska, in what is known as the Juneau Gold Belt, comprise a net area of 2,166 acres, consisting of 1,672 acres of lodes, 219 acres of placers, and 275 acres of mill sites and homesteads. The company owns a 310-acre mill site near the mouth of Sheep creek, on the Gastineau channel. In addition to the above the company owns and controls lands, reservoir sites, power plant sites and rights-of-way on Salmon creek, emptying into Gastineau channel, in connection with its principal water power development; and also on Annex creek and Carlson creek, streams emptying into the Taku inlet about 10 miles east of the mill, and on Granite creek, Gold creek and Lurvey creek. The property of the Alaska Juneau Gold Mng. Co. adjoins the Alaska Gastineau on the west.

Mining costs are discussed in Bull. 153, Sept. 1919, of the A. I. M. & M. E. The average cost of underground work and delivering ore to the mill was 47.859 cents per ton, representing 6,533,873 tons in 4 years; in 1919 this cost was 44c. and in 1920, 46c.

The recovered value per ton was remarkable in its percentage but the amount was much less than expected.

In 1915 the estimate of fully developed, partly developed, and probable ore, was from 75,000,000 to 100,000,000 tons having a recoverable value of $1.50 per ton. Allen H. Rogers reported in 1916, that tonnage developed and partly developed, amounting to 5,500,000 tons would average about $1.45 gross, and that after the newer areas are developed and contribute their proportion of milling ore, the mine should be able to supply the maximum capacity (10,000 tons) with ore that would yield a profit of 45 to 50c. per ton.

The mill was designed to treat 1,500 tons daily in each of its 4 sections, but after operations started it was demonstrated that the mill would handle from 10,000 to 12,000 tons of ore per day.

Production: the first ore was run through the mill Feb. 15, 1915. Towards the end of the year a daily capacity of 6,000 tons was reached, but the grade of ore falling for a time, this tonnage was reduced to 4,000 tons daily, but again increased to average 6,169 tons in 1919 and 5,829 tons in 1920.

Year	Tons Milled	Gross Value	Tails	Extraction %	Value Recovered	Oper. Exp. less Misc. Inc.	Profit or Loss
1920.....	2,133,458	$0.875	$0.178	79.66	$0.697	$0.820	—$0.123
1919.....	2,251,658	0.826	0.171	79.34	0.655	0.780	—0.125

It was officially announced that it was better to operate the property at a loss than to close down and maintain the equipment in good condition, but that in a very short time, company would discontinue operations as a mining industry. Mine was shut down June, 1921, and property partly dismantled. It is planned to convert as much of plant and equipment as may be adaptable to the making of wood pulp, etc., Company has disposed of such movable equipment as cannot so be used. A bondholder's view of the whole affair is that by R. B. Brinsmade in the Mng. & Sci. Press of Jan. 29, 1921, and a very complete description of the enterprise is contained in Vol. XIV of The Mines Handbook.

This is the unfortunate end of a great gold mining promotion.

ALASKA HERCULES MINING CO. **ALASKA**

Dead. See The Mines Handbook, Vol. XIV.

ALASKA HOMESTAKE MINING CO. **ALASKA**

Address. Edmund Smith, American Bank Bldg., Seattle, Wash.

Officers: Edw. Eckern, pres.-mgr.; S. A. Pepper, v. p.; Edmund Smith, sec., with L. L. Bair, directors; C. P. Topliff, supt.

Inc. May 1916, in Washington. **Cap.** $1,000,000; $1 par; 800,000 shares outstanding.

Property: 2 claims, about 40 acres, at Port Wells, Prince William Sound, said to show shoots of gold-silver-lead ore, 12"-36" wide, in a contact deposit in granite, averaging $50 per ton. Developed to depth of 250' by 300' tunnel. About 7,000 tons of ore reported blocked out.

Equipment: includes gas hoist, 20-ton concentrating plant and compressor. About $25,000 expended in development work to date. Mill, started Jan., 1919, was stated to be producing concentrates worth $10,000 per month. Values practically all in free gold.

ALASKA INDUSTRIAL CO. **ALASKA**

Office: 115 Broadway, New York. **Mine** office: Sulzer, Prince of Wales Island, Alaska.

Officers. J. H. Shockley, pres.; S. I. Frankenstein, v. p.; Samuel T. Grossman, sec.; S. B. Thomas, treas.

Inc. in Washington. **Cap.** $1,000,000; $1 par. Annual meeting, second Saturday in January.

Property: The Jumbo group of 35 claims, patented, area 700 acres, also 60 acres in mill sites and miscellaneous properties. Main holdings are near the head of Het a inlet, 2 miles from the beach and 1,000-3,000' above tidewater.

The Jumbo mine has a mineralized metamorphic contact zone from 500 to 2,000' in width, with granite foot and green stone hanging, ore fading into the lime. Property shows 7 irregular lenses of chalcopyrite, and some bornite, in a gangue of garnet epidote and other contact minerals. Shipping ore, averages 4 to 5% copper, with $2.50 gold and silver per ton. A very large tonnage of ore averaging a little less than 2% in copper, and about $2.50 in gold and silver, has been developed, which can be profitably mined when a concentrator with a flotation unit, is installed.

Development: the mine has over 3 miles of underground workings; greatest depth of workings is between 600' and 700'. The tunnels are in series, 100' apart vertically, connected by winzes. The ore stands well, requiring no timbering.

Equipment: includes 200-h. p. electric hoist and duplex air compressor, electrically driven. Buildings include a 35x40' warehouse, 30x35' powerhouse, smith, store, office, dwellings, bunkhouses and various smaller buildings.

The property carries an available water power, rated at 3,000 h. p., and this has been partially developed by a 36" Pelton wheel, taking water from Beaver creek and actuating a 6-k. w. generator, and a 16" Pelton wheel taking water under a 330' head from Jumbo creek, through a 10" pipe line of 3,000' length, this actuating a 55-k. w. 3-phase 2,300-volt 60-cycle generator, current being stepped down to 220 volts for lighting and power. Mine is equipped with electric fans, blowers and Temple-Ingersoll electric drills.

A 9,000' Riblet aerial tram has 14 wooden towers with 22 half-ton buckets, operated by gravity with a capacity of 10 tons per hour. The tram has 200-ton ore bins at the mine and 4,000-ton storage bins at tidewater, where there is a 200' wharf.

Production: began 1908. All profits have gone back into the property for development and permanent improvements. Shipped about 1,000 tons monthly to the Tacoma smelter in 1919. Mine closed down owing to death of Chas. A. Sulzer, mgr., but is to be reopened as soon as the

ore can be sold. The Jumbo Copper Mines are considered valuable, but need further development and a concentrating mill to become commercially profitable.

ALASKA JUNEAU GOLD MNG. CO. **ALASKA**

Office: 1022 Crocker Bldg., San Francisco. **Mine office:** Juneau Alaska.

Officers: F. W. Bradley, pres.; Wellington Gregg, and A. B. Davis, v. ps.; G. D. Abbott, sec.-treas.; J. S. Wallace, asst. sec-treas. **Directors:** A. B. Davis, C. A. Norris, and F. A. Hammersmith. P. R. Bradley, gen. supt; John Richards, mine supt.

Inc. Feb. 17, 1897, in West Va. **Cap.** $150,000, consisting of 1,500,000 shares, increased April, 1915, to $15,000,000; $10 par; outstanding, 1,400,000 shares. 241,300 shares sold on N. Y. Stock Exchange during 1920, with range of $3 in March to 75c in December; range in 1921 to June was $1.75 to $1.

Bonds authorized: $3,500,000, 7%, dated March 15, 1919, payable same date in 1929, unless redeemed at option of company prior to maturity at 110% of face value thereof with accrued interest. Denominations are $1,000 and $500. On April 5, 1921, $1,774,300 were outstanding. Sinking fund to be provided for purchase of outstanding bonds. This issue was for paying indebtedness and re-modeling of the mill. There is also outstanding a 6% guaranteed note for $500,000.

Registrar, Metropolitan Trust Co., New York; transfer agent, Central Union Trust Co., New York. Listed on the New York Stock Exchange. Annual meeting first Tuesday after first Monday in April.

General Balance Sheet: years ending Dec. 31—

Assets—

Year	Property	Devel.	Const. & Equip.	Cash	Other Current	P. & L. Surplus	Total
1920	$9,638,363	$1,962,050	$3,318,711	$1,694	$978,637	$563,624	$16,463,079
1919	9,625,240	1,873,214	3,080,795	345	920,599	—563,624	16,063,816
1918	9,617,790	1,552,925	2,945,856	6,628	878,487	—563,625	15,565,311
1917	9,612,246	1,201,304	2,913,254	22,561	1,038,752	+563,625	15,251,742
1916	9,645,489	994,240	2,180,760	361,289	330,318	563,625	14,075,723

Liabilities—

	Capital Stock	Notes Payable	Accounts Payable	Bonds	Deprec. Reserve	Total
1920	$14,000,000	$500,000	$307,883	$1,639,600	$15,595	$16,463,079
1919	14,000,000	500,000	200,820	1,352,800	10,196	16,063,816
1918	14,000,000	1,427,500	131,235	.....	6,576	15,565,311
1917	14,000,000	1,100,000	149,172	.....	2,570	15,251,742
1916	14,000,000	.....	75,723	.....	.....	14,075,723

Profit and loss—

Year	Total Income	Operating Expense	Interest General, Etc.	Loss
1920	$801,152	$710,631	$157,972	$67,451
1919	562,549	677,923	138,606	253,980
1918	460,322	621,901	163,921	325,500
1917	490,049	624,255	86,367	220,573
1916	149,744	230,474	68,367	147,456

On April 5, 1921, total funded and secured indebtedness was $2,274,300, including $1,774,300 of bonds of the $3,500,000 issue.

Property: consists of 50 patented claims; 29 claims surveyed for patent; 54 claims held by location, 2 patented placer claims, 1 placer claim held by location; 9 patented mill sites; 15 mill sites surveyed for patent; 17 water rights held by location, with a total capacity of 94,000 miner's inches; ¼ interest in water rights on the Speel river, with a

total capacity of 295,000 miner's inches; also 22 lots in the town of Juneau, a ¼ interest in 9 lode claims, 2 placer claims, and 4 mill sites.

The mineralized area adjoins the property of the Alaska Gastineau Mng. Co. on the west and that of the Ebner Gold Mines Co. on the east, one mile inland from Gastineau channel. Company also owns a large tract of land, one along Gold creek and the other farther south; on the forused as a mill site, connected with the mineral area by two narrow strips of land, one along Gold creek and the other farther south; on the former, a long transportation tunnel connects the mine with mill.

Geology: the property covers the outcrop of the mineralized zone, for over a mile in length. The lode has a width between walls of 900' and dips 70° east. The orebody is composed of slate with gold bearing quartz, irregularly distributed through it in the form of veinlets, stringers and masses. Meta-gabbro dikes, intrusive into the vein, carry gold bearing quartz similarly distributed; the quartz contains pyrite, pyrrhotite, galena and a little sphalerite as well as gold. The foot-wall is green-stone, the hanging wall schist.

Deep development was begun 1910, when a main working crosscut, 8'x10', called the Gold Creek tunnel, was commenced at an elevation of 425' above sea-level, starting from a point immediately behind the town of Juneau. At 6,540' from the portal, an 800' inclined raise in the hanging-wall was put through to surface. The true width of the vein is 500' with average assay value close to $2 per ton.

Ore extracted from the Gold Creek tunnel and the intermediate level opened from the incline raise at an elevation of 495' above the tunnel was milled in the new 40-stamp mill on Gastineau channel. A total of 50,000 tons milled up to Dec 1, 1914, averaged $1.36 per ton, the low value being due to the dilution of ore with waste attendant upon the opening of the two levels preparatory to stoping.

The payable ore in the vein occurs as quartz stringers and so far as developed in the Alaska Juneau property, has averaged about $6 in gold per ton, in addition to some lead and silver; it can be sorted out from the enclosing vein-matter, because the quartz is much more friable than the vein matter and thus lends itself to a partial mechanical separation, both when mined and when subjected to coarse crushing in the mill.

The assay-value of all development and preparatory mining work 'muck' samples ,(10,017) taken between January, 1913 and December, 1920, averaged $1.09 per ton. Including 409 moiled samples taken since 1912 the average becomes $1.11.

The mine development work as outlined was designed to give a daily tonnage of not less than 8,000 tons, making available for caving and extracting 75,000,000 tons of ore in one section of the vein. All tunnels are double-tracked and so equipped that 8,000 tons of ore daily can be transported from the mine to the mill.

During the years 1911 to 1920, mine development cost $1,962,050, opening 101,738' of workings.

Briefly, the milling plant included: two revolving tipples, 2,000-ton coarse-ore bin, four 60" apron-feeders, four 8x5' grizzlies, with 8" openings, four No. 9 Gates gyratory crushers, four 30" conveyors, 4 distributing boxes, two 36" shuttle conveyors, twenty-four 30" apron feeders, twelve 8x6' ball mills, 12 revolving screens, 12 V-shaped tanks, 12 mechanical distributors, 48 roughing tables, 24 classifiers, 12 shovel wheels, twelve 6x12' tube-mills, 24 settling tanks, 24 mechanical distributors, 96 finishing tables, and 12 Wilfley tables. There is a retreatment department containing two 5x5' ball-pebble mills, pumps, classifiers and tables. Power plant contains four 825-h. p. Stirling water-tube boilers, with economizers, and forced draft apparatus, one 9-stage Curtis 6,000-k. w. turbo-generator, condensers and auxiliaries. Electric installations at the property are described in the "Salt Lake Mining Re-

view" of Nov. 30, 1919, and "Mng. and Scientific Press" of Feb. 14 1920, by F. Seward Rice.

The railway between mine and mill cost $167,144. To the end of 1920 construction and equipment had cost $3,271,088.

In May, 1917, the daily capacity was only 1,200 tons, and 3,274 in December, the highest being 3,833 in November, less than half that expected. The cost of milling was 53c. per ton during 1917, and all costs 80c. The recovery from 87c. ore was 75%, so that a loss of 15c. per ton was recorded.

During 1918 there was spent $104,675 on the new mill, $30,508 on the power plant, and $10,806 on the stamp-mill. In 1920, total new construction cost $190,292, of which mill used $164,933.

The principal changes during 1919 were a rearrangement of mill so that ⅓ of the material from the mine is sorted out as waste; the converted ball-mills are fed with 2" ore, only consisting of the most friable portion; and the mills are run in close circuit with a return of the oversize. Eventually, of the 16,000 tons delivered daily to the mill, ⅓ is to be rejected as waste. The present rejects carry less gold than the mill trailings.

Production:

Year	Ore milled, tons	Ore rejected, tons	Gold assay p. t. of rock	% Gold Recovery	Value of gold, silver and lead	Cost per milled ton
1920	637,321	305,549	$1.09	71.56	$791,390	$1.19
1919	616,302	76,593	1.00	72.00	542,714	1.14
1918	574,285	16,230	0.92	79.35	459,445	1.13
1917	672,424	.....	0.88	72.72	460,666	....
1916	180,113	.....	0.94	68.08	121,379	2.74
1914-15	239,918	2,410	1.45	71.72	261,326	2.85
1893-1913	330,278	176,976	1.71	81.28	707,730	....
Total	3,250,641	577,758	$1.11	74.77	$3,344,650	

The mill started making profits in December, 1919, and by February, 1920, the net return was $10,000. Officially stated (March 22, 1920) that 2 years' time and $850,000 would be required to bring property to a contemplated capacity of 16,000 tons. One year later, a 7,000-ton capacity was in sight, but further increase was to be suspended until indebtedness had been substantially decreased. Present estimates call for $1,000,000 in order to develop transportation facilities for handling 16,000 tons of rock per day, or 500,000 tons per month.

Alaska Juneau may now be said to be turning the corner although profits will not mean dividends until the indebtedness is repaid. The indomitable courage and technical skill of F. W. Bradley, will bring the enterprise to a successful point.

ALASKA METALS CO. **ALASKA**

Idle. **Mine office:** Bruce, Prince of Wales Island, Alaska. Harry Corbin, supt., at last accounts. Property on the west coast of Prince of Wales Island, formerly known as the Corbin mine, and the Copper Mountain mine. No recent returns secured. Slightly developed.

ALASKA MEXICAN GOLD MINING COMPANY

See **Alaska Treadwell Gold Mining Co.**

ALASKA MINES CORPORATION **ALASKA**

Norman C. Stines, receiver, Nome, Alaska.

Office: 71 Broadway, New York City.

Officers: M. W. Newton, pres. E. E.Powell, v. p.; H. S. Newman, sec.-treas., Louis Eisenlohr, C. S. Funk, J. T. Howe and T. Howe, directors. John H. Miles, mgr.

Inc. July 9, 1916, in Virginia. **Cap.** $10,000,000; $1 par; $6,000,000

outstanding. Transfer office, Empire Trust Co., New York; registrar, Bank of America, New York. Stock listed on New York and Boston curbs.

Property: the dredging rights on 3,000 acres of placer claims at Nome, formerly owned by the **Anvil Hydraulic & Dredging Co., Alaska Dredging Co., Nome Mining Co., and Wonder Dredging Co.** Drilling revealed 350,000,000 cu. yd. of gravel. The Nome M. Co. recovered 39 cents a yard. Operated one dredge in 1919.

Also controls the Schlosser mine in the Prince William Sound region now being developed. In 1920, the main adit was driven 1,450′; and selected ore was shipped to the Tacoma smelter.

ALASKA PEERLESS MINING CO. **ALASKA**

Property: the Basin Queen lode (Yellow Jacket group), at Windham bay, Juneau district, is developed by 400′ tunnel and 300′ of crosscuts, said to expose a belt of highly mineralized talcose schist, 70′ in width. Only assessment work done in 1920, but a long crosscut tunnel, 630′ below present workings, is contemplated.

ALASKA PITTSBURGH GOLD MINING CO. **ALASKA.**

Office: 702 Arott Bldg., Pittsburgh, Pa. **Mine office:** Valdez Alaska.

Officers: B. C. Wiltse, pres.; A. L. Miller v. p.; O. A. MacVay, sec.; Wilber Galbraith, treas. with V. H. Chlebus and W. E. Flick, directors.

Inc. in Delaware. **Cap.** $1,000,000; $1 par; 425,000 outstanding. Annual meeting, first Tuesday in March.

Property: the Dailey-Bennett mine, 8 claims, 160 acres, on Bettles Bay, Prince William Sound, Alaska, Ore, carrying gold and silver, occurs in a porphyry dike, cutting though slate. Course is northerly, with dip of 20°. The orebody has been opened up for about 5,000′ at surface, showing galena, sphalerite and arsenopyrite, also free gold. Mill tests reported to average $13.59 p. t. Developed by 400′ tunnel. Ore reserves estimated by management at 18,000 tons. Probably idle.

ALASKA STANDARD COPPER MINING CO. **ALASKA**

Idle.

Former office: suite 921, 115 Broadway, New York, M. L. Hewitt, pres.; John L. Steele, mgr.

Inc. in South Dakota. Cap. $2,000,000; $1 par; 700,000 issued. Security Transfer & Registrar Co., N. Y., transfer agents and registrar.

Property: 7 patented claims and a millsite, 150 acres, said to carry a 6′ vein of copper-gold-silver ore.

Development: by 3 tunnels to depth of 430′, reported to have proved 300,000 tons of 4% and 10,127 tons of 8% copper ore. Is a Marcus L. Hewitt promotion. One thousand shares were sold at auction in New York on July 16, 1919, for $23 the lot.

ALASKA SULPHUR CO. **ALASKA**

Address: 8 So. Dearborn St., Chicago, Ill.

Officers: W. W. Johnston, pres.; Otto L. Erickson, v. p.; Thos. W. Landswick, sec.-treas.

Inc. in Delaware, **Cap.,** $500,000; $10 par.

Company owns a large sulphur deposit on Akun Island, equipped with an aerial tramway and refining plant. Operations restricted 1919-21 by lack of regular steamship service.

ALASKA THREE METALS MINING CO., INC. **ALASKA**

Office: 328 Lyon Bldg., Seattle, Wash. **Mine office:** Anchorage, Alaska.

Officers and directors: Fred P. Davy, pres.-mgr.; Joe Stewart, v. p.; Chester F. Lee, sec.-treas.

Inc. Nov., 1919, in Washington. **Cap.,** $1,000,000; $1 par; 86,026 shares outstanding. Transfer office, 245 Main St., Buffalo, N. Y. Annual meeting 2nd Friday in May.

Property: 4 claims, 80 acres, in Pangar mountain, at head of North Fork Kashurtna river, Knik district. Ore occurs in a fissure vein in granite. Drifting on vein begun August, 1920.

ALASKA TIDEWATER COPPER CO. **ALASKA**

Dead. Fully described in Volume XIV. **Office:** 602 Alaska Bldg., Seattle, Wash.

ALASKA TREADWELL GOLD MINING COMPANY
ALASKA MEXICAN GOLD MINING COMPANY, } **ALASKA**
ALASKA UNITED GOLD MINING COMPANY,

The affairs of these three Douglas island companies are so interlocked that to be logical, they must be discussed together, particularly so since April 21. 1917, when the Treadwell, 700, and Mexican mines were flooded by the sea, leaving only the Ready Bullion mine intact. This disaster is described in Vol. XIII. in the account of the Alaska Treadwell mine. Financial particulars of the three companies are given under the respective titles, but mine development will be considered as a whole. The 1918. report of F. W. Bradley, president of the three companies, says:

"Future developments in the Ready Bullion mine will determine the fate of the others. It is 3,600′ east of the flooded workings, with a direct connection with them on its 1,350′ level, but was saved from flooding by a strong concrete bulkhead. Unlike the other mines of the group, the Ready Bullion workings extend beyond the shore-line and are under the deep water of Gastineau channel. In order to remove all risks it was decided to fill with waste the cavities left in the mine as the broken ore and caved pillars were drawn and hoisted for the mill. In order to secure waste for this purpose, an Alaska Juneau type of caving stope was cut above the 450′ level, 600′ inland from the shore line. It cost $120,000 to prepare for this waste filling, and filling will continue at a cost of 15c per ton of waste. The shaft was sunk and a cross-cut started for the 2,800′ level. Development continues at 2,600′, the stopable area being 29,025 sq. ft., averaging $2.59 per ton. This compares fairly well with the 14 levels above it. Ore reserves in the Ready Bullion total 2,300,000 tons to the 2,800′ level. Of these, 1,400,000 tons will be recovered, giving 5 years' supply to the mill, or 3 years with the Mexican mill. If the 2,800′ level finds an orebody of profitable size and value, the shaft will be deepened to 3,000 and 3,400′. If this last level should also open ore, it will be driven westerly along the ore-channel to prospect any continuation in depth of the Treadwell-700-Mexican lodes. If these were of sufficient value, the high tides of Gastineau channel would be dammed off from the break on surface, and the workings pumped out. This may be in 5 to 10 years' time. The combination shaft is in solid ground, and could be used for future operations in the Treadwell-700-Mexican orebodies."

In an effort to secure new mining property tributary to Douglas island, many prospects were examined. Finally a molybdenum deposit was taken up at Shakan, Prince of Wales island, 180 miles by water from Treadwell. Reserves were estimated at 100,000 tons of 1.58% and 6,270 tons of 2.28% MoS_2 ore. During 1919, further search was made for molybdenum, as well as chrome, tungsten and nickel-bearing properties. In 1920, the Douglas island companies concentrated their local prospecting on gold and pla inum properties at or near Juneau.

The three hydro-electric plants on Douglas island have been tied-in with the steam plant of the Alaskan Juneau company on the mainland opposite.

Dismantling and marketing saleable equipment continues, the quantity sold to June 30, 1918, being $294,398, with $209,950 awaiting sale. During 1920, equipment salvaged amounted to $41,831. All three companies benefit from this salvaging.

The Exploration Co., Ltd., is the London agent for the Douglas island companies. See below under **Alaska Treadwell** for activities of the Associated companies.

The following table gives the results of the interlocked operations of the three companies during 1917 and the first half of 1918:

	1917 (full)			1918 (half)		
	Mexican	Treadwell	United	Mexican	Treadwell	United
Receipts	$212,924	$2,370,800	$771,554	$35,033	$441,719	$190,499
Expenditures	149,680	1,999,179	861,789	37,934	418,006	284,622
Profits	63,243	371,621	.....	.....	23,712	.....
Loss	.....	.....	90,235	2,900	.....	94,123

	1919			1920		
	Mexican	Treadwell	United	Mexican	Treadwell	United
Receipts	$22,345	$141,181	$4,893	$33,884	$137,154	$101,202
Expenditures	43,596	123,715	83,811	41,545	130,333	40,315
Profit	.....	17,466	.....	.....	6,821	60,887
Loss	21,251	.....	78,918	7,661	.....	.....
Current assets	185,605	2,112,231	104,769	171,160	2,120,048	105,209
Current liabilities	7,704	117,283	465,233	1,269	96,491	403,890

Alaska Treadwell Gold Mining Co.

Address: Mills Bldg., San Francisco, Cal. **Mine office:** Douglas Island, Alaska. **Officers:** F. W. Bradley, pres.; A. B. Davis, v. p.; F. A. Hammersmith, sec.-treas; with E. W. Hopkins, H .S. King, directors; P. R. Bradley, cons. eng.; L. H. Metzgar, asst. supt.

Inc. June 1, 1890, to take over the property of the Paris mine on Douglas island, where operations had been conducted since 1882. Purchase price was $5,000,000 in fully paid shares. **Cap.** $5,000,000; shares $25. Metropolitan Trust Co., New York, registrar and transfer agent.

Comparative General Balance Sheet:

Assets—

	Property & Plant	Cash	Other Current	Supplies	Other Assets*	Total
1918 (June 30)	$3,531,054	$275,695	$1,347,162	$538,039	$7,886,262	$13,578,212
1916	3,942,947	245,023	956,034	789,012	8,439,607	14,372,623
1915	3,775,173	365,365	603,961	565,337	308,618	5,618,454
1914	3,685,306	295,587	558,053	599,471	309,965	5,448,382

* Ore subject to depletion.

Liabilities—

	Capital Stock	Accounts Pay, Etc.	Draft Account	P. & L. Account	Ore Surplus	Total
1918 (June 30)	$5,000,000	$280,365	$4,239	$411,575	$7,886,262	$13,578,212
1916	5,000,000	474,224	9,885	498,209	.....	14,372,623
1915	5,000,000	524,926	3,438	90,090	.....	5,618,454
1914	5,000,000	394,520	5,182	48,680	.....	5,448,382

Comparative Income Account:

	Earnings Gross	Net	Other Income	Construc. & Repair	Divid's	Deprec.	Balance
1916.	$1,604,737	$658,119	$90,090	.....	$250,000	.....	$498,208
1915.	1,828,723	706,610	177,399	$24,822	650,000	$167,777	41,410
1914.	2,367,562	1,314,933	67,813	31,343	1,100,000	250,953	450
1913.	2,358,423	1,286,498	62,592	38,599	1,000,000	487,261	176,770†

† Deficit.

Dividends to Jan., 1917, aggregate $78.93 per share.

For later years, see joint tables.

Property: The Treadwell group of mines, consisting of the Alaska Treadwell, the Alaska Mexican and the Alaska United, which operates the

700′ mine and the Ready Bullion, are under one management and are located on the east side of Douglas island near the shore of Gastineau Channel. The A. T. property is farthest west. Geological conditions are the same in the mines of the 3 companies. Hanging wall of Treadwell is 1,000′ distant from present shore line, while that of the Ready Bullion lies for the most part under tidal water. Though several orebodies have been found, the mines are all situated on the same lode and ore is practically of identical origin throughout. In the Alaska Treadwell, 700′ and Alaska Mexican mines, the lode has been developed continuously for 3,500′. Between the Mexican and Ready Bullion mines is an undeveloped interval of 2,500′. Width of orebodies is from 300′ to 400′.

Geology: the orebodies consist mainly of mineralized albite-diorite occurring in the form of intrusive dikes in black slate, whose structure they closely follow. They strike N. W.-S. E. and dip 50 degrees toward the N. E. The slates are metamorphosed shale. The ore-bearing dikes belong to a series of intrusives that appear interruptedly along the strike for a distance of about 3 miles in a zone 3,000′ wide. Next to the shore of Gastineau Channel the border is defined by a heavy bed of greenstone that forms the hanging wall of both the orebodies and the intrusion zone. Many of the dikes of albite-diorite at a distance from the hanging wall have been greatly altered and impregnated with pyrite and no workable orebodies have yet been found in them. The ore consists mainly of rock impregnated with sulphides, principally pyrite, and in part shattered and filled by veins of calcite and quartz, which also contain sulphides. The ore-bearing dikes are considerably mineralized throughout, and often the whole mass can be mined. The characteristics of the deposit are believed to indicate that it was formed by ascending waters, with little, or no subsequent secondary concentration. If this is correct there is little doubt that the ore will continue to a much greater depth than has been reached, and the limit of mining will probably depend finally upon increased costs, attendant upon operating at great depth.

The production, condition of the property, its history, development, equipment, etc., are fully described in Vol. XIII of this work. The mine has been flooded since April 1, 1917, and is practically a total loss.

Alaska Treadwell has a 60% interest in the joint utilities and outside ventures undertaken by the Douglas island group.

Associated Companies: Bunker Hill and Sullivan Mng. & Conc. Co., of Idaho, together with Alaska Mexican and Alaska United, has joined Alaska Treadwell in taking over (1920) working options on 3 claim-groups in Alaska to be operated on joint account by the latter. Proportionate interests are Bunker Hill, 50%; Treadwell, 30%; Mexican and United, 10% each. Livingston Wernecke is in charge.

Property: the Whelan, Pearson-Strand and McGowan groups, of 13, 6 and 13 claims, respectively, in the Nixon Hills district, between Nixon Fork and Kuskokwin rivers, 36 miles E. of McGrath, a U. S. Government wireless station. These groups adjoin and cover a limestone granite contact for 13,500′; gold-silver-copper ore, assaying $20 to $60 gold; 0.9 to 2.5 oz. silver and 2 to 8% copper, occurs in cross fractures and pockets. Development is by shaft and on the Whelan 6,000 tons of ore are available. Extensions in 1920 amounted to 525′. A 10-stamp mill is to be installed.

An option on silver-lead claims on Keno Hill, Mayo district, Yukon, has also been secured.

Alaska Mexican Gold Mining Co.

Address: Mills Bldg., San Francisco, **Calif. Mine office:** Douglas island, Alaska. Under same management as the Alaska Treadwell, which see.

Inc. April, 1892, in Minnesota. **Cap.** $1,000,000 in 200,000 shares, $5 par; 120,000 of which went to pay for the Alaska Mexican Gold Mine, and 60,000 were issued to the public by the Exploration Co., Ltd., of London. Annual meeting in May. Registration and Security Co. of San Francisco, registrars.

Comparative General Balance Sheet:

Assets—

Year	Property & Plant	Cash	Reserve Fund	Bullion Suspense	Accounts Rec., etc.	Ore Subject to Depletion	Total
1918 (June 30)	$606,459	$56,884	$93,909	.....	$188,873	$986,923	$1,933,049
1916.....	733,235	47,775	93,909	.....	143,798	.....	2,046,896
1915.....	674,195	5,175	93,909	15,315	146,332	.....	934,926
1914.....	785,692	6,955	93,909	20,532	12,298	.....	919,386

Liabilities—

Year	Capital Stock	Accounts Pay., etc.	P. & L. Account	Ore Surplus	Total
1918 (June 30)	....$900,000	$10,233	$35,893	$986,923	$1,933,049
1916	900,000	12,079	74,426	.....	2,046,896
1915	900,000	24,736	10,190	.....	934,926
1914	900,000	8,572	10,814	.....	919,386

Comparative Income Account:

	Total Income	Operating Constr'n, etc.	Net Profit	Divid's	Deprec.	Balance
1916	$330,654	$266,417	$64,236	.....	.. ..	$74,426
1915	401,761	302,284	99,477	$90,000	$10,101	10,190*
1914	513,318	343,298	170,020	144,000	25,451	10,814*
1913	496,007	324,210	171,797	180,000	21,552	10,213*

*Including balance from previous year.

For later years, see joint tables.

Property: Located on the east side of Douglas island, between the 700' claim of the Alaska United on the west and the Ready Bullion mine of that company on the east. For a general description see Alaska Treadwell.

On July 27, 1916, surface evidences of a hanging-wall subsidence near the Treadwell—700 Ft. Claim boundary became apparent, and to protect the Treadwell, 700 Ft., and Mexican mines, heavy drawing of reserves of caved and broken ore was stopped. In April, 1917, the Mexican, Treadwell and 700 Ft. mines were flooded and shut down indefinitely. For details see Vol. XIII. under Alaska Treadwell.

As the Mexican may not produce any more ore, its total output may be given from 1894 to 1917; 4,445,807 tons, averaging $2.61 per ton at cost of $1.67. Out of profits, $4,161,657, dividends absorbed $3,507,381, or $19.42 per $5 share.

In addition to its 20% interest in joint utilities, company has some interest in outside properties, such as the Shakan, etc. Otherwise inactive. See Vol. XIV for description of development, equipment etc.

Alaska United Gold Mining Co.

Address: Mills Bldg., San Francisco, Calif. Mine office: Douglas Island, Alaska. Under same management as the Alaska Treadwell.

Inc. Aug. 6, 1895. **Cap.** $1,000,000, shares $5 par, issued $901,000.

Comparative General Balance Sheet:

Assets—

	Property & Plant	Cash	Reserve Fund	Bullion Suspense	Accounts Rec.	Ore Subject to Depletion	Total
1918 (June 30)	$880,773	$9,129	$106,327	$....	$289,022	$2,141,206	$3,426 64
1916	910,120	7,991	201,810	4.296	28,921	2,654,222	3,807.36
1915	726,180	10,192	201,810	50,245	3,900	.....	992.32
1914	634,000	4,663	201,810	51,924	34,171	.....	926.57

Liabilities—

Year	Capital Stock	Accounts Pay., Etc.	P. &L. Account	Ore Surplus	Total
1918 (June 30)...	$901,000	$384,442	$	$2,141,206	$3,426,647
1916	901,000	243,236	8,902	2,654,222	3,807,361
1915	901,000	55,312	36,015	.....	992,327
1914	901,000	10,411	15,160	.....	926,572

Comparative Income Account:

	Total Income	Operating Constr'n,	Net Profit	Divid's	Deprec.	Balance
1916	$1,111,697	$1,094,749	$26,947	$54,060	.....	$8,902
1915	1,072,412	705,162	367,250	252,280	$94,115	20,855
1914.....	975,329	727,391	247,938	162.180	81.153	4,605
1913.....	1,054,018	668,953	385,065	414,460	30,050	59,445(d)

(d) Deficit.

Dividends to Jan. 1917, aggregate $11.35 per share.

For later years see joint tables.

Property: Located on the east side of Douglas island, includes the 700' mine, lying between the Alaska Treadwell and the Alaska Mexican properties, and the Ready Bullion mine east of the property adjoining the Mexican.

Recent production: (1) Ready Bullion mine, (2) 700-ft. Claim mine.

	Tons Crushed	Yield Free Gold	(1) Conc'trates Tons Treated	Yield	Total Yield p.Ton	Oper. Costs p.Ton	Oper. Profits p.Ton	Div, % (a)
1917-18	328,990	.....	....	$724,686	....	....	....	....
1916	286,078	$237,715	6,630	338,534	$2.11	$1.52	$0.59	6%
1915	252,154	272,274	5,621	249,638	2.07	1.31	0.76	28%
1914	233,100	282,036	5,700	252,370	2.29	1.47	0.82	18%
1913	222,992	268,444	5,651	242,947	2.29	1.45	0.84	46%
1912	216,454	317,970	6,128	300,188	2.85	1.50	1.35	36%
1911 (b)	223,663	278,034	5,461	241,248	2.32	1.71	0.61	9%
			(2)					
1917†								
1916.....	262,850	$180,603	5,342	$260,375	$1.73	$2.37	$0.64(c)	
1915.....	281,265	263,319	5,934	256,943	1.85	1.31	0.54	
1914.....	225,214	230,509	4,409	200,874	1.91	1.62	0.29	
1913.....	225,435	284,097	4,495	248,055	2.36	1.44	0.92	
1912.....	234,339	282,180	4,704	294,951	2.46	1.38	1.08	
1911.(b)....	224,968	284,430	4,477	244,193	2.35	1.56	9.79	

† Mine flooded since April.

(a) Total for both mines. (b) Dec. 16, 1910-Dec. 31, 1911.

(c) Loss due to heavy development charge.

Alaska United is the only mine now being operated on Douglas island. On April 21, the 700-Foot Claim, Treadwell, and Mexican mines were lost by flooding. The Ready Bullion mine is some distance away from these mines and escaped. From 1898 to 1917 the 700-Foot Claim yielded 2,400,868 tons of $2.05 ore, at a cost of $1.66 per ton, giving a profit of $946,259. The Ready Bullion produced 3,967,135 tons of $2.08 ore at a cost of $1.56 per ton, and total profit of $2,049,406. Of combined profits, $2,995,664, $2,045,270 was paid in dividends.

Early in 1920, after every effort to continue normal operations in the Ready Bullion at a profit had proved unsuccessful, President Bradley offered two courses of procedure, (a) to suspend operations and (b) to deplete or work out the mine as rapidly as possible. The second plan was adopted, and operations in 1920 showed a profit of $94,053.

Company has a 20% interest in undertakings of the Douglas island companies.

For a more complete description of the property, development, etc., see Vols. XIII and XIV.

ALASKA UNITED COPPER EXPLORATION CO. ALASKA

Mail returned from former address, 551 Coleman Block, Seattle, Wash.

Mine office: Dan Creek, Copper River district, Alaska.

Officers: L. C. Dillman, pres.-gen. mgr.; Jas A. Munday, v. p.; E. V. Dillman, sec.; W. A. Mears, treas. with A. Ingraham, W. Hughes, Frank L. Huston, Jas. J. O'Keane and Thos. M. Dunn, trustees; C. C. Jones, cons. engr.

Inc. Nov. 14, 1906, in Washington. **Cap.** $12,500,000. $1 par. Debentures, $150,000 6% bonds. Annual meeting, first Monday in January.

The company is primarily a holding company, prospecting and developing properties in its possession for sale to other parties.

Company controls the **Alaska Westover Copper Co.**, which see.

ALASKA UNITED GOLD MINING CO. ALASKA

See Alaska Treadwell Gold Mng. Co.

ALASKA WESTOVER COPPER CO. ALASKA

Controlled by **Alaska United Copper Expl. Co. Former office:** Coleman Block, Seattle, Wash. Mine, 18 miles from Copper River railroad in the Chitina district.

Officers: L. C. Dillman, pres., W. A. Mears, sec.-treas., with F. B. Whiting, F. J. Perine, F. B. Chandler, trustees.

Property: the Westover group on Boulder creek, title to which was transferred from the Alaska United Copper Explor'n Co., 23 claims, about 460 acres, covering a contact between limestone and greenstone. The contact lies horizontally and the ore outcrop is from 6 to 14′ thick and 43′ long in a perpendicular bluff at 4,990′ elevation.

Development: 11000′ of tunnels. One tunnel started at the south end is reported to have shown 4 to 20′ of ore for 45′ in a S. E. direction, and a crosscut on the ore body shows 2′ of glance claimed to assay 50% copper. It widens to 14′ for about 36′; is then cut off by a fault, but continues about 12′ to the north. Bornite, chalcoctie, chalcopyrite have replaced limestone along irregularly distributed fissures.

Presumably idle.

ALASKA ZINC & COPPER CO. ALASKA

Office: Green Bldg., Seattle, Wash.

Officers: M. O. Goodner, pres.-treas.; A. Goodner, v. p.-sec.

Inc. Jan. 3, 1917 in Washington. **Cap.** $1,000,000. $1 par; 800,000 issued 650,000 in escrow for two years with H. C. Loup & Co., New York. U. S. Corporation Co., agent.

Property: a prospect on Prince Sound, showing zinc, copper, gold and silver ores.

Probably idle.

ALICE MINING CO. ALASKA

Last address: Valdez, Alaska.

Property: consists of the Alice mine, situated at sea level on west side of Shoup bay, 1½ miles N. W. of the Cliff mine. The vein, found in 1910, is a well-defined fissure, strike N. 60° W., dip 70° S., width from a few inches to 2½′. Ore minerals include gold, pyrite, chalcopyrite, arsenopyrite, and sphalerite. The country rock is composed of graywackes, and green schists.

Development: by 247′ tunnel, a two-compartment shaft, 170′ deep, and 100′ of drifting at the bottom of the shaft.

Equipment: includes 100 h. p. boiler, 3-drill air compressor, 50-light dynamo, 5 h. p. steam engine, steam hoist, pumps, blacksmith shop, mess house and bunk house.

Small shipments were made in 1913 and 1916. Assessment work only

done in 1915 and 1916, and nothing reported since. See U. S. G. S. Bull 622 and 662.

AMERICAN TIN MINING CO. ALASKA

Operates a dredge on Buck Creek, Seward Peninsula.

AUK BAY MINING & DEVELOPMENT CO. ALASKA

Address: P. J. Wiley, mgr., Juneau Alaska; Henry Brie, sec.-treas.

Property: 19 claims, 380 acres, at Auk Bay, 12 miles N. of Juneau, Harris district, said to show a contact vein in diorite, containing gold and silver values. Has small testing mill of 12 tons daily capacity. Property idle on account of high cost of supplies and materials.

BANGOR CREEK DREDGING CO. ALASKA

Address: Union Construction Co., 604 Mission Street, San Francisco; or Nome, Alaska.

Property: Gold-bearing placer ground near Nome.

Equipment: includes a dredge with 3½ cu. ft. buckets, run by semi-Diesel engines.

BEATSON COPPER CO. ALASKA

Entire property, assets and liabilities acquired by the Kennecott Copper Corporation, and company dissolved Oct. 4, 1915.

BEAVER MOUNTAIN MINING CO. ALASKA

Idle. **Mine office:** Sulzer, Prince of Wales Island, Alaska. Henry Miller, pres.; George Comer, mgr., at last accounts. **Property:** on the southern side of Beaver mountain, Hetta inlet. **Development:** by tunnels, showing ore carrying coper, nickel and cobalt. Operations confined to annual assessment work.

BILLY SUNDAY MINE ALASKA

Property: known also as Smith & McGonnigle, on St. Patrick creek, a tributary of Happy creek, in the Fairbanks district, developed by winzes, crosscuts and drifting, following the main vein for 175'. Operations were continued in 1920. A small producer.

BON ALASKA MINING CO. ALASKA

Offices: 35 Wall St., New York, and 620 Alaska Bldg., Seattle, Wash.

Officers and directors: Jeremiah G. Galvin, pres. gen.-mgr.; Justin C. O'Brien, v. p.; Geo. J. Hurst, asst. sec., and Maurice D. Leehey. Thos. M. Bains, Jr., cons. engr.

Inc. July 10, 1916, in Washington. **Cap.** $1,000,000; $1 par. Stock listed on N. Y. Curb, Feb., 1920. American Trust Co., N. Y., registrar and transfer agent.

Property: 28 lode mining claims, 5 mill sites, 2 water rights, about 585 acres, in Wrangell district of S. E. Alaska. Ore said to occur in veins from 4 to 12' wide, he mill ore averaging $20 and direct shipping ore running $100 per ton, or 30 oz. silver and 50% lead.

Property examined in 1917 by W. J. Elmendorf, Seattle.

BROOKLYN DEVELOPMENT CO. ALASKA

Was merged 1920 into **Kelly Mines Co.**, which see.

CACHE CREEK DREDGING CO. ALASKA

A subsidiary of **Metals Exploration Co.**

Offices: 63 Columbia St., Seattle, Wash. and Thos. D. Harris, mgr. Marigold, California.

Officers: Bulke Wells, pres.; A. D. Snodgrass, sec.-treas.

Inc. Feb., 1914, in Washington. **Cap.** $150.000; $1 par.

Property: a lease on placer ground of the Cache Creek Mining Co., on Cache Creek, Yentna mining district. A 7' bucket dredge has operated with good results, reported showing as high as 75c. per yard.

CAMERON-JOHNSON GOLD MINING CO. ALASKA

Reorganized in 1916 as **Valdez Gold Co.**, which see.

CHICHAGOF MINING CO. ALASKA

Chichagof Island, Alaska. Controlled by Hugh C. Wallace and W. R. Rust of Tacoma, Wash. James L. Freeburn, supt.

Property: the Chichagof mine, 60 miles from Sitka, 170 miles from Juneau, shows high-grade, free milling quartz. A new shaft is being sunk 800′ N. W. of the main working shaft. Extensions in 1920 were 1,422′.

Equipment: 30-stamp mill with tube mill section, flotation unit, and daily capacity of 110 tons of ore. Company has hydro-electric plant with dam at Rust Lake. In 1920, a new tender was put into commission to handle local transportation and shipments of concentrate to Tacoma smelter. 150 men employed. See U. S. G. S. Bull. 504, p. 22 and 692-B.

The bond and lease on the Apex (Cann) group on Lisianski inlet was relinguished, October, 1921. High-grade surface ore was not found to continue with depth.

In August, 1920, company lost suit brought by John Tuppola who was awarded a half interest in the property and in all profits made since 1914, when he was committed to an asylum and his claims sold to the defendant company for $1,000.

CHITINA KUSKULANA COPPER CO. — **ALASKA**

Louis Kleyle, mgr.

Property: 21 claims, includes War Eagle and Calcite groups, near the North Midas, Kuskulana, Copper River district, about 13 miles from Strelna. Ore carries pyrite and chalcopyrite. The same interests control **Mount Wrangell Copper Co.**

Development: by 600′ Calcite and 100′ War Eagle tunnels.

Equipment: power-plant, 125 h. p. boiler, 80 h. p. steam engine, electric generator and air compressor.

CLIFF MINE — **ALASKA**

Controlled by H. E. Ellis.

Property: the Cliff mine, near Valdez, credited with production of $1,000,000. Litigation over ownership reported settled in 1920, the mine unwatered and a crosscut driven 119′.

COLUMBIA RED METAL MINING CO. — **ALASKA**

Office. 1109 First Ave., Seattle, Wash.

Officers: Wm. Uder, pres.-treas.; A. D. Thompson, v. p.; O. Roberts, sec., with W. E. Smith, C. C. Elwood, gen. mgr., C. H. Voll and R. J. McChesney, directors.

Inc. 1917 in Wash. **Cap.** $3,500,000; $1 par; divided into 1,500,000 shares common, all issued and paid to owners for property, and 2,000,000 preferred, outstanding 222,650 shares.

Property: 9 claims, on Glacier bay, Prince William sound, 8 miles from tidewater, Valdez district. Management reports a vein averaging 16′ in width, showing chalcopyrite, in greenstone, varying from concentrating ore to 24% smelting ore, with some gold and silver.

Development: by tunnels. Reserves are estimated at 50,000 tons.

Equipment: includes sawmill of 12,000′ capacity, cable, supplies, cabins, tents and 20-ton tug-boat. A tractor and trailers are required. Operations resumed. July, 1920, with 50 men. See Vol. XIV. for history.

CONSOLIDATED ALASKA CO. — **ALASKA**

Idle. Is a successor of Alaska Bonanza Mng., Trading and Trans. Co., reorganized 1900. Owned property at Nome, Alaska.

CONSOLIDATED GOLD MINES — **ALASKA**

Address: Earl B. Gibbs, pres., 601 Savings & Loan Bldg., Spokane, Wash. Frank H. Beyer, v. p.-mgr; A. H. Featherstone, sec., Wallace, Ida

Property: 66 claims in Willow Creek district. Ore occurs in fissure veins in quartz-diorite, with gold-silver-copper content averaging $33.90 per ton. Developing in a small way.

CRITES AND FELDMAN GROUP — **ALASKA**

Property: 10 lode claims and 1 placer claim on Too-Much Gold

creek, a tributary of Fairbanks creek, in the Fairbanks district, under development since 1912.

Development: by 1,300′ adit, shallow shafts and open cuts. A small production was made in 1920.

Equipment: includes 5-stamp mill, crusher, 40 h. p. steam boiler engine, compressor.

A small but evidently profitable producer.

CRYSTAL GOLD MINING CO. **ALASKA**

Owners, Bernard Heins, and partners, Snettisham, Alaska.

Property: 6 claims near Snettisham, containing gold quartz veins in diorite, course S. E., dip 40°. Ore shoots are 4½′ wide, 60-70′ long; ore is sulphide averaging about $8.50 per ton.

Development: by shaft and 400′ tunnel; workings total 4,000′.

Equipment: includes 5 stamp mill and 2 Frue vanners.

Plant reported in operation, but no production figures available.

CUBE MINING CO. **ALASKA**

Jeff Devinney and M. F. Hendrickson, Valdez, have a bond on the Three-in-One claims, Port Valdez district, one mile W. of Gold Creek The country rock is schistose graywacke, and argillite, cut by quartz vein running N. 30° W., with dip 50° to 80° W. It averages 2′ wide and contains chalcopyrite, sphalerite, galena, and arsenopyrite, with gold values.

Development: by 800′ tunnel on vein, 11′ wide, with raises, giving depth of over 1,000′.

Equipment: 3 semi-Diesel engines, Hardinge conical mill, amalgamation and concentration plant.

CULROSS ISLAND M. & M. CO. **ALASKA**

Reported developing a group of claims near Valdez.

Equipped with Lane mill and concentrator. A 50-ton flotation mill to be added.

CYMRU COPPER CO. **ALASKA**

Idle. Fully described in Vol. XIV.

DICKEY COPPER CO., W. A. **ALASKA**

Office: 31 Nassau St., New York. **Mine office:** Ellamar, Alaska. W. A. Dickey, pres.-gen. mgr.; care J. A. Whalley & Co., Coleman Bldg., Seattle, Wash. Duncan Edwards, v. p.-treas.; H. C. Bryan, sec.

Cap. $50,000. Is a close corporation.

Property: 2 miles from tide water at Irish Cove, Prince William sound, is developed by tunnels and over 1,000′ of workings. Ore, containing chalcopyrite, is in lenses along shear zones, in greenstone, with gold and silver; lenses of gold ore have been developed to a depth of 300′. Shipping ore said to average 12% copper. Last shipment to Tacoma smelter was made April, 1916. Now idle, awaiting improved shipping conditions.

Company bought the Mason-Gleason group, on Fidalgo Bay, for $15,000; shows high-grade ore, but nearest shipping point is Irish Cove, 3 miles distant.

DISCOVERY MINING CO. **ALASKA**

Property: 3 placer claims on Wattamus Creek, Goodnews Bay district, operated since 1917. Mining is done by the open cut method. the gold assaying $16.40 per ounce. **Production** in 1917 and 1918 was $35,000. About 10 men employed.

DUNTON GOLD MINING CO. **ALASKA**

Property taken over by **Kasaan Gold Mng. Co.**, which see.

EAGLE RIVER MINING CO. **ALASKA**

Address: care B. L. Thane, Crocker Bldg., San Francisco, Calif. G. T. Jackson, mgr., Amalga, Alaska.

Property: the Eagle River, a group of gold quartz claims 4 miles from Echo harbor and 25 miles from Juneau, Alaska, has been consol-

idated with the Yankee Basin adjoining and on the same belt as the Cottrell group. Ore occurs in 8 small shoots in black slate zone, broken by an elaborate faulting system and reported to average $20 per ton.

Development: by tunnel, 2,000′ long, that tapped ore at a depth of 700′. In 1915, 2000′ of diamond drilling in 7 holes was done. Property worked since 1903, producing upwards of $500,000, according to reports. Only annual assessment work has been performed of late due to abnormal conditions.

EBNER GOLD MINES CO. ALASKA

Capital stock owned by the **U. S. Smelting, Refining & Mng. Co.**, which see. See Alaska-Ebner Gold Mines Co. in Vols. XII and XIII for early history.

ELLAMAR MINING CO. ALASKA

Office: 211 American Bank Bldg., Seattle, Wash. **Mine address:** L. L. Middlekamp, supt., Ellamar, Prince William sound, Alaska.

Officers. F. M. Jordan, pres.-treas.; C. S. Packer, sec., with W. R. Rust and Chas. de Steigure, directors.

Inc. 1900, in Washington. **Cap.** $10,000,000; $100 par. Reorganized in 1916 with $2,500,000 capitalization; $5 par. Controlled by F. M. Jordan.

Property: 14 claims, patented, known as the Ellamar mine, at Ellamar, on Virgin Bay, 20 miles S. W. of Valdez.

Ore: occurs in a lens 80x200′ and lies wholly within the slate, pinching out 30′ below the 500′ level. Ore is mainly chalcopyrite associated with pyrite, pyrrhotite, and sphalerite in a gangue of slate, graywacke, and quartz, asaying from 3 to 25% copper, 3 oz. silver, and up to $50 gold. Mine was the first copper producer in Alaska, beginning shipments in 1901. A cofferdam has been built to permit mining orebody outcropping on the beach, below sea-level, and from 1910 to 1913 mining was confined to that part of orebody between surface and 200′ level. Geology fully described, p. 90, U. S. G. S. Bull. 605, 1915. During 1916, the water level had been lowered to the 500′ level. Ore is mined by underhand stoping.

Development: by 600′ three-compartment vertical shaft, with levels at 100′ intervals, and 3 miles of workings, said to block out about 250,000 tons of ore for stoping.

Equipment: includes 300 h. p. steam plant, with 3 boilers, 1,200 cu. ft. compressor, a 12x25″ engine, and 60 h. p. hoist. In 1914 a 200-ton per hour aerial tram and new loading dock were completed. The tram conveys ore from mine bunkers a distance of 2,200′ across shallow water to the loading dock, having 25′ of water at low tide. Buildings include a machine-shop, smithy, laboratory, mess-house, and 12 other buildings.

Costs are said to be about $3 per ton, for ore loaded on vessels, with about $3 transportation charges to the Tacoma smelter.

Production:

Year	Tons	Copper, %	Gold, oz.	Silver, oz.
1918	27,184	2.03	0.14	0.52
1917	54,759	1.74	0.17	0.70
1916	46,000	2.83	0.15	0.60
1915	36,000	2.18	0.17	0.61
1914	31,000	...	...	...
1913	25,000	...	...	...
1912	22,000	2.50	0.30	0.90
1911	16,000	6.00	0.24	0.80

Operations were entirely suspended in 1920.

EL NIDO MINING CO. ALASKA

Officers: J. H. Cann, pres., Juneau, Alaska; J. R. Cann, v. p.; L. D. White, sec.-treas.; D. J. Williams, supt.

Inc. July 1921.

Property: El Nido group of claims on Lisianski peninsula, adjoining the Apex group of the Chichagof Mining Co.

Development: by opencuts and trenching, exposing the outcrop for 200'; ore is quartz carrying free gold. Work was started early in 1921.

FAIRBANKS GOLD MINING CO. **ALASKA**

Property: placer ground on Fairbanks creek, Fairbanks district. Company operates 2 dredges of 1000 and 2500 cu. yds. capacity per day. Thirty men employed.

FAIRHAVEN POWER & MINING CO. **ALASKA**

In Sept. 1919, it was reported that a syndicate had been formed to underwrite 200,000 shares. Company had a placer property in Alaska, but is presumably out of business.

FALCON MINING CO. **ALASKA**

Address: Maynard Bldg., Seattle, Wash.

Officers: J. A. Liljestrom, pres.-gen. mgr.; M. Sando, v. p.; J. A. Helstrom, treas.; N. E. Gustafson, sec. Elmer Strom, supt.

Inc. In Washington. **Cap.** $500,000.

Property: 9 claims at Pinta Bay, on Chichagof island.

Development: by crosscut, in 850', July, 1921 and opening several veins from 2-15' in width, containing gold and silver.

Equipment: compressor, drills, 600' incline tram and wharf, bunk and boarding house. About 14 men employed.

FERN GOLD MINING CO. **ALASKA**

Address: Jerome L. Drumheller, Columbia Bldg., Spokane, Wash.

Property: on Archangel creek, Willow creek district, adjoining the holdings of the Consolidated Gold Mines. A crosscut tunnel was driven in 1920.

FIDALGO-ALASKA COPPER CO. **ALASKA**

Thos. Donahue, pres.; L. A. Levensaler, mgr., Hoge Bldg., Seattle, Wash. E. D. Reiter, supt.

Property: 24 claims, about 15 miles from Ellamar and one-half mile east of Irish cove, on the southern side of Fidalgo bay, an inlet of Prince William sound.

Development: by 650' main tunnel following a well-defined fracture zone in slate, carrying 2 lenticular ore-shoots, said to be 5x50' in cross-section, cut at 200' and 300' from portal, with many small stringers. Report good ore outcrops about 300' W. of the old workings.

Ore: mainly chalcopyrite, said to give average assays of about 10% copper, occurring as cementing material of fractures, irregular stringers, disseminated grains and as lenticular replacements of country rock, the fracture zones being very erratic in size and extent.

Equipment: includes 1,000' aerial tram, ore bins and wharf, besides several mine buildings and a 36" Pelton wheel operating under 400' head, driving single-stage air-compressor. Company employed 6 men and did 284' of development work in 1920.

Geology described on page 118, U. S. G. S. Bull. 605.

FISH CREEK MINING CO. **ALASKA**

Office: 558 Empire Bldg., Seattle, Wash. Mines at Hyder, Alaska, Harry Tanner, supt.

Directors. W. R. Tonkin, pres., Seattle; W. J. Palmer, v. p.-treas.; Maurice McMicken, sec.

Inc. 1918, in Washington. **Cap.** $600,000; par 25c; 290 shares in treasury. Security Transfer & Registrar Co., N. Y., transfer agent.

Property: 17 claims with two mill-sites on Salmon river, about 7½ miles from tidewater, on same mineralized zone 1½ miles south of the Premier mine, and on U. S. side of the International boundary.

Ore: contains silver sulphides accompanied by a little galena and chalcopyrite, occurring in 4 well-defined veins.

Development: by several tunnels aggregating 1,000' with greatest

depth of 250'. Principal work is on the Olympia Extension, exposing a body of silver-lead ore, 3' wide and 600' long.

Production: several small shipments of ore, mined in development work, sent to Tacoma smelter, varied from 78 oz. silver per ton, with 10% lead, $10 gold and 1½% copper, up to 200 oz. silver, $20 gold, 16% lead and 2½% copper.

Is a promising prospect.

FLUME GOLD DREDGING CO. **ALASKA**

Address: 1090 Mills Bldg., San Francisco, Calif.

Inc. 1912, in Calif. **Cap.** $30,000; $100 par; all issued. Dividends: total to end of 1920, $67,500.

Company operates a gold dredge on Melsing creek, Council district, Seward Peninsula.

FORTY MILE POWER AND DREDGING CO. **ALASKA**

Office: Chas. L. Peabody, v. p., 10 Wall Street, New York City.

Officers: John H. Stedman, pres.; Chas. L. Peabody, v. p.; E. R. Hollenbeck, sec.-treas. Satterlee, Canfield & Stone, 29 William St., attorneys. Walter G. Clark, 149 Broadway, cons. engineer. R. E. Jordan, gen. mgr.

Inc. 1918 in Del. **Cap.** $5,000,000; $1 par; about 3,500,000 issued.

Property: gold placer ground reported to extend for 119 miles on Forty Mile river in Alaska and Yukon Territory, from which $152,000 was recovered in 149 days by dredging. Also, company is stated to have sunk 5,000 test pits, proving a block of 1,500,000 cu. yds. averaging 60c. with other extensive areas of pay gravel. Both dredging and hydraulicking used.

FREE GOLD PIGOT BAY MINING CO. **ALASKA**

Address: W. R. Millard or C. B. Smith, Valdez, Alaska.

Inc. Aug., 1919. **Cap.** $350,000. $1 par.

Property. on Pigot bay, Prince William sound.

GALENA BAY MINING CO. **ALASKA**

Idle. **Offices:** Albert Barge, 540 Orchestra Bldg., Chicago, Ill., and L. C. Smith Bldg., Seattle, Wash.

Officers: J. B. Carter, pres.; Albert Barge, sec; J. S. Jurey, asst. sec.; L. J. Rusk, treas., Chas. Simenstad, supt.

Trustees: J. B. Carter, Arthur W. Cutten, E. C. Badenoch, R. E. Tearse, B. G. Proctor, L. J. Rusk, C. A. Hayes and John S. Jurey.

Inc. 1906, in Washington. **Cap.** $500,000; $1 par; 486,001 outstanding. Annual meeting, second Tuesday in October.

Property: acquired in 1907, on Galena Bay, about 30 miles from Valdez, and includes the Sunnyside, Copper Crown, Starvation, Sheep Run, Vesuvius, and 15 other claims, all patented.

Development: by 2,200' adit on the Starvation, 400' on the Sunnyside, with only surface work and diamond drilling on the Copper Crown and Sheep Run claims. Ore occurs in lenses 4-5' long and up to 14" in width, and contains chalcopyrite, pyrrhotite, quartz and calcite. On the Copper Crown a 4' vein of solid sulphide ore was opened up in a N. E. shear zone, assaying $3-$4 gold per ton. Geology fully described, p. 100, U. S. G. S. Bulletin 605. Only assessment work done in recent years.

GOLD BULLION MINING CO. **ALASKA**

Fully described in Vol. XIV. Property owned by **Willow Creek Mines,** which see.

GOLD CORD MINING CO. **ALASKA**

Address: 602 S. Kingsley Drive, Los Angeles, Calif., and Willow Creek, Alaska.

Control held by Frank Bartholf, of Billings, Mont., John Smith, pres., Los Angeles, Calif., and J. B. Swan, of Henrietta, Okla. William Martin of Anchorage, was operating under a lease.

Ore: gold values in vein said to be 10' to 14' wide. Mill test on 40

tons reported to have yielded $70.46 per ton and tailings as aying $12 were reduced to 80 cents in the cyanide plant. No recent information.

GOLD KING MINING CO. **ALASKA**

Probably dead. Described, Vol. XII.

GRANITE GOLD MINING CO. **ALASKA**

Valdez, Alaska. **Officers:** B. F. Millard, pres.-treas.; W. R. Millard, 1st v. p.; O. S. Larsen, 2nd v. p.; Miss Shanstrom, sec., with Jafet Lindeberg, directors.

Inc. 1913, in Alaska. **Cap.** $500,000; $1 par; outstanding, 430,000 shares. Annual meeting, first Tuesday in October. **Transfer office:** Alaska Bldg., Seattle, Wash.

Company claims to have spent $330,000 to March, 1916, on the property, and to have had a total production of $277,000. Surplus March 1, 1916, $21,000. Initial dividend, 2 cts. per share, paid April 10, 1916, and 2 cts. paid in May.

Property. 3 claims, 60 acres, on W. side of Port Wells, on the coast between Hobo Bay and Harrison Lagoon. Two veins course N. 60° W., dip 58° N. Country rock consists of interbedded slates, graywackes and argillites cut by large masses of granite. Present development is said to show a third vein on the 210′ level. Metallic ore minerals are gold, and the sulphides of iron, zinc, lead and antimony. Ore said to run from $6 to $50 with average of $12 per ton. See U. S. G. S. Bull. 622, pp. 136-138.

Development: 200′ incline shaft and tunnels, with 4 levels opened up from 300′ to 700′ in length. Total workings, over 5,000′, all connected with 800′ tunnel at mill level.

Equipment: former machinery sold with exception of 10-stamp Hendy mill, crushers and concentrators, as company plans installing 160 h. p. hydro-electric plant to furnish power.

Production: 1916, averaged 60 to 70 tons per day, yielding about $20,000 gross per month.

In 1917, the mine and mill were closed down on account high cost of material; intend to resume when costs become lower.

GREAT BRITAIN GROUP **ALASKA**

Owned by a Vancouver and Victoria syndicate. **Property:** at Whalebone cove, on the western shore of South Valdez island, comprises 4 claims, showing bornite, tetrahedrite and chalcocite ore, occurring in the contact between limestone and altered lime.

Development: by 3 tunnels, showing 4 to 12% copper ore. Ore blocked out estimated at 1,800 tons by F. J. Crossland. Shipments of 700 to 800 tons have been made to the Tacoma smelter, said to average 3% copper. A 500-ton bunker was erected on the beach for loading shipments on vessels. No recent information. Probably idle.

GREAT NORTHERN DEVELOPMENT CO. **ALASKA**

Mine and works office: Phillips, Alaska.

Officers: Jas. Phillips, Jr., pres.; E. F. Gray, v. p.; Walter M. Briggs, sec.-treas.; Edwin F. Gray, gen. mgr., with J. C. Fairchild, H. F. Knoblauch and H. I. Gaskill, directors.

Inc. 1906, in Maine. **Cap.** $1,000,000; $10 par; issued, 70,100. Is a holding company. Annual meeting, first Tuesday in November. Petley, Morse & Co., auditors, 43 Exchange Place, New York.

Property: a solid tract of about 165 claims, 3,000 acres, in process of patenting, on the south bank of the Kotsina river, below the mouth of Roaring creek, near the Copper River railroad, and about 60 miles from the Bonanza mine of the Kennecott Co. Ore is greenstone containing chalcopyrite in small amount. Also controls the Regal Mines Co., which see.

Development: work totals 8,000′, and is said to have opened up a large tonnage of low grade ore. Only assessment work done pending an improvement of the metal market.

HELM BAY MINING CO. **ALASKA**

Property: a group of claims, including the old Gold Standard mine, on Helm bay, S. shore of Cleveland peninsula, in Ketchikan district, covers a shear zone in greenstone schists showing quartz veinlets carrying gold and some pyrite. The ore is said to average $6 gold per ton. Surface openings expose the mineralized zone 10 to 50′ wide, for several thousand feet; a tunnel was being driven late in 1920.

HEMPLE COPPER MINING CO. **ALASKA**

Valdez, Alaska. **Mine office:** Landlock, Alaska. **Officers:** S. A. Hemple, pres., treas. and gen. mgr.; S. I. Hemple, sec., with Arthur Lang and I. J. Devenney, directors.

Inc. March, 1910, in Alaska. **Cap.** $1,000,000; $1 par.

Property: 6 claims, 4 patented, 120 acres, with a 2-acre mill site, all timbered, near the Standard and Three Man mines, at Landlock bay. Shows greenstone, slate and quartzite, carrying 3 veins with 5 or 6 shoots, said to be 24′ wide in places and traceable for 3,000′, carrying chalcopyrite, giving average assay of 3 to 6% copper. Mine is opened by tunnels of 50′, 300′, 575′ and 800′, with about 3,000′ of workings, to a depth of 1,000′. On 350′ level, vein shows width of 24′ in 3 crosscuts. Reserves estimated at 150,000 tons; concentrating ore running 2-4% copper, 40c silver and 80c gold. Equipped with gasoline engine and 6 buildings.

HIRST-CHICHAGOF MINING CO. **ALASKA**

Address: W. A. Castleton, 316 First Ave. S., Seattle, Wash. **Mine address:** Juneau, Alaska. Earl Thompson, supt.

Officers: W. A. Castleton, pres.; C. W. Fries, v. p.

Property: at Hirst cove, Chichagof island, Sitka district, developed by 3 tunnels, and total workings of 1,100′.

A 10-stamp mill being installed; 15 men employed, June, 1921.

HOUGHTON-ALASKA EXPLORATION CO. **ALASKA**

Company dissolved and property sold. Fully described in Vol. XII.

HUBBARD-ELLIOTT COPPER CO. **ALASKA**

Offices: 738 Singer Bldg., New York; 35 N. Dearborn St., Chicago; 657 New York Blk., Seattle, Wash.; Elliott Creek, Chitina district, Alaska.

Officers: R. Reichardt, pres.; J. F. Wessels, v. p.; A. J. Elliott, sec.-treas; Louis G. Hinckel, gen. supt.

Inc. Jan., 1911, in Washington. **Cap.** $3,500,000; $1 par; 1,500,000 shares issued in exchange, share for share, for stock in the old Hubbard-Elliott Copper Mines Development Co. of Alaska; 2,000,000 shares treasury stock. A one-fourth interest in the Hubbard-Elliott is owned by the **Alaska Copper Corp.** A stockholders' meeting held at Seattle on Nov. 19, 1920, ratified an agreement with the "Hubbard Elliott Development Syndicate." This syndicate has a capital of $500,000 in 5 series of shares at $100,000 par for each, to exploit and develop the property. When operations reach the productive stage, the Syndicate will either continue or will organize a new company to be called the Elliott Creek Copper Co., in Delaware, with a capital of not less than $8,500,000, nor more than $10,000,000.

Property: 35 patented claims, 5 mill sites with U. S. government titles and 84 unpatented claims, over 2,500 acres, covering 6 miles in Elliott Creek valley. Elliott creek is an affluent of the Kotsina river, about 15 miles above junction of the Kotsina with the Copper river. The U. G. I. group of 8 claims has been acquired by the Development Syndicate.

Geology: Copper ore occurs in fissure veins and associated replacement orebodies in greenstone, with limestone beds above it. The prominent outcrops are practically all on the north side of Elliott creek, near the contact, which runs N. 75° W. and dips 80° N. All outcrops are in the greenstone underlying the limestone beds except on the Leland and Lawton claims, which are in a well-defined porphyry dike. Above the limestone is found a heavy capping of conglomerates.

The principal ore minerals are bornite, glance and chalcopyrite. The total

absence of surface oxidation due to glacial action is notable, and sulphides occur in a calcite matrix in the veins and with a greenstone matrix.

Development: by tunnels.

Complete new equipment being installed.

INDEPENDENCE GOLD MINING CO. **ALASKA**

Formerly Alaska Gold Quartz Mng. Co.

Described in Vol. XIV. Absorbed, 1920, by **Kelly Mines Co.**, which see.

INDEPENDENT GOLD MINING CORP. **ALASKA**

Address: F. Ketchmark, pres.; Windham, Alaska.

Property: at head of Windham Bay, Juneau district, developed by 150' tunnel in a belt of silicified schist, 10' wide and containing sulphides of iron, gold and galena. Developing at last account.

JOSEVIG-KENNECOTT COPPER CO. **ALASKA**

Address: W. H. Seagrave, mgr., L. C. Smith Bldg., Seattle, Wash.

Officers: D. K. McDonald, pres.; J. B. MacDougall, v. p., with M. E. Hay, W. L. Gazzam and J. W. Roberts, directors.

Inc. in Washington. **Cap.** $2,500,000; $1 par.

Property: 19 lode claims, 1 placer claim, 7 miles from Kennecott, Alaska. Glowing reports were made regarding this property by the promoters, which appear to have misrepresented the facts. One statement claimed that the mine was superior to the Kennecott Copper Corporation. More conservative estimates made by the consulting engineer give a very small tonnage of ore, averaging about 3¼% copper. Due to location, transportation difficulties, small amount and grade of ore, etc., the future of this property is very uncertain. No work being done now on account of litigation and internal dissension between the promoters and the board of directors. Investors brought suit against the promoters for misrepresentation, and in April, 1918, were offered a settlement of 37½ cents a share for stock sold by subscription between Nov. 26 and Dec. 13, 1916. Stricken from New York Curb May, 1918. On October 3, 1919, G. F. Rowe, D. McDonald, G. E. Snyder, W. B. Hancock, J. P. Gearon and Christian Josevig, all of Seattle, were indicted by the Federal Grand Jury on charges of having used the mails to defraud and of conspiracy. These men were alleged to have sold worthless shares, receiving $400,000 therefor.

JUALIN ALASKA MINES CO. **ALASKA**

Company is a subsidiary of the **Algunican Development Co.** Jean Vanophem, pres., 16 Rue de Turin, Brussels, Belgium.

Property: 30 claims, on the north shore of Berners bay, in the Juneau region, developed by 360' main shaft, crosscuts and drifts. A drainage-tunnel to be 7,800' long has been driven 2,500'. Ore reported to be 80% free milling.

Equipment: includes 5½-mile tram, connecting the mine with the wharf, 450-h. p. compressor and hydro-electric plant and 4 semi-Diesel engines of 150-h. p. each.

Production: under former owners said to total 50,000 tons of $11.20 per ton gold ore. Property was closed in Aug., 1914, but reopened in May, 1915. To May, 1917, the output was 22,366 tons of $11.10 ore. Reported production in 1918 of $200,000 from ore extracted in driving the tunnel and treated in the 10-stamp mill.

Operated from Jan., 1919, to April, 1920, when the mill was destroyed by fire, and company forced to close down the mine, owing to adverse mining conditions and prohibitive rate of foreign exchange.

The Algunican Development is now busy developing claims in the Salmon River district of British Columbia.

KASAAN GOLD MINING CO. **ALASKA**

Took over, in 1920, holdings of **Dunton G. M. Co.**

Property: the Harris creek (Dunton) mine, 2 claims, on Harris creek, 2 miles from Hollis P. O., on Prince of Wales island. Ore occurs in quartz

veins in graphite slate, containing auriferous pyrite, gold and a small amount of galena.

Development: by 364' adit and four drifts, the deepest at 250'.

Equipment. includes 5-stamp mill of 20-ton daily capacity. Both mill and mine plant were overhauled in 1920.

KELLY MINES CO. **ALASKA**

Address: 1213 L. C. Smith Bldg., Seattle, Wash. **Mine Address:** Milo Kelly, mgr., Anchorage, Alaska.

Officers: Milo Kelly, pres.; C. L. Harrison, v. p.; R. E. Tobin, Jr., sec.-treas., with H. E. Turner, H. W. Kent, Leo J. Bradner, and Walter Nossaman, directors.

Inc. April 27, 1921, in Washington. **Cap.** $1,700,000; $1 par; 700,000 treasury shares. Company is a consolidation of the Independence Gold Mng. Co., Brooklyn Dev. Co. and Alaska Free Gold Mng. Co.

Property: 33 claims and 2 mill sites, surveyed for patent, on Fishhook creek, Willow Creek district, at head of Cook inlet. Gold-silver ore occurs in fissures in granodiorite. Two orebodies have been opened on 2 different principal veins, one ore shoot being 500' in length.

Development: by numerous tunnels, the longest 500'; greatest depth of workings, 450'. Season is short, 100 to 150 days, and development apparently keeps pace only with production.

Equipment: includes 5 aerial tramways, water power, 2 Lane mills, cyanide plant, compressor, 16-h. p. gas engine, etc.

Production: to Oct., 1921, $750,000, with an average value of $30 per ton of ore.

KENAI-ALASKA GOLD CO. **ALASKA**

Jas. Hayden, mgr., Seward, Alaska. **Property:** on Great Falls lake, adjoining the Skeen-Lechner, shows a 2' vein, cut on the 260' level, which is said to carry ore mining better than $25 per ton.

Developed: by 1,700' of tunnels and stopes.

Equipment: includes 5-stamp mill, and 8,000' aerial tram connecting mine and mill.

KENNECOTT COPPER CORPORATION **ALASKA**

Office: 120 Broadway, New York.

Officers: W. C. Potter, chairman; Stephen Birch, pres.; W. P. Hamilton, v. p.; C. T. Ulrich, sec., with S. J. Clarke, H. O. Havemeyer, Seward Prosser, E. A. and H. F. Guggenheim, directors; E. T. Stannard, v. p.-gen. mgr.; E. S. Pegram, treas.; J. N. Steele, gen. counsel; E. R. Reets, purch. agent; J. C. Lane, met. supt.

Inc. April 29, 1915, in New York. **Cap.** $6,000,000; increased May, 1915, to $15,000,000, in 3,000,000 shares of no par value; 2,787,081 outstanding Jan. 1, 1921. There were 20,000 shareholders early in 1920.

Range of shares during 1920 was $33½ high and $15¾ low. A total of 839,200 shares changed hands; in 1921 to June, range was $22⅝ to $16.

Bonds: authorized (June 1, 1915), $10,000,000 6 per cent, 10-year convertible sinking fund gold bonds. In April, 1917, all outstanding bonds of this issue had been converted into stock.

On Mar. 21, 1917, company issued $16,000,000 of two-year, 6% notes, to finance purchase of more Utah Copper shares. Of this amount, $7,150,000 had been retired by Dec. 31, 1917, and $12,000,000 a year later, leaving $4,000,000 outstanding.

On Mar. 1, 1919, a new issue of $12,000,000 one-year 6½% notes was authorized, in order to finance further development, to enable the company to carry its accumulation of copper, over 50,000,000 lb. at that date, and to retire the $4,000,000 notes due.

On February 1, 1920, company sold $15,000,000 of 7%, 10-year, convertible notes, secured by 500,000 shares of Utah Copper Co., to retire $12,000,000 note issue and to provide additional working capital.

D. A. Crockett, 149 Broadway, transfer agent; Bankers' Trust Co., New

York, registrar. Annual meeting first Tuesday in May. Stock listed on New York Stock Exchange.

Company controls the **Braden Copper Mines Co.**, of Chile, through ownership of 99% of its capital stock. It has also a 38% interest in the Utah Copper, and through its subsidiary, Alaska Dev. & Mineral Co. has control of the Bering River Coal Co.

In 1918,, Kennecott secured control of the **Mother Lode Coalition Mines Co.**, whose property adjoins it.

Statement of Assets and Liabilities, for years ended Dec. 31:

Assets.

Property Accounts:	1918	1919	1920
Mining property, net book value	$20,744,877	$18,457,083	$9,508,810
Construction and equipment	1,495,150	1,203,721	1,268,199
Total	$22,240,027	$19,660,804	$10,777,009
Investments:			
616,504 Utah Copper shares	$50,606,947	$47,647,727	$44,836,469
2,565,986 Braden shares	39,475,890	39,477,176	39,477,330
500 Katalla shares	.....	.....	.....
$23,020,000 par C. R. & N. W. Ry. bonds	8,078,108	8,078,108	*13,257,608
48,174 C. R. & N. W. Ry. shares	1	1	1
23,854 1-8 Alaska S. S. shares	2,385,412	2,385,413	2,385,412
500 Alaska Dev. and Min. Co. shares	62,480	62,480	62,480
1 Copper Export Assoc. share		1	1
Total	$100,608,839	$97,650,906	$100,796,302
Current and Working Assets:			
Metals on hand	$2,421,485	$3,189,311	**$4,651,175
Ore and concentrates	128,739	154,620	202,599
Materials on hand	935,600	852,695	951,662
Accounts collectible	2,389,185	920,325	632,018
Deferred accounts	67,064	81,875	735,800
Marketable Securities	2,336,591	2,646,163	2,441,417
Cash	2,695,534	1,201,002	1,655,247
Loans to affiliated companies		9,250,000	12,950,000
Total current assets	$10,974,198	$18,295,991	$24,219,918
Grand total	$133,823,064	$135,607,701	$135,016,229

Liabilities

Stock (without nominal or par value):			
Authorized	3,000,000	3,000,000	3,000,000
Unissued	212,940 8/13	212,921 4/13	212,918 11/13
Outstanding	2,787,051 5/13	2,781,078 11/13	2,787,081 2/13
Stated capital	$15,000,000	$ 15,000,000	$ 15,000,000
Capital surp. (from bond conv., ex. of stock, mines acquired) less cap. Distributed	102,553,995	99,767,857	87,516,541
Total	$117,553,995	$114,767,857	$102,516,541
Notes payable	4,000,000	12,000,000	.....
Bonds, 10 year 7s			15,000,000

Current Liabilities:	1918	1919	1920
Accounts payable	224,909	179,531	214,555
Accrued taxes int., and deferred accounts	603,133	369,015	575,363
Treatment, refining and delivery charges (not yet due)	1,045,172	413,288	615,077
Total current liabilities	$1,873,214	$961,834	$1,404,995
Development reserves	396,496	366,605	.....
Undivided profits after deducting depletion	9,999,360	7,511,405	16,094,693
Grand total	$133,823,065	$135,607,701	$135,016,229

* Includes accrued interest. ** Includes sales price of metals for future delivery.

Income Account—Year Ended December 31.

Operating Revenue:	1918	1919	1920
Copper	$14,418,357	$5,034,906	$7,921,929
Silver	662,569	569,004	515,262
Total	$15,080,926	$5,603,910	$8,437,191
Operating expense	5,649,635	3,091,515	5,185,700
Net operating profit	9,431,292	$2,512,395	$3,251,491
Misc. income at mines	loss 41,156	28,713	7,897
Net income for period	$9,390,136	$2,541,108	$3,259,388
Operating Expenses Detail:	1918	1919	1920
Mine and mill	$2,162,033	$1,316,898	$2,373,425
Treatment, ref. and freight	2,830,646	1,453,893	2,320,535
Selling and delivery	515,989	194,809	320,163
General expense	140,966	125,915	171,577
Total as above	$5,649,635	$3,091,515	$5,185,700
Other Income:			
Utah Copper Co. dividends	$4,777,906	$739,805	887,766
Alaska Steamship Co. dividends.	238,541	143,125	143,125
Interest, discount, etc	265,689	514,344	2,186,742
	$5,282,136	$1,397,274	3,217,633
Total income	$14,672,272	$3,938,381	$6,477,021
Deduct:			
Accrued taxes, interest on bonds, adm'n.	898,307	820,864	1,279,686
Net income	$13,773,965	$3,117,517	$5,197,334
Undivided Profits			
Balance forward	$8,569,444	*$9,851,607	*$17,412,376
Net income for year	13,773,965	3,117,517	5,197,334
	$22,370,409	$12,969,124	$22,609,710
Less depletion charge	.....	2,287,793	3,505,832
Net income	$22,370,409	$10,581,331	$19,103,878
Depreciation of plant	541,232	382,853	222,104
Dividends	5,574,089	2,787,793	2,787,081
Depletion	6,255,728	.....	.....
Balance forward	$9,999,360	$7,511,405	$16,094,693

*Adjusted.

Dividends: initial on Mar. 31, 1916; $5.50 in 1916; $5.70 in 1917; $4 in 1918; $2 in 1919; $2 in 1920; none in 1921. The grand total is $53,502,152.

Property: Alaskan holdings include the Kennecott and Beatson mines; also 17 patented claims, 216 acres, at Latouche, and 11 lode claims bought in 1916. During 1918 39 new claims were located. Two placer claims were added in 1919 and 58 lode claims were located during 1920.

The **Kennecott** group, 3 miles from Kennecott, on the C. R. & N. W. R. R., includes the Bonanza and Jumbo mines, with 23 additional patented lode claims and 14 patented placer mines, 2,314 acres.

The **Bonanza** mine had one of the most remarkable ore bodies ever found by a prospector. A great mass of high-grade ore, much of which carried over 60% copper, outcropped on the crest of precipitous mountain overlooking the Kennecott river, a tributary of the Chitina, which flows into Copper river.

There were no large masses of oxides or carbonates present, as glaciation and active erosion prevented the formation of an oxidized capping. The ore outcrops were massive chalcocite averaging about 50% copper and 0.2 oz. silver to each per cent. copper.

Geology: the claims show Nicholai greenstone, consisting of a number of basaltic flows of lava, a hard close grained rock considerably altered and in places amygdaloidal, overlaid by massive beds of Chitistone limestone of Triassic age, with bedding planes parallel to the flow planes of the lava, the limestone being of a bluish color, weathered to gray at the surface. There also are diabase and andesite intrusions and dikes.

Ore occurs in irregular replacement masses more or less parallel to vertical planes of a fault zone, ore following to some extent, minor fault planes, as well as the bedding planes of the limestone making stockwerks and irregular masses in the crushed limestone. The outcrop is 20 to 40′ wide, and over 400′ in length, the southern half showing 2 nearly parallel bands of chalcocite, 4 to 10′ in width, separated by about 10′ of limestone. At the northern end of the outcrop the chalcocite bands give place to stringers and interlacing seams of ore which thin out northward and fade into barren limestone.

In addition to the Bonanza outcrop there was a large amount of ore in the talus, or slide rock, broken off from the outcrop. This mass of broken ore and rock was about 300′ wide, extending for about 500′ or more down the slope from the outcrop, varying from 3 to 20′ in depth. A number of test-pits, sunk to the outcrop, showed an average of 4′ depth, with an average assay of 13% copper, this including both boulders of chalcocite up to 200 lbs. in weight and barren limestone. Ore is extracted from the slide by a system of cuts. Two grades of ore were mined, with 70% and 15% copper, respectively.

Further notes on the geology, ore, and mining were published in "Min. and Sci. Press," June 8, 1918, and Jan. 11, 1919. Also 80 pages in 'Economic Geology' for Jan.-Feb., 1920, the results of 5 years of field and laboratory study.

Development: by tunnels and inclines. At the Bonanza, the 2-compartment incline is down 1,150′, and that at the Jumbo is 1,100′ deep. These two mines are connected by a 4500′ crosscut, completed during 1919.

Underground openings at all the company's mines during 1916 were extended 15,340′; 10,770′ at Kennecott in 1917; 11,790′ in 1918; 12,889′ in 1919, plus 4,199′ of drilling; 13,630′ in 1920, plus 14,396′ of drilling.

The most important recent developments include the discovery of ore-bodies on the 600-ft. level of the Bonanza mine, and on the 900-ft. level of the Jumbo mine, both about 400 ft. northwest of the main fissuring. Ore-bodies on the 500′ level are larger and higher grade than on the upper levels.

The Bonanza mine is connected with the mill at the lower camp by a Bleichert aerial tram, in 2 sections, the upper of 7,000′ and the lower of 8,000′ with a drop of 4,000′. The tram line has 40 towers, longest span 1,500′, with

ore bins at both terminals, and has an estimated daily capacity of 600 tons. A 5,500'-ft. aerial tram has been erected to connect the Jumbo mine with the Glacier mine, so that ore from the latter will be available for the mill. The upper terminal is now in solid rock, and the skips are filled direct from the top of the Jumbo incline, thus affecting a considerable saving. At the lower camp are the mine buildings, power plant and mill.

Equipment: includes steam plant, hoists, air compressors, etc. Buildings include a bunk house, mess-house, assay office and 10,000' sawmill.

The 700-ton concentrator is equipped with Blake and Symons crushers, Hancock jigs, bull jigs, rolls, Wilfley and Deister tables, and 600-ton ammonia leaching plant. (Described by L. Eddy in "Eng. & Min. Journ.," June 28, 1919.)

Guggenheim interests constructed the Copper River & Northwestern railway, at a cost of about $20,000,000, this line of 195 miles length starting at Cordova, on the sea, and ending at the lower camp. Results have been as follows:

Year	Revenue	Profit
1920	$1,765,140	$ 534,973*
1919	1,145,662	177,896
1918	1,846,585	581,329
1917	2,496,670	1,210,304
1916	2,911,207	1,768,671

* Loss.

The Alaska Steamship Co. is also controlled by Kennecott. It carries ore to the smelter at Tacoma and returns with supplies for the mines. Recent results are as under:

Year	Revenue	Profit	Dividends	Year's Surplus
1920	$4,587,461	$339,884	$270,000	$169,884
1919	4,791,231	957,379	270,000	687,379
1918	3,733,938	429,190	450,000	176,530
1917	4,018,667	979,524	360,000	513,239
1916	3,816,087	1,366,666	1,740,000	130,216

The **Beatson** mine comprises 17 patented claims, 268 acres, about 3 miles from the northern end of Latouche island, within one-half mile of tidewater, where there is a good natural harbor. Mine was located, July 4, 1897, by the late Andrew K. Beatson, and began shipping, 1903. Country rock is slate; ore is chalcopyrite, pyrite and pyrrhotite, occurring in brecciated portions of the country rock. The orebody is a large lens; total length developed is about 800' with an average width of 100'. Ore assays up to 30% and as shipped returns 7.23% copper and 2 oz. silver per ton.

Development: includes over 34,000' of underground workings, in addition to diamond drilling. New work in 1919 covered 5,268' and in 1920, 8,652' plus 4,846' of drilling. The ore is mined in an open pit and dropped through to the main tunnel level. Mine and mill are connected by an aerial tram. A 700-ton concentrator, employing oil flotation and completed Feb., 1915, was enlarged in 1918 to treat 1,500 tons a day. Buildings include rooming, mess and change houses, office, store and a hospital.

Situation, geology, ore, mining and milling methods and leaching of copper tailings with ammonia, were briefly described by H. M. Lawrence in the "Eng. & Mng. Journal," Nov. 3, 1917. A 300-ton plant was erected 1917, and one of 800-ton capacity is under construction. Four 30' diam. leaching tanks with dome tops, hold 500 tons of tailing per charge in a depth of 15'.

The following figures show past production, costs and profits of the two Alaska companies prior to their acquisition by the Kennecott Corporation

Kennecott Mines Co.:

	Net lbs. Copper	Cost per lb.(a)	Profit
1916	101,410,000	5.10c.	$20,525,384
1915 (5 months)	14,240,412	4.00c.	1,522,747
1914	13,988,273	5.78c.	1,104,645
1913	14,621,834	5.48c.	1,424,635
1912	22,366,478	4.43c.	2,633,568
1911 (9 months)	21,007,096	4.19c.	1,656,205
Beatson Copper Co.:			
1916	6,872,000	5.10c.	$1,390,893
1915 (9 months)	1,970,947	11.41c.	122,504
1914	5,286,667	8.75c.	241,895
1913	5,178,629	8.36c.	353,239
1912	3,254,858	9.74c.	221,116
1911 (9 months)	3,078,444	7.44c.	163,939

(a) Includes selling.

Production:

Year	Bonanza and Jumbo Ore, Tons	Copper, %	Beatson Ore, Tons	Copper, %
1916	48.855	67.90	184,411	2.30
	19,271	15.60	6,608	7.23
	229,717	8.49		
1917	265,579	13.78	273,523	2.44
1918	262,377	10.59	397.851	2.02
1919	162,248	10.24	264,460	1.95
1920	223,009	9.04	451,463	1.77

Summary of Operations

	1918		1919		1920	
	Kennecott	Latouche	Kennecott	Latouche	Kennecott	Latouche
Ore, etc., to smelter, tons	71,888	52.427	34,844	28,204	*47,723	44,268
Copper, per cent	36.09	12.42	45.41	14.78	41.02	15.00
Ore milled, tons	218,819	395,524	148,768	264,265	**199,656	451,863
Copper, per cent	7.82	2.00	8.44	1.95	6.82	1.77
Concentrate, tons	27,174	49,915	20,128	28,204	21,696	44,268
Copper, per cent	53.00	12.80	53.89	14.78	51.06	15.00
Recovery, per cent	84.19	80.70	85.94	80.80	82.29	82.85
Tailing leached by ammonia, tons	132,304	.....	143,329	.....	190,327	.....
Copper, per cent	0.94	.....	1.02	.....	1.14	.....
Recovery, per cent	73.50	.....	74.00	.....	74.50	.....
Copper, pounds	60,994,757		38,577,148		51,365,261	
Average price, cents	24.53		18.18		17.42	
Silver, ounces	684,779		520,660		507,727	
Average price, cents	95.29		109.29		101.48	
Cost of copper sold, cents per pound	9.2		10.		10.84	
Metallurgical efficiency (copper in ore and products shipped) per cent	93.33	80.91	94.38	80.80	93.26	82.85

*Includes 7,893 high grade yielding 4,685 tons of copper. **Mill treated 67,567 tons from Mother Lode Coalition additional.

Rich ore and concentrates are sent to Tacoma, Wash., for reduction and refining. Copper is sold through the new agency of Guggenheim Bros.

In 8 months of 1921, copper production was 44,956,000 lb., or 40% less than for same period in 1920.

Copper production was at its highest by mid-1916, when the yield was 10,750,000 lb. in July. From then on, there was a steady drop to 5,500,000 in Sept., 1918. After that, the published output includes Braden with Kennecott, thus concealing individual outputs. Despite the depletion of its very rich ores, Kennecott has a profitable future in the treatment of low grades ores. (The Braden and Mother Lode Coalition companies are described under their respective titles.)

KENSINGTON MINING CO. **ALASKA**

Address: Juneau, Alaska.

The Kensington has been idle for many years.

KNIGHTS ISLAND ALASKA COPPER CO. **ALASKA**

Address: J. J. Dieringer, Valdez, Alaska.

Property: on eastern arm of Drier bay, Knights island district.

Geology: a shear zone, 20′ to 50′ wide, crossing greenstone with a strike N. 15° E., shows slight mineralization with chalcopyrite, sphalerite and pyrrhotite for several hundred feet.

Development: by a 650′ crosscut tunnel with three short drifts and some shallow surface pits.

KUSKOKWIM DREDGING CO. **ALASKA**

Address: McGrath, Alaska.

Operates a dredge on Candle creek, in the McKinley district, Kuskokwim region. In 5 months of 1920, 74,597 cu. yrds. of gravel were handled by a force of 22 men.

LADYSMITH SMELTING CORP., LTD **ALASKA**

Address: S. De Witt, sec.-treas.,, 600 Leary Bldg., Seattle, Wash., and Latouche, Alaska.

Property: an operating lease on the holdings of the Latouche Copper Mng. Co., which see.

LAKINA KENNECOTT MINING CO. **ALASKA**

(Formerly the Lakina Copper Co.)

Address: E. A. Patrick, v. p., Rookery Bldg., Spokane, Wash.

Directors: E. A. Patrick, J. J. Kinnan, E. J. Hurley, E. E. Younge, T. A. Brady, V. C. Hill, J. S. Ross, and T. E. Coleman.

Cap. $2,000,000; $1 par; 770,000 outstanding; 750,000 owned by Lakina Copper Co. of Idaho.

Property: 30 claims and a mill site on headwaters of Lakina river, Chitina district, S. E. Alaska, about 12 miles from the holdings of the Kennecott Copper Corporation.

Geology: a well-defined shear-zone in greenstone, running N. 10° W. dip 70° W. has evidences of leaching and is traceable up the mountain for a distance of over 1,000′ vertically. The ore is bornite, although chalcocite occurs along fracture planes with a calcite gangue. Some native copper is also found. See U. S. G. S. Bull, 662, page 161.

Development: by 235′ tunnel driven near the mouth of Mill creek, elev. 2,100′, and by numerous open-cuts.

LAKINAW TAGISH AND MOIRA MINES CO. **ALASKA**

No recent returns.

Mail returned from Carcross, Y. T. and Cymru mine, Moira Sound, via Ketchikan, Alaska. Had bond on Cymru mine, the Portland (or Westlake King) group and the Yukon properties, formerly held and operated by the Conrad Consolidated Mines, now dead.

LANDLOCK BAY COPPER MINING CO. **ALASKA**

Out of business. Fully described in Vol. XIV and U. S. G. S. Bull. 605, p. 97.

LATOUCHE COPPER MINING CO. **ALASKA**

Office: 600 Leary Bldg., Seattle, Wash.

Mine office: Latouche, Latouche Island, Alaska.; W. J. Rattle, gen. mgr.

Property: 7 claims, includes the Girdwood mine, adjoining Beatson-Bonanza mine of the Kennecott Copper Co., at the northern end of Latouche Island. The vein has been traced about 750′, by trenches and pits, and is developed by a 750′ tunnel, showing chalcopyrite, associated with pyrite and pyrrhotite, having small gold and silver values. There is an 1,175′ ground tram to a shipping wharf.

Shipment of 300 tons of sorted ore reported made to the Tacoma smelter in 1917, and 600 tons of 6% copper ore shipped in 1919. Property under development by the **Ladysmith Smelting Corp.**

LATOUCHE ISLAND COPPER MINING CO. LTD. **ALASKA**

Office: 330 Burke Bldg., Seattle, Wash. **Mine office:** Latouche, Latouche Island, Alaska.

Officers: Jas. A. Murphy, pres.; L. G. Wheeler, v. p.; A. E. Fraser, 2nd v. p.; C. P. McCormick, sec.; A. L. Cohen, treas.; with Tenning Carlson and H. I. Jacobs, directors.

Inc. in Washington. **Cap.** $5,000,000; $5 par.

Property: 42 claims, with about 4 miles of tidewater frontage, on the N. E. shore of Latouche Island, 60 miles S. of Valdez. The mine has 3 practically parallel N.-S. shear-zone veins in graywacke of 5 to 15′ estimated average width, with dip of 65°, proven by trenches for about 3 miles.

Ore carries bornite and chalcopyrite, with quartz gangue, averaging about 4% copper, with some gold-silver values. It closely resembles that of the Beatson mine, and is said to be amenable to flotation.

Development: by shallow shaft and 4 short tunnels.

Equipment: includes small hydro-electric plant with water wheel and an air compressor.

Little progress has been made during the past few years, but considerable development is planned.

LONDON AND CAPE CO. **ALASKA**

Property: 14 patented claims near Trail creek, Chitina district, S. E. Alaska. Copper stains found along fracture planes in quartz diorite in 245′ tunnel. Property reported idle for several years.

LOST RIVER TIN MNG. CO **ALASKA**

Property: 100 miles from Nome, in York district, Seward peninsula, has been under development since 1903.

Development: by 300′ shaft.

Equipment: includes compressors, drills, hoists. A mill is planned.

LUCKY STRIKE MINE **ALASKA**

John Hirshey, owner, Hope, Alaska.

Property: on Palmer creek, Kenai peninsula.

Ore: free gold occurs in quartz fissure vein, averaging $75 per ton. Amalgamation recovers 60%.

Development: by 400′ of tunneling. A 150′ adit was driven in 4 months of 1920.

A 400-lb. prospectors' stamp-mill is used.

MABEL MINING, MILLING & POWER CO. **ALASKA**

Address: Anchorage, Alaska.

Officers: W. E. Bartholf, pres.; F. Laubner, v. p.; T. Caveny, sec.-treas.; with J. H. Bartholf, F. McCoy and W. Martin, directors.

Inc. Nov. 1, 1915, in Alaska. **Cap.** $100,000; shares $1 par.

Property: 11 claims in Willow Creek district, said to show a quartz vein in diorite, dipping 42° S. W., with N. W.-S. E. course. Orebody varies from 1″ to 7′ in width, and yields over $50 gold per ton.

Development: by tunnels. During 1920, about 1,000′ of new work was done, and production reported.

Equipment: includes 3,500′ aerial tram, 1 mile of ditch, 10-stamp mill, crusher, and water power.

Production: $12,000 in 1916, and $10,000 from May 28 to June 26, 1917. Seasons are short, with probably not over 120 days available for surface work.

MAYFLOWER MINE **ALASKA**

Address: G. F. Johnson and J. McConnell, Strelna, Alaska.

Property: 3 claims, 60 acres, 2½ miles above foot of Kuskulana glacier and 18 miles by wagon-road from Strelna on Copper River railroad, shows a quartz vein in greenstone, cut by a prominent fault. Main copper exposure is 1,000′ above the glacier, on east side of a deep gulch. Copper minerals are bornite and glance.

Development: by 75′ tunnel, opening 100 tons of 30% copper and 18 oz. silver ore. A prospect. See U. S. G .S. Bull. 662, p. 159.

McKINLEY GOLD PLACERS, INC. **ALASKA**

Address: Prudential Bldg., Newark, N. J.

Company is a consolidation of the McKinley Placers, Valdez Creek Placer Mines, Oregon Susitna Mining companies, and other holdings near Mt. McKinley, 100 miles S. W. of Fairbanks.

Officers: P. H. Woodward, pres.; Louis C. Hay, v. p.; Geo. Flatow, sec.; Leo Flatow, treas.; with Wm. M. Brown, Glenn G. Congdon, Geo. C. Hollister, Eugene Mackey, Geo. A. Mahoney and Geo. W. Sias, directors. Geo. J. Strachan, mgr.

Inc. 1920, in Delaware. **Cap.** $11,500,000; $5 par; in 1,999,000 common, 116,000 8% 1st pfd., and 185,000 8% 2nd pfd. shares. Guaranty Trust Co., transfer agent; Equitable Trust Co., registrar; both of New York. $2,000,000 common stock offered at par in 1920 to secure funds for retirement of preferred stock.

Property: 145 claims and water rights in Valley Creek district, covering about 3,000 acres of placer ground. Examined by Forbes Rickard who reports 45,000,000 yds. of gravel available for hydraulicking with a possible gold extraction of $25,000,000. The plant, in operation, July, 1920, has a capacity of 15,000 yds. of gravel per day. Estimated operating cost placed at 5c. per yard. For geology of the district see U. S. G. S. Bull. 480, p. 114.

Equipment: includes 3½ mile ditch, 6,000′ of piping, hydro-electric power plant with dynamos, Pelton water wheels, drills, compressors, aerial tram, and 27 buildings equipped with electric light and water. Credited with past production of $400,000. Property is in a remote district and the cost of securing supplies is high, with a short operating season of about 120 days per year.

McKINLEY PLACERS **ALASKA**

See **Valdez Creek Placer Mines** and **McKinley Gold Placers, Inc.**

MINERAL CREEK DEVELOPMENT CO. **ALASKA**

Property: Hercules and Millionaire claims on Mineral creek, Port Valdez district, Prince William Sound. Country rock is graywacke. Numerous short tunnels with drifts have opened up a vein about 20″ wide carrying gold, galena, sphalerite, pyrite. Strike N. 80° W., dip 70° N. A small mill has been built to treat the ore. Season is short, from March to October.

MOTHER LODE COALITION MINES CO. **ALASKA**

Offices: 120 Broadway, New York, and Kennecott, Alaska.

Officers: Charles Earl, pres.; R. F. Foraker, v. p.; C. T. Ulrich, sec. F. W. Hilles, treas., with F. R. Raiff and J. K. MacGowan, directors.

Inc. May 1, 1919, in Delaware. **Cap.** 2,500,000 shares of no par value of which Kennecott Copper Corporation interests receive 1,275,000, equal to 51% and Mother Lode Copper Mines Co., 1,225,000, or 49%. The directors consist of 4 and 3, respectively, from these companies. Shares exchanged on basis of 1 ($10 par value) of Mother Lode Copper Mines for 1.63 in the Coalition Co. Stock quoted at $5.50 in February, 1921. The Coalition Co. paid off the Mother Lode Copper Mines Co.'s $500,000 bonds, and provided working capital not exceeding $1,000,000, to develop the property on a large scale. The Coalition Co. has a contract with the Kennecott Copper Corporation for the treatment of its ores, and is to have the benefit of the same milling, smelting, refining, freight and selling charges enjoyed by the Kennecott Copper Corporation. Corporation Trust Co., Jersey City, transer agent; Commercial Trust Co., Jersey City, registrar.

The property owned by the Mother Lode Copper Mines Co. was deeded May 20, 1919, to Mother Lode Coalition Mines and the former company is in process of liquidation.

Financial report for year ended Dec. 31, 1920, shows: receipts from ore sales $2,472,057, operating costs, $1,251,453; net earnings, $1,168,649. Total assets, $18,076,390, include current, $1,844,470. Liabilities include: capital stock, $16,822,274; 1st mortgage 6% 10-year sinking fund gold bonds $1,000,000; current, $346,931. Debit balance of undivided profits, $92,815.

Property: about 100 lode and placer claims, about 1,640 acres, includ

ing the Smith-Haglund Sall group, adjoins the Bonanza Mine of the Kennecott Copper Corporation, in the Copper River district.

The Houghton-Alaska Exploration Co.'s property to the east and adjoining the Jumbo mine of the Kennecott Corporation was acquired in Nov., 1916. It consists of 12 lode and 1 Association placer mining claims.

Geology: conditions at this property, according to Herman Keller, are similar to those at Bonanza mines. The base of the mountain is formed of amygdaloidal basalt, highly altered and called the Nicolai greenstone. This is covered by thick beds of Chitina limestone, dipping north. The ore-shoots occur in the limestone, and exploration has shown that contrary to general belief, the ore does not occur along the greenstone contact, but in a favorable bed 90' above it, and then only in connection with the Bonanza fault, or shear-zone. This shear-zone, 20 to 24' wide, cuts both greenstone and limestone and the ore is found in chimneys, and as irregular bunchy masses along the zone and as impregnations in the limestone walls. The ore consists of nearly pure glance with minor and unimportant amounts of covellite and very little malachite, etc. Principal copper mineral is chalcocite. Like the Bonanza ore, it carries gold and silver.

Development: during 1920, new work totaled 4,351' and 4,285' of diamond drilling, giving very satisfactory results. A 1,400-ft. tunnel has been driven to connect the Mother Lode and Kennecott workings. Electric locomotives are used on this level to haul ore to the Kennecott tramway. A large hoist has been installed and a 2,300 volt transmission line completed.

Production: in 1920, 72,457 tons mined containing 9,929 tons copper and 153,170 oz. silver. Cost of copper produced was 8.66 c. per lb. and the 13,803,911 lb. sold realized 16.93c. per lb.

Property has been fully and favorably reported on by Herman A. Keller, Arthur W. Jenks, and Alan M. Bateman.

MOTHER LODE COPPER MINES CO. OF ALASKA **ALASKA**

Address: 29 Broadway, New York.

Company in process of liquidation. Holdings deeded to **Mother Lode Coalition Mines Co.**, which see.

MOUNT ANDREW IRON & COPPER CO. **ALASKA**

Defunct. Former Office: Empire Bldg., Seattle, Wash. W. J. Rogers, supt., Ketchikan, Alaska, at last accounts.

Property: held under lease from the Mount Andrew Mining Co., 1¼ mile from Mount Andrew harbor on S.W. side of Kasaan peninsula, Prince of Wales island, Alaska.

Geology: ore carries chalcopyrite disseminated in magnetite, with hornblende gangue, and is practically unaltered at surface, masses of sulphide ore even showing glacial striations. Ore averages about 3.75% copper and $1 to $1.60 per ton in combined gold and silver values. The orebody has been stripped for about 2 acres and is developed by tunnels of 300' and 700', with a 70' blind shaft from the tunnel, and 10 small glory-holes, opened upwards to surface from the tunnels.

Equipment: includes two 50 h.p. boiler,s with 5-drill and 7-drill air compressors. A 4,600' aerial tram of 40 tons hourly capacity leads from a 50-ton loading bin at the mine to a shipping bunker 500' from tide water. Buildings include office, boarding house, bunk-house and smithy.

In Sept., 1917, reported shipping 1,000 tons high-grade copper ore per month to the Tacoma smelter.

MOUNT ANDREW MINING CO. **ALASKA**

Property leased to **Mt. Andrew Iron & Copper Co.** and described thereunder.

MOUNT WRANGELL COPPER CO. **ALASKA**

Controlled by same interests as Chitina-Kuskulana Copper Co.

Property: Copper Queen or Rarus group, Broken Leg and Mineral King groups on Chokosna river, Chitina valley, Alaska.

NEW MABEL MNG., MLG. & POWER CO. **ALASKA**

Office: Loveland, Colo.

Officers: Carlton E. Clark, pres.; I. J. Henderson, v. p.; Emily Kelim, sec.; J. R. Handy, treas., with L. R. Rinker, F. G. Barthold and Mary B. Sutherland, directors.

Inc. 1917, in Colorado. **Cap.**, $100,000; par $1; in treasury, 25,000 shares. Annual meeting, Sept. 1.

Property: 4 claims, 82 acres in Willow Greek district, purchased from F. Laubner and Wm. Bartholf.

Ore: occurs in vein in granite, dipping 45 degrees, and said to yield $46 in gold per ton. Only assessment work being done.

NIBLACK COPPER CO. **ALASKA**

Niblack anchorage. Prince of Wales island, Alaska. A. A. Wakefield, agent. Property formerly worked by the Niblack Copper Development Co., afterwards the Niblack Copper Co., is reported to have reverted to the Geo. M. Wakefield Mineral Land Co. Fully described in Vol. VIII, Copper Handbook. No work done on the property since 1912 and 1913 save annual representation. Niblack Copper Co. is said to still have a corporate existence.

NIKOLAI BUTTE COPPER MINING CO. **ALASKA**

Officers: Harry F. Goetz, pres.; Fred E. Grimmer, v. p.; H. G. Twomey, sec., Old Natl. Bank Bldg., Spokane, Wash.; Gus F. Eilers, treas., with A. P. Witherspoon, directors. C. A. Bode, gen. mgr., McCarty, Alaska. E. F. Wann, cons. eng.

Inc. Dec. 15, 1916, in Washington. **Cap.** $2,500,000; par $1; 1,500,000 issued. Annual meeting, July 25, in Spokane, Wash.

Property: 20 claims on Dan creek, Chitina district, about 15 miles S. E. of Kennecott Copper Corp. High grade copper ores carrying bornite, chalcocite and chalcopyrite said to occur at contact of greenstone and limestone.

Development: by tunnel to open up ore body stated to be 18' wide, averaging 35% copper. No recent return.

NORTHERN LIGHT MINING CO. **ALASKA**

Address: 1059 Mills Bldg., San Francisco, Calif.

Operates a gold dredge on Ophir Creek, Council district, Seward peninsula.

NORTHLAND COPPER-GOLD GROUP **ALASKA**

Dead. Last address, 518 Hinckley Bldg., Seattle, Wash., in 1917. See Vol. XIII.

NORTH MIDAS COPPER CO. **ALASKA**

Office: 50 Congress St., Boston, Mass. **Mine office:** Strelna, Alaska.

Officers: Willis D. Rich, pres.; F. A. Ball, v. p.; James F. Crane, sec.-treas., with A. A. Nye, W. L. Hall, J. E. Kelley, O. J. Berg, and G. M. Wheeler, directors.

Inc. Dec. 10, 1915, in Maine. **Cap** .$1,500,000; $1 par; 1,400,000 outstanding. Stock listed on Boston Curb. Annual meeting first Tuesday in June. Old South Trust Co., Boston, transfer agents. Company's secretary is registrar.

Debentures: $60,000 mortgage notes due April 1, 1921.

Property: 18 lode and 4 placer claims with mill site, near the Kuskulana river, in the Chitina district, Copper River region. Twelve mile wagon road connects with the railroad at Strelna on the Copper River and Northwestern R. R., 146 miles from the terminus at Cordova. Silver-gold occurs in a quartz vein, 1-7' thick, in porphyry, dip 45°. Copper is also present as chalcopyrite; gold and silver occur with iron pyrite.

Development: by 5 tunnels and incline shaft, aggregating 2,300'. No. 1 tunnel cut a series of alternating limestone beds and porphyritic intrusions. Cupriferous pyrite in small quantity appears in the tunnel face. Above this, another tunnel has exposed copper pyrite.

Equipment: includes compressors, 4500' aerial tram, mill with daily capacity of 20 tons, 10-ton cyanide plant, 2,200' wooden pipe line; water power, etc. Twenty men employed.

Development continued in 1920, but mill was idle.

OREGON SUSITNA MINING CO. ALASKA

Former holdings now owned by **McKinley Gold Placers Inc.**, which see.

PANDORA GROUP ALASKA

Address: Ellamar, Alaska. Geo. Valentine, Chas. Wallace, James McPherson, owners.

Property: 6 claims, on Bay of Isles, Knights island, Prince William sound, showing small lenses of chalcopyrite ore in a shear zone 2′ to 20′ wide in greenstone, said to assay 3% copper. Developed by 90′ shaft with 400′ of workings.

PARDEE-MEIER COMPANY ALASKA

Property: 14 claims on Steel creek, 14 miles from Fairbanks. Several narrow veins showing scheelite (a tungsten mineral) and molybdenite with copper, lead, gold, silver and antimony.

Development: by open cuts and short tunnels. Strike of lode system N. 20° W., dip 30° E.

Reported idle since Feb., 1918.

PATTEN CO-OPERATING CO. ALASKA

Address: Valdez, Alaska. W. E. Patten, mgr.

Cap. $100,000; $100 par.

Property: 23 claims, 475 acres, in Valdez district. Ore occurring in a contact deposit in shale contains bornite, carrying gold, silver and nickel values.

Development: by 400′ of underground workings. Small shipments were made in 1917.

Equipment: includes compressor, steam power, pump, tramway.

PEABODY ALASKA COPPER CORPORATION ALASKA

Office: Chas. L. Peabody, Room 707, 10 Wall St., New York.

Property: the Addison-Powell group of 33 claims, on Sulphide gulch, Valdez district, 4 miles from Lowe river, near Granby Cons. M. S. & P. Company's property. Said to have shear zone 1,000′ wide of green schist impregnated with chalcopyrite.

Development: by short tunnels and prospect pits.

Reported optioned to an English syndicate; if sold, the corporation will be dissolved.

PEABODY DEVELOPMENT CO. ALASKA

Office: Chas. L. Peabody, 10 Wall St., New York.

Inc. 1913, in Del. **Cap.** $700,000; par $1; fully paid.

Property: several claims on Passage Canal, Valdez district, stated to contain a gold quartz vein 3′ wide, in slate and graywacke.

Development: 113′ tunnel and crosscuts.

Reported in litigation.

PETERSON MINE ALASKA

Address: P. O. Box 198, Juneau, Alaska, or Amalga, Alaska.

Owners: Mrs. J. G. Peterson, Miss I. M. Peterson, Miss M. W. Peterson.

Property: 12 claims, 40 miles N. W. of Juneau, in the Harris district. Gold associated with arsenopyrite occurs in quartz veins, 4-6′ wide.

Development: 60′ vertical shaft with tunnels 127′ and 360′ long.

Equipment: 4 mile tramway, 3-stamp mill. Wilfley concentrator, etc. About 80% of the gold is free and is recovered on the plates. Shipments made to Tacoma smelter. Was being operated in a small way in 1920. Examined by H. S. Brockunier.

PINTA BAY MINING CO. ALASKA

Inc. 1921, in Alaska. **Cap.** $1,000,000; $1 par.

Property: gold-copper group, 6 claims on Pinta bay, 20 miles from Chichagof, Portlock Harbor, Chichagof island, fully described in U. S. G. S. Bull. 692-B.

PIONEER MINING CO. ALASKA

See Pioneer Mining and Ditch Co.

PIONEER-MINING AND DITCH CO. **ALASKA**

Formerly Pioneer Mining Co.

Office: 509 Balboa Bldg., San Francisco, Cal., and Nome, Alaska.

Officers: Jafet Lindeberg, pres.-mgr.; E. O. Lindblom, v. p.; J. E. Chilberg, sec.; G. W. Campbell, treas., with W. H. Metson and J. L. Hagelin, directors.

Inc. Dec. 27, 1901, in Washington. **Cap.** $2,500,000; $1 par; all issued.

Profit for year ended Dec. 1, 1916, was $242,904, of which $100,000 was paid as No. 17 dividend. Surplus at end of year was $240,153. No recent returns.

Dividends: 8% in 1902; 11% in 1906; 12% in 1907; 3% in 1908; 9% in 1909; 6% in 1910; 3% in 1911; 2% in 1915, and 4% in Jan., 1917; a total of 58% or $2,900,000.

Property: placer areas in the Nome district, Alaska, worked by hydraulicking since 1899. They are fully equipped and plant stands in accounts as worth $57,428. Company controls the Miocene Ditch and United Ditch companies.

The president, Jafet Lindeberg is under indictment for various offences and company involved in litigation.

PLATINUM PALLADIUM PRODUCING CORP. **ALASKA**

Address: 1414 Alaska Bldg., Seattle, Wash. Mine address: Ketchikan, Alaska.

Officers: J. E. Chilberg, pres.-mgr.; H. R. Chilberg, v. p.; M. Chilberg, sec.-treas., with J. A. Moore, A. G. Larson, directors.

Inc. Nov. 8, 1920, in Wash. **Cap.** $1,500,000; $10 par; all outstanding. U. S. Corp. Co., N. Y., registrar and transfer agent. 150,000 shares listed on N. Y. Curb. Bonded debt; $300,000 1st mortgage 8% convertible gold bonds.

Property: 29 claims, 16 fractional claims and a mill site, 700 acres, includes the Salt Chuck mine on Kasaan bay, Ketchikan district, Prince of Wales island. The ore contains mainly bornite and chalcopyrite in a gabbro country rock, averaging 7.5% copper; 0.02 oz. gold; 0.20 oz. silver; 0.01 oz. platinum; 0.09 oz. palladium. For geology see U. S. G. S. Prof. Paper 87.

Development: by 1,225′ tunnel to depth of 300′.

Equipment: compressor, engine, surface tram, 150-ton mill and flotation unit. The mill will be enlarged to 250 ton capacity. About 25 men employed.

Production: in 1920 was 13,862 tons of ore, or 554 tons concentrate, containing 405,525 lb. copper; 599 oz. gold; 3,356 oz. silver; 23 oz. platinum; 1,422 oz. palladium.

QUIGLEY MINE **ALASKA**

Owners: Quigley & Dalton.

Property: 20 claims on Quigley Mtn., in the Kantishna district of the Yukon Basin. Silver-lead and copper ores occur in 2 shoots, a few hundred feet apart, one 200′ in length.

Development: by shafts, 40 and 100′ deep, and tunnels, 130 and 300′ long. Equipped with grizzly and sorting table, as only 200 oz.-silver ore can be shipped with profit.

Thos. P. Aitken has been operating the property under an option for the past three years.

RAE-WALLACE MINING CO. **ALASKA**

Address: A. G. Kennedy, Gyde-Taylor Bldg., Wallace, Idaho. **Mine address:** D. S. Rae, Wasilla, Alaska.

Officers: Don S. Rae, pres.-mgr.; A. G. Kennedy, sec.-treas.; with J. Wood, H. M. Childs, Fred Porter, directors.

Property: 11 claims, and an option on the 3 Sylvanite claims adjoining on Fish creek, near the Martin and Marble mines, in the Willow creek district, Alaska, 21 miles from Wasilla, the nearest R. R. station. Six veins have been opened. Ore carries free gold and averages $35 per ton. Work is only done during the summer and fall.

Development: by tunnels and drifts, 300′ of the latter having been done recently. Reserves are said to be fairly large. With equipment, $50,000 has been spent to 1921.

Equipment: includes 3 oil engines, 2-drill compressor, hoist, crusher, 2 Gibson mills and amalgamating tables, 2,000′ aerial tram, shops, and complete camp.

RAMSEY-RUTHERFORD GOLD MINING CO. **ALASKA**

Mail returned from Valdez marked "Out of business". Inc. in Sept., 1913.

Property: 10 miles N. E. of Valdez at an elevation of 3,500′.

Ore: free milling gold quartz in fissure veins in graywacke.

See U. S. G. S. Bull, 642, p. 190, and The Mines Handbook, Vol. XIV.

READY BULLION MINE **ALASKA**

See **Alaska Treadwell Gold Mining Co.**

READY BULLION MINE **ALASKA**

Address: Hollis, Prince of Wales island, Alaska, formerly called the Puyallup mine.

Ore: free milling, occurs in quartz vein, averaging 6″ to 7″ in width, and in places 3′ wide, having well defined walls, inclosed in quartz-diorite.

Development: by 3 tunnels; one, 1,160′ long, is driven along vein, stoped for length of 1,100′ to an average height of 150′ to 250′.

Equipment: includes Pelton wheel, compressor, electric-light plant, 5-stamp mill. See U. S. G. S. Bulls. 642 and 662, pp. 79 and 65.

Produced both bullion and concentrate.

REGAL MINES CO. **ALASKA**

Subsidiary of the Great Northern Development Co., which see.

Office: 77 Franklin St., Boston, Mass. **Mine Office:** Kennecott, Alaska.

Officers: Walter M. Briggs, pres.; H .I. Gaskill, sec.-treas.; with James Phillips, Jr., C. Hartman Kuhn, Chas. S. Farnum, Mulford Martin, E. F. Gray, W. M. Brigg-, I. M. Satterfield, directors. E. F. Gray, gen. mgr.

Inc. 1912 in Maine. **Cap.** $250,000; $5 par; issued $28,011. Annual meeting, November 2.

Property: 17 claims, 340 acres, near Kennecott, Copper River district. Developed by 115′ shaft sunk on a contact between limestone and greenstone and showing copper glance ore. Assessment work only in recent years.

REYNOLDS-ALASKA DEVELOPING CO. **ALASKA**

Office: 1182 Broadway, New York. **Mine office:** Latouche, Latouche Island, Alaska.

Officers: Marvin F. Butler, pres.; H. M. Coffin, v. p.; J. Frank Birdsell, sec.-treas.; with A. T. Austin, F. A. Reynolds, W. C. Gilbert, John Yule, O. C. McGilvara, Geo. K. Hinds and G. B. Wrigman, directors.

Inc. 1903 in Washington. **Cap.** $3,000,000; $1 par; in $1,000,000 cumulative 6% preferred and $2,000,000 common stock. Authorized March 3, 1908, a $500,000 twenty-year 6% gold bond issue; issued, $125,000. Annual meeting, first Tuesday in April.

Company was in receiver's hands until June, 1910, when discharged by court order. Former management fully described in Vol. X, Copper Handbook.

Property: 102 claims, about 2,000 acres, in Valdez district, Prince William sound.

The Boulder Bay group of 31 claims, 620 acres, is on the mainland at eastern side of Prince William sound. Claims shows a contact deposit between greenstone and slate, carrying chalcopyrite said to assay up to 11% copper and $3 gold per ton, but averaging 2 to 4% copper. Developed by 2 tunnels. Equipment includes a 60 h. p. boiler and a 5-drill air compressor.

The Iron Mountain group of 62 claims includes the Duchess and Duke properties, on Horseshoe bay, Latouche island. The footwall in both properties is black slate; graywacke forms the hanging wall. The ore consists of chalcopyrite with pyrite and pyrrhotite. The Duke mine has a 4′ vein

of ore, said to have averaged 7% copper, slightly developed by a shaft now filled with water.

The Duchess mine, last worked in 1916, when 400′ of drifting was done on the lower tunnel, is developed by 2 tunnels, the upper a 375′ drift tunnel, and the lower having 500′ of drifts on the orebody, which has an average width of 25′ This group shows massive sulphide ore, estimated by the management to average about 3% copper. Assessment work only has been done since 1916.

In 1916 the Duke shaft was unwatered and sunk to depth of 110′ and the orebody reported to show a maximum width of 27′ along a length of 140′ of undeveloped ore. Drifts are 300′ below the lower Duchess tunnel. Ore is of similar character and value to that in the Duchess. Estimated ore opened above lower Duchess tunnel is said to be over 600,000 tons, averaging 2% copper, $2 gold, 40% iron and 43% sulphur; maximum width of orebody in last completed crosscut was 124′, with average width of 25′ for a developed length of 500′.

Equipment: includes a 200 h. p. hydro-electric installation, with a flume and steel pipe leading from Big Falls creek to a Pelton wheel, direct-connected to two 40 k. w. generators; a 50 h. p. hoist and 2 air compressors, of 5 drills aggregate capacity, with 6 air drills and 10 electric drills. In 1920 company obtained U. S. Gov. patent to 16 claims of the Iron Mountain group, covering 6,000′ of the lode line, the water power and harbor frontage. See U. S. G. S. Bull. 662, pp. 206-208.

RICH HILL MINE — ALASKA

Owner and Operator: Henry Andrews, Kasaan, Alaska.

Property: 5 claims containing a fissure vein in lime and granite, developed by 54′ shaft and 130′ tunnel. Ore is chalcopyrite with some gold and silver. Gross production 1918, $14,036; expenses, $6,548.

RUSH & BROWN MINE — ALASKA

Address: Kasaan, Prince of Wales island, Alaska. U. S. Rush, owner and operator.

Property: 24 claims, 480 acres and two 5-acre mill sites, near the head of Kasaan Bay, 8 miles N. W. of Kasaan. The claims show greenstone intruded by granodiorite and carry three orebodies, 2 in E. W. shear zones in the greenstone, the third orebody along the greenstone-diorite contact. The latter carries magnetite-chalcopyrite ore in a body of unknown extent, but opened for 200′ in length, width of 63′ and to a depth of 120′.

One shear zone contains the sulphide body. The ore occurs as massive chalcopyrite in stringers, bunches and lenses, and also as a commercial impregnation of the greenstone and chloritic schists. The massive chalcopyrite, without waste, assays 20% to 30% copper, with $12 to $18 gold. The lenticular shoots of the clean ore run with the shear zone, and are as much as 7′ thick. Pyrite, quartz and calcite are practically absent. The sulphide body, in which this ore occurs has an average width of 14′, varying from 8′ to 20′ between the walls, with dip of 55°.

On the footwall side, and at a distance of 30′ from the hanging wall, a parallel vein, evidently in the same shear zone, has been exposed for 45′ on the 200′ level.

Development: includes 177′ vertical shaft connecting by drift with incline shaft to 500′ vertical depth, with drifts at 50′ intervals. On 400′ level drift is 450′ long. In last few years, work has been largely confined to the smaller orebody, consisting of a rich chalcopyrite ore shoot in a mineralized gangue of graywacke.

Equipment: includes a steam plant with 2 hoists, necessary mine buildings, saw-mill and 528 cu. ft. compressor. Ore is taken over a 3-mile private railway of 42″ gauge to Venus Bay.

Production: for 1918, 403,512 lbs. copper, 3,460 oz. silver, 609 oz. gold. No later figures available. Mine considered promising. Seventeen men employed, and shipments made to Anyox smelter, 1920-21.

RUSSELL BALL COPPER CO. **ALASKA**
Probably dead; see Vol. XIV.

SALT CHUCK MINING CO. **ALASKA**
Inc. July, 1917, to operate the Salt Chuck mine on Kasaan Bay, taken over in 1920 by **Platinum Palladium Producing Corp.**, which see.

SEA COAST MINING CO. **ALASKA**
Holdings taken over by **Alaska Hercules Mining Co.**, described in Vol. XIV.

SEATTLE-ALASKA COPPER CO. **ALASKA**
Probably dead. Fully described in Vol. XIV.

SHELIKOF MINING CO. **ALASKA**
Address: Kodiak, Alaska, and Carroll Hendron, 701 New York Blk., Seattle, Wash.
Officers and directors: Z. T. Halferty, pres.; F. S. Golding, v. p.; Carroll Hendron, sec.-treas.
Inc. Jan., 1916, in Washington. **Cap.** $500,000; $1 par; 105,000 issued. Annual meeting in April.
Property: 7 claims, 154 acres, on Alaska peninsula, in the Katmai reservation. Claims show a contact deposit, carrying copper in granite and diorite. Shoots said to be 10′ wide, assaying 36% copper. Openings by tunnels.

SNOWSTORM GROUP **ALASKA**
M. B. Anderson, owner, Ellamar, Alaska.
Property: 4 claims, at Unakirk Bay, Prince William sound.
Ore: occurs in quartz vein in limestone, carrying gold, silver, copper and some zinc. A 65′ tunnel has opened ore to a depth of 40′. A prospect.

STANDARD COPPER MINES CO. **ALASKA**
Probably out of business. Fully described in Vol. XIV.

TALKEETNA MINING CO. **ALASKA**
Address: Wasilla, Alaska. Reported under lease to W. R. Hocking, of Seattle, Wash.
Officers: D. M. Fulton, pres.; E. H. Bartholf, v. p.; C. T. Hatcher, sec.; K. I. Fulton, mgr.-treas., with H. McGregor, directors.
Inc. Sept. 25, 1915, in Washington. **Cap.** $1,000,000; $1 par; 800,000 issued. Annual meeting 1st Monday in October.
Property: 8 claims in Willow Creek district, about 40 miles N. of Anchorage, said to show a 2′ quartz vein in diorite, carrying gold ore assaying $10-$200 per ton.
Development: by several tunnels, longest 130′.
Equipment: includes 2 aerial tramways and 15-ton mill.
Producing 1919-20, but no figures available.

TEIKELT GOLD MINING CO. **ALASKA**
Address: E. E. Ritchie, Valdez, Alaska.
Is a development company working on a small scale.

THOMAS-CULROSS MINING CO. **ALASKA**
Probably dead. See Vol. XIV.

THREE MAN MINING CO. **ALASKA**
Office: 31 Nassau St., New York. Mine office: Landlock, Prince William sound, Alaska.
Officers: H. C. Bryan, v. p.-sec.; Duncan Edward, treas.; officers are the directors. W. A. Dickey, gen. mgr.
Inc: in New York. **Cap.** $1,000; $100 par; fully issued. Is a close corporation, having only 3 shareholders.
Property: 43 claims, 10 patented, 812 acres, on tidewater, at Landlock bay, in the Valdez district of Alaska, giving the company nearly a mile along a great shear zone, only one end of which has been developed. The property, which has been under continuous development since 1903, is said to show 10 orebodies with a general E.-W. strike, occurring as fissure veins and as replacement deposits in shear zones in greenstone and slates. Orebodies reported to average 8′ in width and to carry chalcopyrite ore in lenticular shoots averaging 10% copper. Low-grade ore is continuous, with rich ore

found mainly on the footwall in paystreak of 1 to 8′ width, the largest shoot carrying massive chalcopyrite, assaying 10% copper, 1 oz. silver and 50cts. gold per ton. The quantity of low-grade ore of concentrating tenor is very much greater than that of the smelting ore, but it is not available for present use.

Development: by tunnels, with 6,000′ of workings. Six levels have been opened up on one orebody, giving a little over 600′ of stoping depth on the ore. Another orebody has been opened up on 3 levels, giving about 500′ of stoping depth. No stoping has been done, all ore produced having been extracted from levels and upraises. Company claims to have over 200,000 tons of 3% copper ore developed.

The mine has no machinery or power equipment, owing to development by tunnel, but has 14 buildings, with ore bunkers on a wharf at tidewater, connected by a short ground tram with the portal of the 5th level.

Production: about 600 tons of 10% ore were shipped, 1910, to the Tacoma smelter, yielding 120,000 lb. fine copper, and over 3,000 tons of 10% ore yielding 610,000 lb. fine copper in 1912. No shipments were made in 1913, 1914 and 1916, but in 1915, 300,000 lb. copper was produced. Over 5,000 tons of 10% ore have been shipped. Total production to date is about 1,000,000 lb. copper, shipments being under name of W. A. Dickey. Property considered promising.

UNITED METALS CO. **ALASKA**

See Alaska Metals Co. Property is the Corbin mine, near Coppermount.

VALDEZ CREEK PLACER MINES **ALASKA**

Office: 705-8 Newport Bldg., Boston, Mass. Mine office: McKinley, Alaska.

Officers: G. W. Sias, pres.; F. E. Nye, v. p. and sec.; R. B. Griffin, treas.; also trustees.

Inc. Nov. 1, 1911, recognized as an Express Trust Co., in Massachusetts, called McKinley Placers. **Cap.** $2,500,000; shares of no par value; 2,408,186 issued. **Bonds:** $500,000 authorized, of which $454,100 are outstanding. Property fully described in Vol. XIV, was taken over by **McKinley Gold Placers, Inc.**, which see.

Bondholders of the Valdez Creek agreed to accept 1st preferred stock of the McKinley Gold Placers at par; and to discharge mortgages and foreclosure proceedings instituted at time of the reorganization.

VALDEZ GOLD CO. **ALASKA**

Formerly Cameron-Johnson Gold Mining Co.

Address: R. B. Kenyon, treas., Yakima, Wash., or Valdez, Alaska.

Directors: Geo. S. Rankin, W. A. Bell, Geo. Ker, Alex. Miller, Chas. S. Mead, J. M. Bruce, and H. Y. Saint. J. D. McDougall, supt.

Cap. $750,000; 50c par; $600,000 outstanding January, 1919.

Property: 26 claims on the right side of Shoup Glacier, N. W. of Valdez, which show fissure veins in gravwacke and argillite.

Ore: free milling gold quartz. About 3% of the ore is said to be sulphides of iron, lead and zinc.

Development: by tunnels. The upper workings are mainly on the Treasury Note vein, said to show from 3″ to 36″ ore. Lower workings are chiefly on the Mazuma claim, said to have the largest vein, as well as lowest grade on the property. A 2,000′ tunnel is being driven to cut 9 veins. A little ore was produced in 1920.

Equipment: includes a 3,850′ aerial tram, 5-stamp mill, a 7′ Lane mill, concentrator and bunkhouse. Power is supplied by a No. 3 Pelton water wheel operating under a 240′ head. Fifteen men are employed on the property. See U. S. G. S. Bull. 662, p. 192.

VALDEZ MINING CO. **ALASKA**

Property: a group of claims on W. side of Valdez glacier, Port Valdez district, 8 miles inland from Prince William sound. A 3 to 8′ quartz vein cuts interbedded schistose graywacke and slate; the ore value is in gold, sometimes high-grade.

Development: by adits, longest 800′ of which 400′ was driven in 1920. Equipped with mill which operates on ore produced by development.

VICTORY COPPER MINING CO. ALASKA

Probably deod. Fully described in Vol. XIV.

VIRGINIA MINE ALASKA

Property: a gold mine on the Kenai peninsula, equipped with mill which was operating in 1920.

WARD COPPER CO. ALASKA

Office: J. S. Eaton, 141 Broadway, New York. Mine office, Teller, Alaska.

Officers: J. S. Eaton, v. p.; T. A. Ward, sec.; Francis Purnell, treas.

Inc. 1918. **Cap.** $250,000; 50,000 outstanding.

Property: on Kougrak Mtn., 50 miles inland from Port Clarence bay, developed by shallow shafts. Ore is mainly azurite and malachite, small shipments running 30% copper. Present high cost of transportation delays profitable operation of the property.

WILD GOOSE MNG. & TRADING CO. ALASKA

Address: 354 Pine St., San Francisco.

Operates a gold dredge on Ophir Creek, Council district, Seward peninsula.

WILLOW CREEK DEVELOPMENT CO. ALASKA.

Address: M. D. Leehey, 620 Alaska Bldg., Seattle, Wash. **Mine office:** Wasilla P. O. via Seward, Alaska.

Officers: L. C. Thompson, pres.; H. Doheny, v. p.; Archibald Beck, treas.; M. D. Leehey, sec.; N. B. Bothwell, mgr.

Property: Gold Bullion mine, 14 claims, on Willow creek, 185 miles from Seward, operated spasmodically since 1911 and credited with a total production valued at $1,200,000. **Ore:** free milling, occurs in quartz vein 24′ wide and said to be proven for length of 3,500′.

Development: by several tunnels. Present owners purchased the mine in 1920 from the Gold Bullion Mng Co. for $500,000, did 700′ of drifting and installed a large cyanide plant. A 500-ton hydro-electric power plant and compressor to be installed in 1921.

WILLOW CREEK MINES ALASKA

Probably dead. See Vol. XIV.

YORK TIN DREDGING CO. ALASKA

Operates a dredge on Grouse creek, Seward peninsula, 100 miles N. W. of Nome. Produced 55 tons concentrate averaging 69.76% tin in 1918.

ARIZONA

Arizona leads all other states in copper production. Its metal production has been as follows:—

Year	Copper lb.	Gold oz.	Lead lb.	Zinc lb.	Silver oz.	Value
1921....	163,087,000	147,363	5,182,000	.....	2,179,000	.....
1920.....	558,256,302	231,528	14,355,929	1,457,296	5,355,303	$114,609,077
1919.....	538,101,844	217,997	10,203,078	1,717,000	5,266,605	111,157,872

A. B. C. MINING CO. ARIZONA

Address: Phoenix, Ariz.

Officers: Ned Creighton, pres.; Jas. Letson, v. p.; C. P. Lee, sec.-treas., with D. F. Gary and W. P. Kyne, directors.

Property: A. B. C. Mine, developed to depth of 600′. Operated intermittently in 1920.

ABE LINCOLN COPPER CO. ARIZONA

Address: E. W. Getter, sec.-treas., Citizen's Nat'l Bank Bldg., Los Angeles, Calif.

Officers: G. W. Platner, pres.; V. P. Unitt, v. p.; W. H. Dudley,

v. p.; with W. H. Wood, A. E. Mack, J. H. Bulla, W. F. Denny and R. McPhail, directors, all of Omaha, Nebr. C. E. Nathorst, mgr.

Property: the Abe Lincoln mine 12 miles N. E. of Wickenburg, near the Monte Cristo, Silver Bar and Eagle mines.

Development: by 2,000′ of workings, with shaft completed to the 700′ level. Assays gave 12% copper, 12 oz. silver, $5 gold per ton. In the tunnel being driven to connect with shaft the vein is stated to be 10′ wide with high copper content,12 oz. silver and $10 gold per ton. Other lower grade veins exist.

Equipment: includes 50 h. p. hoist, 5-drill compressor and a 50-ton mill with flotation unit.

Shipped high-grade chalcopyrite ore from tunnel in 1919-20. Reserves claimed to be sufficient for 200 tons daily output for some time.

ACME MINING & REDUCTION CO. **ARIZONA**

Idle. Mail returned from former address in Tucson, Ariz. See Vol. XI, Copper Handbook.

ADAMS EXTENSION M. CO. **ARIZONA**

Address: Leslie C. Monks, 739 Merchants Natl. Bank Bldg., Los Angeles, Calif.

Property: in Katherine mining district, Mohave country, near Oatman.

ADAMS GOLD MINING CO. **ARIZONA**

Address: 636 I. W. Hellman Bldg., Los Angeles Calif. **Mine address:** Thos. Kilker, Supt., Kingman, Ariz.

Officers: E. H. Newlan, pres.; N. A. D'Arcy, sec.-treas.-gen. mgr., with C. H. Palmer, Jr., and M. Lines, directors.

Inc. Dec., 1915, in Arizona. **Cap.** $100,000; 10c. par; assessable; issued 734,000. Annual meeting, first Monday in February. Listed on Los Angeles Stock Exchange. Assessment of 1c. per share levied Nov., 1920.

Property: 9 claims in the Black Range section of the Oatman district, adjoining the Nellie mine. These claims were abandoned in 1920 after an unsuccessful attempt to find a commercial ore body. Company reported to have since acquired new holdings near the Sunbeam group in the Katherine-Union Pass district.

ADAMS MINING CO. **ARIZONA**

Property transferred to Adams Gold Mining Co.

ADJUST MINING CO. **ARIZONA**

Address: Winkelman, Arizona.

Officers: P. R. McDowell, pres.-treas.; C. L. McDowell, v. p.; B. C. Burgess, sec.-gen. mgr.

Inc. in Arizona. **Cap.** $1,000,000; $1 par.

Property: 10 claims in Saddle Mountain district, traversed by 4 fissure veins. Developed by tunnels and drifts. Shipments from June to December, 1920, totaled 325 tons averaging $42.18 per ton. The mine is 2 miles by trail from Christmas, the nearest station on the Arizona Eastern R. R.

AJAX METAL MINING CO. **ARIZONA**

Office: 312 Cooper Bldg., Denver Colo.

Officers: Nat P. Wilson, pres.; W. H. Wilson, v. p.; S. O. Foxworthy, sec.-treas., with C. S. Campbell, M. E. Peters, directors. M. H. Wilson, mgr., 1440 Stanley Ave., Hollywood, Calif.

Inc. Oct., 1916, in Arizona. **Cap.** $1,500,000; par $1; issued 824,897. Transfer office and registrar: Peters Trust Co., Omaha, Nebr. Annual meeting, first Tuesday in October.

Property: 24 claims, patents pending, totalling 498 acres, California district, Chiricahua Mts., Cochise county. Said to show "disseminated" ore occurring in a porphyry dike 220′ wide. Values reported to average 8% copper, 9% lead, 6 oz. silver.

Development: by 210′ shaft and 3000′ of workings; will sink to a depth of 650′ in near future.

Equipment. includes electric hoist, compressor and pumps. Management proposes to erect a flotation mill.

AJO CONSOLIDATED COPPER CO. **ARIZONA**

Property purchased in 1917 by New Cornelia Copper Co., which see. Fully described in Vol. XII.

AJO CORNELIA COPPER CO. **ARIZONA**

The State Corporation Commission, after inspection of the company's books, ordered a public sale of the Ajo Cornelia property to be held March 8, 1919, to satisfy a claim of the E. J. Longyear Co. for $2,000. Fully described in Vol. XIV. Property now owned by Copper Ridge Mng. Co., which see.

AJO GUNSIGHT MINING CO. **ARIZONA**

Address: Ajo, Ariz.

Property in the Gunsight mountains, 20 miles S. E. of Ajo, is said to show a main vein 25′ wide, with gold values of from $10 to $20 per ton for small block of developed ore.

AJO MINES CORPORATION **ARIZONA**

Address: J. F. Dietrich, supt., Douglas, Arizona.

Officers: .P. L. McCabe, pres.; J. F. Dietrich, v. p.; M. C. Hankins, sec.-treas., with J. E. Newbury, Gus Nelson, A. R. Wood and A. B. Murchinson, directors.

Inc. August 2, 1920, in Arizona. **Cap.** $1,000,000; $1 par; 24,000 shares outstanding.

Property: 7 claims, in Quijotoa district, Pima county, 85 miles W. of Tucson and 42 miles S. of Ajo. Ore, found in a contact fissure reported to average $25 per ton.

Development: by 150′ shaft. A prospect .

AJO PIMA COPPER CO. **ARIZONA**

Address: Harvey B. Thomas, care Valley Bank, Ajo, Ariz.

Controlled by Harvey B. Thomas, C. B. Zingg, Emory Orr, W. B. Hager, J. W. Moyes, J. R. Grant, Theo. C. Thomas and R. M. Boller.

Property: .24 claims, 480 acres; one group of 20 claims adjoining and lying contiguous to New Cornelia Copper Co., the remainder lying separate and apart from main group, about 2,000′ in a southerly direction, all in the Ajo district, Pima county. The general geology is said to be identical with that of New Cornelia and Ajo Consolidated, and surface indications are considered good.

Development: by shallow shafts and trenches on numerous outcrops. One shaft is down 25′ on a stringer of high-grade copper ore pitching toward the contact which is highly mineralized and can be traced through property for several thousand feet. Shallow pits along this formation have exposed good ore. Company is seeking capital for development.

ALADDIN MINING CO. **ARIZONA**

Presumably defunct.

W. A. Kent, mgr., Prescott, Ariz., wrote in 1919; "I do not feel at liberty to fill out blanks you send. All those entitled to receive the information asked for receive it direct." Company had a 5-year lease on Paymaster mine and 8 other claims, the property of the Oriental Mining Co., in Big Bug district, near Poland. Lottie mine of same group has 4,400′ tunnel and 20-stamp mill.

ALAMO GOLD MINING CO. **ARIZONA**

Office: Rol. King, 304 Wilcox Bldg., Los Angeles, Cal.

Officers: B. A. Kipp, pres.; Calvert Wilson, v. p.; Rol. King, sec. and mng. director; with J. S. Parlin, directors. J. V. Allison, supt.

Inc. Aug., 1917. **Cap.** $1,000,000; $1 par; 700,000 issued. All owned by officers.

Property: 6 claims in Alamo Springs district, Yuma county. Development: by 507′ incline shaft and 55′ Kipp shaft.

Equipment. includes 12 h. p. hoist, compressor, jack-hammers.

ALCYONE MINING CO. ARIZONA

Office: Oatman, Ariz.

Officers: W. O. Wright, pres.; Niels Buck, v. p.; Chas. F. Pugh, sec.-treas.-mgr., with H. C. Topp and H. T. Becker, directors.

Inc. Nov., 1915, in Arizona. **Cap.** $100,000; par 10c; 700,000 issued.

Property: 4 claims, now being patented, in San Francisco district, 2½ miles south of Oatman. Mine shows a quartz fissure vein in andesite; strike N. 80° E., dip 68°. Ore, free milling gold, said by company to run $42 per ton.

Development: by 415′ incline shaft and 800′ underground workings. The crosscut west on the 400′ level was in 450′, May, 1921, cutting numerous small veins.

Equipment: 60 h. p. hoist, compressor, etc. Management plans further drifting, diamond drilling, and sinking.

ALGONKIAN MINES CO. ARIZONA

Office: 8 W. 40th St., New York. **Mine address:** Crown King, Yavapai county. A. J. Heath, mgr.

Officers: Geo F. Shurtleff, pres.; John B. Frich, v. p.; John L. Schellenberg, sec.; J. Edward Michel, treas., with Ralph H. Cameron, directors.

Inc. 1910, in Arizona. **Cap.** $1,000,000; $1 par; 402,645 outstanding. Registrar & Transfer Co., N. Y., transfer agent.

Property: 17 claims, 5 patented, 335 acres, in Bradshaw mountains, 4 miles east of Crown King, Yavapai county. Fourteen claims are said to be along a shear zone, paralleling a diabase monzonite contact. The schist is intruded by several porphyry dikes or sheets parallel to the schistosity. Mineralization is said to occur in the porphyry at the diabase contact.

Development: by tunnels and shaft totals 2,400′. The lower or Algonkian tunnel, 1,100′, runs along the dike contact, on the Anaconda claim. For 350′ it is reported to follow the apex of an ore shoot: a raise run from the tunnel to the surface at 322′, is said to be on the orebody. This air shaft continues as a 50′ winze below the tunnel and a drift N. from the bottom shows galena with occasional bunches of glance and chalcopyrite. Equipment, sold, 1919.

Presumably idle. Company is a Cameron-Michel corporation.

ALPHA COPPER MINING CO. ARIZONA

Office: 34 S. Stone Ave., Tucson, Ariz.

Officers: John W. Bogan, pres.; R. J. Monahan, v. p.-mgr.; Geo. P. Myers, sec., with F. S. Lockwood, J. L. Toohey, J. W. Bogan and John Nelson, directors.

Inc. Oct. 7, 1916, in Ariz. **Cap.** $1,000,000; $1 par; increased from $500,000 March 16, 1917; 350,000 shares in treasury. Last offering of 100,000 shares at 50c. made in May, 1917.

Property: 22 claims, about 450 acres, including the Pima and Frie groups, situated midway between Mineral Hill and Twin Buttes camps San Xavier district, Pima county. The tract is underlain by granite cappe on the hills by quartzite and traversed by two different sets of veins, both metalliferous. The fracturing is complex and the veins associated with porphyry and andesite dikes, and wide breccia zones.

Ore: carries silver and copper as chalcopyrite and gray copper (tennantite) with silicious gangue. The Pima mine, opened to 150′ in depth 1876, produced $85,000 in silver.

Development: by 215′ shaft on the Pima vein with levels at 150 and 200′ cutting 2 veins, 4′ to 5′ wide, with stopes above 150′ level yielding ore that ran 37.2 oz silver and 3.55% copper.

Equipment: adequate for existing needs only, includes 2 gasoline engine hoists, pumps.

Reported on by W. Tovote, who said property appears to have merit. Assessment work only being done.

ALTA MINING & SMELTING CO. ARIZONA

Idle. Mail returned, 1916, from former offices at Superior, and Florence, Pinal county, Ariz.

Property reported sold, 1917. Fully described Vol. XIV.

ALVIN DEVELOPMENT CO. ARIZONA

Office: Houghton, Mich. Controlled by **Tank Pass Consolidated Mining Co.,** Salome, Yuma county, Ariz. Idle except for annual assessment work. Described Vol. X.

AMERICAN BOY MINE ARIZONA

Owned by Geo. Clarke, J. Petersen and J. B. David, Patagonia, Santa Cruz county, Ariz., but bonded to A. F. Gross of Duluth, Minn. Harry Armstrong, supt.

Property: 6 claims near Patagonia, shows several veins from 6" to 18" wide. Ore contains gold, silver, copper and lead, and is said to average $5 gold, 12 oz. silver and 10% copper.

Development: by an 80° incline shaft, 120' deep and a 370' tunnel that cuts the bottom of shaft. On the 40' level 200' of drifting has been done, on the tunnel level 250'. The small shipments made have consisted of ore extracted by development work. The tunnel was reported being retimbered early in 1921.

AMERICAN CELTIC COPPER CO. ARIZONA

Out of business. See Vol. XIII for description.

AMERICAN EAGLE CO. ARIZONA

Probably dead. **Former address:** E. C. Lane, mgr., Parker, Ariz.

Property: in the Cienega district, Yuma county, reported to have made several shipments of copper ore to smelter averaging 20%.

AMERICAN FLAG SILVER MINING CO. ARIZONA

Office: Kingman, Ariz.

Officers: H. K. Le Claire, pres.; W. C. Rannels, v. p.; Albert J. Rigalli, sec.-treas.

Cap. $1,000,000; par 50 cents. 1,000,000 shares were paid for the property and for organization purposes.

Property: 7 claims, in Maynard district, Mohave county, said to have produced rich silver ore in past; idle for about 30 years. Some high grade ruby silver ore has been extracted recently by prospectors.

Mine reported taken over early in 1921 by F. P. Aylwin and associates.

AMERICAN MOLYBDENUM CO. ARIZONA

Dead. See Vol. XIV.

AMERICAN ORE CORPORATION ARIZONA

Address: R. S. Billings, Kingman, Ariz.

Reported to have taken over the property of **Copper Butte Mines Co.,** which see.

ANACONDA COPPER GROUP ARIZONA

Owner: D. W. Arte, P. O. Box 741, Bisbee, Ariz.

Property: 11 claims, 3 patented, in Warren district, covering a lime-quartzite contact, 2,600' west of the Shattuck, 1,600' west of the Higgins, and adjoining the Copper Queen on S. E. and N. W. A 35' shaft has been sunk on the contact. Assays along contact reported to carry $1.30 gold and 1.65% copper.

ANDERSON & BIRCH ARIZONA

Operated a mill and mine, 2 miles west of Humboldt, Yavapai county, in 1918. See Vol. XIV.

ANGLO SAXON SMELTING & REFINING CO. ARIZONA

Officers: J. E. Russell, mgr.-dir. Bank of Ariz. Bldg., Prescott, Ariz.

Hugh Rose Croup, pres.; Robt. L. Service, sec., with G. G. Lemons, directors.

Inc. 1916, in Arizona. **Cap.** $1,500,000. The company was to be financed in England.

The corporation had a lease on 200 acres of land from the City of Prescott for a smelter site and had also acquired several water rights. During the war no active work was carried on. Reported June, 1919, that the company died during the war.

ANTELOPE MINING CO. **ARIZONA**

Property: near Kelvin, Pinal county, owned by W. E. Hanney and associates of Kansas City, Mo. Examined 1919 by Alfred Roos of Tucson.

ANTELOPE PEAK COPPER CO. **ARIZONA**

Officers: F. A. Meyer, pres.; W. F. Hanny, mgr.; M. G. Tarr, supt. **Inc.** 1909.

Property: 15 claims, 12 miles from Winkelman, said to show a vein of 7% copper ore, 7′ wide, and opened for 200′ in length.

Development: to depth of 400′ by shafts and drifts.

Equipment: includes compressor, drills and 25 h. p. hoist. Development work is in progress and small shipments reported made in 1919-1920.

AOTMAN PIONEER GOLD MINES, INC. **ARIZONA**

Idle.

Address: Oatman, Ariz. Officers: R. G. Tryon, pres.; Geo. F. Moser, sec.-mgr.

Inc. in 1915. **Cap.** $1,500,000; $1 par; all outstanding.

Property: 6 patented claims, including the Pioneer, formerly owned by the Pioneer Cons. Mines Co., 2 miles from Oatman. The Pioneer vein, one of the largest of the district, is covered for 4,000′ by company's claims.

Development: by 420′ main Pioneer shaft and drifts on the 100′, 200′ and 400′ levels, exposing above the 200′ level 17,000 tons of $9.20 ore north of the shaft and $100,000 south, or a total of $256,400 gross. No estimate is made of the lower-grade ore below the 400′ level, and the high-grade shoot is bottomed.

In the Treadwell mine a 340′ shaft with levels at 100′, 200′ and 300′ exposes 12,800 tons of an average value of $5.62, which is about the cost of handling such ore in the district.

The 35 Parallel mine has a 220′ shaft connecting on the 150′ level with a tunnel. The work is all in ore, exposing 8,500 tons of $13.30 ore.

Equipment: includes 10-stamp mill, 80 h. p. engine, compressor and 2 hoists.

APACHE CHIEF MINING CO. **ARIZONA**

The secretary, W. G. Lentz, 218 National Bank of Arizona Bldg., Phoenix, Ariz., reported in Oct., 1919, that company had not kept up its corporation tax and was probably dead. See Vol. XIII. **Property:** reported taken over in 1920 by **Arizona Cave Creek Mines Corporation**, which see.

ARABIAN DEVELOPMENT CO. **ARIZONA**

Address: Chas. D. Ridgeway, mgr., Union Pass, via Kingman, Ariz.

Property: an option on the Arabia mine in Union Pass section of San Francisco district, Mohave county.

Development: by 300′ shaft and crosscuts at 100′ and 300′. The workings have been cleaned out and lateral work reported under way. April, 1921.

ARAVAIPA LEASING CO. **ARIZONA**

Address: F. Wickes, sec., 55 Congress St., Boston.

Officers: H. A. Wentworth, pres.; W. D. Ticknor, v. p.; H. L. Smith, treas., with R. V. Dey, W. A. Ogg, T. H. Leggett, directors. C. E. Minor, supt. Operated as a close corporation.

Property: Grand Reef mine, 24 claims, 7 patented, 420 acres, in Aravaipa district, Graham county, purchased from R. V. Dey in 1920.

Ore: occurs in fissure veins in granular igneous rocks.

Development: by adit and winze to 300' depth, with 4,100' of workings.

Reserves: estimated at 90,000 tons of ore, averaging 67 oz. silver, 1.7% copper, 7.4% lead.

Production. to date about 30,000 tons of ore mined. Shipments by lessees have amounted to 4,477 tons ore and concentrates averaging 22 oz. silver and 31% lead; in 1920, they shipped 448 tons, netting $17,747.

ARGENTA MINING COMPANY ARIZONA

Last Address: E. J. Bessett, Prescott, Ariz. See Vol. XIV.

ARGO MINES CO. ARIZONA

Address: Oatman, Mohave Co., Ariz.

Officers: S. S. Jones, pres.-gen. mgr.; J. M. Francis, v. p.; J. E. Shank, sec.-treas., with J. S. Withers and Wm. Bates, directors.

Inc. in Arizona. **Cap.** $1,000,000; $1 par; 410,000 shares held in treasury. Listed on Los Angeles Stock Exchange.

Property: 9 claims in the Oatman district, shows a vein 40' to 130' wide on surface, stated to be a continuation of the Tom Reed vein.

Development. a two-comparment shaft 605' deep. Crosscutting on 350' level at last account.

Equipment: includes a hoist with 1,000' capacity, and a 360 cu. ft. air compressor.

ARGONNE COPPER CO. ARIZONA

Address: Box 462, Prescott, Ariz. Mine near Cordes, P. O., Yavapai county.

Inc. 1919, in Arizona. **Cap.** $500,000; 50c par; 320,000 issued for property. Hall and Finlayson, incorporators. Personal promotion stock held by Arizona Corp. Comm. Company was granted permission to sell 300,000 shares at 50c. in 1919, less 15% selling commission.

Property: 27 claims including the Gil Ferguson group and 4 other claims near the Stoddard mine. Shows a blow-out 20 to 100' acro s with 3' of shipping ore in 60' shaft, and 4½' of 20% glance ore in a new footwall shaft sunk in 1918-19. No recent returns.

ARGUS COPPER & GOLD MINING CO. ARIZONA

Idle. Last address: care D. M. Jones, v. p., Planet, Ariz.

Officers: A. B. Jones, pres.; A. B. Hardwick, sec.; Ernest C. Lane, mgr.

Inc. in Arizona. **Cap.** $2,000,000; $1 par; 500,000 shares in treasury.

Property. 46 claims, 920 acres, adjoining the Planet mine in Yuma county, said to show several well-defined veins, carrying gold-copper ore, assaying from $5-$20 gold and 10% copper per ton. No information since 1916.

ARIZONA AMERICAN COPPER CO. ARIZONA

Address: B. T. MacMasters, principal owner, 135 Broadway, New York.

Inc. 1917, in Ariz. **Cap.** $1,000,000; $1 par; operated as a close corporation. About $150,000 has been expended on the mine.

Property: 3 claims, 66 acres, located in Mohave county, 75 miles easterly from the St. Thomas, Nevada, terminus of a branch of the Los Angeles and Salt Lake R. R.

Geology: sandstone in flat beds total 450' thick, underlain by limestone and cut by fissure veins containing copper-gold-silver.

Development: by several tunnels and a 70° incline shaft, 218' deep, with 5 levels. Shipments total 40 cars said to have averaged 5 oz. silver per ton.

ARIZONA-BAGDAD COPPER CO. ARIZONA

Formerly Bagdad Copper Co.

Office: Suite 708, 111 Broadway, New York. Mine at Bagdad, via Hillside, Yavapai county.

Officers. L. H. Taylor, Jr., pres.; E. B. Bronson, v. p.-treas.-pur. agt.;

E. C. Christensen, v p.; Frederick C. Hart, sec.; with Wm. L. Austin, E. A. Julian, H. B. Richardson, F. C. Hart, P. Chrystie, directors. H. A. Geisendorfer, gen. mgr., Luning, Nevada.

Inc. March, 18, 1918, in Delaware. **Cap.** $1,750,000 $1 par; outstanding, 785,000 shares. No bonds. Security Transfer & Registrar Co. transfer office; The New York Trust Co., registrar; both of New York. Annual meeting, first Tuesday in March.

Property : 62 claims (9 patened), over 1,000 acres, in the Copper Creek region, Eureka district, Yavapai county, 26 miles by wagon road from Hillside, on the Santa Fe line to Phoenix. About $1,000,000 has been expended to date in purchase price, development and equipment.

Development: by tunnels and churn-drilling with about 8,000′ of underground workings and 51,000′ of drilling. In 1914 H. A. Geisendorfer made detailed estimates of 6,031,000 tons of blocked ore, averaging 1.77% copper and 7,246,200 tons probable ore, averaging 1.60% copper, a total of 13,277,200 tons of ore, averaging 1.68% copper, underlying 67.88 acres. Average thickness of ore is estimated at 58.4′.

Work planned for 1921 includes churn drilling to increase tonnage. Reported on by A. H. Rogers, W. H. Weed, J. Parke Channing, F. H. Clark, H. A. Geisendorfer and others.

ARIZONA BASE ORES MINING & MILLING CO. **ARIZONA**

Letters reurned unclaimed from former address: c/o C. R. Harris, Kingman, Ariz.

Inc. 1917, in Ariz. **Cap.** $100,000; 10cts. par.

Property: in the Hualpai Mtns., Mohave county.

ARIZONA BELMONT MINING CO. **ARIZONA**

Described in Vol. XIV.

ARIZONA BINGHAMTON COPPER CO. **ARIZONA**

Address: 405 Lexington Ave., New York. **Mine:** Stoddard, Yavapai county, Ariz. Company absorbed the **Stoddard Mines Co.** and **Stoddard Milling Co.**, described, Vol. XII.

Officers: Wm. H. Reynolds; E. W. Wells v. p.; Geo. W. Johnson, gen. mgr.; E. V. Davies, supt.

Inc. Feb. 1917, in Arizona. **Cap.** $1,700,000; $5 par; changed late in 1918 to $2,000,000; $1 par; 1,713,250 shares issued plus 286,750 issued Dec. 1920, in payment of loan to the president. Exchange basis 5 of new for 1 of old. Stock listed on New York Curb. Security Transfer and Registrar Co., New York, transfer agent; Empire Trust Co., New York, registrar.

Dividend: an initial dividend of 2c. a share was paid Jan. 20, 1919.

During year ended May 31, 1919, there was an operating profit of $21,217, changed to a loss of $6,306 on deducting other charges, the result of non-settlement for 1,000,000 lb. of copper on hand.

Property: 10 claims, 6 patented, about 175 acres, in the Copper Mountain district, 5 miles from Humboldt. Mine was discovered in 1882 and reopened by present company, 1916. The Binghamton mine shows a broad shear zone in green chlorite-sericitic schist. The ore carries chalcopyrite with little pyrite, in silicified schist, oxidized to the 600′ level. Main ore shoot has been opened from the 100′ to 600′ levels, and yields 5% ore though the mill feed averages but 2.2% copper. Reserves are reported as 100,000 tons 3% ore and 150,000 tons of a lower grade.

Development: by 1,000′ tunnel and 600′ shaft, with about 4,000′ of workings. The new 3-compartment shaft is to be sunk to 1,200′ and was down 900′ in Sept., 1919. At 750′ the orebody is 15′ wide and averages 5% copper. In 1918-19 $38,626 was spent on development.

Equipment: includes double-drum electric hoist, a 10-drill compressor, pumps, and 150-ton flotation mill, to be enlarged to 350 tons.

Production: during year ended May 31, 1919, the mill treated 36,60[illegible] tons of ore yielding 1,873,358 lb. of copper at a total cost of 19.84c. per lb. Concentrates contain about 25% copper; extraction is reported as 92.5%.

During part of 1920 production averaged 300,000 lb. copper monthly. Concentrate is shipped to Cons. Arizona smelter. Operated intermittently during 1920-21.

ARIZONA-BISBEE COPPER CO. **ARIZONA**

Mine office: Bisbee, Ariz.

A Phoenix corporation fathered by Mr. Ned Creighton and others formerly interested in the Higgins lease. About 20,000 additional shares offered to the public at 50c., September, 1920.

Property: 19 claims S. W. of the White Tail Deer property of the Copper Queen. Sinking a two compartment shaft and drifting on 400′ and 600′ levels.

ARIZONA BONANZA MINING & MILLING CO. **ARIZONA**

Dead; formerly held claims near Miami. See Vol XIV.

ARIZONA BRUNSWICK MINING CO. **ARIZONA**

Address: Wm. Cook, Jr., supt., Chloride, Mohave county, Ariz.

Property: 3 claims, south of the Tennessee mine, developed by 320′ shaft. Drifting underway on the 250′ level is said to have opened up 5′ of $24 ore.

Equipment. includes electrically driven pumps, compressor and hoist.

ARIZONA BULLION CO. **ARIZONA**

Address: Wm. D. Grannis, mgr., Kingman, Ariz.

Officers: A. H. Smith, pres., Wm. D. Grannis, v. p.; Ross H. Blakely, sec.-treas.

Inc. 1915, in Arizona. **Cap.** $250,000; $1 par; 25,000 shares issued.

Property: 11 claims, 200 acres, includes the Great Republic mines, in Cedar Valley district, Hualpai range, Mohave county. Ore occurs in a contact deposit in granite porphyry. The orebody is 6″-4′ wide, has N. W.-S. E. course and dips E., the output averaging $25 per ton in silver, lead and copper.

Development: by shafts and tunnels. About 300′ of new work was done in 1920-21. Hoist and compressor to be installed.

ARIZONA BUTLER MINES CO. **ARIZONA**

Address: F. D. Friend, San Francisco, Cal., or Bouse, Ariz.

Officers. F. D. Friend, pres.; M. L. Strong, v. p.; E. E. Henuee, treas.; D. H. Jackson, engr.

Property: 700 acres, near Bouse, Yuma county, including claims worked in 1870. There are 18 shafts from 30′ to 300′ deep, exposing ore with gold, silver, copper, and lead values.

Equipment: includes oil engine and compressor.

ARIZONA & BUTTE COPPER MNG. CO. **ARIZONA**

Address: care Edw. W. McKay, Suite 307, 230 Fifth Ave., Pittsburgh, Pa. **Mine office:** Ray, Ariz.

Officers: G. H. Harn, pres.-mgr.; Eva G. Titus, sec.

Inc. in Arizona, 1916. **Cap.** $1,000,000; par $5; 155,000 shares issued; 45,000 shares in treasury. Shares offered, 1917, at $3; 5,000 offered at $10 in Feb., 1919. Pittsburgh Trust Co., transfer agent and registrar.

Property. 32 claims, 560 acres in one group, on west side of Ray district, adjoining Ray Cons. ground. **Ore:** chalcopyrite and tetrahedrite occur as cementing material in granite breccia and as boulders and streaks of sulphide in quartz and clay matrix filling crush zone or fault vein in altered Pinal schist cut by wide diabase dikes and intruded by offshoots of the Ray granite mass. Surface indications are regarded as favorable at granite contact on Overlook claim, in S. W. part of group.

Development: by 670′ Overlook shaft with 800′ of workings on 200′, 450′ and 550′ levels. On upper level oxidation has leached the ore; on 450′ level a crosscut still in ore shows 3.66 oz. silver per ton, 1.46% copper and 50c. gold, across a 10′ face. On 550′ level, a 150′ drift shows 50′ of milling ore carrying boulders and bunches and streaks of high-grade chalcopyrite ore with tetrahedrite.

The Overlook shaft encountered ore at 412′ that extended down for 30′, assays running as high as 17% copper and 80 ounces silver. Stringers of high grade ore were also cut at 620′ extending down to 670′, where water level was cut. Tunnel work and several shallow shafts on other claims show values, but conditions are less promising than at Overlook.

Equipment: 15-h. p. gasoline hoist, compressor, jackhammers, buildings, etc.

Presumably idle 1920-21.

ARIZONA-BUTTE CORPORATION ARIZONA

Address: Columbia National Bank Bldg., Pittsburgh, Pa.

Officers. Wm. Schafer, pres.; E. R. Schafer, v. p.; Wm. Perry, sec.-treas., with C. S. Jamison, Jas. M. Rae, A. C. Held, Jr., and J. H. Faught, directors.

Inc. April, 1917. **Cap.** $1,000,000; $1 par. National Security Co., New York, transfer office.

Property: 15 claims, 300 acres, 8 miles west of Miami and 4 miles from the R. R., said to show numerous veins in granite, carrying pyrite, chalcopyrite, and bornite. Veins said to average about 5′ in width.

Development: on one vein by a 600′ tunnel with a 240′ winze—here the vein is said to be 23′ wide; 700′ lower is a tunnel 1,700′ long which was expected to cut the vein within the next 100′.

Equipment: includes a 100-ton concentrator, which will need remodeling before being able to treat the several thousand tons of medium grade ore that the management claims is opened up..

ARIZONA BUTTE MINES CO. ARIZONA

Fully described in Volume XIV. Property taken over by **Kingman Cons. Mines Co.**, which see.

ARIZONA CACTILONE COPPER CO. ARIZONA

Dead. Former address Phoenix, Ariz.—See Vol. XIII.

Officers. (at last account) J. G. Hardis, pres.; S. C. Kingsbury, v. p.-gen. mgr.; I. J. Lipson, 2nd v p.; C. D. Montgomery, sec.-treas.

Inc. Feb. 8, 1917, in Arizona. **Cap.** $3,000,000; $1 par; 400,000 sold at 25c. each.

Property: 21 claims of the **Slocum Copper Co.**, in Maricopa County, 22 miles N. of Phoenix. Examined by C. H. James in 1917, who recommended expending up to $50,000 in exploration.

Geology: schistose pre-Cambrian granite and an altered diabase, is traversed by ledges of iron-stained quartz showing copper carbonate and pyrite.

Development. by shafts 106′ and 200′ deep, midway between the 2 quartz dikes.

ARIZONA CALIFORNIA MINING CO. ARIZONA

Probably dormant. Former address: Prescott, Ariz.

Officers: Dr. E. A. Butler, pres.; G. W. Lavender, v. p.; H. G. Wilhelm, sec.-treas.; William S Wilhelm, mgr.

Inc. April, 1915, in Arizona. **Cap.** $250,000; $1 par; outstanding, $100,000.

Property: the Shamrock and Ruth mines, 6 claims, 122 acres, patented in the Hassayampa district, 6 miles S. of Prescott, shows a quartz vein containing gold, silver, zinc and lead ore. Developed by a 300′ shaft.

Equipment includes a 10 h. p. hoist and 40-ton mill, with Huntington mill and Wilfley tables. Concentrates said to assay 36% zinc, 55% lead and 30 oz. silver. An oil flotation plant was planned at last accounts.

ARIZONA CAVE CREEK MINES CORP. ARIZONA

Address: Alfred Strong Lewis, Phoenix, Ariz.

Inc. 1920 to take over a group of claims covering 4,000 acres and including the Maricopa, Apache Chief and Pocahontas mines, in the Cave Creek district, 28 miles N. of Phoenix. The property is to be explored by 2 diamond drills.

ARIZONA-CELTIC COPPER CO. **ARIZONA**

Out of business. Property formerly owned by the **Arizona Morenci Copper Co.** See Vol. XIII.

ARIZONA CENTRAL GOLD MINES CO. **ARIZONA**

Now controlled by **Arizona Divide Mining Co.** of Nevada, which see.

ARIZONA CHLORIDE MINING CO. **ARIZONA**

Address: 332 I. W. Hellman Bldg., Los Angeles, Calif.

Officers: John B. Hughes, pres.-treas.; Edw. B. Hughes, v. p.; I. M. Thompson, sec.; F. W. Jacques, supt.

Inc. in Arizona. **Cap.** $200,000; par 10 cts.; 1,100,000 issued.

Property: 138 acres, in the Chloride district, Mohave county. The Windy Point mine is developed by a 145′ shaft in gneiss. Ore containing mainly pyrite, arsenopyrite and chalcopyrite, occurs in a fissure vein, 2-4′ wide, with strike N. 42° W. and dip 77° N. E., said to run 3 oz. gold, 486 oz. silver and 21.5% copper p. t. The Bobby Burns group of 7 claims in the same district, acquired in February, 1917, is developed to depth of 250′ by tunnels said to have proved copper ore of commercial value. New shaft now 72′ deep.

Production: totaled $300,000 to end of 1916. Property considered very speculative. Presumably idle.

ARIZONA COMMERCIAL MINING CO. **ARIZONA**

Offices: 50 Congress St., Boston, Mass., and 188 Middle St., Portland, Me. Mine at Globe, Gila Co.; H. S. Plumer, supt.

Officers: Chas. S. Smith, pres.; Harry M. Stonemetz, v. p.; C. H. Altmiller, treas., with E. S. Goulston, J. Waldo Smith, Chas. Sumner Cook, clerk, and Wm. E. Chandler, directors.

Inc. April 4, 1912, in Maine. **Cap.** $1,500,000; $5 par; 265,000 issued. Listed on Boston Stock Exchange. American Trust Co., transfer agent; National Shawmut Bank, registrar; both of Boston. Annual meeting second Wednesday in April.

Company is successor of the Arizona Commercial C. Co.; bondholders of the old company receiving 70 shares of new stock for each $500 bond held and the stockholders being privileged to subscribe, share for share, for fully-paid stock in the new company upon payment of $3 per share.

Financial Statement, years ended Dec. 31:

Year	Revenue	Expenses	Deprec. and depletion	Dividends	Surplus
1920.....	$1,020,223	$811,537	$241,821	$.....	$33,135*
1919.....	1,390,888	1,101,633	228,734	.....	60,521
1918.....	862,307	560,784	188,277	530,000	416,754*
1917.....	818,523	416,415	98,143	424,000	120,035*
1916.....	888,346	339,578	60,020	132,500	356,248

* Deficit.

Dividends: Initial of 50c. per share was paid Oct. 31, 1916; similar payments were made each quarter from April, 1917, to Oct., 1918, both inclusive; none since. A special Red Cross dividend of 10c. a share, was paid July, 1917. Total disbursements to Jan. 1, 1920 were $4.10 per share, equal to $1,086,500.

Property: 11 claims, 3 fractional, in 2 groups, known as the Black Hawk and Copper Hill groups, separated by the Iron Cap mine of the Iron Cap Copper Co. Lands are at Copper Hill, 3 to 4 miles N. E. of Globe lying just north of the Old Dominion, and adjoining the United Globe and Superior & Boston mines in Gila county. The Copper Hill group, 56 acres, carries the Old Dominion and Copper Hill veins for about 1,500′.

Ore: is a mixture of pyrite and chalcopyrite, contains 5% copper, 20% sulphur, 30% iron.

Development: in 1917 was confined to the Copper Hill mine, with 2,659′ of level work and 565′ of raises from the 8th to the 15th levels. In 1918, there was 6,729′ of work done; in 1919, 7,524′; in 1920, 7,544′.

The working shaft at the Copper Hill mine, 1,600′ deep, has extensive workings on the 10th, 12th, and 14th levels, along the Old Dominion vein, and ore has been exracted eastward until cut off by the Budget fault, ore being exposed along the bottom of the 14th level for 400′. The most important development includes the opening up of the orebody for 400′ horizontally and 75′ vertically on the 8th level, east of the fault where it is from 5′ to 40′ wide, averaging 5% copper; indications point to its extension downward to the 16th. Above the 13th level, a new vein of high-grade ore was opened in the hanging wall; it does not show on the 13th and continues some distance above the 12th level.

In 1919, the 16th level was opened and in 1920 it was officially reported to show "the best orebody ever encountered in the mine". In the east end, the 6th and 7th levels were developed from the 8th level, and in 1920 work above the 6th level gave satisfactory results. The 1920 ore reserves are said to show an increase over 1919 both in tonnage and copper content. The new (No. 2) shaft 1,300′ deep has been completely equipped.

In Feb., 1919, company began two suits in Massachusetts against the Iron Cap Copper Co: (1) for $500,000 for ore alleged to have been illegally removed; and (2) for $150,000 for share of pumping expense. In Sept., the Supreme Court of Massachusetts sustained the pleas of the Iron Cap. that suit must be brought in Arizona Courts. Immediately after this decision, Arizona Commercial brought the same suits under Massachusetts laws to be tried by a court and jury. In October, this company asked for an injunction in the Maine courts restraining Iron Cap from disposing of any of its assets until the suit was settled. In June, 1920, the Supreme Court decided that the Massachusetts courts had no jurisdiction, but the Maine court accepted jurisdiction of one suit, trial to be delayed pending legal action begun in Arizona.

The Black Hawk group, 97 acres, which carries the Black Hawk and Old Dominion veins for about 3,000′, has a surface capping of low-grade iron ore, above a 25 to 50′ vein, leached to considerable depth, followed by silicious ore, estimated to average about 4% copper, with excess of iron. There also is a hematite vein of 3 to 4′ width giving assays of 4.5% copper, with small silver values. In Dec., 1920, it was reported that the Black Hawk vein was 10′ wide on the 400′ level, and assayed 5½% copper, also that the future possibilities of this area were good.

Equipment: at Copper Hill shaft includes a 72′ steel headgear, hoist, good for 1,500′ driven by 175 h. p. motor; 500-gal. electric pump; 20,000 cu. ft. Sturtevant fan; and 300-ton ore bins.

The power smelter plant was remodeled in 1916; new equipment includes two 600 k. w. turbo-generators. All power used is generated at this plant, which is connected with the Copper Hill mine by a 6″ pipe line for compressed air and an electric transmission line. On the 14th level two 500-gal. p. m. pumps, electrically driven, were installed, pumping all water from the Copper Hill mine to surface.

Production:

Year	Ore, tons	Copper, lb.	Silver, oz.	Gold, oz.
1920	77,972	7,913,836	31,028	1,72
1919	76,572	7,280,861	16,918	1,31
1918	62,797	6,076,303	15,981	83
1917	39,702	3,860,949	5,208	37
1916	48,889	4,178,474	21,163	30

Opinion: "in proportion to its output this company has one of the largest showings of ore of any of the vein mines. The shaft is down to the 1,600′ level and, indeed, in Dec., 1919, the crosscut on this level has encountered the orebody finding it well up to the average grade.

The "Budget" fault throws the ore up several hundred feet, so that east of this fault the ground is almost virgin. At present the company is mining about 6,000 tons per month. It is, however, sinking a new shaft, which will have a capacity of 400 tons in six hours. With this the company should have no difficulty in mining easily 10,000 tons per month.

The relations between cost and price of copper production have been so upset of recent years that it is difficult to take any definite basis for estimating earnings. The ore, however, running 5½ to 6% is decidedly above the average of vein mines and should make for a cost somewhat lower than the average. With a normal spread between cost and price on a full production, it would not seem unreasonable to figure on a profit of $2.50 to $3 per share."

It is estimated that there is in sight about 750,000 tons of ore, so that even on this larger rate of production there is some six years' supply of ore in sight. At this rate of mining it should not be difficult to produce 12,000,000 pounds of copper per year, as against a rate hitherto attained of around 8,500,000.

Mine and mill closed down Dec. 16, 1920, to await a better copper market.

ARIZONA CONSOLIDATED COPPER MINES, LTD. ARIZONA

Office: H. S. Blake, sec., Throgmorton House, Copthall Ave., London, E. C. 2, Eng. **Mine office.** Clifton, Ariz. Hon. H. A. Stanhope and W. M. Steward, directors.

Inc. June 17, 1899, in Great Britain. **Cap.** £150,000; £1 par; issued £135,007, which was paid to the Continental Finance Syndicate, Ltd., 1909, for property, and £10,000 cash working capital. Balance sheet, Nov. 1919, showed cash, £564; loans at call, £232; expenditure £10,578; creditors £1,367.

Property: 120 acres, known as the Scioto, Lowland and Chilicothe mines, in the Copper Mountain district, Clifton, Greenlee county, adjacent to the Arizona Copper Co. and the Detroit Copper Co. Location includes a millsite on the San Francisco river. The claims are said to show a vein 2½ to 8′ and in places 30′ wide, proven for 3,500′. Company also owns 8 claims at Armstead, Mont., showing copper.

Development: at the Clifton properties by 3 adits; No. 1 in ore for 55′. No. 2 110′; No. 3, 100′. No record of recent development work.

ARIZONA CONSOLIDATED COPPER & MINING CO. ARIZONA

Name changed in Feb., 1919, to Liberty Silver Mines Co., which see.

ARIZONA COPPER BELT MINING CO. ARIZONA

Office: 120 Liberty St., New York. **Mine office:** Constellation, Yavapai county, Ariz.

Officers. Wm. J. Dilthey, pres.; Percy H. White, v. p.; R. A. Camp, treas.; E. Rappold, sec.; with Samuel Bloom, directors. W. C. Dilthey, supt.

Inc. Feb., 1906, in Arizona. **Cap.,** $1,000,000; $1 par; issued 753,758.

Property: 19 claims, exclusive of water rights and millsite, comprising the Texas and the Wren groups, in the Black Rock district, Yavapai county, about 15 miles N. E. of Wickenburg, the nearest railroad station on the Santa Fe Railroad.

The groups are 2 miles apart and work is mainly on the Texas group, adjoining the Monte Cristo silver mines, some 2 miles nearer the railroad. The working shaft is about 320′ deep; a crosscut on the 300′ level has been extended 700′ to the S. W. and has crosscut 4 mineral ledges, one carrying 4′ of gouge said to assay $45 in gold per ton. Another crosscut is being driven W. on the 100′ level. The company has a well established camp, 25 h. p. gasoline engine, air-compressor, 1,000-gal. oil tank, machine shop and camp buildings.

ARIZONA COPPER CO., LTD. (THE) ARIZONA

Head office: 44 Charlotte Sq., Edinburgh, Scotland. Mine and works office: Clifton, Greenlee Co., Ariz.

Board of directors: G. Readman, chairman; Young J. Pentland, F. L. MacLeod, H. A. Rose, T. E. Salvesen, and David Paulin; William Exley Miller, sec.; Norman Carmichael, gen. mgr. John Kiddie at Longfellow, R. W. Macfarlane at Metcalf, and W. G. Scott at Coronado, mine supts.; Arthur Crowfoot, supt. of mills; J. Owen Ambler, smelter supt.; J. G. Cooper, cashier and purch. agent.

Inc. August 5, 1884, in Great Britain. (For early financial details see Copper Handbook, Vol XI, 1914, p. 72.)

Cap. authorized. £755,000; issued £703,984 10s as follows: 160,000 "A" preference shares of 5s each, all uncalled but £7,480 10s paid in advance of call; £316,530 preference stock; £379,974 ordinary shares (1,519,896 shares of 5s each fully paid). Profits are divided thus: 10% cumulative dividends on "A" preference less 5% interest on amount uncalled and unpaid; 7% cumulative dividends on preference stock; balance to ordinary shares.

Funded Debt: 5% terminable debentures were redeemed in 1918. Company guarantees the $1,294,533 first-mortgage 6% bonds, due May 1, 1928, of the Arizona & New Mexico Ry. This line runs from Clifton, Arizona, to Hachita, New Mexico, connecting with El Paso & South Western Ry.

Balance sheet for 1916-1917 showed a profit of £317,717, after setting aside £137.805 for redemption of debentures, paying preferred dividends, transferring £50,000 to reserve (now £678,731), and £255.000 to reserve (now £613,563) for contingent liabilities. Ordinary shares received a total of £303,979. There was £13,737 carried forward.

For 1919-20, operating loss was £39,087; reduced by other income to £5,986. Net loss was £178,747 after taxes and general expense; reserves and dividends were £165,457, making a deficit of £344,204. Claim for repayment of taxes of £388,948, if allowed, will give a surplus of £44,744 for the year. Deficit for 8 months ended May 31, 1921, was £309,234, and profit and loss account showed a deficiency of £244,124.

Dividends: on ordinary shares for recent years have been as follows: 10s 3d, 1913-16; 4s 9d in 1917; 3s 3d in 1918; 2s 3d in 1919; 9d in 1920, to May 31.

In Oct. 1921, company sold its entire holdings to the Phelps Dodge Corporation, for 50.000 shares of latter Company's stock.

Property: about 3.770 acres in the mineral belt of Clifton-Morenci district. Principal producing mines: Humboldt, Clay, Longfellow, Coronado, King, Metcalf and Boulder, others in reserve or process of development. Produces about 4,500 tons of concentrating ore and about 175 tons of direct smelting ore daily. Concentrating ore is chalcocite, disseminated in porphyry, carrying about 2.45% copper. Top-slicing is principal mining method used. Metcalf mining division supplies concentrator at Clifton. Morenci and Coronado divisions supply concentrator at Morenci. All mines connected by electric haulage to main hoisting shaft at concentrator, except Metcalf, which is connected by 36" gauge steam road (Coronado R. R.) to Clifton.

In 1919, acquired from the Shannon Copper Co. 73 claims, 1,078 acres, sidelining Arizona Copper claims at Metcalf and 550 acres at Clifton, together with former's stock holdings (53%) in Coronado Mng. Co.

Electric haulage operated by 21 6-ton locomotives, used singly, and two-unit and three-unit. Coronado-Morenci ore tram consists of 36 10-ton cars hauled by three-unit locomotive over track of 20" gauge of 50 lb. rails.

Longfellow division, principal mines, Humboldt, Clay and Longfellow. Orebodies disseminated chalcocite in porphyry dikes and faulted or brecciated areas. Mining conducted principally through adits at present.

There are 8 working levels and 2 shafts. Commercial ore proven to depth of 900' below surface. Concentrates transported by gravity incline 2,515' long to Coronado R. R., thence 6.1 mile to smelter, 2.2 miles below Clifton.

Metcalf division: principal mines, King and Metcalf. Other smaller producers. King mine produces disseminated chalcocite ore from faulted areas in porphyry and granite. Metcalf mine yields oxide ore from deposits in limestone and shale and small porphyry dikes. Ores transported by gravity inclines to bins on Coronado R. R. and treated at the Clifton concentrator. Outlying mines served by cable tramways. Ores mined by open-pit and shrinkage underground methods.

Coronado division: principal mines, Coronado Horseshoe, and Pyramid. Orebodies disseminated chalcocite and surface oxide ore in porphyry dike filling fault fissure in granite. Developed by 5 shafts (deepest 1,100') and nine levels; an adit level 1,100' below surface is part of electric haulage system to concentrator at Morenci.

At the Clay mine further development work opened up a large but very low-grade orebody, not yet being mined. In the Coronado vein, the oreshoot is bottomed between the 7th and 11 levels, but ore reserves have been maintained by additional ore developed east of the Matilda shaft.

The Horseshoe orebody is connected with the main haulage, or 1,100' level. In the King mine, a shoot of 8-10% ore, 10' thick and 200' long, was found in the pyritic vein on the 3rd level.

In 1919, openings in the Humboldt gave satisfactory results as did those in the King mine until shut down in April; work was suspended also at the same time in the Longfellow and at Coronado a month earlier. The 1,100-level adit was in 12,253' on Sept. 30. Smelting ore averaged 6.45% and milling ore 2.123%, in 1919.

During 1920, the Humboldt supplied ¾ of ore extracted, but reserves notwithstanding were materially increased, Development of the Bluebell ore shoot was continued through the 1,100-level adit and 35,000 tons of better than 3% ore were opened. The grade of smelting ore was 6.97% and of concentrating ore 2.08% copper.

After November, 1920, development work practically ceased, and on May 31 following, operations were entirely suspended, except for ore extraction in the Coronado where workings are endangered by fire only partly under control.

The incline top-slicing method of mining at the Coronado was described by W. G. Scott in a paper for the A. I. M. E., February, 1918.

The reduction works consist of two concentrating plants, No. 4 mill at Clifton with 500 tons daily capacity; and No. 6 mill at Morenci, with 4,000 tons daily capacity. A 500-ton experimental mill for the treatment of low-grade ores was erected at Morenci. Both concentrating plants have been equipped with the Callow system of pneumatic flotation, with the necessary thickener and filter equipment for handling the flotation concentrate. An addition of 8 Dorr pulp thickeners has been made to the water reclaiming equipment; tables have replaced jigs, and a dust-catching system has been installed in crushing department at No. 6 plant.

Recent improvements include 12 Allen cones for de-watering and regrinding mill feed; 12 Dorr classifiers, Dorr thickeners, and 8 Callow cells.

The smelting plant, is situated 2 miles below Clifton, on the east bank of the San Francisco river. This plant is entirely of steel, brick and concrete, and consists of a receiving bin system with a capacity of 1,000 tons of ore and 1,500 tons of concentrates, a crushing, grinding and sampling plant, and a bedding plant with a storage capacity of 20,000 tons for mixing and storing the ores and concentrates, supplementary bunker bins being provided for the fettling ores, converter ores and fluxes.

The mixed charge is fed to the roasting plant, consisting of eight 7-hearth Herreshoff air-cooled roasters, equipped for firing with coal if

needed. The roaster gases pass through a large dust chamber to a central stack, and the roaster charge and dust to the reverberatory plant, consisting of 3 oil-fired furnaces 22x100′ (2 operating). The waste gases from this plant pass through a set of six 712 h. p. Stirling boilers, which, with 5 oil-fired boilers, supply the steam necessary to operate the power pant. The matte is tapped into ladles by 40-ton cranes for treatment in the converter plant, which consists of 4 stands with 5 shells of the Great Falls type converter, 12′ in diameter. The bullion produced is cast in pigs for shipment on two straight-line casting machines. Both the reverberatories and the converters are provided with suitable dust chambers, the gases ultimately discharging into a common stack. The plant is served by both standard and narow gauge railroad, in addition to electrified industrial tracks and is equipped throughout with belt conveyors for the transportation of material.

In addition to its interest in the Arizona & New Mexico Ry., company owns Shannon-Arizona Ry., acquired, together with mill and smelter, from the Shannon Copper Co. The latter two have since been dismantled.

The power plant is housed in a brick-steel concrete structure, and consists of 3 General Electric turbines of 2,000 k. w., three 10,000 cu. ft. Nordberg blowing engines for converter air, and a compressor for high-pressure air; the auxiliary pumps, motors, generators, transformers, condensers, cooling towers, spray ponds, etc., necessary for operations. The plant supplies all power needed at the smelter and also, through a 13,200-volt transmission line 10 miles long, the power needed for the town of Clifton, the concentrators and mines.

Well-equipped machine, blacksmith, boiler, tin, carpenter and electrical shops are maintained, as well as a large warehouse and brick shed.

Miscellaneous enterprises operated by the company include foundry, machine shop, saw-mill, a 30-ton ice plant and town lighting plant. The company also has general merchandise stores at Clifton, Morenci, and Metcalf.

Production: for fiscal years ending September 30: 1907, 27,404,349 lb.; 1908, 33,980,291 lb.; 1909, 32,017,487 lb.; 1910, 32,161,205 lb.; 1911, 34,569,019 lb.; 1912, 38,150,000 lb.; 1913, 34,230,000 lb.; 1914, 38,942,455 lb.; 1915, 37,416,010 lb.; 1916, 34,100,000 lb. (operations suspended by strike five months) from 905,486 tons of ore; 1917, 42,480,000 lb.; from 1,178,087 tons; 1918, 40,468,000 lb. from 1,095,568 tons; 1919, (due to general curtailment) 36,460,000 lb. of copper from 1,147,659 tons of ore; 1920, 35,692,000 lb. from 1,046,331 tons of ore; 1921 (8 mos.) 18,550,000 lb. from 573,397 tons of ore.

ARIZONA COPPERFIELDS, INC. ARIZONA

Company is dead. Was one of the many promoted by George Graham Rice. Fully described in Volume XIII.

ARIZONA COPPER-GOLD MINES CO. ARIZONA

Office: 1011 Pabst Bldg., Milwaukee, Wis. **Mine office:** Cherry Yavapai county, Ariz. R. H. Burmeister, pres.-gen. mgr, at last accounts.

Inc. Oct. 12, 1903, in Arizona, as **Gold Lode Mines Co.**, and reorganized, April 10, 1906, under present title. **Cap.** $1,500,000; $1 par Company thrown into receivership and property acquired February, 1914 by bondholders, who planned reorganization and continuation of development work.

Lands: 17 claims, 340 acres, in the Cherry Creek district, 15 miles N. E. of Humboldt, including the Bugler group of 4 claims. **Development:** by several short tunnels, and the 600′ Leghorn shaft, with about 3,500′ of workings, on a 2′ fissure vein. The ore apparently averages about 2% copper, with gold values.

Equipment: includes a 40 h. p. hoist, good for 1,000′ depth, and a 3-drill air compressor. A 40-ton mill, at the Leghorn shaft, has a 10′

Lane slow-speed Chilean mill. For early history, see Vol. XI, Copper Handbook.

ARIZONA COPPER MINES CORPORATION ARIZONA

Presumably dead. See Volume XIV.

ARIZONA COPPER MINING CO. ARIZONA

Office: Tucson, Ariz.

Officers: John U. Mettler, pres.; V. Brunner, sec.-treas., Mishawaka, Ind., with Leo J. Wachs and Jos. Brunner, directors.

Inc. Aug. 1, 1901, in Arizona. Cap. $1,000,000; $1 par; 168,000 shares outstanding, February, 1921.

Property: 20 claims, 400 acres, 16 miles W. of Tucson, in Amole district, Pima county. Developed by 100′ tunnel and 300′ shaft, said to show a vein carrying 2% copper. Ore occurs in porphyry and limestone and carries much iron

Equipment: includes hoist, engine and several buildings. Developing.

ARIZONA COPPER QUEEN MINING CO. ARIZONA

Address: 814 New York Life Bldg., Kansas City, Mo.

Officers: S. C. Douglass, pres.; E. S. Herider, sec.-treas., with E. J. White, W. D. Coldren, W. Burr Douglass, W. E. Trossell and S. C. Casey, directors.

Inc. July 24, 1907, in Arizona. **Cap.** $5,000,000; $1 par; 2,641,000 shares outstanding. Annual meeting, first Tuesday in October.

Property: 8 claims, 160 acres, in Yavapai county, about 26 miles S. E. of Mayer, shows a number of narrow quartz veins in granite. The ore is quartz carrying copper sulphides and their oxidation products with fair gold-silver values.

Development: by 325′ shaft and some crosscutting. Shaft in ore nearly entire depth.

Equipment: includes 75 h. p. boiler, 2 hoists, one good for 1,500′, 8-drill compressor and steam power.

The company has been idle since September, 1918.

ARIZONA COPPER SHIPPING MINES CO. ARIZONA

Idle and apparently dead. Fully described in Vol. XIV.

ARIZONA CORNELIA MINES CO. ARIZONA

Probably idle. See Vol. XIV.

ARIZONA CORONADO COPPER CO. ARIZONA

Former address. E. M. Fisher, pres., Superior, Ariz.

Property: 24 claims, 9 miles, south of Superior, Pinal County. Developed by 260′ shaft. Ore, copper with gold. At depth of 138′, ledge said to be 13′ wide of commercial ore, widening with depth.

Probably dormant.

ARIZONA DIXIE COPPER CO. ARIZONA

Officers: R. J. Schultz, pres.; J. W. Ambrose, v. p.; F. H. Larson, sec.-treas., all of Phoenix, Ariz.

Inc. 1917 in Ariz. **Cap.** $1,500,000; 25c par.

Property: 13 claims, 25 miles S. W. of Hassayampa, developed by 80′ shaft and 40′ drift, said to show a 5′ vein carrying ore that assays 4% copper, with gold and silver values.

ARIZONA EAGLE MINING CO. ARIZONA

Dead. See Vol. XIII of this book.

ARIZONA-EASTERN MINING CO. ARIZONA

Mail returned from Los Angeles, Calif. and Kingman, Arizona.

Officers and Directors: Wm. Schuette, pres.; S. W. Odell, v. p.; Lewis Lusk, sec.-treas.

Inc. July 9, 1915, in Ariz. **Cap.** $1,500,000; $1 par; issued 700,000 Bonds authorized, $100,000, none issued.

Property: 23 claims, 1 patented, 375 acres, 2 miles east of Hancock siding, on main line of Santa Fé R. R. and 10 miles south of Kingman, Ariz., includes the Red Hill and Fay mines, showing gold quartz fissure

veins in granite porphyry. The mine was worked years ago by Mexicans. Mill tests said to show average value of $11.78 gold per ton, with a 93% recovery in cyanide plant.

Development: by 200′ incline and two 50′ shafts with 400′ of workings.

Equipment: includes gasoline hoist and a 5-ton stamp mill for testing purposes. Idle since 1918.

ARIZONA EMPIRE COPPER MINES CO. ARIZONA

Mine office: Parker, Yuma county, Ariz.

Officers: W. A. Moses, pres.; Gen. E. Bouton, v. p.; L. H. Knowlte, sec.; Newton Evans, treas.; with F. X. Pfaffinger, directors; Jas. H. Watson, gen. mgr., at last accounts.

Inc. Aug., 1909. **Cap.** $5,000,000; $5 par.

Property: bought of Carnation Mining Co., comprises 41 contiguous claims, 820 acres, about 10 miles north of Parker and 3 miles from Eagle Landing, on the Colorado River. Company also has 160 acres of ranch lands on the Colorado River, including Eagle Landing, held for a smelter site. Geological conditions are markedly similar to those at the Planet and Clara mines.

Development: by about 6,000′ of workings, deepest 300′ showing a large amount of copper carbonate, with sulphide zone not yet reached. On the 200′ level of the Carnation shaft is an orebody said to assay 5% copper and $5 gold per ton, carrying a 10′ paystreak estimated to average 10% copper and $6 gold per ton.

Surface showing interesting and shallow excavations show irregular areas, often 50′ wide, with well stained copper carbonate; much could be shipped. Development usually reveals a sheared zone, copperstained, but only a few feet wide. Throughout this region there are occasionally encountered pockets of rich gold ore with the copper. These seem to be lenses interbedded in the schist, and while one or two important orebodies have been found in the region, no mines of importance have been developed. Letters returned unclaimed and company probably dead.

ARIZONA EUROPEAN MINING CO. ARIZONA

Office: Nogales, Ariz.

Officers: Manuel Escalada, pres.; W. M. Schuckman, sec., with Geo. Januel, directors. Jas. Ritchie, supt.

Property: the Buena Vista group. 2 miles rom Patagonia, at an elevation of 5,500′, said to show a 6′ ledge of high grade copper-gold-silver ore.

Development: by shaft 115′ deep and 700′ of drifts. Average of 36′ of drift opened is reported to be 2.58% copper. During 1918, shipments of about 50 tons of ore monthly are stated to have carried 12% copper, 40 oz. silver and $3 gold per ton.

Employs 16 to 20 men. Developing at last account.

ARIZONA-GLOBE COPPER CO. ARIZONA

Office: 110 North First Ave., Phoenix, Ariz.

Officers and directors: P. J. Hickey, pres.; Harry Kay, v. p.; with Geo. M. Mickie of Phoenix; J. T. Brown, Globe; and J. P. Hickey, Jr., mine supt.

Cap. $2,000,000; $1 par; listed on New York Curb. Registrar & Transfer Co., New York, transfer agents.

Property: the Cole & Goodwin mine located on N. fork of Mineral creek, 10 miles S. E. of Globe, held under lease and bond from P. J. Cole of Globe (Cole Dev. Co. q. v.).

Operations reported temporarily suspended, October, 1920.

ARIZONA GOLD & COPPER MINING CO. ARIZONA

Clerk's office: Burlington, Vt. **Mine office:** Gleeson, Ariz. **Officers;** L. V. Hastings, v. p.; Hamilton S. Peck, sec.

Inc. July 28, 1911, in Vermont. **Cap.** $100,000; $5 par. Is successor of the Vermont & Arizona Copper Co .

Property: 11 claims, 220 acres, 4 miles from Gleeson, Cochise county, in the Turquoise district, on the western slope of the Dragoon mountains, show 2 gold and silver veins and several copper veins, giving average assays of $6 gold and 3% copper per ton.

Development: by 230′ main shaft and 2 tunnels, longest 125′. Company to have developed a large body of low-grade milling ore.

Equipment: includes steam power and 12 h. p. hoist. Property idle, owing to lack of funds.

ARIZONA GOLD RANGE MINING CO. ARIZONA

Address: J. E. Nelson, mgr., 828 W. P. Story Bldg., Los Angeles, Calif.

Inc. in Ariz. **Cap.** $150,000; 10¢ par; 750,000 shares in treasury.

Property: 7 claims, 140 acres at Oatman, shows gold bearing ore in a fissure vein.

Development: by 275′ shaft. **Equipment:** includes hoist and compressor. Inactive.

ARIZONA GOLD STAR MINING CO. ARIZONA

Company is supposedly dead. Fully described in Vol. XIV.

ARIZONA-HANCOCK COPPER CO. ARIZONA

Idle many years. **Office:** Hancock, Mich. **Mine office:** Florence, Pinal county, Ariz.

Officers: John D. Cuddihy, res.; Alfred C. Sieboth, v. p.; Henry L. Baer, sec.-treas., with C. D. Hanchette, F. C. Mayworm and Philip Carroll, directors.

Inc. in Arizona, as successor to Arizona-Hancock Cons. Mng. Co.

Property: 4 claims, patented, 2 miles S. of Superior, showing a vein traversing 2 claims, parallel to the vein of the Lake Superior & Arizona, with diabase footwall and limestone hanging, opened by a short tunnel and a winze of 55′, with drifts on 2 levels, showing lead above and copper below.

ARIZONA HERCULES COPPER CO. ARIZONA

See Vol. XI for full description.

Stock control passed to Ray Hercules Mining Co., which see. A bond issue of $3,000,000 7s, maturing Jan. 8, 1924, is held by **Ray Hercules** as security for monies advanced for equipping and developing property. Interest on bonds had not been paid up to mid-1921.

ARIZONA HILLSIDE DEVELOPMENT CO. ARIZONA

Addresses: 801 Kearns Bldg., Salt Lake City, and Hillside, Ariz.

Officers and directors: E. R. Pembroke, pres.; Philip Clark, v. p.; J. H. Winwood, sec.-treas.

Inc. Sept., 1917, in Arizona. **Cap.** $1,500,000; $1 par; 934,000 issued. Annual meeting second Monday in January, Prescott, Ariz.

Property: 730 acres (140 recently purchased) in Eureka district, Yavapai county, 30 miles by new road to rail at Hillside; also has 186 acres under option. Examined in April, 1919, by J. W. Neill of Pasadena, California.

Deposit is in a crushed or sheeted zone in schist, dipping 35° W. with N.-S. course. Orebody is up to 14′ thick. Ore carries zinc, silver, copper and lead, shipments returning 47% zinc, 5 oz. silver, 4 to 6% lead, and 1 to 2% copper.

Development: work has been concentrated on the Copper King claim, in center of the group, by 624′ incline. Reserves are estimated by Mr. Neill to be 15,000 tons of shipping ore and 10,000 tons of second-class ore. These ores carry 47.5 and 30% zinc, respectively. This tonnage is to a depth of 380′. The 400′ level does not show any sulphide ore. Whether the copper content will improve at depth remains to be seen. Now drifting on 600′ level.

The Rudkins-Pinto claims, 3 miles S. E. of the Copper King, are considered a good prospect for copper; while the Pinafore group, 20 miles from the Copper King carries zinc and copper.

Equipment: gasoline hoist, compressor, fan, shops, orebins, and living quarters. Power plant is insufficient for deeper exploration and company must be financed for new compressor, etc., if deeper development is to be done to prove the existence of the copper ore indicated by geologic evidence.

ARIZONA LEAD & COPPER CO. **ARIZONA**

Address: unknown as letters are returned unclaimed, from Wickenburg, Ariz., and from Edw. E. Northrup, pres. and mgr., El Paso, Texas.

ARIZONA MAMMOTH MINES CO. **ARIZONA**

Mail returned, from Needles, Ariz. W. C. Rannells, mgr.

See Vol. XIV.

ARIZONA-MAYFLOWER COPPER CO. **ARIZONA**

Dead . Fully described Vol. XIV. Property sold at sheriff's sale, May 1917, to Krakauer, Zork & Moyer, El Paso, Texas, and now owned by S. D. Conley, Duncan, Ariz. See Arizona Wampum Mine, Ariz.

ARIZONA McGINNIS COPPER CO. **ARIZONA**

Mail unclaimed, Parker, Ariz.

Officers: B. L. Vaughn, pres.-gen. mgr., San Diego, Cal.; E. C. Fleet, sec. C. E. Boydston, supt., at last accounts.

Inc. 1916, in California. **Cap.** $1,000,000; $1 par.

Property: 13 claims, adjoining the holdings of the **Empire Copper Co.** about 12 miles N. W. of Parker, Yuma county, developed by 200′ shaft and 200′ tunnel. Ore occurs as a contact deposit in limestone and quartz schist, running N. 65° E., with 30-70° dip. The orebody is reported to be 50′ wide and 200′ long, opened to depth of 20′, with 2′ shoot of shipping ore containing cuprite, malachite and chyrsocolla, said to run 10% copper and $8 gold.

Equipment: includes 35 h. p. oil engine, compressor and 1,100′ aerial tram. Several carload shipments made in 1917.

ARIZONA MERGER GOLD & COPPER CO. **ARIZONA**

Idle. H. C. Hillwell, S. L. Herron, Henry Reefson, Alonzo Hall, Robert M. Bazel and Geo. D. Birch, directors, at last account.

Inc. 1909, in Arizona, as a reorganization of **the Lyon Copper Co.** **Cap.** $5,000,000; $1 par.

Property: 64 claims, near Mayer, Yavapai county, shows fissure veins developed by a number of tunnels and crosscuts with 250′ shaft.

ARIZONA & MICHIGAN DEVELOPMENT CO. **ARIZONA**

Mail returned unclaimed, March, 1919. Property taken over August, 1919, by **Mines & Development Co.**, which see.

ARIZONA MIDDLEMARCH COPPER CO. **ARIZONA**

Office: Middlemarch, Pearce, Ariz.

Officers: W. A. Potter, pres.; D. E. Wellcome, v. p.; E. D. Elson, sec.-mgr., with F. C. Austin, D. R. Weller, H. H. Bones, Paul Legrande, W. E. Austin, J. W. A. Off, all of Los Angeles, Calif., directors. Geo. Brown, gen mgr.

Inc. Dec., 1916, to take over the property of **Middlemarch Copper Co.** under lease and bond. Has since acquired 8 additional claims adjoining. **Cap.** $1,000,000; $1 par; 700,000 shares issued April 1, 1919.

Property: 43 claims, over 860 acres, in Dragoon Mts., 9 miles west of Pearce. Sedimentary rocks are intruded by granite stocks and quartz porphyry dikes of great width, making contact zones of garnet, epidote, pyroxene, etc., with limestone, hematite, copper oxides and carbonates. The Cobrelona workings show a 2′-4′ vein between granite and slate, with ore along a 200′ drift. Most of such outcrops are undeveloped, but commercial ore is shown on the Cobrelona and Missouri claims.

Development: principal development on Missouri claim, shows a chimney of contact metamorphic ore. Stopes on fifth level 40 to 50′ i

diameter. Oxidized ore was high-grade, but below a thin zone of enrichment primary chalcopyrite ore of approximately 2% copper was encountered. Workings include a 250′ incline and a 300′ vertical shaft. High silver values were encountered on the seventh level.

Equipment: includes compressor, hoist and steam pump. Mill is a straight flotation plant of 150 tons daily capacity erected in 1917 and operated as steadily as the limited water supply permits.

The ore is crushed to 1½″ max., then fed to 6′ by 6′ ball mill in closed circuit with an Akins classified, pulp going to 2 launder flotation machines. A K. & K. flotation machine is used as a cleaner. Tailing from roughers goes to a Dorr thickener for recovery of water. Power for mill and 25 k. w. alt. current generator is obtained from a 200 h. p. oil engine. Mill makes recovery of 90% of copper content, concentrates averaging 16% copper and 6 oz. silver per ton.

Shipments to April, 1919, total 51 cars concentrate and 3 cars crude ore. Enlargement of mill contemplated when mine development warrants. About 20 men employed.

ARIZONA MIDWAY MINING CO. ARIZONA

Consolidated, 1920, with **Arizona Rex Mining Co.** as **Western Mines Co.**

ARIZONA MOLYBDENITE CONSOLIDATED ARIZONA

Office: 300-304 Los Angeles St., Los Angeles, Calif.

Officers: Theo. F. Bentel, pres.; J. A. Brown, v. p.; J. N. Beardslee, sec.; J. C. Oscher, treas., with I. W. Dubbs, L. H. Dutton, and R. L. Van Dusen, directors. E. C. Bradshaw, supt.

Inc. Feb., 1918, in Arizona. **Cap.** $500,000; 10cts. par; 3,500,000 issued. Annual meeting, third Saturday in January.

Property: 21 claims, 28 miles from Yucca, Mohave county.

Development: by tunnels which have opened molybdenum-copper ore, in quartz veins cutting granite. The veins are considerably faulted.

Equipment: includes an 80-ton flotation plant.

ARIZONA MOLYBDENUM CO. ARIZONA

Address: F. J. Wharton, pres. Tucson, Ariz.

Inc. 1917, in Ariz. **Cap.** $300,000.

Property: 10 claims, about 200 acres, in the Baboquivari mountains, Pima county, about 35 miles from Twin Buttes, slightly developed by several shallow shafts.

Ore: carrying molybdenite, chalcopyrite and galena, occurs in veins of quartz-feldspar, 4-10′ wide, with S. E. strike, traversing coarse-grained granite. Samples reported to assay 2.2 oz. silver, 1.8 oz. gold and 3.9% copper. **Equipment:** a 50-ton flotation plant constructed in 1917, was reported to be producing 1,500 lb. of concentrate daily, running 18% molybdenum.

ARIZONA MOSSBACK MINES CO. ARIZONA

Office: Oatman, Ariz.

Officers: Jesse W. Speidel, pres.; W. A. Shirley, sec-treas.; with Lee C. Paul, D. Garth Hearne, and C. H. Burlock, directors. E. A. Ritter, mgr.

Inc. Sept. 4, 1917, in Arizona. **Cap.** $1,000,000; increased to $2,000,000; $1 par; issued 900,000. Bonds authorized, $500,000. Annual meeting, second Monday in January.

Property: 5 patented claims, 100 acres, 4 miles northerly from Oatman, Mohave county.

Geology: andesite-porphyry is cut by a fissure vein having a dip of 76° S. E. down to depth of 400′, where it changes to N. W. and S. E. course. Ore-shoots are 250′ and 300′ long. Ore is free milling gold and silver.

Development: by 700′ vertical shaft with 2,500′ of underground workings.

Equipment: includes 40 h. p. hoist, compressor, 60 h. p. gas engine, pump.

ARIZONA NATIONAL COPPER CO. ARIZONA

Property: sold at foreclosure sale in 1920 and company dissolved. See Volume XIV. for description.

ARIZONA NATIONAL MINING CO. ARIZONA

Address: F. M. Anderson, Humboldt, Ariz.

Inc. July, 1916. **Cap.** $250,000; increased March, 1917, to $500,000; $1 par.

Operates the Anderson silver-lead-copper mine, about 2 miles west of Humboldt.

Equipment: includes a small mill and flotation unit. Developing and shipping in a small way since 1917.

ARIZONA ORE REDUCTION CO. ARIZONA

Main Office: 1002 Citizens National Bank Bldg., Los Angeles, Calif. **Mine Office:** Chloride, Ariz.

Officers: R. M. Martin, pres.; Geo. F. Goerner, v. p.-cons. engr.; C. B. Guittard, sec.-treas., with L. B. Wood, W. C. Fry, Nelson Ward, and A. F. McKee, directors.

Inc. 1916, in Arizona. **Cap.** $1,250,000; issued 1,015,310 shares.

Property: 11 claims, in process of patenting, 1.5 miles S. of Chloride, Mohave county, include the Copper Age, Blossom, Diana and other mines containing 9 parallel fissure veins in granite with strike of N. E.-S. W. and dip of 70-80°, averaging about 2′ wide.

Ore: carbonates and oxides of silver, zinc and copper with gold, changing to sulphides at about 60′ depth; antimony also occurs. A representative sample of the sulphide ore is reported tocarry: gold 0.02 oz.; silver, 6.6 oz.; lead, 2.1%; copper, 0.10%; zinc, 4.7%; antimony, 2.2%. Estimate of ore reserves are given as 138,178 tons, gross value, $1,617,907, based on metal prices of 1918.

Development: and ore extraction, has been mainly at the Copper Age mine and includes a 360′ shaft, a 2,120′ working tunnel, and 1,450′ of workings. On the 170′ level the ore shoot is said to be 300′ long, 3′ wide, and worth $40 per ton in gold, silver, and copper.

Equipment: a 150-ton wet concentrator has been used to work out the best method of treatment. The machinery on hand consists of a 7″x24″ Sturtevant jaw crusher, Standard ball mills, tables and Deister slimers. To obtain an adequate continuous supply of water for milling is a serious problem. A 153,000 gallon reservoir and Dorr thickeners are now installed, and a 750,000 gal. cement tank was being built. The complex nature of the ore makes careful experimental work a prerequisite to success. Three hundred and fifty electric h. p. is used in mine and mill, auxiliary boilers in reserve. Houses, tools, compressors, etc., have been provided.

ARIZONA PACIFIC COPPER CO. ARIZONA

Succeeded by **Ripsey Copper Co.**, which see.

ARIZONA PATAGONIA SILVER MINING CO. ARIZONA

Address: Jas. M. Layman, mgr., Patagonia, Arizona. Richard Kingdon, supt.

Officers: Jas. M. Layman, pres.; R. W. D. Barger, v. p.; John S. Eberman, sec.-treas., with J. C. Callaghan and Chas. E. Beach, directors.

Inc. November, 1919, in Arizona. **Cap.** $500,000; 50c. par; 475,000 in treasury. Pittsburg Trust Co., transfer agent and registrar.

Property: 13 claims, about 180 acres, includes the Blue Nose mine, 8 miles from Patagonia, shows a contact deposit between limestone and rhyolite, with N. W.-S. E. course, reported to assay 23 oz. silver, 1 08% copper and 2% lead.

Development: by 213′ shaft and 1,600′ of workings. **Equipment:** includes 360 cu. ft. compressor and 75 h. p. engine. A 100-ton mill and flotation unit contemplated.

Reserves, estimated by management at 35-40,000 tons ore, available July, 1921.

ARIZONA PAYMASTER MINING & MILLING CO. ARIZONA

Address: Edmund E. Walton, supt., Twin Buttes, Ariz.

Property: about 27 miles south of Tucson, is an old silver-lead mine. Has shaft 100′ deep.

ARIZONA PORPHYRY COPPER CO. ARIZONA

Dead. See Vol. XIV.

ARIZONA PORTLAND MINES, LTD. ARIZONA

Taken over by the **International Syndicate of Mines & Smelters** which see.

ARIZONA-RAND GOLD MINE, INC. ARIZONA

Address Kingman, Ariz.

Directors: Thad. M. Boggs, pres.-treas., Charleston, W. Va. S. S. Jones, v. p.; Chas. D. Wagner, sec.

Inc. May 27, 1921, in Arizona. **Cap.** $1,500,000; $1 par. Annual meeting 3rd Monday in April.

Property: 12 claims, 240 acres, includes the Roadside mine, in Union Pass district, Mohave county, 3 miles from the Katherine mine and 25 miles from Kingman, shows a quartz vein in granite, with N.-S. course and dipping W. The vein carries free milling gold ore.

Development: by 300′ shaft and crosscuts on the 50′, 100′ and 300′ levels. Reserves estimated at 36,000 tons ore blocked out. Development a depth planned for 1921.

Equipment: 25 h. p. gas hoist, 10 x 10 compressor and pump.

ARIZONA RAY COPPER CO. ARIZONA

Name changed to **New Arizona Ray Copper Co.**, which see.

ARIZONA REVENUE COPPER CO. ARIZONA

Officers: at last accounts, David F. Johnson, pres., Phoenix, Ariz.; W. L. Williams, v. p.; Oscar M. Spence, sec.-treas., Parker, Ariz., with A. J. Beecher and Paul C. Thorne, directors. H. A. Morse, supt.

Inc. Dec., 1916, in Ariz. **Cap.** $2,500,000; 50c par; of which 2,200,000 shares were given the owners for the claims and 200,000 shares offered to the public, March, 1917, at 15c.

Property: 72 claims, about 1,400 acres, in Cienega district, Yuma county, includes the Echo, Milton, Cecil, El Moline, Revenue and Elephant groups.

Development: about 3,000′ of workings, at a cost of $40,000. A 185′ shaft on the Echo group is said to show ore running better than 8% copper. The Revenue group has 2 incline shafts, 285′ and 150′ deep. Ore consists of hematite containing oxidized copper minerals, and occurs as a replacement of limestone lenses in schistose rocks. Surface showings are promising and warrant further development at depth. Geology of the district fully described in U. S. Geol. Survey Bull. 451.

Ore reserves: about 400 tons of high-grade ore on the dumps. Property formerly owned by E. E. Osborne. No recent returns.

ARIZONA REX MINING CO. ARIZONA

Fully described in Vol. XIV. Company absorbed 1920 by **Western Mines Corporation.**

ARIZONA SAMPLING & REDUCTION CO. ARIZONA

A Geo. M. White promotion. Operated a reduction plant at Wickenburg, handling custom ores.

Out of business.

ARIZONA SILVER QUEEN MINING CO. ARIZONA

Probably dead. Former address: care L. E. Troxel, mgr. and owner, Ray, Ariz.

Cap. $1,000,000; $1 par; 100,000 shares offered for sale, 1918, at 15c. to provide funds for development.

Property: 11 undeveloped claims in Mineral Hill, Pinal county. Reported to have a vein 4′ wide containing some gold. Regarded as a prospect of doubtful merit.

ARIZONA SMELTING CO. ARIZONA

Merged with Consolidated Arizona Smelting Co. in 1914.

ARIZONA SMELTING & POWER CO. ARIZONA

Office: Benson, Cochise county, Arizona.

Officers: C. E. Goetz, pres.; Martin Fishback, gen. mgr.-sec.; R. L. Lee, supt.

Inc. in Arizona. **Cap.** 100,000 shares; $5 par. Company was organized to purchase the old lead-silver smelter at Benson, and engage in the reduction of copper-silver-gold ores from nearby districts.

Property: 60-acre site formerly occupied by a smelter that was operated 30 years ago, treating ore from Mexico, sent in via Nogales. These operations produced 75,000 tons of neutral slag, now available for resmelting by this company. It carries 5 oz. silver, 50 c. gold, and 15 lb. copper, equal to $8 per ton.

Equipment: modern 200-ton blast-furnace for copper ore, 32 by 100 in. at tuyeres; a No. 7 Connersville blower, 250-ton mechanical sampling plant of the Vezin type to handle car lots, crushers, boilers, engines, water-supply, etc.

ARIZONA-SOUTHWESTERN COPPER CO. ARIZONA

Office: 622 Higgins Bldg., Los Angeles, Cal.

Officers: R. H. Weber, pres.; Fred Hessel, v. p.; J. H. Hoffman, sec.; C. Hoffman, treas.; with W. G. Laidley, T. A. McNeal, and E. B. Schermerhorn, directors.

Inc. 1907, in Arizona. **Cap.** $4,000,000; $1 par; issued 3,300,000. Authorized bond issue, $150,000; all outstanding.

Property: 14 claims, 9 patented, 276 acres, including the Pittsburgh mine, in Crow canyon, Cedar Valley district, Hualapai Mountains, 25 miles from Yucca, the nearest rail point. Mine has 2 orebodies, estimated to average 30′ in width and to be traceable 2 miles, opened by tunnels of 500′ and 682′, and shafts 400′ and 300′ connected on the 200′ level, with about 5,000′ of workings. Mine, which is quite wet, shows chalcopyrite, galena and sphalerite, estimated by the company to average 0.25% copper, 3% lead, 4% zinc, 10 oz. silver and $1 gold per ton, which seems too high for a large orebody of this type. Company claims to have 100,000 tons of $12 ore on the 200′ level.

Equipment: includes an 85 h. p. electric hoist, steel head-frame, a 12-drill air compressor, smithy and 300-ton concentrator, with 14 Overstrom tables.

Company reported to have lost its property.

ARIZONA STANDARD COPPER CO. ARIZONA

Office: Pacific Finance Bldg., Los Angeles, Calif. **Mine address:** T. J. Carrigan, mgr., Parker, Ariz.

Officers: J. P. Sweeney, pres.; W. E. Carrigan, v. p.-treas.; E. W. Gillett, sec., with F. M. Hall, T. J. Carrigan and Carl Leonardt, directors. C. J. Brinkmeier, supt.

Inc. 1917. **Cap.** $5,000,000; $1 par; permitted to sell 300,000 shares in Dec., 1920; 2,415,078 shares outstanding, April, 1921.

Property: 39 claims, 780 acres, 14 miles E. of Parker, and about 4 miles from Midway, on the Swansea railroad, reported to show surface indications of a disseminated copper deposit, samples assaying 5½-20% copper, $2-$4 gold, $2-$10 silver.

Development: by 210′ shaft. A 3-compartment shaft is planned.

Equipment: 300-ton mill being installed, April, 1921. Reserves estimated by T. E. Kelso, at 400,000 tons blocked out, Feb., 1921.

ARIZONA SUPERIOR COPPER CO. ARIZONA

Address: 243 Washington St., Jersey City, N. J.; also 115 Broadway New York City.

Officers: Samuel Bell Thomas, pres.; S.T. Grossman, sec.-treas.

Inc. 1920, in N. J. **Cap.** $500,000; $1 par; no bonds.

Property: Prince Albert group, 9 patented claims, 160 acres, in the Hassayampa mining district, Yavapai county, 7 miles from Prescott. Claims show an E.-W. vein, 10-20′ wide, with orebodies at intersections with several N.-S. veins, that of No. 4 vein showing 11′ of 6% copper ore, carrying $19 per ton gold and 12 oz. silver per ton.

Development: by 115′ shaft, with 90′ drift on 100′ level.

Equipment: 25 h. p. hoist, 220 cu. in. air compressor and buildings, etc. Power line on property.

ARIZONA SUPERIOR MINING CO. ARIZONA

Office: 403 Fleming Bldg., Phoenix, Ariz.

Officers: A. A. Fairchild, pres.; V. E. Messenger, v. p.; James E. Nelson, sec.-treas., with Meade Clyne, directors.

Inc. Dec. 11, 1916, in Arizona. **Cap.** $1,500,000; $1 par; issued for property 722,804 shares. Annual meeting, first Tuesday in February.

Property: 17 claims and 2 millsites, about 5 miles N. W. of the Ray Consolidated, midway between Ray and Superior, Pinal county.

Prospectus reports a contact of quartzite and limestone with 2 parallel veins dipping 43° E. and several fissures or cross fractures. Veins are 2′ wide on surface, widening to 12′ at shallow depth, showing traces of gold, silver, copper and lead. Developed by 100′ tunnel.

A prospect. Closed since the war because of excessive cost of material and labor.

ARIZONA SYNDICATE MNG. & DEV. CO. ARIZONA

Address: E. Hunt, pres., Globe or Phoenix, Ariz.; **Other officers:** Ernest van de Vord, v. p.; L. E. Troxel, treas.

Inc. Jan., 1918, in Arizona. **Cap.** $500,000; $1 par.

Reported to have owned a group of 6 claims near Price, Pinal county. No record of development work.

ARIZONA TELLURIUM MINES CO. ARIZONA

Mail returned unclaimed, from Kingman, Airz.

Officers: Thos. H. Condon, pres.; Geo. A. Shea, sec.-treas., with Carl Bertchinger, and W. C. Pedlar, directors.

Property: claims in the Maynard district, 15 miles E. of Kingman.

Development: by 200′ tunnel and shaft. Presumably idle.

ARIZONA TIP TOP MINES CO. ARIZONA

Succeeds **Tip Top Cons. Mines Co.**, described in Vol. XIV.

Address: P. O. Box 1209, Boston, Mass. Mine address: Carl J. Barth, Jr., res. mgr., Canon, Yavapai Co., Ariz.

Officers: J. S. Coupal, pres.-gen. mgr.; Geo. S. Adams, sec.-treas., with Carl J. Barth, Jr., L. S. Dumesnil and A. G. Gabriek, directors.

Inc. Jan., 1920, in Arizona. **Cap.** $2,000,000; $1 par.

Property: the old Tip Top mine, 6 claims, in Bradshaw Mts. about 25 miles S. of Prescott, also a lease and bond on the Security group of 6 claims, ¾ mile from the Tip Top, on a parallel vein.

Development: the Tip Top was originally developed to the 800′ level; new work on the 350′ level reported to have opened up a high grade silver ore.

Equipment: a 50-ton mill is to be installed, to treat new ore and the 40,000 tons of ore on dump and in stope fills.

ARIZONA TOM REED GOLD MINES CO. ARIZONA

Address: Oatman, Mohave Co., Ariz. **Officers:** Geo. F. Moser, pres.-gen. mgr. Chas. S. Seeley, sec.; C. L. Moser, v. p.

Inc. July, 1915.

Cap. $1,000,000; $1 par; issued 657,903. Stock listed in Los Angeles and San Francisco.

Property: 7 claims, 97 acres, and a lease and bond on the Snowball group, 90 acres, all adjoining the property of Aotman Pioneer Gold Mines, Inc., on the north. Main ledge of the Pioneer continues into the company's claims.

Development: by several shafts 10′ to 100′ in depth, and at the 400′ level by a crosscut from the Pioneer. Company was sinking a main working shaft on the Trio claim at last accounts. Presumably idle.

ARIZONA-TONOPAH MINING & MILLING CO. ARIZONA

Office: 503 Delta Bldg., Los Angeles, Calif. **Mine office:** 30 E. Congress St., Tucson, Arizona.

Officers: Jos. Dixon, pres.; Alfred Auger, v. p.-sec.; Geo. Ankers, treas.-gen. mgr. A. J. Harchberger, supt.

Inc. Jan., 1916, in Arizona. **Cap.** $1,000,000; $1 par; 750,000 outstanding. Annual meeting, first Monday in January.

Property: about 1,050 acres, in Amole district next to the **Arizona Tucson** and **Saginaw** mines in Pima county, 9 miles S. W. of Tucson, shows granitic schists, limestone, andesite and rhyolite, carrying a sulphide deposit, said to assay from 1-5½% copper, with gold and silver.

Development: by 185′ tunnel with several shafts, deepest 145′. Development at depth and installation of mill planned.

ARIZONA-TUCSON COPPER CO. ARIZONA

Office: Hibernian Bldg., Los Angeles, Calif.

Officers: Harwood Robbins, pres.; Riverside, Calif.; J. J. Freeman, sec.; Glendale, Cal.; B. F. Dogett, treas.; T. E. Kelso, gen. mgr.

Permitted to sell shares in Dec., 1920, and again in Sept., 1921.

Property: 32 patented claims, in Amole district, next to the Arizona-Tonopah and Saginaw mines, 8 miles S. W. of Tucson. Ore carries gray copper, and selected samples assay about 26½% copper, $18 gold, and 12 oz. silver per ton.

Development: by shaft and lateral work. Good ore reported cut on the 650′ level, January, 1921.

Equipment: 60 h. p. Fairbanks-Morse crude oil engine, 20 h. p. distillate engine, hoist, head-frame, dwellings, etc. Several carload shipments of ore have been made.

ARIZONA UNITED MINING CO. ARIZONA

Office: 1420 Chestnut St., Philadelphia, Pa. **Mine office:** Johnson, Cochise county, Ariz.

Officers: Alfred S. Miller, pres.; Alfred C. Harmer, Jr., v. p. gen. mgr.; David H. Ross, treas.; Alfred H. Miller, sec., with Chas. B. Cox, Geo. E. Barnett, M. D. Brown, W. M. Houston, J. N. Stetson, J. K. Kane, G. M. Jones and Earl P. Mendelhall, directors. J. M. Libby, mgr. Kirby Thomas, cons. engr.

Inc. Aug. 12, 1910, in Arizona, as successor to Arizona United Mining Co. of Delaware. **Cap.** $5,000,000; $1 par; $2,500,000 outstanding.

Dividends: 1% quarterly, begun October, 1916. Company is a close corporation.

Treasurer's statement for year 1918 showed total receipts of $208,247, including $161,541 from ore shipments. Disbursements totalled $192,270, including $25,000 paid on purchase of lease from Goodrich-Lockhart Co. Cash on hand, Dec. 31, 1918, $15,976.

A 10-year lease on the property given to the **Goodrich-Lockhart Co.** in 1913, was surrendered July, 1918, for $75,000, property reverting to the company. During the life of the lease the Arizona United paid all debts, including the mortgage, and distributed $100,000 in dividends from its 45% of net earnings received. The $75,000 payment to the Goodrich-Lockhart Co. was also paid out of royalty under the lease. These earnings came from ore containing 4% or more copper.

Property: 45 claims, 30 patented, 900 acres, 7 miles N. E. of Dragoon, in the Johnson mining camp including the Mammoth, Republic Copper King and Southern group. Principal development is on the Republic claim, opened by a 1,500′ shaft, with about 1,200′ of lateral workings. The most important ore deposit developed after the company resumed

control was between the 900′ and 1,100′ levels, where there has been exposed a deposit 150′ long, 11′ average thickness, 150′ on the dip, with the bottom not reached; assays from this deposit are said to average 6.2% copper. Another deposit, but of lesser importance has been opened on the 900′ level. At the time of suspending operations, Feb. 1, 1919, on account of low price of copper, company states it had enough ore blocked out to give a daily output of 200 tons for sixty days. In addition an ore deposit on the Mammoth claim has been opened up by lessees. The mine has a considerable tonnage of low grade ore opened up.

Equipment: includes a 200 h. p. oil-burning boiler, with hoists at the Republic and Mammoth mines, an electric plant, 4 electric drills and an air compressor. Transportation is by a standard-gauge railway from Johnson to Dragoon, connecting with the Southern Pacific Railway.

During first 6 months of 1918 lessees shipped 24,902 tons of ore, with a value of $290,216, and in last 6 months the company shipped 18,041 tons, value, $174,223, while the Mammoth furnished 2,480 tons of ore with net smelter value of $38,196. No record of 1921 work.

ARIZONA VENTURE CORPORATION ARIZONA

Reorganized as the **Waldron Mining Co., which see.**

ARIZONA VERDE COPPER MINE CO. ARIZONA

Presumably dead.

Mail returned from the advertised postoffice address: care W. M. Lazenby, P. O. Box 814, Phoenix, Ariz.

Property: 26 claims, near Clarkdale, a ¾ interest in 16 claims in the New River district and 41 claims in the Cave Creek district, all in Yavapai county. Company also had a 2-year option on 1,700,000 shares of stock in he Golden Reef Mining Co. (which see), owning the Golden Reef mine, 35 miles from Phoenix. Offered stock at 50¢ a share, May, 1917, solely on the prospective value of its holdings, calling itself "a corporation, with the possibilities of another Guggenheim Exploration Company," which is interesting if true.

ARIZONA VICTORY MINING CO. ARIZONA

Address: R. B. Cross, treas., Room 916, 30 Broad St., New York.

Controlled by **U. S. Continental Mines Co.**, a promotion of Irving K. Farrington & Co.

Cap. $750,000; 50¢ par; 400,000 shares in treasury after issuance of 200,000 shares of treasury stock offered at 6¢ a share, Dec. 1920.

Property: that of Mark Bradley in the Walker district, adjoining the Sheldon, 14 miles from Prescott, opened by 500′ of workings, showing gold, silver and copper ore. A two-compartment shaft is down 78′.

Equipment: includes 60 h. p. hoist, Cameron pump, buildings, etc.

ARIZONA VIRGINIA COPPER CO. ARIZONA

Selling agent, T. D. Hosmer, 306 Colorado Bldg., Colorado Springs, Colo.

Officers: G. W. Lewis, pres.; E. C. King, sec.-mgr., with George S. Elstrum and George Birdsell, directors.

Cap. $1,500,000; $1 par; outstanding 550,000 shares; including 250,000 shares paid to former owners for property; $20,000 cash still due.

Property: 14 claims in the Castle Creek district, Yavapai county, said to show two lodes, 40′ to 50′ wide, traceable for 3,500′, forming a junction at the N. W. end of the property, on which small prospect holes have been sunk. Now driving two tunnels at depths of 250′ and 350′. Shipments reported of 269 tons of ore yielding 15% copper. Ore is hauled 32 miles to railroad at Hot Springs Junction. Reported on by Louis S. Noble.

ARIZONA WAMPUM MINE ARIZONA

Address: S. D. Conley, owner, Duncan, Ariz.

Property: 40 claims, formerly owned by the **Arizona Mayflower Copper Co.**, in the Mayflower district, Greenlee county, 10 miles from Dun-

can. Ore occurs as sulphides and oxides in fissure veins, 7′ to 10′ wide, dip 55° S. W., course S. E.-N. W., with dacite foot and limestone hanging wall; reported to average 5 oz. silver, 2.5% copper and 9 oz. silver, 7% copper, with $2.50 gold per ton. Developed to a depth of 100′ by 3 shafts and 160′ tunnel. Equipped with compressor, drills, gasoline engine and hoist.

ARIZONA WESTERN MINES CO. **ARIZONA**

Address: W. H. Little, 33 Fremont St., San Francisco.

Officers and directors: A. T. Dunbar, pres.; F. H. Crafts, v. p.; W. H. Little, sec.-treas.

Inc. 1913, in Arizona. **Cap.** $1,000,000; $1 par; 605,549 shares issued.

Property: 7 patented claims, 123 acres, at Chloride, Mohave county. Ore contains gold-silver lead-zinc.

Development: by 250′ shaft and 1,000′ tunnel. Inactive several years.

ARIZONA YUCCA MINES CO. **ARIZONA**

Offices: 934 Central Bldg., Los Angeles, Calif.; 320 Fleming Bldg., Phoenix, Ariz. **Mine office:** J. R. Rawl, supt., Yucca, Ariz.

Officers: R. W. Coleman, pres.; F. E. Blessington, v. p.; N. K. Potter, 2nd v. p.; D. M. Locey, sec.-treas.-mgr.

Inc. April, 1920, in Arizona. **Cap.** $1,000,000; par $1; 370,685 shares issued in payment for Franconia property, but held in escrow.

Property: 22 claim, 320 acres, includes James Rawl group and former holdings of the **Franconia M. & M. Co.**, in Buck Mts., 46 miles S. W. of Kingman and 12 miles S. of Franconia on the Santa Fe R. R.

Development: by shafts to depth of 215′, said to cut several fissure veins averaging 5′ in width and running $20 per ton in gold content.

Management plans deep development and installing necessary equipment.

ARIZONA MINING CO. **ARIZONA**

Probably dead. See Vol. XIV.

ARKANSAS & ARIZONA COPPER CO. **ARIZONA**

Office and mine: Jerome, Yavapai county, Ariz.

Officers at last accounts: John F. Boyle, pres.; H. P. Tear, v. p.; J. E. Leeper, mgr., Jerome, Ariz.; H. N. Jasper, sec.-treas., Little Rock, Ark., and W. D. Tickner, directors; W. H. Galligan, supt. Controlled by the **Goodrich-Lockhart Co.**, 60 Broadway, New York.

Inc. June 25, 1906, in Arizona. **Cap.** $1,500,000; increased Jan., 1912, to $3,000,000, and 1916 to $6,700,000; $1 par. Company refinanced in 1915 and bond issue of $150,000 authorized for further development work; $68,800 issued.

Property: the Royal Irish group, 14 claims, 280 acres in the Verde district. Claims show felsite porphyry and diorite cut by olivine basalt dikes running north and south and dipping 60° to the east. Orebodies lie on each side of the basalt in the porphyry and quartz schist. Orebody said to be 85′ wide where encountered on 1,400′ level and shows chalcopyrite and some bornite. Extent of shoot not yet determined. Company acquired the adjoining claims, 230 acres, of the **Mowles Copper Co.** in May, 1916.

Development: by 1,650′ shaft with about 6,000′ of workings.

Equipment: includes three 150 h. p. boilers, hoist good for 2,000′, air compressors, machine shop, power house, and a mile of road, connecting with United Verde Copper Co. railroad.

The property was shut down indefinitely, August, 1917, after spending $100,000 in a crosscut on the 1,000′ level. The pumps are out, but conditions warrant drifting on the pyrite bodies cut in the crosscut, in the hope of getting copper ore.

ARMOUR MINING CO. **ARIZONA**

Idle. Former address: J. A. Armour or E. A. Williams, 311 N. First St., Phoenix, Arizona.

Property: 900 acres located 16 miles east of Florence and 5½ miles from Price, Pinal county.

Reported prospecting with churn-drills in 1918.

ASH CREEK GOLD MINING & MILLING CO. **ARIZONA**

Address: Winkelman, Ariz.

Officers: E. W. Childs, pres.; J. H. Pool, v. p.-mgr.; F. M. Pool, sec.-treas., with P. M. Butler, and E. Rargel, directors, at last accounts.

Inc. in Arizona. **Cap.** $1,000,000; $1 par; 150,000 shares outstanding.

Property: 10 claims, 200 acres, 5 miles E. of Winkelman, Gila Co., Ariz.

Ore: occurs in fissure vein, 4′ wide, in andesite, diorite and diabase, said to show a 30″ shoot of sulphide ore, assaying 0.42 oz. gold and 2.13% copper.

Development: by tunnels and shaft, totaling 600′. Property reported on by R. W. Hollis, Los Angeles, who recommended development at depth and erection of a small mill.

ASH PEAK EXTENSION MINING CO. **ARIZONA**

Address: J. Horgan, Duncan, Ariz.

Inc. 1917, in Arizona.

Property: 14 claims in the Clifton district, said to show good gold-silver values at surface.

Development: by 500′ shaft and drifts on a vein said to be 9′ wide, assaying 25-30 oz. silver per ton. Shipments of 20 tons daily from development work reported made to El Paso smelter, September, 1920.

ASH PEAK MINES CO. **ARIZONA**

Address: Arthur Murphy, Jr., mgr., Duncan, Ariz.

About 30% or $90,000 of the issued stock is owned by the **Goldfield Cons. Mines Co.**, Nev.

Property: claims in the Duncan section below Clifton, said to show good gold and silver values. **Development:** by 800′ Shamrock and 500′ Commerce shafts, with about 8,000′ of drifting on vein, said to develop ore-bodies averaging 14 oz. silver and $1 gold per ton.

Equipment: includes compressor plant and new hoisting machinery. A 100-ton cyanide plant under construction.

ATLANTIS MINING CO. **ARIZONA**

Address: Payson, Ariz. J. D. Riley, gen. mgr.

Property: Ox Bow mine, 15 claims, 7 miles S. of Payson, said to show a 6′ vein of free milling ore. New equipment being installed and development work on 200′ level underway.

ATLAS COPPER CO. **ARIZONA**

Inc. 1917, in Arizona. **Cap.** $1,000,000; $1 par. Is a reorganization of the **San Juan Copper Co.**

Property: the San Juan mines, 13 claims, 260 acres, in the Lone Star district, Graham county, 8 miles N. of Safford. Ore occurs in veins in granitic porphyry traversing diorite and is said to average 3.6% copper, with gold and silver values. Developed by 330′ main shaft, 750′ of drifting, and 2,500′ of diamond drilling, and equipped with hoist, compressor, churn-drills, and pump.

Shipments in 1916 to Douglas and El Paso smelters said to have netted the company $50,000. No output during 1917 and 1918.

Property closed mid-1919, and company in bankruptcy.

ATLAS DEVELOPMENT CO. **ARIZONA**

Had an option on the Lake Shore mine, near Casa Grande. Ceased operations 1919, and has gone out of business. Described in Vol. XIII.

ATLAS MINING CO. **ARIZONA**

Defunct. L. & K. W. Gano, Cincinnati, Ohio, owners. J. F. O. Reilly, Silverbell, Arizona, agent.

Property: 6 claims, 5 mill sites, all patented, one mile N. W. of the Silverbell post office. Property located 1879, and equipped with 40-ton

smelter in 1888, which operated for years on rich surface ores, but, unable to handle sulphide ores at a profit, was closed down. Operation by lessees since then, with extraction of small tonnages of rich copper sulphide ore and of zinc carbonate.

AUSTERLITZ GROUP OF MINES — **ARIZONA**

Owned by A. H. Noon, Nogales, Ariz. Under lease and option to Camphius & Rives, of El Paso, Texas.

Property: 5 claims, about 100 acres, in Oro Blanco district, Santa Cruz county.

Development: by 150′ shaft and 2 tunnels, 600′ and 300′ long, said to show quartz fissure vein in porphyry assaying from $4 to $40 in copper, gold and silver. Ore shipments, totaling over $200,000, said to have been made to date. The property has been an intermittent producer.

AZTEC MINES CO. — **ARIZONA**

Apparently dead. See Vol. X of the Copper Handbook.

AZTLAN GOLD SYNDICATE — **ARIZONA**

Address: Hiram Whitcomb, Patagonia, Ariz.

Inc. 1920 as a close corporation and reported to have taken over the holdings of the **Lavell Gold Mining Co.**, fully described in Vol. XIV.

Property: the Apex group, 19 claims, 386 acres, in the Banner district, 6 miles N. of Hayden Junction. Ore contains gold, copper, silver-lead. Developed by tunnels and shallow shafts. **Equipment:** includes 50-ton mill.

Management plans building aerial tramway and enlarging mill to 100-ton capacity.

BACHMAN-MERRITT METALS CO. — **ARIZONA**

Address: Nogales, Ariz., or R. T. Barton, Prescott, Ariz.

Property: the old Tres de Mayo mine, 10 claims, in Palmetto district, 14 miles N. E. of Nogales, said to contain vanadinite and silver ores. Main vein is a well-defined fissure in mononite, with a width of 10 to 50′. Reserves are estimated at 8,000 tons of vanadinite. Shaft is to be sunk to 600′ and a mill erected.

In 1920, a lease was taken on the World's Fair mine in the Patagonia Mtns., credited with a past production of $1,000,000. The ore is a sulphide, carrying silver, lead, gold and copper. For geology see U. S. G. S. Bull. 582.

Development: at World's Fair, by 15,000′ of drifts, tunnels, stopes, shafts and winzes, to depth of 600′.

Equipment: includes concentrator, flotation plant, crushers, compressors, hoists, drills and necessary buildings.

BAGDAD COPPER CO. — **ARIZONA**

Name changed to **Arizona Bagdad**, which see.

BALLARD GROUP — **ARIZONA**

Address: F. C. Bolen, 312 E. Van Buren St., Phoenix, Ariz.

Property: 7 miles south of Palo Verde station, on the Arizona Eastern line, Maricopa county, a few miles north of Rawley mine.

Examined by D. C. Nicholson in June, 1919, who says that the formation consists of altered schist, much decomposed. Three immense "bars" of red oxidized silicious porphyry which run through the ground from north to south, seem to be favorable for prospecting. Secondary enrichment is expected at depth, as the rock at surface has been leached. Drilling is suggested.

Development: by open-cuts and two 30′ shafts. In most of the trenches the ore exposed is said to carry from 3.8 to 31.35% copper.

Mine formerly operated by the **United Verde, Jr. Co.** and the **United Verde Cons. Co.**

BALL COPPER CO. — **ARIZONA**

Office: 416 Investment Bldg., Los Angeles, Cal. **Mine office:** Hayden Junction, Gila county, Ariz.

Officers: Chas. E. Finney, pres.; F. B. Pugh, v. p.; Robt. J. Simpson, sec.-treas., with S. F. Parrish and D. Carl Kurtz, directors.

Inc. Feb. 1, 1908, in Arizona. **Cap.** $3,000,000; $10 par; $1,250,000 issued. Bonds, $9,000 outstanding at 6%. Annual meeting, third Tuesday in January. Company owns 40,000 shares of the **London Arizona Consolidated Copper Co.**, and has transferred its mineral claims to that company; they are described under that title.

BALTIC MINING CO. **ARIZONA**

Address: W. K. Ridenour, pres.-mgr., Oatman, Ariz.

Officers: W. K. Ridenour, pres.-treas.; J. L. McIver, v. p., with Geo. MacKay, directors. L. G. Hand, sec.

Inc. 1920, in Arizona. **Cap.** $300,000; 20c par; 600,000 shares issued.

Property: 8 claims at Oatman, Mohave county, shows gold bearing ore in a fissure vein. No development work done.

BANNER GOLD MINING & MILLING CO. **ARIZONA**

Office: Kingman, Ariz.

Officers: B. L. Vaughn, pres., San Diego, Calif.; J. C. Brian, v. p.; E. E. Bollinger, sec., Kingman, Ariz.

Cap. $1,000,000; $1 par; issued 779,250 shares; 500,000 shares paid for property. May, 1918, offered 50,000 shares at four cents.

Property: 9 claims in the Union Pass section of San Francisco district, Mohave county. Mine is said to carry the extension of the rich Sheep Trail vein, and a 400′ shaft has been sunk on milling ore. Shipping ore reported on 400′ level in drift 300′ west of shaft.

BARBARA MINE **ARIZONA**

Formerly owned by **Monte de Cobre C. Co.**

Address: Robertson & Walker, owners, Mayer, Arizona.

Property: on South Copper Mtn., near Mayer, Yavapai county, shows chalcopyrite and oxidized copper ore.

Development: by shaft and adit tunnel, opening up 7′ of 15% copper ore. Idle, pending an improvement of the copper market.

BARNEY COPPER CO. **ARIZONA**

Absorbed with the Porphyry Copper Co. by **Porphyry Consolidated Copper Co.**, which see.

BEACH MINES, INC. **ARIZONA**

Address: 38 N. Church St., Tucson, Ariz. Arthur Cook, supt.

Officers: Geo. N. Beach, pres.-gen. mgr.; John B. Wright, v. p.; Wm. Truehart, sec.-treas., with Jas. M. Treahey, J. W. Hopkins, Geo. R. Darnell, all of Tucson, and Arthur Allen of Dallas, Texas, directors.

Inc. June, 1917, in Ariz. **Cap.** $2,500,000 $1 par; 1,000,000 shares issued.

Property: 40 claims, 800 acres, in Ventana and Baboquivari mining districts, Pima county, 65 miles S. W. of Tucson, said to show veins in quartz-schist with copper, gold and silver values.

Development: by tunnels and 125′ shaft. Sinking to 400′ depth. Property is in the prospect class.

BEE HIVE GOLD CO. **ARIZONA**

Office: Hotel Zeiger, El Paso, Texas. Chas. Zeiger, pres.

Cap. $100,000; 25c par.

Property: 9 patented claims, adjoining the Octave mine, near Congress Junction, Weaver district, Yavapai county. **Ore:** carrying gold values occurs in quartz vein on contact between granite and schist.

Management claims to have spent $60,000 in development work, driving tunnels, 1,000′ and 2,000′ long respectively, and to have 10,000 tons of $8 ore on the dump besides 500,000 tons blocked out above tunnels and between two winzes sunk below the tunnel level.

Equipment: engine, compressor and drills. Idle.

BEEMER CONSOLIDATED GOLD & COPPER CO. **ARIZONA**

Owns the Stormcloud Mine at Mt. Union, 12 miles S. of Prescott, Yavapai county, Ariz. Idle.

BELCHER MINE **ARIZONA**

Formerly part of the **Belcher Mining Co.**, but bought at tax sale by George Demain, Prescott, Ariz.

Property: 5 claims, including the Belcher, Mammoth and the Eugene in the Big Bug district, 13 miles south of Prescott. Vein carries gold and silver, reported to average $5.90 per ton.

Said to be under option 1919 to John R. McEwen and E. C. Evans representing Phoenix parties, for $100,000.

BELCHER MINING CO. **ARIZONA**

Defunct and assets reported sold for taxes. Fully described, Vol. XII. See Belcher Mine and Red Rock Mine.

BELLA UNION MINE **ARIZONA**

Mine at Chloride, Mohave county, Ariz.

Operations were to be resumed in 1920 and 125′ shaft sunk to 500′ level. Mine is equipped with a 10-ton cyanide plant. C. H. Fay and C. B. Schoenmehl reported in charge.

BERKLEY MINE **ARIZONA**

Address: T. J. Sparks, Kingman, Ariz.

Property: an old silver mine in the Deluge Wash section. Was pumped out, and said to be operating through a 40′ shaft on a 6′ vein, from which high-grade ore was mined.

BIG BLUE MINING CO. **ARIZONA**

Mail returned unclaimed, from Constellation, Arizona.

Fully described in Vol. XIV.

BIG BUG COPPER CO. **ARIZONA**

Office: Mayer, Ariz.

Officers: Frank Thornton, pres.-gen. mgr.; E. B. Bunker, v. p.; Uri Embody, sec.-treas., with Frank W. Giroux and Jas. Hill, directors.

Property: 6 claims, 5 miles east of Mayer, Yavapai county; 21 claims, adjoining the Blue Bell, 2 near the smelter at Mayer, and 2 on Copper mountain.

Development: work on the Copper mountain property consists of shaft now 235′ deep, reported in ore assaying from 15 to 45% copper. Ore is a sericite schist containing lime spar shot through with chalcopyrite and black oxide of copper. A 30′ shaft, 1,000′ away, is stated to show the same ore with more glance and gray copper. Machinery was installed in Aug., 1919. Property to be developed to depth of 500′ when necessary capital is available. Is a promising prospect.

BIG BUTTE COPPER CO. **ARIZONA**

Address: H. E. Shumate, sec., Prescott, Ariz.

Officers: Geo. L. Reed, pres.; Ed. Shumate, v. p.; Geo. C. Ruffner, treas.

Inc. April, 1917, in Montana. **Cap.** $1,500,000; $1 par.

Property: 43 claims in Copper Basin district, 12 miles from Prescott, developed by tunnel, shafts and open cuts, from which some copper and silver ore has been shipped. Reported driving tunnel to cut vein at point below rich outcrop. Idle in 1920-21, pending improved conditions in copper industry.

BIG COPPER CHIEF CO. **ARIZONA**

Address: care Thomas Boyd, pres., Mound City, Ill.; S. E. Jordan, sec.-treas., Phoenix, Ariz.; R. E. Grace, v. p. **Mine address:** Canon, via Bumblebee, Ariz.

Property: the Jasper N. Nellis groups, 1½ miles S. W. of Bumblebee, Yavapai county, shows schist mineralized by copper glance, etc., in a zone 300′ wide.

Developed by 50′ shaft, 250′ tunnel and many pits.

BIG DOME MINES **ARIZONA**

Owner: C. Benjamin Hayes, care Walker Stage, Prescott, Ariz.

Property: 4 patented claims, in Walker district, Yavapai county, about five miles W. of Prescott. Reported showing an 8′ fissure vein in porphyry andschist, with gold, silver and lead values from $8 to $200 per ton in a 10-inch streak. **Developed** by vertical shaft 85′ deep, equipped with 3 h.p. hoist made by owner, small compressor and pump.

Expended $1,800 in 1918; planned to continue sinking.

BIG JEROME COPPER CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from Los Angeles, Calif., and from former Fiscal Office, Arizona Securities & Trust Co., Phoenix, Ariz.

Officers: L. L. Wallace, pres.; F. M. Dorsey, v. p.; Fred T. Sheppe, sec.; with C. T. Talbert and J. B. Bourne, directors.

Inc. in Arizona. **Cap.** $2,500,000; 25c. par; 5,000,000 shares given in payment for property are pooled, balance said to be treasury shares.

Property: 32 claims, about 640 acres, 1½ miles S. W. of the United Verde Co. and adjoining the Pittsburgh Jerome property and the Copper Shoe group in the southern part of the camp, near the Shea group.

Company's promotion stock was advertised luridly at 10c. a share in December, 1916, during the Jerome boom.

No development work of importance has been done on the property. Unfavorably regarded. New York Tribune showed it to be a twin fake of the Ray Arizona of Wilson & Co.

BIG JIM CONSOLIDATED MINING CO. **ARIZONA**

Office: 591 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Mohave county, Ariz.

Officers: C. C. Spicer, pres.; Lester M. Dull, v. p.; S. M. Warmbath, sec.-treas., and Elmer M. Bray and C. W. Pope, directors. A. G. Keating, supt.

Inc. 1917, in Arizona. **Cap.** $1,500,000; $1 par; 1,250,000 shares outstanding. Stock listed on Los Angeles exchange. Is the successor of **Big Jim Gold Mng. Co.**, which see.

1,000 shares sold for $12 the lot at public auction in New York on Dec. 22, 1920.

Property: 7 claims in the Tom Reed-Gold Road region. The Bluebird group, W. of the Tom Reed, shows gold bearing veins. in andesite.

Development: by 400′ shaft on the Bluebird group, reported to cut the vein in a crosscut on the 200′ level.

Equipment: includes 25 h. p. gasoline hoist and compressor. There has been no production and property is still in the development stage. Idle.

BIG JIM GOLD MINING CO. **ARIZONA**

Dissolved by vote of stockholders, April 24, 1917. The Big Jim and Monarch claims were sold to the **United Eastern Mng. Co.** in 1917, the owners of Big Jim G. Mng. Co.'s stock receiving one-sixth share of United Eastern stock and one share of Big Jim Cons. Mng. Co. stock for each share of old stock.

BIG LEDGE COPPER CO. **ARIZONA**

Successor to Big Ledge Dev. Co.

Office: 512 Sellwood Bldg., Duluth, Minn. New York office: 7 Dey Street.

Mine address: W. W. Lytzen, mgr., Huron, Ariz.

Officers: John Borg, pres.; Nelson Gray, v. p.-treas.; William C. Sherwood, sec., with Joseph B. Cotton, M. C. Cole, Alexander Garbe and H. A. Bingham, all of New York, directors.

Inc. Jan. 20, 1915, in Arizona. **Cap.** $15,500,000; in 3,000,000 shares common and 100,000 preferred; $5 par; 2,865,587 common shares outstanding. Registrar and Transfer Co., transfer agent; Empire Trust Co., registrar; both of New York. Listed on N. Y. Curb; quoted in 1921, high 30c., low 13c.

Financial statement for year ended Dec. 31, 1918, showed receipts from sale of shares, $220,883 and $102,278 from sale of ore; disbursements totaled $358,196. Current assets were $94,690; liabilities, $168,991.

In June, 1918, the former management was succeeded by the same interests that control the **Callahan Zinc Lead Co.** of Wallace, Ida.; under the new control, payment on all claims under option was completed, and systematic development of the mine begun.

In October, 1921, it was officially announced that pfd. stock was being sold to provide capital to liquidate $128,000 of debts.

Property: .two groups, a mile apart; (1) the **Henrietta,** 7 patented and 12 unpatented claims, forming a compact tract covering 5,750′ along the Henrietta vein, and (2) the **Butternut,** of 2 patented claims and 10 locations, surveyed for patent, covering 7,500′ along the main line of mineralization.

Henrietta Group

The Henrietta mine was in the nineties a steady producer of gold ores from the oxidized portion of the Henrietta vein. The ore occurs in bands in a fissure vein averaging 5′ in width, and contains cupriferous pyrite, chalcopyrite, a small amount of zinc and lead sulphides and quartz. All the sulphides carry gold and silver, the average grade being about 3.25% Cu, $4.00 gold and 2 oz. silver.

Development: comprises a main haulageway, 2,300′ long, with the Henrietta incline shaft at the 2,000′ point. The shaft is 600′ deep with levels at 150, 300, 450 and 600′. The first level runs 1,100 feet north and in Nov., 1921, had entered one of the main shoots of gold ore mined 60′ above this level in the early days of the Henrietta. A 5′ face, sampled 4.81% Cu., $3.20 gold and 4.12 oz. silver, showing that below the oxidized zone good ore is to be found. The face is 1,500′ from the end line, where on this same vein in the Gladstone-McCabe mine immediately north of the Big Ledge, rich copper-gold ore was mined 1,000′ feet lower than the Big Ledge level. A raise 600′ to 450′ samples 3.9% copper, $5.50 gold, 8.2 oz. silver. Other levels about 400′ north of the shaft are connected by raises. Stopes have been started and necessary chutes and manways built.

Butternut Group

This group is on the schist side of the contact, and the ore zone shows sulphide replacement for width of 10 to 20′.

Development: by a 3-compartment shaft, which should reach the mineralized zone at about 800′, where lateral development will be done. Though the Butternut has no ore reserves actually blocked out, the new work is expected to develop a wide zone of concentrating ore that can be mined by low-cost methods, because surface indications and the shoot already mined up to the surface make this a reasonable expectation.

Equipment: both mines have electric power, high voltage lines going on each property, compressors, shops, drys, etc.

Mill: of 100 tons initial capacity was completed in 1920, to treat the ore already developed in both mines. It follows standard practice throughout. Crushers are followed by a Hardinge ball mill to 12 mesh and tabling; the tails being reground to 48 mesh in a 4 by 10′ tube mill and then flotation. All the concentrates being dewatered in an Akins classifier, the overflow after being thickened going to a Portland Filter. The concentrates are carried by a conveyor to the loading bin on the railroad 200′ from the mill.

The Santa Fe Ry. has a spur to the Henrietta ore-bins and a 3,800′ aerial tram will convey Butternut ore to the mill.

With the mill completed, the Henrietta mine should make a fair profit over its cost of operation as soon as conditions are normal. It must be admitted however that the 1921 price of the stock, about 33c., gives a current valuation of $3,000,000, which is excessive for the property and

its prospective earnings. The hope that bonanza orebodies may be found to the north, near the McCabe Gladstone line, while natural, is not a fact that can be capitalized.

BIG LEDGE DEVELOPMENT CO. **ARIZONA**

Merged into **Big Ledge Copper Co.**, which see.

BIG PINE CONSOLIDATED MINING CO. **ARIZONA**

Address: C. H. Dunning, mgr., Prescott, Ariz.

Officers: A. Bjorkman, pres.; Richard Lamson, sec.; A. Berquist, treas.; with Felix Durochur and C. H. Dunning, directors.

Inc. April 30, 1915, in Arizona. **Cap.** $500,000; $1 par; outstanding, $400,000. Annual meeting 1st Monday in April. Commercial Trust & Savings Bank, Prescott, registrar. Is a consolidation of the Big Pine Mng. Co., and the Lake Superior & Western Mng. Co., each of companies receiving 200,000 shares for its property.

Property: 14 claims in Senator district, 12 miles south of Prescott, which show gold ore in 3 parallel veins.

Development: by 7 tunnels, principally on a vein claimed to show ore for 700' in one tunnel, 1,100' in a second, 1,600' in a third, and 400' in a fourth. Company claims ore reserves of 60,000 tons with average grade of $9.50 per ton.

Mill: the 100-ton cyanide plant of the Mascot mine, **Lake Sup. & Western Co.**, was moved to the Big Pine property and erected near portal of tunnel No. 6. This treated 5,000 tons of ore said to average $10.00 per ton, making an extraction of about 93%. The plant was burned and the property was closed down in October, 1918, owing to prevailing excessive costs of reconstruction.

BIG REEF COPPER CO. **ARIZONA**

Address: Box 857, Prescott, Ariz.

Officers: O. G. Griffin, pres.-mgr., Phoenix, Ariz.; L. F. Wilson, v. p.; R. E. Donovan, sec.-treas., with Frank Giroux and Judge M. K. Knapp, directors.

Inc. in Ariz. **Cap.** $1,000,000; $1 par; 519,997 shares in treasury.

Property: 19 claims, 380 acres, located 2¼ miles from Mayer, in Big Bug mining district, Yavapai county, Ariz., formerly owned by **Great Western Sm. Co.** The mines of the Cons. Ariz. Smelting Co. and Big Ledge Copper Co. are but a few miles distant. Claims cover an area of Yavapai schist traversed by a wide zone of silicification containing disseminated copper ore chiefly oxidized, with segregations in quartz veinlets.

Development: about 300' of shallow work has been done to date and chalcopyrite ore reported in 60' shaft. Property favorably reported on, 1917, by J. H. Shockley, of New York and Val De Camp of the U. V. Copper Co.

Equipment: compressor, gas engine, hoist. Company inactive

BIG SEVEN GROUP **ARIZONA**

Near Harrington, Yavapai county, Ariz. Mine, developed by 1,200' tunnel, shows a well-defined vein with high value in gold, silver and copper.

Mail returned unclaimed; presumably idle.

BILLIE MACK MINING CO. **ARIZONA**

Dead and former property reported to be owned by **Illinois Arizona Copper Co.**, which see.

BISBEE AJO COPPER & DEV. CO. **ARIZONA**

Officers: W. E. Holm, representative, Bisbee, Arizona; Ed. Sweeney, pres. and gen. mgr.

Cap., increased during 1917 from $650,000 to $3,000,000.

Property: consists of 2 groups; the first of 9 claims, 5 miles from the Mexican border, has a shaft 140' deep; assays are said to have shown from 3% to 73% copper; shales and porphyry predominate. The second group of 26 claims, south of the town of New Cornelia, is undeveloped.

BISBEE COPPER MINING & DEVELOPING CO. ARIZONA

Idle and mail returned from former office: Bisbee, Ariz.

Officers: Daniel B. Seed, pres.-mgr.; Joseph Waters, v. p.-supt.; W. Hubbard, treas.; A. H. Livingston, sec.-mgr., with Jack Sheldon, directors.

Inc. 1916, in Arizona. **Cap.** $1,000,000; $1 par; 600,000 issued. U. S. Corporation Co., transfer office; Empire Trust Co., registrar; both of New York. Annual meeting, first Saturday in September.

1,000 shares sold for $6 the lot at public auction in New York on Dec 31, 1920, and 100 shares for $1 on Oct. 15, 1921.

Property: 21 claims, 12 patented, 273 acres in Warren district, comprising the Arizona and Winwood group and other claims, located ½ mile north of Lowell and a mile east of Bisbee. Lands are north of the Denn Arizona, and north of the Dividend fault and lie outside of the recognized ore belt. Claims are said to show iron outcrops and some copper carbonate ore, but the U. S. Geological Survey map shows that although schist and a very small acreage of porphyry occur on the southerly claims, most of the group is covered by barren Cretaceous rocks.

The tract does show some 2-6½% oxidized ore probably deposited by surface waters, as the Cretaceous rocks do elsewhere in the district but in such cases the ore is only surficial, and rapidly fades out at a few yards or so in depth. It may be added that company's officers make affidavit to such ore being 50′ wide and going down to bottom of shaft 12 deep. Although one drill-hole was down over 892′ July, 1917, sampling of the drill cores failed to show any commercial value.

Equipment: a 10x12″ electric hoist.

If the above facts are correct the claims are entirely outside of the mineralized area and have little, if any, chance of becoming profitably productive.

BISBEE-SONORA DEVELOPING CO. ARIZONA

Owned several mining locations S. W. of Bisbee in 1906-7, but failed to do assessment work and lost property. No meeting was held for over 4 years, and company is insolvent.

H. C. Beumler, pres., Douglas, Ariz., wrote in 1917: "Company out of business." Was the holding company for Badger Hall, **Bisbee & Duluth M. & D. Co.** and **Paradise Mng. Co.** .Fully described, Vol. XII.

BISBEE-WARREN COPPER CO. ARIZONA

Address: Box 1129, Bisbee, Ariz.

Officers: Fred Sutter, pres.; M. Newman, v. p.; R. A. Bretherton sec.-treas., with W. H. Brophy, M. J. Cunningham, Walter B. Congdon and Jos. Walker, directors.

Inc. Nov. 6, 1916, in Ariz. Cap. $1,000,000; $1 par; 12,000 issued.

Property: 12 patented claims, 196 acres, in Warren district, Cochise county, 1½ miles E. of Lowell. Is a prospect.

BISHOPS KNOLL MINING CO. ARIZONA

Main office: Gisela, Gila Co., Ariz.

Officers: E. B. Simanton, pres.; Wm. Brown, v. p.; John McCormick sec., A. J. Hammons, treas. M. J. Kane, gen. mgr., Payson, Ariz.

Inc. 1917, in Arizona. **Cap.** $3,000,000; $1 par; 1,000,000 issued. Permit to sell stock was issued, June, 1921.

Property: 50 claims. 1,000 acres. 15 miles S. of Payson. Ore said to contain copper sulphides, occurs in porphyry dikes.

Development: by tunnel and shallow shaft. Company is developing and prospecting the property.

BLACK BESS MINING CO. ARIZONA

Address: .I. N. Potter, 33 Davison Ave., Highland Park, Mich.

Officers: I. N. Potter, pres.; J. W. Travers, v. p.; H. L. Hall, sec Levi Stanton, treas.; J. L. Austin, counsel; with A. W. Bramwell and E. Hall, directors.

Inc. 1918, in Arizona. Cap. $600,000; $10 par.

Property: 10 claims near the Bullion Bar, 7 miles W. of Gunsight, Pima county, known as the Submarine group. Shaft 200′ deep. Vein on the 50′ and 80′ levels said to have 20″ of excellent free milling gold ore, containing molybdenum.

Equipment: 5-stamp mill and two 20-ton cyanide tanks, within one mile of the Black Bess main shaft. Idle.

BLACK CANYON MINING CO. **ARIZONA**

Address: Claude Baker, gen. mgr., Turkey, Yavapai county, Ariz.

Officers: W. A. Moses, pres., Kansas City, Mo.; A. L. Harroun, v. p.; Edna Harroun, sec., Kansas City, Mo.

Property: 12 claims and mill site in the Black Canyon district, Yavapai county, 3.5 miles S. E. of Turkey on the P. & E. R. R. Claims show 1 vein, 5-16′ wide, opened by 1,500′ adit which follows vein for 960′ and by 230′ incline; maximum back is about 300′. Portal of adit is on the adjoining Silver Zone property. The highly altered vein material carries silver, with some lead and a little zinc; ore is largely of milling grade but high grade streaks occur.

At last account (April, 1920) manager was operating property under a lease.

BLACK CHIEF COPPER CO. **ARIZONA**

Former address: Dewey, Yavapai county, Ariz.

Officers: John Milligan, pres.; J. M. Sullivan, Welsh, La., v. p.-mgr.; Eugene Milligan, sec.-treas.;

Inc. 1908, in Arizona. **Cap.** $2,000,000; $1 par; 1,170,000 shares issued. Annual meeting, 2nd Tuesday in July. About $30,000 expended to date.

Property: the Uncle Sam group, 6 claims, 10 miles S. of Jerome, has 200′ shaft, with a total of 1,300′ of workings, showing ore said to give assays up to 25% copper, $4 gold, $3 silver, 6% zinc and 10% lead. Has a hoist and 2 pumps. A prospect.

BLACK DIAMOND MINING & DEV. CO. **ARIZONA**

Address: Gus Dalahn, mgr., P. O. Box 403, Prescott, Ariz.

Officers: Geo. S. Walters, pres.; F. J. Parr, v. p.; Geo. E. Weatherby, sec., 106 E. William St., Decatur, Ill.; J. C. Mitchell, treas.

Property: 17 claims, located in the Walker district, 7 miles S. of Prescott said to be producing gold-silver-lead ore from a vein 24-36″ wide, worth $50 per ton. Shaft 300′ deep, with numerous drifts.

Equipment: includes steam hoist, air compressor, 30-ton mill and buildings.

Holdings taken over by a trustee for the bondholders (1921).

BLACK EAGLE COPPER CO. **ARIZONA**

Address: W. Perry Howle, Box 99, Superior, Ariz.

Officers: W. Perry Howle, pres.; Henry Benning, v. p.; Geo. King, sec.-treas., with John Hofman and J. Stove, directors.

Inc. in Arizona. **Cap.** $1,000,000; $1 par; fully paid.

Property: 11 claims, 220 acres, in Pioneer district, Pinal county, ¼ mile from the Silver King mine, developed by 2,500′ of workings. Is said to have produced $50,000 in silver ore taken from a 100′ shaft. Six quartz veins have been cut containing chalcopyrite, chalcocite and bornite. Examined by H. B. Starbird and W. W. Simon.

Company has been financed and considerable development work planned.

BLACK EAGLE GROUP **ARIZONA**

Address: C. A. Pierce, Patagonia, Ariz.

Property: 6 claims, 84 acres, in Santa Cruz county, Arizona, contains a fissure vein in limestone, dipping 45° N. E. and pitching S. W. Ore occurs as shoots, said to assay 36 oz. of silver, 0.2% copper and 16% manganese.

Development: by 110 ft. incline and 400 ft. of workings. Reserves estimated at 500 tons. Only equipment is a 10 h. p. Fairbanks-Morse hoist.

Production: $80,000 received from ore sales during 1918 and 1919 of which $45,000 was expended.

BLACK GIANT MINES CO. ARIZONA

Operating the Black Giant and little Giant Mines, at last account.

Main office: Mobile, Ala. **Mine office:** Wenden, Ariz.

Officers: A. Meaher, pres., Mobile, Ala., Dick Wick Hall, v. p., Salome, Ariz., C. R. Hall, sec.-treas.; G. S. Leatherbury, A. Meaher, Pat. J. Lyons, A. Hubbart and Tom Stevens, directors, all of Mobile, Ala. S. B. Serf, supt.

Inc. April 3, 1917, in Arizona. **Cap.** $1,500,000; $1 par; 1,300,000 outstanding. Annual meeting, first Monday in January. Transfer office, Mobile, Alabama.

Property: 8 claims, 160 acres, located in the Harcuvar mountains, 10 miles N. of Wenden, in Cunningham Pass. In 1918, work was started on an incline shaft, down 240′ and sinking on ore. Ore opened up on the 110′ level. Orebody reported to be from 25-100′ long, nearly vertical, and running N. W.-S. E. It is in a fissure vein with iron gossan with copper and gold values; 11 carloads of ore are said to have been shipped.

Equipment: 25 h. p. gasoline hoist and 4-drill compressor. Is an attractive prospect.

BLACK HAWK COPPER CO. ARIZONA

Address: J. E. Pemberthy, Gleeson, Ariz.

Inc. 1921, in Arizona. **Cap.** $1,000.000 Par $1.

Property: Pemberthy group in Turquoise district, near Gleeson, Cochise county.

BLACK PRINCE COPPER CO. ARIZONA

Office: 467 Gas & Electric Bldg., Denver, Col. **Mine office:** Johnson, Cochise county, Ariz.

Officers: Robt. N. Bell, pres.-gen. mgr., Denver, Colo.; J. C. Thompson, v. p.; J. B. Wright, sec.-treas., with M. A. Hoag and F. T. Henry, directors.

Inc. May 10, 1901, in Arizona. **Cap.** $1,000,000; $1 par; issued 1,320,100 shares. Annual meeting, last Wednesday in May.

Property: adjoins Peabody mine and comprises 8 patented claims, 147 acres, showing replacement deposits in limestone. Mine has a 950′ two-compartment shaft, sunk in limestone and showing copper oxides and carbonates, bornite and chalcopyrite, with silver, on various levels.

Equipment: includes two 100-h. p. boilers, 175-h. p. steam hoist, compressor, gas engine, 3 pumps and electric generator.

BLACK PRINCE METAL PRODUCTION CO. ARIZONA

Mail returned unclaimed from Ajo and from Tucson, Arizona. Company probably dead.

Officers: J. D. Johnson, pres.; O. H. Finn, v. p. E. W. Oakely, sec.

Cap. $1,000,000; par 50¢

Property: 16 claims, also bond and lease for $25,000 on three more in the Sierra Blanca or Quijotoa Mountains, 40 miles southeast of Ajo.

Assays reported by an optimist for a block of ground 40′ wide and 80′ long are 30% lead, 4.9% copper, 6 oz. silver.

BLACK RANGE MINING CO. ARIZONA

Address: Oatman, Mohave county, Ariz.

Officers: D. P. Wright, pres. and mgr.; Theodore Peterson, v. p. Del Sherer, sec.-treas.

Inc. Oct. 30, 1913, in Ariz. **Cap.** $1,000,000; $1 par; outstanding 700.000. Listed on Los Angeles exchange. Annual meeting, first Tuesday in November.

Property: 8 claims, 2 patented, 155 acres, 5 miles south of Oatman. Shows quartz veins in andesite. Ore is said to run from $2 to $20 per ton. Developed by 300′ shaft, with 600′ of workings.

Equipment: includes a gasoline hoist, air-compressor, and pumps. Property is still in the development stage.

BLACK REEF COPPER CO. **ARIZONA**

Office: 17 W. Adams St., Phoenix, **Mine address:** Wenden, Ariz.

Officers: H. E. Willhalm, pres.-mgr.; F. H. Larsen, v. p.; T. M. Burroughs, sec.-treas.

Cap. $250,000; 25¢ par; 650,000 shares in treasury.

Property: 8 claims, 160 acres, on the south side of Cunningham Pass, Harcuvar mountains, 8 miles north of Wenden. Claims adjoin property of the **Desert M. & D. Co.**

Development: by 400′ working shaft. The 170′ level runs 45′ W. and 180′ E. on the vein, which, though leached, shows some shipping ore. The vein is practically vertical and the shaft is bottomed in ore. Mine yields 1,000 gals. of water per day.

Ore: carries chalcopyrite and bornite associated with limonite and siderite. An ore shoot on the 300′ level is said to show $3-$40 gold, 3-35% copper and high iron values. Vein is 2′-3′ wide with swell to 6′ at 100′ in depth.

Equipment: includes 25 h. p. steam hoist, 50 h. p. gasoline engine and compressor.

In 1917 company offered the public 100,000 shares at 25¢ for a development fund. It was reported that the company was fully financed September, 1917, but the Arizona corp. com. requested the officers to explain sale of stock after expiration of selling permit of July 1, 1917.

BLACK ROCK (LTD) MINING & MILLING CO. **ARIZONA**

Idle or possibly dead. **Former address:** Constellation, Ariz. **Inc.** 1910, in Arizona.

Property: 3 patented claims, about 12 miles E. of Wickenburg. Developed by 360′ shafts, drifts and crosscuts, on a vein from which some ore is reported to have been extracted.

Equipment: includes hoist and 2 Huntington mills.

BLACK ROCK MINING & RED. CO. **ARIZONA**

Address: Paul Kimball, agent, Yuma, Arizona.

J. B. Johnson, pres.; F. B. Johnson, of Fresno, Calif., sec.-treas.

Inc. 1921, in Arizona. **Cap.** $500,000; $1 par.

Property: Black Rock and Silver Glance groups, N. of Yuma, Yuma county, developed to depth of 350′. Ore contains silver. Is a prospect

BLANCHE ROSE MINING CO. **ARIZONA**

Practically dead. At Twin Buttes, Pima county. Company relocated land of the bankrupt **Chesterfield Copper Co.**, described in Vol. XI, Copper Handbook.

See Esperanza Mine.

BLAND MINING CO. **ARIZONA**

Address: F. S. McGinley, lessee, Patagonia, Santa Cruz Co., Ariz.

Property: Bland and Trudy claims in the Tyndall district, Santa Cruz county, said to carry ore in a 3′ vein, assaying 70 oz. silver per ton. Developed by tunnels. The property now is operated under bond and lease and ore will be treated at the R. R. Mason custom mill.

BLANTON GOLD BULLION MINE CO. **ARIZONA**

Address: Oatman, Ariz.

Officers: Chas. P. Blanton, pres. and gen. mgr.; B. Ginsberg, v. p.; Herman Marks, sec.-treas.; with Louis Dorfman, directors.

Reported to have a gold property in the Mossback section.

Idle, but likely to be revived by Katherine boom of 1921

BLOCK MINES CO **ARIZONA**

Address: Care Ed. Block, Prescott, Ariz.

Officers: A. J. Head, pres.; E. Block, v. p.-treas.-mgr., with H. Brinkmeyer and M. Goldwater, directors.

Inc. August, 1913, in Arizona. **Cap.** $1,000,000; par $1; $500,000 shares in treasury.

Property: the Billy Boy and Christmas groups on the Hassayampa river, Yavapai county. Billy Boy mine developed by 225 tunnel showing 14" paystreak carrying gold, silver, lead and copper ore, said to assay $70 per ton.

Is a prospect with merit but needs financing and competent management to prove its possibilites.

BLUE BELL EXTENSION COPPER CO. ARIZONA

Address: L. A. Denman, sec., Humboldt, Arizona. **Mine address:** C. J. Murdock, mgr., Mayer, Ariz.

Officers: J. E. Garber, pres.; C. J. Murdock, v. p. and mgr.; L. A. Denman, sec.

Property: adjoins the Blue Bell, on south. A shaft was sunk 1919 in expectation of finding ore on an extension of the Blue Bell vein of the Consolidated Arizona Smelting Co. of Humboldt.

BLUE BELL MINE ARIZONA

See **Consolidated Arizona Smelting Co.**

BLUE BELL MINING & REDUCTION CO. ARIZONA

Last address: Swansea, Yuma county, Ariz.

Officers: W. P. Martin, pres.; E. T. Miner, v. p.-supt.; K. E. Newcomb, sec.

Property: 23 claims, about 5 miles from Swansea, just across the Bill William's Fork river from the Swansea pumping plant.

Development: 200' two-compartment shaft and several hundred feet of tunnels, showing ore carrying up to 10% copper, with fair gold and silver values. No recent returns.

BLUE BIRD SILVER MINING CO. ARIZONA

Address: Thos. N. Wills, Winkelman, Ariz. **Mine office:** Copper Creek, Arizona.

Officers: Thos. N. Wills, pres.; George C. Young, v. p.; Miles Miller Carpenter, treas. and cons. eng.; S.W. Purcell, sec.; I. B. Winsor, mgr., with Chas. E. Walker, Tucson, Ariz., directors.

Inc. 1918, in Arizona. **Cap.** $1,500,000; $1 par; 750,000 shares were issued to the owners and were to have been placed in trust until one year after commencement of dividends.

Property: 10 claims, Copper Creek district, Pinal county. Reports by both Young and Carpenter state that previous shipments are estimated at 1,000 tons of ore worth $150,000 in silver, besides further values in lead, copper and gold. Mr. Young stated he shipped 32 tons, which returned $4,200 net. Stock offered by Boston broker at 35¢ 40¢ and 50¢ in 1918, accompanied by intensive advertising campaign of alluring claims. Reported idle, and in 1918 machinery was reported removed.

BLUE JACKET MINING CO. ARIZONA

Address: Crown King, Ariz.

Property: 3 claims, surveyed for patent, in Pine Grove district, Yavapai county, near Crown King.

BLUE JOHN MINE ARIZONA

Address: J. H. Cavanaugh, mgr., Walker, Ariz.

Property: 2 claims, at Walker, Yavapai county, shows a 2' fissure vein in granite and porphyry, with N. E. S. W. course and dip of 82° W. Ore said to contain gold-silver-copper-lead and zinc.

Development: by shafts and drifts to depth of 110' with 400' of workings. Reserves estimated at 2,100 tons of ore averaging $20-$30 per ton.

BLUE MONSTER COPPER CO. ARIZONA

Addresses: Room 817, 7 Water St., Boston, Mass., and Cherry, Ariz.

Officers:. L. N. Wombacher, pres.; Thos. Sutcliffe, v. p. and supt. Jos. H. Morgan, sec., Prescott; P. J. Keohane, treas., with Jos. Lee, directors.

Inc. Dec. 26, 1916, in Arizona. **Cap.** $2,000,000; $1 par. Property acquired for 640,000 shares, which are held in pool until $75,000 has been raised for development work.

Property: 33 claims, and a water right on Cherry Creek, in the Verde district, Yavapai county, 12 miles S. E. of Jerome, 32 E. of Prescott. The group is said to be located along the great Verde fault, which drops limestones against schist, and this group is in places covered by conglomerate and lava flows. The crushed zone, 300′ or more wide, is iron stained, and shows green copper stains, and on Blue Jay claim 4′ of 2% ore. W. B. Fisher reports that he believes valuable ore in commercial quantities will be found by development. Experience at the various other Jerome properties shows the faulting to be post mineral and the ore seen in the fault either drag or due to deposition by surface waters.

Development: by 400′ shaft; crosscuts being run east and west on 400′ level.

Property favorably reported on by W. C. Thomas and Cyril Wigmore.

BONNIE MINING CO. **ARIZONA**

Address: R. M. Garrett, Prescott, Ariz.

Mine on upper Lynx Creek, Yavapai county, Ariz., is an old one reopened in 1916. The shaft is 360′ deep, and is being sunk to 1000′ depth.

BORAS LEASING CO. **ARIZONA**

Address: M. J. Elsing, supt., care Phelps Dodge Corporation, Bisbee, Ariz.

Officers: J. L. Winters, pres.; Fred Henderson, v. p.; John P. Williamson and M. E. Kawn, directors.

Property: a lease on part of the Copper Queen ground at Bisbee, adjoining the **Night Hawk Leasing Co.** Work at present is at 700′ depth, where sulphide ore was opened. The shaft is being enlarged to 2½ compartment and sunk an additional 500′. Six men employed.

Production: reported to have averaged 1,250 tons of 8% copper ore per month in 1920. Eight disbursements of 10¢ per share have been paid to Feb., 1921.

BOSTON & ARIZONA MINES CO. **ARIZONA**

Mail returned unclaimed since 1918, from former address, Tucson, Arizona.

Officers: Geo. P. Gregory, pres.; Henry C. Young, Jr., v. p. and gen. mgr., Gerald S. Howland, treas.

Inc. 1915. **Cap.** $100,000; shares $1 par. Stock listed on Boston curb. Federal trust Co., Boston, transfer agents; Exchange Trust Co., registrars.

Property: 5 claims in the Old Hat district, 25 miles N of Tucson, Pinal county, said to show an orebody 25′ wide and 100′ long, with copper, silver and gold. Ore occurs between granodiorite foot and quartz limestone hanging-wall. Developed by 247′ tunnel A prospect.

BOSTON & JEROME COPPER CO. **ARIZONA**

Office and mine: Jerome, Ariz.

Directors: include Richard Kingdon, supt. U. V. Extension; J. S. Acker, L. E. Hesler of Prescott, and E. C. Farrel of Clarksdale.

Inc. 1907, in Airz. **Cap.** $1.500,000; $1; par; increased May, 1908, to $2,500,000; shares $5; issued $129,090. Listed on San Francisco Exchange.

Property: the Juniper group of 9 claims, 146 acres, 2 miles south of Jerome, north of the Verde King (or Verde Central,) and adjoins

outlying detached claims of the U. V. Copper Co. There is a limestone cap over much of the property, but copper staining is said to show in some places.

Development: includes 3 tunnels of 400′ aggregate length and 130′ shaft, sunk on a large porphyry and schist reef carrying copper sulphide in small amount in bottom. Property was idle from February, 1908, to 1917. Is a prospect, that is west of the well-recognized mineral belt of the district, though considered to be worthy of exploration. In 1921, property idle, company without funds.

BOTSUM HOLDING CO., C. A. ARIZONA

Property: Vampire gold mine, N. E. of Parker, Yuma county. A 25-ton mill was installed early in 1921.

BOUNDARY CONE GOLD MINES CO. ARIZONA

Address: Oatman, Ariz. Officers at last accounts: F. H. Biles, pres.; J. D. L. Williams, sec.; Calvin Hartwell, treas.; preceding, with W. F. Ball, S. M. Barnes, T. C. Job, directors. Frank Dryden, supt.

Inc. in Arizona. **Cap.** $1,500,000; shares $1 par; outstanding 1,198,000 shares. Listed on Los Angeles Stock Exchange.

Property: 8 claims, 82½ acres, patented, 1 mile S. W. of Oatman. **Ore:** gold.

Development: shaft 775′ deep, January, 1919, with about 4,500′ of workings. On the 450′ level management reported an ore-shoot 150′ long, 15′ in width, with average assays of $14 per ton, and on the 550′ level to have a shoot that was 150′ long when work was stopped and shaft-sinking resumed. Also said to have opened up considerable milling grade of ore in rather thin stringers. Shaft makes 15,000 gal. of water daily, handled by bucket.

Equipment: hoist, 300 cu. ft. air compressor, blacksmith shop.

BOWYER GOLD & COPPER CO. ARIZONA

Office: Quartzite, Yuma Co., Ariz.

Officers: Jos. Bowyer, pres.-treas.; H. C. Wohler, v. p.; C. M. Robins, sec., with J. D. Bowyer and O. T. Hodge, directors.

Inc. July 15, 1909, in Arizona. **Cap.** $5,000,000; $5 par.

Property: the Bowyer group, of 7 claims, and 160 acres placer ground, in the Plomosa district, on the western slope of the Dome Rock Mtns., about 30 miles W. of Bouse, on the Santa Fe R. R. Property has 3 contact deposits, between schist hanging and limestone foot, showing 50 to 200′ gossan outcrops, ore carrying malachite and chalcocite, said to average 2 to 15% copper and $1 to $10 gold per ton.

Development: by 625′ incline, sunk in ore to depth of 100′. A crosscut is being driven on bottom level to reach the main ore body near the hanging wall.

Company reports being out of debt and having funds on hand to complete development work and erect concentrator.

BRADFORD MINE ARIZONA

See Sonoita Copper Co.

BRADSHAW COPPERMINES CO. ARIZONA

Office: 229 Broadway, New York.

Officers: W. J. Peterman, pres.; John J. McNamara, sec.-treas. and supt.; J. G. M. Browne, asst.-sec.-asst.-treas.

Inc. Dec., 1916, in Arizona.

Property: 21 claims near the Senator mine, Copper Basin district, Yavapai county.

It is said that this was a rank promotion, floated by a New York house, investigation proving that the company did not own the mine, that over $17 000 was missing from the treasury, and that the officers were merely dummies acting for a clever crowd of apparently unscrupulous men.

Reported that Mr. Alex. Ratcliff, apparently the real owner, had reclaimed the property, but it was under foreclosure proceedings at last account.

BRADSHAW REDUCTION CO. **ARIZONA**

Company dissolved. Fully described in Vol. XIV. See Yavapai Cons. Gold-Silver-Copper Co.

BROOKLYN ARIZONA MINING CO. **ARIZONA**

Address: J. B. Hill, sec., Andover Mass. Mine near Mayer Yavapai county, Ariz. Benj. B. Tuttle, v. p.; Jas. S. May, treas.

Inc. March, 1907, in Me. **Cap.** $2,500,000; $10 par; fully issued. Bonds authorized $500,000; about $75,000 outstanding. Was promoted by the **American Securities Co.** Annual meeting first Wednesday in April.

Property: 82 claims, about 1,600 acres, including the Brooklyn group of 14 claims, in the Squaw Creek district, about 20 miles S. E. of Mayer, shows auriferous and argentiferous copper sulphides.

Development: by 750′ main shaft and 2,500′ tunnel.

Equipment: includes compressor, double-drum hoist, 3,000′ cable and Partridge smelter. Former rank mismanagement fully described in Vols. X and XI. Company reported in new hands, 1915, but no later returns received.

BROWNELL-ARIZONA MINING & SMELTING CO. **ARIZONA**

Mail returned unclaimed from former address: Casa Grande, Pinal county, Ariz.

Property: formerly held by Producer Mining & Smelting Co., is supposed to include the Jack Rabbit mine, 80 acres, in Pinal county, together with the Producer and Century-Chief group of 320 acres, and Index group of 220 acres, all in the Quijotoa Mountains. Company sold stock, 1910, on the strength of a clever brochure, written by Alfred Henry Lewis, the talented writer, whose statements were not hampered by a knowledge of copper mining. Company not favorably regarded. Presumably idle.

BROWN WHITLOW GROUP **ARIZONA**

Mine address: Superior, Pinal Co., Ariz. Owned by J. C. Brown and J. W. Whitlow.

Property: 5 claims, in Pioneer district, near Superior; adjoins the old Silver King mine, once the richest silver property of Arizona.

Development: by tunnel, which cuts a 7′ contact vein of ore low in copper and silver. Probably idle.

BUCKEYE COPPER & GOLD MINING CO. **ARIZONA**

Bankrupt. Property sold. See Buckeye Group.

BUCKEYE GROUP **ARIZONA**

Address: Sam Parker, Turkey, Yavapai Co. Ariz., who with others bought the mine, formerly owned by the Buckeye Copper & Gold Mining Co., under execution of judgment.

Property: 35 claims, 720 acres and 20-acre smelter site, in 3 groups, is 2 miles from Turkey, in Black Canyon district of Bradshaw mountains. Claims show chloritic schists and diorite, carrying fissure veins with occasional native copper and malachite, but mainly azurite, chalcopyrite and bornite, estimated to average 4% copper, 3.5 oz. silver and from a trace to $6 gold per ton.

Development: 726′ two-compartment shaft on the Columbia claim, a 520′ two-compartment shaft on the Sullivan claim, with 2 other 200′ shafts, and tunnels of 87′ and 314′, with about 5,000′ workings.

Equipment: includes 15 h. p. and 40 h. p. gasoline hoists a small air compressor and several mine buildings.

Property idle at last account.

BUCKHORN & BOULDER MINING CO. **ARIZONA**

Probably dead. Described in Vol. XIV.

BULLARD MINE **ARIZONA**

Address: John C. Bullard, Aguila, Ariz.

Reported bonded to B. C. Wilson, W. Douglas and E. Bemdurant of Wickenburg.

Property: 36 claims, 10 miles N. of Aguila, in Cunningham Pass, Harcuvar mountains, Yuma county. Shaft 225′ deep and 400′ adit tunnel. Reported to have 300,000 tons ore in the mine averaging 4% copper and $5 gold per ton. Shipments made 1918-'19.

BULLION BAR MINING & DEVELOPMENT CO. **ARIZONA**

Address: I. N. Potter, 33 Davidson Ave., Highland Park, Mich. **Mine Address:** A. W. Bramwell, Ajo, Arizona.

Officers: I. N. Potter, pres.; J. W. Travers, v. p. and gen. mgr.; H. L. Hall, sec.; S. E. Potter, treas.; J. L. Austin, counsel; Levi Stanton, supt., with A. W. Bramwell, directors.

Inc. 1918, in Arizona. **Cap.** $300,000; shares $10 par.

Property: 8 claims, 24 miles east of Ajo, in the Gunsight district, showing a 5′ vein on a contact between basalt and granite. Values as given are from $4 to $50 free milling gold per ton with about 1½% tungsten. Developed by 150′ shaft. Planning erection of 10-stamp mill.

BULLION HILL MINES CO. **ARIZONA**

Address: Knight Investment Co., Provo, Utah, who control company.

Officers: O. Raymond Knight, pres., Provo, Utah; A. M. McDonald, v. p., Eureka, Utah; R. E. Allen, sec.-treas., with J. W. Knight and M. C. Godbe, directors.

Cap. $100,000; par 10c; all issued. Annual meeting 2nd Wednesday in February.

Property: 4 claims, near the Tennessee mine at Chloride, Ariz. Reported that vein cut on the 300′ level is 16′ wide.

BUNKER HILL MINES CO. **ARIZONA**

Address: F. M. Pool, Winkelman, Ariz.

Officers: F. M. Pool, pres.; H. S. Bailey, sec.-treas.; with B. H. Norton, A. N. Lewis, Chas. Dixon, P. Figueroa and Thos. Quarreli, directors. J. W. Mangum, supt.

Inc. 1917, in Arizona. **Cap.** $1,500,000; $1 par; $600,000 issued. Annual meeting in March.

Property: 39 claims, 780 acres, in Bunker Hill district, Pinal county, 35 miles from Winkleman. Vein is in diorite, and sulphide ore carries gold, silver, copper, and lead. Shoots are 4′ wide.

Development: by 300′ shaft and 450′ tunnel; total workings, 1,500′. A crosscut being driven on the 300′ level, in 400′. May, 1921, reported to have cut a 5′ ledge assaying 4½% copper, 7 oz. silver, 5% lead.

Equipment: 15 h. p. hoist and Sullivan 2-drill compressor. Nine men employed.

BUNKER HILL MINES CO. **ARIZONA**

Subsidiary of the Phelps Dodge Corporation, which see.

BUSH-BAXTER MINING CO. **ARIZONA**

A close corporation. Fully described in Vol. XIII.

BUTTE & ARIZONA COPPER MINING CO. **ARIZONA**

Office: 619 Hennessy Block, Butte, Mont. Mine near Hereford, Cochise Co., Ariz.

Officers: B. H. Dunshee, v. p.; A. S. Nichols, sec.; John C. Adams treas.; with L. O. Evans, Chas. S. Shoemaker, A. P. Henningson, C. B Mosely, John E. Corette and D. M. Watts, directors.

Cap. $1,250,000; $1 par.

Property: 14 claims, 11 patented, costing considerably over $60,000 was exchanged for $450,000 stock. Property is in the Huachuca mountains 35 miles S. W. of Bisbee, and about the same distance north of Cananea.

Geology: claims show ochrous gossan of 10 to 300′ width, covering a contact vein between syenite and limestone carrying occasional copper ox-

ides, carbonates, pyrite and argentiferous gray copper, and chalcocite of fair tenor, though not in large quantities.

Development: by a long main tunnel cutting several small veins giving assays up to 18% copper with an average of 4.5% tenor, mine having upwards of 3,900′ of workings. Main vein, 350′ from mouth of tunnel, is claimed to show 39′ of 6% chalcopyrite, which is an overestimate.

Nearest railroad is 15 miles, with a fair wagon road. Has steam power and an air compressor. Company reported to have no debts, considerable treasury stock and is being carried by the directors, who are advancing the money required to pay taxes and maintain the property.

CABABI MINING CO. **ARIZONA**

Address: E. H. Emerick, 321 Law Bldg., Indianapolis, Ind. **Mine P. O.:** Camp Cababi, via Tucson, Pima co., Ariz.

Officers: Allen W. Conduitt, pres.; with E. J. Scoonover, Albert Off and R. A. Wilcox, directors.

Inc. 1908, in Arizona. **Cap.** $1,500,000; $1 par; issued $1,250,000. Annual meeting, third Monday in June.

Property: 50 claims, about 1,000 acres, 35 claims patented, also 2 mill sites of 5 acres, situated in the Cababi mountains, 69 miles S. W. of Tucson.

Development: by numerous shallow shafts, and 450′ main shaft on the Picacho claim, includes an antigua, reopened about 1860, and which, years ago, was a small producer of silver-bearing copper and lead ores.

Equipment: includes a steam hoist good for 500′.

A full report on the property made Oct., 1912, by C. J. Price, mg. engr., shows 2,240 tons of ore, valued at $28,485, on dumps. Manager reported 10,000 tons high-grade ore blocked out April 25, 1913. Mine operated under lease by S. G. McWade in 1920.

CACTUS QUEEN **ARIZONA**

Office: Phoenix, Ariz. **Mine office:** Congress Junction, Ariz.

Officers: H. H. Barbee, pres.; H. Borders, v. p.; A. G. Barbee, mgr.; with P. B. Wing, P. A. Hildebrand, R. H. Carrick, directors.

Inc. 1906, in Arizona. **Cap.** $5,000,000; shares $1 par.

Property: 130 claims, located about 50 miles west of Congress Junction, Yavapai county. Developed by a shaft 200′ deep, drifts on this level are reported to be in ore averaging 6% copper with some gold. Reported on by E. A. Ritter.

CALUMET & ARIZONA MINING CO. **ARIZONA**

Office: Calumet, Mich. **Mine office:** Warren, Cochise county, Ariz. Works office: Douglas, Cochise Co., Ariz.

Officers: Gordon R. Campbell, pres.; Capt. Jas. Hoatson, v. p.; Capt. Thos. Hoatson, second v. p.; Peter Ruppe, treas.; with Thos. Cole, Walter B. Congdon, William B. Mershon, Chas. Briggs, G. A. Newett, T. H. Collins, and J. C. Oliver, directors; Jas. E. Fisher, sec.; Henry B. Paull, auditor.

Operating officials: John C. Greenway, gen. mgr.; Ira B. Joralemon, asst. gen. mgr.; E. E. Whiteley, mine supt.; D. M. Rait, asst. mine supt.; H. A. Clark, smelter supt.; R. H. Dickson, engr.; Geo. Jay, acting purch. agt.; K. I. Mohler, supt. at 85 Mine, Valdeon, New Mex., and M. Curley, supt at Ajo.

Inc. March, 1901, in Arizona. **Cap.** $2,500,000; shares $10 par, increased Feb. 15, 1911, to $6,500,000; shares $10 par; issued 642,521 shares; held for exchange, 273 shares. The company, which already controlled the **Superior & Pittsburgh Copper Co.,** through ownership of 1,494,333 shares out of a total of 1,499,792 shares issued, took over the property in Feb., 1916. All S. & P. assets were transferred to the C. & A. Co., effective Dec. 31, 1915, basis of exchange being 3½ shares Superior & Pittsburgh for 1 Calumet & Arizona, and a bonus of $1 per share for quick delivery of stock

American Trust Co., Boston, and Mechanics and Metals National Bank, New York, registrars; State Street Trust Co., Boston, and Bankers' Trust

Co., New York, transfer agents. Stock is listed on the New York and Boston Stock Exchanges. Annual meeting, second Monday in April.

Range of shares in 920 was $69 high, $40 low, and 21,000 shares were sold in New York. In 1921 to June, the range was $53½-$42⅛.

Financial statement: years ending Dec. 31:

	Assets						
Year	Property & equipment	Invest-ments	Notes, ac. receivable	Cash, etc.	Metals on hand	Supplies	Total
1920.....	$24,943,502	$8,635,189	$1,086,249	$1,236,085	$4,699,143	$1.060,048	$41,660,216
1919.....	25,643,041	7,804,531	1,487,791	886,341	5,315 859	1,069,410	42,206,973
1918.....	27,341,057	7,679,153	1,307,053	3,699,287	2,484,381	1,273,327	43,784,258

	Liabilities				
Year	Capital	Accts. payable	Reserves	Surplus	Total
1920.....	$6,425,210	$1,710,777	$376,092	$33,148,137	$41,660,216
1919.....	6,425,210	1,031,270	611,473	33,869,020	42,206,973
1918.....	6,425,190	781,183	1,305,698	35,272,187	43,784,258

	Income Account				
Year	Total revenue	Oper. charges, deprec., taxes	Ore depletion	Dividends	Year's Surplus
1920....	$11,418,574	$8,206,403	$1,362,969	$2,570,084	—$720,882
1919....	10,286,478	8,381,973	1,380,089	1,927,563	—1,403,147
1918....	15,528,530	9,943,009	1,499,283	5,140,062	—1,053,824
1917....	20,035,866	11,518,420	1,888,945	7,067,241	— 438,740
1916....	20,587,941	9,432,936	.....	5,777,296	+5,377,709
1915....	11,683,724	6,229,376	.....	2,006,557	+3,447,325

Dividends: $2 in 1903; $6.50 in 1904; $8.50 in 1905; $13 in 1906; $16.50 in 1907, $4 in 1908, 1909, 1910, 1911, $4.25 in 1912, $5 in 1913, $3 in 1914, $3.25 in 1915; $9 in 1916; $11 in 1917; $8 in 1918; $3 in 1919, and $4 in 1920. The total is $45,630,471.

In 1911 the company took an option on the New Cornelia claims, 243 acres in the Ajo district, 42 miles south of Gila. The C. & A. was to receive treasury stock of the **New Cornelia Copper Co.** (described under its own title), for all money expended in development work on the property. It exercised its option in 1913 and now owns 1,229,741 shares, or 68.3% of the stock of the subsidiary company. It built jointly, with the E. P. & S. W., the 43 mile Tucson, Cornelia and Gila Bend Railroad, running from Gila Bend to Cornelia. The New Cornelia Co. entered the producing class in June, 1917.

The C. & A. also owns a majority of the capital stock of the **Gadsden Copper Co.**, at Jerome, Arizona. Property consists of 39 claims adjoining the United Verde Extension Mining Co. on the south, developed by 1,200′ shaft. Operations discontinued in 1920, after work had failed to show ore

Property: includes the original claims at Bisbee, claims formerlyowned by the Superior & Pittsburgh C. Co., bought Dec. 31, 1915 the American Saginaw group, bought in 1912; the Calumet & Bisbee group and the Higgins group brought in 1913; total area of about 2,068 acres, patented, within the mineral zone of the Warren district, Ariz.

Side-line agreements with the Copper Queen Cons. Mng. Co., the Denn-Arizona Mng. Co. and the Shattuck Arizona Copper Co., insure freedom from litigation, and continuance of the friendly feeling and neighborly cooperation existing from the very inception of this company.

The Copper Giant group, at Copper Creek, Graham County, Ariz., includes 35 claims, known as the Scanlon or Clark-Scanlon property, 16 miles northeast of Mammoth. This property, bought Sept., 1908, has been extensively tested by diamond drills, giving good cores, and has a 600′ two-compartment working shaft, with several levels opened, and considerable medium to high-grade sulphide ore is blocked out. A 15-mile railway will be required to render this property a producer.

In June, 1920, company bought property of the **85 Mining Co.**, comprising 34 claims, 577 acres, in the Virginia district, Grant county, New Mexico, near Lordsburg. It shows a persistent 4′ quartz vein in rhyolite in which ore occurs in shoots, up to 200′ long. Ore averages $1.60 in gold, 1.25 to 7 oz. silver and 2.50 to 3.75% copper, and as it is silicious, it is particularly desired for the C. & A. smelter.

Geology: the Calumet Arizona mines are in limestone, near a porphyry contact, with occasional porphyritic intrusions. The surface gives small indications of values, showing but small and infrequent outcrops, the existence of the original orebodies in the Irish Mag claim, farthest to the north, having been inferred from underground work in the adjoining territory of the Copper Queen, after careful study of the general geological conditions of the district. Ore occurs in highly irregular bodies, the mine having native copper, cuprite, melaconite, azurite, chalcocite, bornite and chalcopyrite, usually with an iron oxide or sulphide gangue, and with considerable hematite and manganese ores, the latter carrying malachite in small disseminated nodules, frequently averaging 10 to 18% in copper. The ore, which is practically self-fluxing, averages about 2 oz. silver and 0.05 oz. gold per ton, as smelted.

Development: by 6 main working shafts penetrating the limestone formation to a maximum depth of 2,300′. The orebodies are extensively developed, but are not developed in advance, owing to the constant shifting of the ground, caused by the creeping of the ground, as is the case at the neighboring Copper Queen mine, requiring very heavy timbering, with frequent bulkheading, and constant care for all openings, which renders it prudent to keep costs down by blocking out ore but a comparatively short time ahead of actual stoping requirements.

The working shafts are the 1,390′ Irish Mag, 1,375′ Oliver, 1,480′ Briggs, 1,680′ Hoatson and 2,358′ Junction shafts, through which a rhomboidal area a mile long is being actively developed and worked. The new Campbell shaft, located on the Regular claim in unprospected territory, and originally begun in 1917, is now (1921) being sunk from the 1,400 to 1,800′ level. Underground work totals about 164 miles, 50% of which is open and in use. New openings in 1919 amounted to 99,355′, including 16,281′ of diamond drill holes. During 1918, 7.1 tons of ore were mined per foot of development; in 1919, 9.9 tons; in 1920, 9.4 tons. Mines have electric traction on the 1,400′, 1,600′ and 1,800′ levels.

During 1919, new work covered 57,090′, including 3,281′ of drilling; in 1920, the total was 53,824′, and drilling was 3,741′.

A 4-compartment 1,390′ **Irish Mag** shaft, sunk on a single 20-acre claim, was the original mine; the shaft is sunk in hard limestone throughout, except where occasional orebodies were cut, rendering it unusually safe from drawing. The Irish Mag has yielded some of the best copper ever mined, including some entire stopes of 30 to 40% copper. The Irish Mag shaft has a 78′ steel headgear, a 114′ ore bin and a 250′ h. p. electric hoist, raising 3-decked cages. The **Oliver** shaft, 4 compartments, 1,375′ deep, is equipped with 600 gal. Nordberg electric pump and hoist. It serves both the Senator and Buckeye claims, cutting ore at 710′.

The **Powell** shaft, started Nov., 1918, is on the line between the Hope and Wagner claims, which lie 2,000′ S. W. of the Irish Mag shaft. This ground was explored by a crosscut from the Irish Mag that traversed 600′ of the Copper Queen ground, stopping about half way across the group, as it showed nothing of value. This shaft, about 600′ deep, has an electric hoist.

The Washington, Angel and Old Republic claims lie on the porphyry side of the gulch, and were secured mainly as a possible smelter site, being considered of little promise for ore, when purchased, but 5,165′ of churn drilling on this group in 1915 developed a substatial tonnage of low-grade disseminated ore in an irregular body from 170′ to 450′ below the surface.

The **Cole** shaft handles the output from the southwestern part of the company's holdings. The greater part of the recent production has come from a body of oxide ore of great size between the 800′ and 1,100′ levels. Smaller bodies have contributed sulphide ore from the 1,000′ to 1,400′ levels. This shaft has Prescott and Cameron station pumps caring for a flow of 225 gals. of water per minute.

The **Congdon** shaft, on the Black Bear claim, only 650′ from the Mag, is 1,267′ deep, but has been out of commission for several years, as the territory can be worked to better advantage through the Cole shaft. Surface equipment includes a 300-h. p. steam plant, with a 12x36″ double-drum hoist.

The **Hoatson** shaft, on the Del Norte claim, 2,500′ from the Briggs, has 5 compartments, and is 1,680′ deep. Ore is being mined from a large body on the 1,300′ level. Equipment at the Hoatson shaft includes a steel head-gear, double-drum hoist, good for 2,000′ depth. Power plant has 6 boilers.

The **Junction** shaft has 5 compartments and is 2,358′ deep, being the deepest of any shaft in the Bisbee district. Shaft is concreted to 1,800′ level. The Junction is the main hoisting shaft of the Briggs-Hoatson-Junction division, and virtually the entire production of the 3 mines is hoisted through it. Ore is hoisted in 5-ton skips, crushed in Allis-Chalmers gyratory crusher, and loaded by belt conveyor into railroad cars.

Large bodies of both oxide and sulphide ore have been opened up from the 1,200′ to the 1,800′ levels. Important recent development is on the 1,400′ and 1,600′ levels driven from the Junction shaft south towards the Denn, where important ore bodies were found. In addition to the ore of shipping grade developed, immense bodies of solid pyrite, carrying between 1% and 2% copper, have been found on the 1,400′, 1,500′ and 1,600′ levels. Smaller bodies of oxide ore, only, occur between the 770′ and 1,200′ levels.

The Junction shaft drains the entire Calumet & Arizona and Copper Queen group of mines. Water pumped during 1918 was 1,664,518,500 gals.

Pumping plant has been much simplified by installation of a 1,500-gal. electric pump on the 1,800′ level of the Junction. They are now handling 1,500 gals. p. m. from the 1,500′ and 1,900 gals. p. m. from the 1,800′ levels.

Surface plant consists of fifteen 250 h. p. Marine boilers, a 4-cylinder Nordberg, double-reel main hoist, good for 2,500′ depth, and a Sullivan single-drum hoist, used as an auxiliary hoist for handling men and timber.

There is a 5,000′ Nordberg compressor having compound air cylinders driven by a four-cylinder triple expansion steam engine. This machine has an attached air pump and condenser. In addition, there is a 3,500′ Nordberg compressor, having compound air cylinders, driven by a cross compound steam end.

The **Briggs** shaft, about 3,000′ south of the Junction shaft, is 1,630′ deep and 3,000′ east of the Lowell shaft of the Copper Queen. Large bodies of enriched sulphide ore of much greater horizontal than vertical extent, averaging about 5½% copper, have been developed between the 1,200′ and 1,400′ levels. A substantial tonnage of oxide ore of good grade is being mined from the 900′ to the 1,400′ levels from nearly vertical fracture zones. On the 1,400′ level, 500′ south of the shaft, an important sulphide orebody 300′ long by 30′ wide was developed. Ore from this mine is handled by electric haulage on the 1,400′ level to the Junction shaft and hoisted.

Equipment at the Briggs shaft includes steel gallows frame. Power plant has 2 boilers of 250 h. p. each, burning crude petroleum.

A fire in the heavy sulphide area at 1,400′ depth gave trouble early in 1920, but has been controlled by means of bulkheads and a ventilating shaft.

During 1920 and 1921 development was reduced to a minimum; being very largely confined to known orebodies; the Oliver and Cole mines were closed down in February, 1919, and at end of 1920, the Briggs mine was operated through the Junction shaft.

At the **85 mine** in New Mexico old work includes 4,000′ of laterals and a 750′ blindshaft. In 8 months of 1920, total extensions were 5,602′, of which 2,452′ was drilling; ore mined amounted to 31,016 wet tons, averaging $2.33 gold, 2.6 oz. silver and 2.6% copper.

Ore reserves: in Oct., 1916, were estimated as 1,976,815 tons, averaging 4.99% copper plus 831,000 tons of 1.75% copper and $1.25 gold-silver ore. For 1919 and 1920, due to limited exploratory work a slight decrease in ore reserves is reported.

Equipment: surface equipment is very complete. The original machinery plant was clustered about the Irish Mag shaft, on a steep hillside, where limited room was secured by grading, but the principal plant is now at the Junction shaft, including complete machine and plate shops, sawmill, warehouses, etc. Electric power for mine plant is brought from the smelter at Douglas, generated by steam from waste heat boilers.

Fire protection is furnished by direct pipe lines to large storage tanks, all hose couplings being made to connect with those of the Bisbee fire department. Other mine equipment is described above under individual shafts.

The 85 mine is equipped with complete hoisting plant and a 300-ton mill with 6 vanners and flotation unit; the latter is not now in use.

The company's smelter is located at Douglas, 25 miles from the mine, receiving ore over the El Paso & Southwestern Railway, at a very favorable freight rate. The original smelter was blown in Nov. 15, 1902, and has been twice enlarged, giving the old works a capacity of nearly 3,000 tons daily.

The C. & A. Smelter

The smelter completed 1913 at a cost of about $2,000,000, was designed by C. H. Repath, and A. G. McGregor described by R. H. Vail, in the "Eng. and Min. Journal," Vol. 98, p. 102, July 18, 1914. The works consist of a sampling mill, crushing plant, calcining plant, reverberatory, blast furnace and converter departments and 6 mixing beds, each of 10,000 tons capacity, together with a 5,000-ton coke storage bed.

The crushing and sampling plant, 40x84′ on the ground and 5 stories high, is built of steel and concrete throughout, and is divided into 2 sections, operating independently of each other. Each section has a crushing and sampling department. Ore from the crushers at the receiving bins is delivered over an incline conveyor to the crushing and sampling plant, where the large sizes are screened out for the blast furnaces. The sampling department, equipped with Snyder automatic samplers, cuts the ore 4 times, making a sample weighing 1.6 or 3.2 lbs., as desired, per ton of ore passing through. The plant is flexible and ore may be crushed and screened and discharged at any desired size.

The material from the sampling and crushing plant is passed to mixing beds similar to those in use at the Cananea smelter, there being 3 beds for coarse and 3 for fine ore. The coarse ore mixed with coke is conveyed directly to the coke charge bins over the blast-furnace charge floor, the fine ore going directly to the calciner or roaster plant.

The roaster plant has twenty-four 258″ Herreshoff roasters, having a capacity of approximately 80 tons of fine ore per day. The plant is equipped with a tile and steel dust chamber, 60x140x70′ high, equipped with baffles and wires and roofed with copper, discharging into a brick-lined steel chimney, 20′ inside diameter by 279′ high.

Twelve of these roasters completed early in 1917, are used in connection with a sulphuric acid plant, which is furnishing 200 tons of 60 degree Baumé acid to the New Cornelia Copper Co.

A 222x460′ building of steel frame, sheathed with iron, covers the blast furnace, reverberatory, converter, and copper-casting departments. The blast-furnace department consists of two 48x40′ blast furnaces, and has a steel dust chamber, 60x180x70′ high, equipped with suitable baffles and wires. The gases from the converters will also pass through this

chamber and be discharged into a brick-lined steel chimney, 25′ inside diameter by 305′ high. Ore and coke is discharged directly from the bin over the charge floor into cars resting upon platform scales, the charge car being propelled from the scales to the charge doors of the furnace by an electric motor.

The reverberatory department contains 4 reverberatory furnaces, 19x100′ in size, with a foundation and building for a fifth furnace in place. Each furnace is equipped with two 712 h. p. Stirling boilers. Steam at 80 lb. pressure is generated by using waste heat, driving a 3,000 k. w. turbine alternating-current generators. The furnaces are charged directly from the calcine cars running on a track overhead. Matte is tapped into 20-ton pots, and transferred by cranes to the converters, slag being skimmed directly into 25-ton pots, running on tracks underneath and just in front of the skimming end of the furnaces.

The converter department, having a main converter aisle 55′ wide, and two 40-ton electric traveling cranes, has stands for 6 Great Falls type converters. There are also 2 straight-line casting machines and other necessary equipment. The converter slag is poured directly into the reverberatory furnace.

The power house, formerly 80x160′ in size, was increased, 1907, by the building of a transverse section 100x100′ in size, the new building being driven through the center by a row of columns into 2 bays, each 50′ wide, and each served by a 10-ton hand-power traveling crane. Equipment includes two 14 & 28x36 Allis-Chalmers Tandem Corliss engines, all driving No. 10 Connersville blowers. One 22 & 48 & 52 & 52x48 and one 22 & 42 & 48 & 48x48 Nordberg cross compound Corliss blowing engines, and one 20 & 40 & 44 & 48 Allis-Chalmers blowing engines.

There are also a 750 k. w. and a 500 k. w. Allis-Chalmers steam turbine, driving 440-volt, 60 cycle, 3-phase generators and one 165 k. w. and one 200 k. w. motor generator sets for converting alternating current to direct current for cranes and locomotives.

There are also 2 triple expansion steam pumps, size 8″ x 12″ x 20 & 22x24, and 3 motor-driven centrifugal pumps for water service; also two 14 x 25 and 2-36x24 Prescott steam condensers. Steam is supplied from the boilers over the reverberatory furnaces.

The smelter plant includes a machine-shop and smithy, both of steel frame, and a considerable number of dwellings. The whole plant is fully described in "Mining and Scientific Press" of August 10, 1918.

Tonnage: Ore treated by smelter in 1920 amounted to 591,914 including 193,266 tons of custom ore. This compares with 850,894 tons, dry weight, including 245,443 tons custom ores, in 1918, and 701,450 tons, of which 189,463 tons were custom ores, in 1919.

The Acid Plant: M. E. Jacks supt.

The sulphuric acid plant, to produce the sulphuric acid for leaching the Ajo ores, designed by the Process Engineering Co., is complete and modern in every respect. Capacity is 200 tons 60° B. acid per day, of which Ajo uses about 75%, the balance finding a ready market with other mining companies and with the farmers. The works were fully described in "Min. & S. Press" of March 30, 1918. Production in 1918, 1919 and 1920 was 67,110, 48,596, and 39,996 tons of acid, respectively.

The Safety Department, organized in 1915, has been very effective, reducing cost of mine accidents by over 70%.

Production: since 1910 is as follows:

Year	Lb. Copper	Oz. Silver	Oz. Gold	Net Cost Copper (a)	Selling Price Copper
1911.....	49,945,905	453,947	18,114	7.34 cts.	12.49 cts.
1912.....	53,108,628	594,319	22,881	7.02. cts.	16.25 cts.
1913.....	52,987,383	880,915	18,989	7.65 cts.	15.57 cts.
1914.....	52,667,929	922,143	24,122	8.19 cts.	.....

1915.....	65,268,910	1,381,077	35,264	8.00 cts.	.....
1916.....	74,898,788	1,863,149	46,377	9.04 cts.	24.70 cts.
1917.....	62,397,017	1,257,081	37,130	13.00 cts.	.....
1918.....	51,357,154	1,133,801	33,868	15.50 cts.	.....
1919.....	50,236,013	1,363,253	35,844	.....	.....
1920.....	45,087,408	1,214,049	37,911	.....	18.50 cts.
1921 (2 mos.)	5,768,000	.....	.....	.....	.....

(a) Per pound copper, after crediting gold and silver.

The gold and silver content in 1919 was $76.25 per ton of refined copper; in 1920, $88.51.

In 1920, ore mined was 493,672 tons, of which 393,227 tons were shipped to Douglas.

During 1918, 676,888 tons of ore were mined, dry weight, of which amount 105,074 tons were shipped to various smelters. In 1919; 552,078 dry tons mined including 54,429 tons of high sulphur ore.

Production has been greatly curtailed, since February 1919; copper production was but 59% of normal in 1919, and only 47% in 1920. Except for development work, operations were suspended at both mine and smelter in May, 1921.

Summary: The company's holdings of 1,229,741 shares out of a total of 1,800,000 issued shares of New Cornelia stock ensures a return of about $2 per share to C. & A. stockholders for each $1 dividend paid by New Cornelia. The Bisbee property is a low cost producer, making copper at 12.52¢ per pound in 1920 compared with 8 or 9¢ in pre-war years; the mines are said to be far from exhausted and the company's cash balance is large.

The management is very generally regarded as energetic and competent and a model for others to follow.

CALUMET & CORNELIA DEVELOPMENT CO. ARIZONA

Mail returned unclaimed from former office: National Bank of Arizona Bldg., Phoenix, Ariz.

Cap. $1,000,000; $1 par; in treasury, 740,000 shares.

Property: 370 acres, 25 miles from Phoenix. Shaft 50′ deep said to show carbonate and oxide ores averaging 6.7% along a contact vein in schistose rocks cut by intrusive dykes. Reported on by R. W. Hollis.

Unfavorably regarded; presumably idle.

CALUMET & JEROME COPPER CO. ARIZONA

Idle. **Office and mine:** Jerome, Yavapai county, Ariz.

Officers: G. W. Avery, pres. and gen. mgr.; John Rauber, v. p.; Geo. H. Avery, sec.-treas;. with Chas. P. Avery, directors.

Inc. May, 1907, in Arizona. **Cap.** $1,500,000; $1 par; issued $600,000. Money on hand May 1, 1919, $25,000. Listed on Boston Curb; 600 shares sold at auction in New York, July 23, 1919, at 37 cents.

Property: 10 claims, patented, 160 acres, one-half mile S. of the United Verde mine, and adjoining the Cleopatra. Claims show schist and quartz porphyry in part cut by basalt and covered by basaltic tuff. Rocks are identical with those of adjacent properties. During 1918, acquired a two-third interest in the 101, 102, and 103 claims adjoining the United Verde and a one-half interest in the Ohio claim.

Development: includes a main 3-compartment shaft now 600′ deep, sunk on the N.-S. fault on Remington claim; several tunnels, one 1,115′; main tunnel. 2,100′ long which at 360′ is reported to have passed through the fault into mineralized green schist. Headings on the 600′ level are said to show "schist impregnated with pyrite and chalcopyrite, and similiar rock is cut in a winze sunk from the 600′ level." Underground workings total 7,000′.

Diamond-drill holes reaching a depth of about 450′ below the 600′ level continued in schist and greenstone showing pyrite and chalcopyrite, but failed to reveal ore of commercial grade. Company reports "a drill-

hole on the Calumet claim cut body of pyrite and chalcopyrite ore for approximately 200'." Over 2,500' of drilling had been done in 1919, to August. Ore opened on the Gadsden property, 1000' on the E. of the C. & J. tract is regarded as a favorable factor.

Equipment: a 285 h. p. Diesel engine direct connected to a 200 kva., C.-W. generator and exciter with panel board and current regulator for 480 volts; a No. 10 Imperial, 513 cu. ft. compressor by a 75 h. p. Westinghouse motor; a double-drum hoist counter-balance, driven by a 75- h. p. Westinghouse motor, good for 1,600' depth; No. 17 Buffalo blower driven by 10 h. p. a. c. motor; No. 5 Leyner drill-sharpener and oil furnace; 9 jackhammer drills; 2 No. 148 Leyner-Ingersoll drilling machines; No. 7 Cameron special sinking pump; 2, 4 stage No. 3 electric station pumps, cap. 170 gal. per. min. against 540' head, driven by two 50 h. p. a. c. motors. There are two 5,000 gal, cooling towers; two 5,000 gal, water tanks; two 10,000 gal. crude oil tanks.

The market manipulation of the stock and the misleading and often faise statements given by various newspapers concerning alleged ore-bodies disclosed by crosscuts and drifts of the mine in 1917, 1918 and 1919, hurt the good name of a promising prospect. At last accounts company was to be refinanced, but operations have not been resumed.

CAMELBACK GOLD & SILVER MINING CO. **ARIZONA**

Address: Superior, Pinal county, Ariz.

Reported developing a property near the Silver King mine.

CAPITAL COPPER CO. **ARIZONA**

Address: Chas. E. McKinley, Prescott, Ariz. Company succeeds **McKinley Mng. & Dev. Co.**, described in Vol. XIV.

Property: in Copper Basin district, includes Dixie group of 6 claims, showing veins 5-15' wide, and the Peacock group with a vein 60' wide said to average 3.7% copper.

Development: by 700' shaft, equipped with hoist good for depth of 1,000'.

Company said to be involved in litigation with creditors of the McKinley Co.

CARDIGAN COPPER CO. **ARIZONA**

Company dissolved. Fully described in Vol. XIV. Property at Ajo reported under lease in 1920.

CARMELITA MINING & MILLING CO. **ARIZONA**

Last address: 142 W. Washington St., Phoenix, Ariz.

Officers: P. P. Parker, pres.; M. S. Weyant, v. p.; J. A. Marr, sec.-treas., with H. J. McCoy and J. H. Williams, directors. Geo. Waymire, superintendent.

Inc. in Arizona. **Cap.** $350,000; $1 par; 30,782 outstanding.

Property: 17 claims, 340 acres, in the Harqua Hala mountains, Maricopa county, 14 miles from Wenden, said to carry a body of free milling ore, from 2 to 8' wide and assaying $17 per ton. Shaft 200' deep with 100' crosscut to vein. **Equipment:** small mill, using tables and flotation process, compressor, air drills and gasoline hoist.

Presumably idle.

CARNEY MINING CO. **ARIZONA**

Probably dead. Described Vol. XIV.

CARTER GOLD MINING CO. **ARIZONA**

Oatman, Ariz. E. A. Shaw, pres.; Henry Lovin, v. p.; W. K. Ridenour, sec.; H. H. Watkins, treas. Dan Bosque, in charge.

Inc. in Arizona. **Cap.** $1,000,000; $1 par. Ariz. Central Bank, Kingman, transfer agent.

Property: New York, Giant and Gold Cross patented claims, 55 acres, in Tom Reed-Gold Road mining district, near Oatman, Mohave county, Ariz. Developed by incline shaft 350' deep, with several hundred feet of workings on the 150 and 250' levels. The vein on the 150' level was said to

be 12′ wide, but of small value. On the 250′ level management reported that the vein was over 7′ wide and averaged $8.60 gold per ton. On the 350′ level 1,200′ of drifting was done.

Company probably defunct.

CASANEGA-DALY MINING & REDUCTION CO. ARIZONA

Last address: Amadoville, Santa Cruz county, Ariz., A. D. Daly, supt.

Property: 7 claims, 140 acres, in the Tyndall district, Santa Rita Mtns., near Amadoville, Santa Cruz county. Sulphide ore said to contain copper, gold, silver, lead and molybdenum, occurs in orebodies 3 to 8′ wide in monzonite.

Development: by 600′ tunnel, said to have blocked out 50,000 tons ore.

Equipment: includes a 50-ton concentrator, that started operating in Dec., 1915. Management planned driving a 1,000′ development tunnel and increasing mill equipment. Idle 1921.

CASEY JONES MINING CO. ARIZONA

Address: Oatman, Ariz. **Officers:** J. M. Francis, pres.; V. S. Rowley, v. p.; J. E. Shank, sec-treas., with J. J. Casey and H. M. Caswell, directors.

Inc. in Ariz. **Cap.** $100,000; 10¢ par; 600,000 shares in treasury. Listed in San Francisco.

Owns the Swallow group, 14 claims, 176 acres, adjoining the Oatman Gold, and the Argo and Tom Reed properties. Property in the development stage.

CASH MINE ARIZONA

Address: Prescott, Ariz.

Property: leased to N. E. Getchell, Maxton, Yavapai Co., Ariz., shows veins with gold-silver-copper-lead ore. Developed by a shaft with extensive workings.

Equipment: includes a 10-stamp mill. Six men employed at last account.

CASTLE BUTTE MINES. ARIZONA

Address: Patagonia, Ariz.

Owned by Jas. Keating and E. H. Evans.

Property: group of 6 copper-silver claims, 2½ miles S. W. of Patagonia, Santa Cruz county, Ariz, developed by 65′ shaft and tunnels. Several cars of carbonate ore shipped during 1918. Indications said to be good.

CASTLE COPPER CO. ARIZONA

Property: the Dunkirk or Mt. Tritle group, 11 claims, 12 miles S. of Prescott, on the southern slope of Mt. Tritle, near the head of Slate creek, in Hassavampa district. Formerly owned by **Dunkirk Gold & Silver Mining Co.**, later by **Mt. Tritle Copper Co.**, and purchased in 1914 by D. M. Clark of Prescott, Ariz. Is an old mine, with tunnels of 150′, 160′, 170′ and 300′, driven at vertical intervals of 100′, showing copper and lead sulphides, with value in copper, gold, and silver, in about the order named.

Equipment: includes steam and gasoline power, air compressor and electric light plant. A 40-ton mill has 4 Nissen stamps, 3 Wilfley tables, 100-ton ore bin and a 10,000-gal. water tank. Oil flotation unit reported to be an unqualified success, saving as high as 98% on assay value of ore. No recent information available.

CASTLE DOME DEVELOPMENT CO ARIZONA

Address: 43 Cedar St., New York City.

Officers: Garrett Mott, pres.; Mulford Martin, v. p.; E. C. Curnen, sec.-treas., with H. A. Tingley, John Kasser, S. D. Wright and L. B. Pearson, directors. T. R. Drummond, gen. mgr., Box 1717, Globe, Ariz.

Inc. in Maine. **Cap.** $3,000,000; $5 par; 500 shares sold for $110 the lot at public auction in New York on Dec. 22, 1920.

Property: 35 patented claims, in Castle Dome group, 5 miles W. of Miami, Gila county; owns 97% of the outstanding shares of, and has bond

and lease, on the Inspiration Extension Copper Co. (q. v.); also controls small group of patented claims adjacent to holdings of Inspiration Cons. C. Co.

Development: by 8 tunnels, and 4,500′ of workings to depth of 600′; churn-drills reported to show a diabase intrusion 20′ wide in granite, course N. 50° E., dip 18°. Company has developed a substantial deposit of copper ore on its main property. Ore runs from 1 to 2½% copper, estimated to average 1.4% for 10,000,000 tons.

CATHERINE MINE. ARIZONA

See New Comstock Mining Co., and Katherine Gold Mng. Co.

C. B. S. MINING CO. ARIZONA

Office: care Granite Securities Co., Citizens Natl. Bank Bldg., Los Angeles, Calif.

Property: near Prescott, Ariz., in the Copper Basin district, Yavapai County, shows several veins, with 62′ shaft developing a 6′ orebody, assaying 9% copper, $10 silver and $3 in gold. Vein dipped out of shaft and bottom of workings show a 10″ ore streak of native silver. Shaft has been sunk 100′. Owned by same people as the Climax Mining Co., near Prescott, Ariz.

C. & B. VANADIUM MINE. ARIZONA

Address: % Wilson & Stone, Christmas, Arizona.

Property: 6 claims in Dripping Springs district, 10 miles N. W. of Christmas, Gila county. The orebody, 25′ by 50; on a limestone—diabase contact, is opened by 1,000′ of shafts and tunnels. For geology see U. S. G. S. P. P. 115.

Production: about 500 tons of ore, said to average 1-3% V_2O_5, yielding 50 tons of concentrate.

CEDAR MINES CONSOLIDATED. ARIZONA

Address: I. M. George, Kingman, Ariz.

Property: Arnold and Queen mines in Cedar Valley district, on W. slope of Hualpai Mtns. Mohave county. Ore occurs in fissure veins in granite carrying gold and silver. Development work to be resumed in 1921.

CENTRAL BUTTE MINING CO. ARIZONA

Office: Box 973, Douglas, Ariz.

Officers: A. H. Struthers, pres.-mgr.; F. F. Williams, v. p.; Z T. Phillips, sec.-treas., with A. J. Thompson and Chas. M. Seaman, directors. H. W. Evans, supt.

Inc. 1917, in Arizona. **Cap.** $750,000; 50¢ par.

Property: 145 acres, in the Pearce mining district, Cochise county, 4 miles south of Pearce. Shaft 180′ deep. Shipped some copper ore from the 70′ level, from a stoping length of 42′ on the vein. Ore carries from 1 to 10% copper, with some gold and silver.

Company installed an oil-driven air compressor and expended $25,000 on property. Presumably idle.

CENTRAL COPPER CO. OF ARIZONA, INC. ARIZONA

Offices: 71 Broadway, New York; Harris Trust Bldg., Chicago. **Mine address:** J. W. Prout, Jr., gen. mgr., Dos Cabezos, Ariz.

Officers: T. N. McCauley, pres.; D. S. Stevenson, v. p.; F. M. Utt, sec.; Geo. L. Ramsey, treas.; with D. B. Falter, A. W. Rathbun, Axel Johnson, J. A. Veness, H. A. Morgan, H. J. Tilbert, and A. R. Orr, directors.

Inc. 1919, in Arizona. **Cap.** $10,000,000; 50¢ par; 1,296,397 shares outstanding.

Assets: include

Property investment of $500,000 in mining claims and $930,562 for mine operations, improvements and general developments; also general expenses to be charged against income.

Current: bank balances and cash on hand, $250,433, securities, $1,230, capital stock Central Mercantile Co., $6,500, accounts receivable, $75,090,

Central Joint Lease, $168,880, material and supplies, $29,200; total for current assets, $531,335.

Installments: amount receivable on shares of stock sold, $1,017,104, a total of $2,979,002.

Liabilities: include

Fixed; capital stock authorized, $10,000,000, less unissued, $8,022,894 and unissued stock sold on deferred payment, $1,145,376, a total of $9,168,270, leaving the amount of capital stock issued, $831,729. Premium on stock sold, $470,744, which with the deferred payments noted above makes a total of $2,447,850.

Prospective: balance payable in future, half in royalties on ore sold as partial payments on property purchase; development, mine betterments and operations, $531,152, or total liabilities of $2,979,002.

Property: 30 claims, about 520 acres, 18 miles W. of Wilcox, adjoining property of the Mascot Copper Co. Surficial exposures are said to be good, and the ore deposits similar to those in the Mascot property. An 81′ orebody opened up at 100′ depth is claimed to show sulphide ore averaging 4% copper with small gold and silver values. Company also has 20-year lease and bond on holdings of the Mascot Copper Co,, consisting of 56 claims. The Central and Mascot properties are being developed simultaneously. Employed about 100 men during 1920 on road work.

Development: by numerous open cuts and shafts, totaling 3,000′. The 200′ Elma tunnel reported to have developed 60,000 tons of 4% copper ore, to January, 1921. A 3-compartment shaft, down 200′ in Oct., 1921, is being sunk to 1,000′ depth, with levels at 100′ intervals.

Equipment: under the leasing agreement the equipment of the Mascot company is availabe for the treatment of Central Copper company ore.

CENTURION ARIZONA MINING CO. **ARIZONA**

Dragoon, Cochise Co., Ariz.

Officers: J. P. Richardson, pres.-gen. mgr.; Samuel Bennett, v. p.; H. A. Morgan, sec.-treas., with H. C. Arnold, J. W. Angle, W. H. Purdy, M. S. Richardson, E F. Woodworth, directors. Willcox Bank & Trust Co., treas.

Inc. July 26, 1906, in Arizona. **Cap.** $1,000,000; $1 par; issued 789,186.

Property: 23 claims, 430 acres, in two groups, 1st group about 2 miles N. W. of, and 2d group about 5 miles N. E. of Dragoon, in the Dragoon mountains, shows a contact deposit between pre-Cambrian limestone and altered schist, averaging about 15′ in width and carrying azurite and malachite, associated with hematite. Ores carry an average of 2.7% copper.

Development: by a 660′ incline, several shafts from 40 to 100′ in depth, and a 2,000′ tunnel, with about 4,500′ of workings, estimated by management to show 165,000 tons of ore. Work on the 600′ level said to be in 8.12% ore for 50′.

Equipment: includes a 15 h. p. gasoline hoist, good for 800′, a small air compressor, machine shop, smithy and other necessary mine buildings. Water encountered on 600′ level has retarded development, but shaft is to be deepened when conditions permit. Property considered promising.

CERBAT SILVER MINES CO. **ARIZONA**

Officrs: M. S. McEniry, pres.; T. W. Hokom, sec.-treas., with W. L. Hokom and J. M. Sheridan, directors.

Property: a lease and option on the Imperial and White Elephant claims in the Wallapai district, 12 miles from Kingman and 3½ from Cerbat.

Development: White Elephant claim has a 285′ shaft. The Imperial claim is being developed on the 125′ level, using a 15 h. p. hoist.

Production: to end of 1916, said to have been $300,000.

CERBAT SILVER MINING & MILLING CO. **ARIZONA**

Officers: C. C. Perdoe, pres.-mgr.; F. E. Steele, sec.; P. Potter, treas.

Inc. 1919, in Delaware. **Cap.** $1,000,000; $5 par; issued 80,000 shares. Is reorganization of original company, whose capital stock of $1,000,000, $1

par, was exchanged on basis of 5 shares of old for 1 of new company. Transfer agent, Registrar & Transfer Co., N. Y.

Property: company has 10-year lease with 10-year renewal privilege on 8 claims and 3 millsites in the Chloride district, including the Elkhart, Argyle, Edgar, and Victoria mill site, with 9 veins showing. The Elkhart mine, owned by Elkhart Mines Co., and which adjoins the Tennessee mine 1 mile E. of Chloride, is traversed by a strong vein, in places 10′ wide, with 1′ 5″ of pure galena and 8 feet of galena and silver with some gold and zinc.

Developed by shafts 200′ and 500′ deep, short tunnels, and about 2 miles of workings. Operations were resumed in 1920 and the Elkhart shaft unwatered to 300′ level.

Gross production in past is said to have been about $1,000,000.

Ore reserves are estimated at over $500,000 proven ore, and $1,000,000 probable ore.

Equipment: crude oil hoist, 150-ton concentrating mill, etc. Propose sinking shaft deeper and installing flotation plant. Reported on by F. E. G. Bery.

CHAPARRAL MINING CO. **ARIZONA**

Officers: J. F. Rogers, Columbus, Ohio, sec.-treas.; W. H. Jones, supt.

Company has a lease on the Little Jessie gold mine, owned by the Ohio Mines Co., in Big Bug district, Yavapi county.

Production: to 1897 was $750,000; not much since. According to the management, active operations have ceased because of lack of capital.

CHARCOAL CANYON MINING CO **ARIZONA**

Property: 5 claims, near Cerbat, 9 miles S. of Chloride, Mohave county, Arizona.

Development: by open cut that exposed ore 50′ wide and 200′ long.

Thirty tons of this yielded $27 gold per ton. Exploratory work was under way at last accounts.

CHASE CREEK COPPER CO. **ARIZONA**

Idle many years.

See Volume XIV. Was controlled by Lone Star Cons. Copper Co.

CHERRY CREEK MINES CO. **ARIZONA**

Believed to be dead.

Former office: Cherry, Yavapai county, Ariz. Main shaft, 115′ said to show a vein with 3′ paystreak giving assays of about 12.5% copper, 4 oz. silver and $9.60 gold per ton.

CHERUM PEAK SILVER, INC. **ARIZONA**

Address: M. B. Dudley, Kingman, Ariz.

Property: 17 claims, on Cherum Peak, in Mineral Park district, Mohave county, N. W. of the Rural and managed by same interests.

CHLORIDE CERBAT COPPER CO. **ARIZONA**

Owners: J. T. Winn, C. P. Richards, Dr. A. W. Kirsch of Prescott.

Property at Mineral Park, near Chloride, Mohave county, opened by about 400′ of workings. Said to show a 3′ vein, with values up to 60 oz. silver and 20% lead, with some copper.

CHLORIDE GOLD MINING CO. **ARIZONA**

Taken over by the Chloride Samoa Mines Co., which see.

CHLORIDE MINING CO. **ARIZONA**

Address: F. C. Smith, Chloride, Ariz., or W. B. Twitchell, Phoenix, Ariz.

Officers: W. B. Twitchell, pres.; F. C. Smith, v. p.-mgr.; Geo. A. Macdonald, sec.-treas., with W. T. Smith, and Geo. Christy, directors.

Inc. May, 1916, in Arizona. **Cap.** $200,000; 10c. par; 1,950,000 shares issued.

Property: 8 patented claims, 126 acres, includes Hidden Treasure Revenue, Chenango and Oro Fino claims, in Wallapai district, 2½ miles E. of Chloride, shows lead-zinc-copper-silver-gold ore.

Development: by tunnels with 4000′ of working, estimated to block out 100.000 tons of ore. Company has been developing for years and plans building a mill in 1921.

CHLORIDE QUEEN MINING CO. **ARIZONA**

Office: Phoenix, Ariz. J. M. Kellogg, mgr.; Sam Rhea, supt.

Officers: C. C. Thompson, pres.; R. C. Sanfley, v. p.; R. A. Jarrott, sec.; W. S. Goldworthy, treas., all of Phoenix, Ariz.

Property: 5 claims and 2 fractions, better known as Sunday School and Silver Mtn. groups near Chloride., Mohave county.

Development: by shaft 300′ deep, with 650′ drift and tunnels 100′ and 200′ long.

Equipment: includes air compressor and hoist.

A carload shipment of $35 ore was made in 1920.

CHLORIDE SAMOA MINES CO. **ARIZONA**

Office: 622 Higgins Bldg., Los Angeles, Cal. **Mine Office:** Kingman, Mohave county, Ariz.

Officers: L. Hoffman, pres.; A. B. Seelye, v. p.; J. H. Hoffman, sec.-treas., with C. Hoffman and R. Mangold, directors.

Inc. Feb. 26, 1917, in Arizona. **Cap.** $1,500,000; $1 par; 1,019,050 issued.

Property: the Samoa mine, formerly owned by Chloride Gold Mining Co., consists of 6 claims, 1 patented, 125 acres, in Wallapai district, 3½ miles E. of Chloride, Ariz., said to show vertical quartz vein in granite, 8 to 36″ wide and 400′ long. Ore is a sulphide said to carry gold, silver, lead and iron, worth $40 per ton. Lead content is given as 8% and iron 24%.

Development: by 300′ shaft and 3,500′ of workings. Crosscut tunnel was to be driven 1,664′ to open deposit to depth of 710′.

Equipment: 15 h. p. Witte hoist and 2 compressors.

Production: 96 cars of ore, 1903-1908, the last 30 tons assaying 1.2 oz. gold, 11.5 oz. silver, 3% lead, worth $28,79 per ton. Total yield about $250,000.

CHLORIDE & TELLURIDE MNG. MLG & LEASING CO. **ARIZONA**

Property abandoned, company dead. See Vol. XIV.

CHLORIDE X-RAY MINING CO. **ARIZONA**

Main office: 33 N. First Ave., Phoenix, Ariz. Mine at Chloride, Ariz.

Officers: T. A. Barker, pres.; S. Chittick, v. p.; A. W. Galpin, sec.; W. H. Mann, treas.; J. Spargo, mine mgr

Inc. in Arizona. **Cap.** $1,500,000; par $1; issued 700,000 fully paid.

Property: Hillside group of 6 claims, in the Chloride district near base of Rainbow Mountain. Developed by a 743′ tunnel; reported to have 400′ of vein 3½′ wide carrying $30 per ton. Values are in gold, silver and lead. Tunnel was being driven to intercept the X-Ray vein.

CHOLLA COPPER CO. **ARIZONA**

Mail returned unclaimed from former office: Winkelman, Ariz.

Officers: E. R. Rice, J. F. Shaw, D. R. Williamson, R. J. Rice and A. Williamson.

Inc. Jan., 1917, in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: Henry Owen group of 12 claims, about 18 miles from Hayden. Values are in copper and gold.

CIRCLE PEAK MINING CO. **ARIZONA**

Mail addresed to John A. Peacock, Fort Worth, Texas, returned unclaimed.

Property: the Old Corkscrew. 10 claims, 8 miles W. of Mayer, Yavapai county, stated to show a porphyry dike, 1 mile long, with copper and some gold and silver. Presumably idle.

CLARA CONS. GOLD & COPPER MNG. CO. **ARIZONA**

Declared bankrupt. Jan. 27, 1912. Sec. Vol. XIV. Reorganized as the Swansea Consolidated Gold & Copper Mining Co., which see in this book.

CLARISSA MINING & MILLING CO. **ARIZONA**

Out of business. See Vol. XIV.

CLEOPATRA COPPER CO. **ARIZONA**

Is controlled by Chas. W. Clark, trustee for himself and associated interests, Jerome, Yavapai county, Ariz. **Executive office:** Clarkdale, Ariz.

Officers: R. E. Tally, pres.; R. K. Duffy, LeRoy Anderson, sec.; H. V. Young, asst. sec.-treas.-transfer agent.

Inc. 1901 in Arizona. Cap. $10,000,000; shares $1 par; assessable; 8,644,-156 shares issued.

Property: 11 patented claims, about 149 acres, S. of the United Verde mine in the Verde district, shows fissure and gash veins carrying ores assaying 1 to 65% copper and 1 to 500 oz. silver per ton, with fair gold value. Has 6 shafts, of 25 to 150′ depth, and 9 tunnels, the Dillon tunnel 3,200′ long, planned to connect with the "1888' shaft.

As company is now practically owned by W. A. Clark (United Verde Copper Co.), no further exploration work will be done from the old workings.

CLEOPATRA COPPER & GOLD MINES CO. **ARIZONA**

Idle and probably dead.

Officers: E. F. Thompson, pres.; Anson H. Smith, v. p.; J. W. Morgan, sec.-treas., with Harvey Hubbs, directors, all of Kingman, Ariz.

Inc. 1917 in Arizona. **Cap.** $3,000,000; $1 par; 1,510,000 outstanding Annual meeting, third Wednesday in January. Arizona Central Bank, Kingman, Ariz., transfer office.

Property: the Cleopatra and Palo Verde groups, 19 claims, in the Owens district, Mohave county, 15 miles from Swansea by road, shows gneiss and schist capped by 1 to 20′ of limestone, and cut by quartz porphyry dikes. A zone of brecciation and crushing, 600′ wide and exposed for 1,200′ in length, shows iron and copper staining. The ore contains gold, and copper, present as carbonate and sulphide; assays of extensive sampling work show values of 2.9% copper with $1.32 gold, 0.3 oz. silver, 87.6% insoluble, and 4.5% iron.

Development: by shallow pits and open cuts. Claim 600,000 tons ore in sight, which is excessive. Stock issue was offered at 50 cents.

CLIMAX MINING CO. **ARIZONA**

Working under lease to Stewart Duncan at last account.

Address: Prescott, Ariz. Owns the Climax gold mine on the Hassayampa river, near Prescott.

Development: by 5 tunnels, longest 1,000′, showing a pay shoot 2″ to 3′ in width. Average grade of mill ore, oxidized, is said to be $35. Sulphide ore in No. 5 tunnel is said to average $21 per ton. Property is equipped with 10-stamp mill, air compressor and good camp buildings. No recent report received.

CLINTON COPPER CO **ARIZONA**

Idle and practically dead.

John F. Campbell, pres., 40 Court St., Boston, Mass.; A. F. Parker, treas.

Inc. in Arizona. **Cap.** $5,000,000; par $5.

Property: the O'Connor mine, about 20 miles E. of Nogales and ½ mile N. of the Mexican border.

COBALT & COPPER MINING CO. **ARIZONA**

Address: J. B. Taylor, cor. Third & Pacific Aves., Long Beach, Calif.

Officers: J. Stewart, pres.-mgr. J. B. Taylor, sec.-treas., with W. M. Monroe, I. N. Vining and B. Brown, directors.

Inc. Nov., 1913, in California **Cap.** $500,000; $1 par; 50,000 shares outstanding; assessable.

Property: 6 claims, 120 acres, in Grape Vine canyon, Black Hills district, Yavapai county, 15 miles S. of Jerome, said to show a vein carrying cobalt, gold, copper, nickel.

Development: by 187′ tunnel and shafts to depth of 60′. Only assessment work being done.

COBRITA MINES CO. **ARIZONA**

Address: Salome, Ariz.

Inc. 1916. In Jan., 1918. mines were leased to the Cobrita Verde Co., which see in Vol. XIV. for complete description of property.

Property: 14 claims, 295 acres, developed by 390′ tunnel and 200′ two-compartment shaft with 40′ crosscut at 100′ and 300′ drifting at 200′ level.

Sixty thousand dollars claimed to have been spent on equipment of property. This was a promotion of "Dick Wick Hall," which caught many small investors.

COBRITA VERDE COPPER CO. **ARIZONA**

Mail returned and company presumably out of business. See Vol. XIV.

Address: G. J. Kahn, pres., 1707 Leighton Ave., Los Angeles Cal.

Officers: Judge W. M. McCrea, v. p.; J. W. Whittington, sec.; above with C. A. Wilson, P. E. Parentean, directors.

Inc. Nov. 13, 1916, in Utah. **Cap.** $2,500,000; $1 par; increased 1918 from $1,000,000; 1,400,000 issued; 500,000 pooled. In January, 1918, company took lease and bond on property of Cobrita Mines Co., and relinquished Leatherby bond and lease on Vindicator and Little Grant Mines.

COBRIZA MINES DEVELOPMENT CORP. **ARIZONA**

Out of business. Described in Vol. XIII.

COCHISE DEVELOPMENT CO. **ARIZONA**

Address: Bisbee, Cochise county, Ariz.

Officers. Lemuel C. Shattuck, pres. Chas L. Jones, v. p.-gen. mgr.; T. O. McGrath, sec.; Jos. M. Muheim, treas.

Inc. Aug. 1, 1905, in Arizona. Succeeding the Cochise Copper Mining Co. **Cap.** $1,000,000; $10 par. Annual meeting, second Tuesday in January.

Property: 16 claims, 176 acres, abutting on the Holbrook mine of the Copper Queen mine and lying north of the Dividend fault and Dubacher gulch.

Development: by a 900′ three-compartment shaft. Drifts on the 300′, 600′, and 900′ levels show small bunches of sulphide ore.

Equipment: includes a 100 h. p. boiler, a 10x30″ first-motion double-drum hoist, good for 1,200′, and a 6-drill straight-line air compressor. Buildings are an engine house, boiler house, 20x40′ carpenter shop, 20x30′ smithy, and a coal trestle. Idle since 1907.

COCHISE MINERAL MINES CO **ARIZONA**

Address: H. D. Buford, mgr. Paradise, Ariz.

Property: in the Chiricahua Mtns., near Paradise, Cochise county, developed by tunnel in 1,050′, said to cut a mineralized zone showing lead-silver and manganese ore. The tunnel is to be 1,700′ long.

C. O. D. MINES, INC. **ARIZONA**

Address: M. B. Dudley, gen. mgr., Kingman, Ariz.

Officers: Walter Heyn, pres.; Chas. L. Simonson, sec.-treas.; with M. B. Dudley, Jas. Lehy, directors. C. H. Urquhart,; gen. supt., George Williston, supt., M. Pressler, mill supt.

Inc. 1920 in Delaware. **Cap.** $5,000,000; $1 par; all oustanding. Operating expenses for 1920 reported as $125,000.

Property: 6 claims, 120 acres, in the Cerbat range, Mohave county, 16 miles N. of Kingman. Ore occurs in fissure veins, with shoots of high-grade ore, from 6″ to 7′ wide, containing gold, silver and lead.

In September, 1919, the mine was taken over by M. B. Dudley, was unwatered to 300′ level and machinery installed. The shaft had reached a depth of 500′ by December, 1920, with drifts on the 300′ and 400′ levels. A new 3-compartment shaft is planned.

Equipment: includes 100 h. p. electric hoist, 1400 cu. ft. compressor and a remodeled 175-ton mill. The dumps are estimated to contain 100,000 tons of ore.

COLE DEVELOPMENT CO. **ARIZONA**

Office and mine: Globe, Gila county, Ariz. P. J. Cole, pres; M. L. Cole, Jr., sec.-treas.

Inc. Sept., 1909, in Arizona. **Cap.** $300,000; $1 par; 151,000 issued. Company holdings reported under bond and lease to Arizona-Globe Copper Co. Only a limited amount of development work has been done under the option.

Property: the Cole & Goodwin groups, 17 claims, extending along Mineral creek, 3 miles S. of the Gibson mine and about 10 miles S. W. of

Miami, the nearest available rail point, and 10 miles N. E. of Ray, but is separated from Ray by some extremely rugged country.

Geology: country rock is Pinal schist with diabase intrusions, carrying the Cole and Goodwin fault, traceable about 2 miles, that cuts the schist diagonally. This property shows fissure veins and also disseminated ore in schist.

Development: by the 450′ Cole incline shaft, with 5 drifts, cutting several bodies of low-grade disseminated ore and some high-grade from which regular shipments of 6% to 17% copper and $2 to $4 gold and silver were reported in 1917. There also are several short tunnels, there being a 135′ crosscut tunnel about one-half mile from the shaft, and a 480′ crosscut tunnel, 1,700′ west of the shaft, with portal 500′ vertically below the collar of the shaft.

Equipment: includes a 22 h. p. gasoline hoist. Examined by G. M. Butler in 1919.

COLE-TENNESSEE MINING CO. ARIZONA

Successor to Schuykill Mining Co.; Controlled by Richard H. Cole, Pasadena, Calif.

Officers: R. H. Cole, pres.; David B. Gemmill, v. p.; Byron C. Hanna, Los Angeles, Calif., sec.; with Roy T. Richards and Allison L. Jones, directors. J. W. Crenshaw, Phoenix, Ariz., agent.

Inc. 1921. **Cap.** $2,000,000; $10 par; 60,000 shares issued to stockholders of Schuykill Mining Co. in exchange for the 150,000 issued shares of Schuykill stock. The Cole-Tennessee company assumed all liabilities of the old company, including $300,000 due Frank A. Garbutt.

Permit to sell stock issued, August, 1921.

Property: the Tennessee and Schuykill mines in Chloride district, Mohave county. The ore contains gold, silver, lead and zinc in varying proportions and occurs in a fissure vein between pegmatite and schist, striking N. and S. The ore shoot averages about 300′ in length and 6′ in width and has been followed down to the 1,170′ level. The ore is being extracted through a shaft which has reached a depth of 1,400′. Indications are that the ore shoot will be followed in undiminishing strength to a much greater depth than has been yet achieved. Reported, September, 1921, that 100,000 tons of milling ore are available.

The Schuykill is developed by 800′ incline and levels at each 100′. The vein dips slightly E. and strikes N. of 9° W. At 500′ the shoot is 5′ wide. In a tunnel connected with the 200′ level, the shoot is 8′ wide.

Equipment: 100 h. p. steam hoist, 108 h. p. gas engine, 460 cu. ft. angle-compound compressor, lighting plant, etc.

COLONIAL COPPER CO. ARIZONA

Norwood, Mass. Geo. H. Morrill, former president, reported that company was sold out on foreclosure sale, March, 1916. See Vol. XIII.

COMBINATION SILVER MINES CO. ARIZONA

Address: Hackberry, Ariz. **Inc.** 1920, by J. H. Townsend and Sam Martin.

Property: an old silver mine north of Hackberry, reported reopened in 1920 and under development.

COMMERCIAL MINING CO. ARIZONA

Dead; see Vol. XIV. Absorbed by Phelps, Dodge Corporation and described thereunder, as Copper Basin Branch.

COMMONWEALTH DEVELOPMENT CO. ARIZONA

Office: Pearce, Ariz. **Mine office:** Patagonia, Ariz.

Officers: Andrew Y. Smith, pres.-gen. mgr.; Chas. E. Knox, v. p.; F. L. Bryant, sec.-treas., with C. M. Renaud and H. H. Brown, directors.

Property: a lease on the Commonwealth mine, near Pearce, Cochise county, reported to be shipping several cars of silicious silver-gold ore a week to the Douglas smelters.

COMMONWEALTH EXTENSION MINING CO. **ARIZONA**

Control held in Bisbee, Ariz. Operated under lease by Emmons & Layman, Pearce, Arizona.

Property: a tract adjoining the Commonwealth mine on the E. and S. E. shows the same mineralized contact that carries high-grade ore in that mine.

Development: by a 250′ shaft sunk in andesite with 230′ level, corresponding to 7th level of the Commonwealth and to the water level of the district.

Equipment: includes steam plant, hoist and compressor.

COMMONWEALTH MINING & MILLING CO. **ARIZONA**

Described in Vol. XII.

Property: the Commonwealth mine at Pearce, Cochise county, operated under lease by the Commonwealth Dev. Co.

COMOBABI CONSOLIDATED MINES CO. **ARIZONA**

Address: G. W. Miller, pres.; Box 776, Tucson, Ariz.

Inc. Oct. 1, 1919, in Arizona. **Cap.** $5,000,000; par $1; 400,000 shares issued for property and 22,000 shares sold.

Property: 43 claims in Comobabi district, Pima county, developed by 100′ shaft, and drifts, opening four veins containing silver. Developing.

COMSTOCK CONSOLIDATED MINES CO. **ARIZONA**

Address: Jas. Curtin, Kingman, Ariz.

Property: in Union Pass section, San Francisco district, Mohave county, adjoins Gold Chain on E. Reported that Atterbury & Tuttle, Inc., of Los Angeles, will assist in financing this undertaking. Permit to sell stock was authorized, October, 1921.

CONE MINING & MILLING CO. **ARIZONA**

Office: 132 Edgerly Bldg., Fresno, Cal.

Officers: J. P. Eaton, pres.; M. J. Walsh, v. p.; Hugh Sparkman, sec.-treas.

Inc. Aug., 1911, in Arizona. **Cap.** $1,500,000; $1 par; 778,875 shares issued; 1,200 shares sold for $20 the lot in New York on Dec. 8, 1920.

Property: 12 claims, 240 acres, 2½ miles S. W. of Oatman, in the Tom Reed-Gold Road section, Mohave county. Ore occurs in veins in rhyolite dike, traversing ground from E. to W.

Development: 275′ shaft with crosscutting to reach ledge on 200′ level.

Equipment: includes a 15 h. p. Fairbanks-Morse hoist.

CONSOLIDATED ARIZONA COPPER CO. **ARIZONA**

J. A. Ritsler, pres., Kansas City, Mo.; W. J. Mitchell, supt.

Property: 12 claims, in Patagonia district, comprising the El Paso and Olive groups. A 270′ shaft, said to show high-grade chalcopyrite and chalcocite ore will be sunk to 1,000′ depth. Stock underwritten by Mid-Continent Securities Co. of Chicago.

Equipment: includes 25 h. p. gasoline hoist.

CONSOLIDATED ARIZONA SMELTING CO **ARIZONA**

Office: 15 Broad St., New York City. Mine, smelter, and works office: Humboldt, Ariz.; G. M. Colvocoresses, receiver.

Officers: C. A. Kittle, pres.; E. S. Hooley, v. p.; F. A. Dillingham, v. p.; F. W. Thompson, sec.-treas., with A. E. Cortis, I. A. Heitzmann, Donald G. Ross and J. H. Flagler, directors. O. F. Janssen, aud.

Inc. Dec. 22, 1908, in Maine. **Cap.** $9,200,000; $5 par; 1,663,000 issued. 177,000 reserved for bond conversion. **Bonded debt:** $1,200,000 5% 30-year income bonds authorized, $885,000 outstanding; and $1,000,000 6% 20-year refunding and improvement bonds, of which $652,000 were pledged as of Dec. 31, 1919, against loans and notes. Listed on Boston and New York curbs.

Columbia Trust Co., trustee of 6% bonds; Equitable Trust Co. trustee of 5% bonds; Guaranty Trust Co., transfer agent; all of New York.

Acquired at foreclosure sale the properties of the Cons. Ariz. Sm. Co. (see Vol. X), and the Ariz. Sm. Co. The intricate relationship of the old company and its subsidiaries is fully described in Vol. X.

Company acquired in 1920, 75% of capital stock of **Swansea Lease, Inc.**, (q. v.) and holds also an interest in the **Western Metallurgical Co.** The Swansea Lease, Inc., holds a 10-year's lease on holdings of **Swansea Cons. G. & C. Co.** and owns the mine plant and reduction works. In March, 1920, a 3-years' lease was secured on the Planet mine of the **New Planet Copper Mng. Co.** (q. v.) in Yuma county, 9 miles W. of Swansea.

Financial statement: on Dec. 31, 1918, current assets were $627,539, and current liabilities, $342,549, a net excess of $285,990. The operating profit for 1918 was $580,406.

On Dec. 31, 1919, current assets were $530,580 and current liabilities, $624,641; and as of July 31, 1920, they were $553,077 and $747,858. The operating profit for 1919 was $96,294.

The surplus account shows the following changes: credit of $613,876 in 1916; and $261,031 in 1917; and deficits of $112,294 and $243,761 in 1918 and 1919. These are net amounts after paying interest, taxes, depreciation and dividends. The profit and loss surplus on Jan. 1, 1920, was $172,077.

By about June, 1920, the financial position became such that reorganization was necessary, and negotiations were started with the Southwest Metals Co. (q. v.) to this end. On Dec. 24, 1920, G. M. Colvocoresses was appointed Federal receiver.

Dividends: initial dividend was declared in 1917. Payments have been as follows: 10¢ in 1917; 20¢ in 1918; none since.

Property: Reduction works, with mill and smelter at Humboldt and 40 claims, 20 patented, 725 acres, near Mayer and near Middleton, Yavapai county, Ariz. The most valuable mines owned are the Blue Bell and De Soto mines.

The Blue Bell Mine: 3 claims, carries composite fissure veins in Yavapai schists; the ore has quartzite foot and sheared granodiorite hanging wall.

Development: 6 shafts, deepest, 1,200′ and 2 short tunnels, with about 30,000′ of underground workings. Ore contains pyrite and chalcopyrite, both slightly argentiferous and auriferous. The deposit has been opened to the 1,200′ level and explored by underground workings and by diamond drill holes. Nine lenses of ore have been worked, six extending from near the surface to the 1,200′ level. Ore lenses vary from 100′ to 400′ in length and from 5′ to 25′ in width, the ore averaging about 2.8% copper, 1.2 oz. silver and .04 oz. gold. Shrinkage stoping is used wherever practicable.

New work in 1919 totaled 1,227′ of drifts, etc., and 1,594′ of drilling; 122,069 tons of ore were produced at cost, plus development, of $4 per ton. Indications are that orebodies will continue with depth and perhaps laterally.

Ore reserves estimated to be 390,000 tons carrying 2.65% copper and $2.80 in gold and silver in Dec., 1919. With increasing depth the gold-silver content is increasing while the copper values are decreasing.

Mine is connected with the Prescott & Eastern R. R. by an aerial tramway.

The De Soto mine: also in schist and in the Bradshaw range a few miles from the Blue Bell, is developed by 4 tunnels, 5,000′ in length, to depth of 1,000′ with total workings of 14,400′. Reserves estimated, Dec. 31, 1919, to be 21,000 tons, averaging $2.30 gold and silver and 2.15% copper. New work in 1919 was 2,584′, including drilling; 27,067 tons of ore were produced at cost of $4.75 per ton. Exploration work was disappointing.

Ore reserves: total for both the Blue Bell and De Soto mines are officially given as 411,000 tons, of which 54,548 tons are broken in stopes. In addition there is a considerable tonnage of low-grade material, some of which averages $1.50 in gold and silver, and 1.75% copper.

The Smeltery: the reduction plant, well located for custom business, includes sampling, concentrating, roasting, smelting and converting departments, with a machine shop and smithy. All buildings are of structural steel

with brick walls or corrugated-iron sheathing, floored with cement. This plant was reconstructed in 1914, and many improvements and additions have been installed since then at a cost of over $1,597,266; it is considered a modern and efficient plant in every respect.

A 350-ton Minerals Separation flotation plant was installed in 1913. The concentrator has two 200-ton units, each having one 10x20" and two 7x10" Blake crushers, 1 Symons disc crusher, 3 elevators, 2 sets of rolls 2 ball-mills, 10 Wilfley tables, 8 Overstrom tables, 8 vanners, 4 trommels, 8 Callow tanks, classifiers and flotation machines. The mill has a large slime pond, and overflow water is returned to the mill for re-use.

During 1919, 100,610 tons of ore were treated at a cost of $1.56 per ton; 33,614 tons of concentrate were produced, with a copper recovery of 90.34%.

The smelter has four 7-hearth Wedge roasters. 22'6" dam, fitted with auxiliary oil-burners and supported on step bearings instead of trunnion. There are two reverberatory furnaces, burning oil and rated at 400 tons daily capacity. Matte from the reverberatory furnaces is tapped into a launder, which delivers it to a ladle in the converter room. Production averages 1,800,000 lbs. blister copper per month from company ore and custom material. Smelting is done in a 250-ton water-jacket blast-furnace for copper. Slags are granulated. The stack is of reinforced concrete, 180' high, 18' in diameter at the base and 11' at the top.

The converter department has 2 stands, with shells of barrel type, rotated electrically. Equipment includes a 40-ton Whiting electric crane with a 15-ton auxiliary crane, cranes also taking hot slag from the converters and pouring same into the reverberatories and delivering shells.

The smelter treated 97,941 tons of ore and concentrate in 1919, as compared with 160,328 tons in 1918, of which 14,723 tons were custom ore; total yield was 9,403 oz. gold, 256,927 oz. silver, and 8,689,227 lb. of copper; copper recovery was 92.83%; cost per ton was $3.69. In first quarter of 1920, copper output was 2,810,000 lb.

The power plant has four 345 h. p. Stirling water-tube boilers, burning waste gases from the reverberatories, steam being sent therefrom through a 10" pipe line, under 150-lb. pressure. Machinery includes 2 Connersville blowers, a Nordberg duplex cross-compound air compressor, with 40x42" air cylinder and 18x36x42" steam cylinders. There are two 300 k. w. 480-volt 3-phase 60-cycle generators, direct-connected to two 16x32x36" Nordberg cross-compound engines, and an electric turbine pump. Electric power is furnished the Blue Bell mine, 18 miles distant, current being transmitted at 15,000 volts, stepped down to 440 volts, at the Blue Bell transformer station.

Production:

	Tons Mined	Copper Lb.	Silver Oz.	Gold Oz.	Profit
1919.....	149,136	7,578,282	203,546	8,706	$96,894
1918.....	173,960	9,472,075	254,583	10,509	580,406
1917.....	147,256	9,229,113	207,600	8,620	881,816
1916.....	109,452	7,242,347	127,228	4,858	859,015
1915.....	90,531	5,473,740	100,682	3,174	194,943

Average copper price realized in 1919 was 18.514¢; cost of domestic copper production was 17.064¢ after crediting gold and silver.

Company has been handicapped by debts incurred prior to 1915, liquidated since in part only, and these, coupled with the return of 6,000,000 lb. of copper by the Government and a falling copper market, brought on the receivership.

Reported, Fall of 1921, that Southwest Metals Co. had purchased, in part for cash and in part for stock, most of the outstanding debts of the Cons. Arizona. A petition for the sale of the property was to be heard on Oct. 24.

It is hoped that the reorganization under the auspices of the Southwest Metals Co. will safeguard the interests of the security-holders.

CONSOLIDATED HOMESTEAD MINES, INC. **ARIZONA**

Subsidiary of **U. S. Continental Mines Co.**, an I. K. Farrington promotion, which see.

Address: care I. K. Farrington, 30 Broad St., New York.

Cap. $600,000; $1 par; 364,514 shares owned by U. S. C. Mines Co.

Property: Homestead mine, in Lynx-Creek district, near Walker, Yavapai county, shows a vein yielding a complex sulphide ore containing copper, lead and zinc, with gold and silver. Will eventually be consolidated with **Arizona Victory Mining Co.**

CONS. KING DEV. & COLUMBIA COP. MG. CO. **ARIZONA**

Controlled by Chas. W. Clark, trustee for himself and associated United Verde C. Co. interests.

Address: Clarkdale, Ariz.

Directors: R. E. Tally, pres.-treas.; R. K. Duffey, v. p.; Leroy Anderson, sec. H. V. Young, asst. sec.

Inc. in Arizona. **Cap.** $6,000,000; shares $1 par.

Property: 11 claims, 154 acres, S. of the United Verde mine, Jerome, Yavapai county, showing several bodies of oxidized and sulphide ores, carrying fair values in copper, gold and silver. Mine has a 100′ shaft and a 750′ tunnel, with about one-half mile of workings. Idle since 1913.

CONTINENTAL CONSOLIDATED COPPER CO. **ARIZONA**

A reorganization of the **Southern Arizona Mng. Co.**, described in Vol. XIV.

Address: 317 Ridge Bldg., Kansas City, Mo. **Mine address:** C. A. Pierce, supt., Patagonia, Ariz.

Officers: Henry C. Page, pres.; C. E. Sweet, sec.; Chas. L. Cookson, treas., with A. E. White, E. Thielman, H. J. Richards, E. P. Greenwood and R. W. Pierce, directors.

Property: the Sweet group, 23 claims, 3 patented in Wrightson district, district, 10 miles N. W. of Patagonia, shows gold-bearing copper ore, occurring as contact deposit between granite and monzonite. Mine has 365′ shaft equipped with steam hoist, pumps, and air-compressor.

See Mansfield M. & S. Co.

CONTINENTAL COMMISSION CO. **ARIZONA**

Office: Winkelman, Arizona.

Officers: Lee Reagan, pres.-gen. mgr.; Alice McFadden, sec.-treas.; with R. A. Chastang, directors. Tom Sanford, supt.

Property: 23 claims, including the old 79 mine near Winkelman, Gila county, held under lease and bond, and said to cover 3 parallel veins, 1-4′ thick, carrying gold, silver and lead.

Present management has done 2,000′ of development work and estimates 45,000 tons of ore blocked out. Shipments made to the El Paso smelter, totaled 70 cars to February, 1921, averaging $1,200 per car net.

CONTINENTAL CONSOLIDATED COPPER CO. **ARIZONA**

Office: 517 Thacher Bldg., Pueblo, Colo.

Officers: F. E. Wallace, pres.-treas.; G. E. Wallace, v. p.; G. S. Treader, sec. F. E. Wallace, G. E. Wallace, D. E. Arnitt, J. C. McCoy, F. J. Weber and L. T. Gray, directors.

Inc. 1918, in Arizona. **Cap.** $1,500,000; shares $1 par; outstanding 135,000 shares.

Property: 400 acres, Owens district, Mohave county, 40 miles N. of Wenden. Ore occurs in 2′ vein in altered schist, course N. W., dip 45°. Developed by prospect pits and 60′ incline shaft. Assays reported as 5.6% copper and $3 to $100 gold.

A prospect which has merit if transportation difficulties are overcome.

CONTINENTAL COPPER & GOLD MINING CO. **ARIZONA**

Out of existence. Described in Vol. XIII.

COPPER AGE MINE. **ARIZONA**

Owned by the Arizona Ore Reduction Co., which see.

COPPER BUTTE MINES CO. ARIZONA

Offices: 906 New York Life Bldg., Minneapolis, Minn. and Phoenix, Ariz.

Officers: Ace. P. Abell, pres.; Wm. H. Lucia, v. p.; E. B. Crabtree, sec.-treas.

Inc. 1904, in Arizona. **Cap.** $6,000,000; shares $10 par.

Property: 16 claims, 8 patented, 4 miles N. W. of the Ray Cons.

The ore deposit is a mineralized breccia, consisting of schistose rock with fragments of quartz, diabase, granite and limestone; the ores are the oxides and silicates of copper. Mine is fully described in Vol. XII.

Development: by several shafts, deepest 300', and 6 tunnels, said to open orebody 85' wide at depth of 185' containing 4 to 7% copper.

Property reported taken over by **American Ore Corporation** in 1921 and active development under way.

COPPER CHIEF MINES CO. ARIZONA

Offices: Chas. W. Chubbuck, 20 W. 34th St., New York. Mine at Quartzite, Yuma county, Ariz.

Officers: Richard Darling, pres.treas.-mgr. Quartzite, Ariz.; Richard Darling, Jr., v. p.; B. A. Darling, sec.

Inc. 1910, in Arizona. **Cap.** $5,000,000; $1 par; outstanding, 3,000,000.

Property: 28 claims, patented, 560 acres, in Plomosa district, Yuma county, 20 miles S. W. of Bouse, shows schist and greenstone with a contact deposit dipping at 35° and containing copper and gold ore that assays 1.3% to 20% copper. Gold runs from $1 to $12.80 per ton.

Development: by 2-compartment 650' vertical shaft, which has passed through greenstone into a replacement body of copper ore in limestone. Shaft is down to water-level, and crosscutting has reached 490' on the 648' level, 165' on the 420' level and 100' on the 250' level, in ore said to assay 6-20% copper.

Examined by L. A. Dunham, who reported that the remarkably favorable iron outcrops on all the claims of this company would probably be underlain by high-grade copper ore.

Equipment: includes a 25 h. p. gasoline hoist, a small compressor, 50 h. p. engine, triplex pump, two 20 k. w. generators, 20 h. p. motor, autotrucks, and complete camp site.

COPPER CHIEF MINING CO. ARIZONA

Address: J. T. Matson, gen. mgr., Clarkdale, Ariz.

Officers: J. T. Matson, pres.-treas.; W. S. Fulton, v. p.; W. J. Wolf, asst. treas.-sec.; G. W. Bierbauer, asst. sec., with M. K. Hayden, R. H. Fulton, R. W. Gordon, Thos. B. Stearns and N. P. Rathvon, directors.

Cap. $1,500,000; $1 par; 649,897 shares issued.

Property: 21 claims, 11 patented, adjoining Senator Clark's Iron King mine in the Black Hills range, 3½ miles S. E. of Jerome, and a mill site. The claims are in the belt of metamorphosed igneous rocks and schists forming the southern extension of the United Verde or Jerome schist area. The Copper Chief-Iron King ore-body, is a boat shaped mass which runs across 3 of the claims, is 60 to 95' wide, and consists of copper-bearing iron oxide carrying gold, silver and a little copper, the total value being from $8 to $13 per ton. Was under lease to **Hayden Dev. Co.**, 1916 to 1918.

Development work on this deposit shows that it extends downward about 315' below the outcrop. Material composing this lens is completely oxidized from the surface down to a depth of 226'. The bottom of the lens consists of massive pyrite with about 5' of enriched ore between the sulphide and the overlying oxidized material. Less than half of the ore has been payable ore in the oxidized zone and about 15% of the lower lying sulphides can be mined at a profit.

Development: by 350' shaft, 2,225' of work on the 100', 160', 220' and 280' levels. The Wonderful shaft is 200' deep with 250' of drifts. A crosscut tunnel is being driven to connect with the bottom of the shaft. Mine

reported to have a large tonnage of low-grade oxidized ore, which cannot stand transportation to a distance. Future of the property depends upon development of sulphide ore in quantity.

Ore reserves: 5,800 tons of oxidized ore of $12 gold and silver content; 8,240 tons of mixed oxide and sulphide, 1,000 tons of $50 per ton enriched ore and 8,000 tons of other ores running from $15 to $25 per ton.

The Wonderful claim has been developed by a 160' tunnel and 4 winzes with ore estimated at $25,000.

Equipment: includes 125-ton cyanide mill, electric power, air compressor and hoist.

Production: total output for 1916 to 1918 (by Hayden Co.), was 71,849 tons returning $875,800. The mine was returned to Copper Chief company and was closed in November, 1918, owing to high costs.

COPPER DOG MINING CO. — **ARIZONA**

Mail returned unclaimed and company probably dead. See Vol. XIV.

Property: 12 undeveloped claims in the Huachuca district, Cochise county, held under bond and lease. Ore is gold, with some silver and copper. Values as high as $90 per ton are reported in a narrow vein.

COPPER EXPLORATION CO. — **ARIZONA**

Office: 8 West 40th St., New York. Is a Cameron, Michel & Co. promotion.

Officers: D. K. Jeffris, pres.; W. L. Detmold and G. H. Stetson, v. p.'s.; with P. J. Cogan, H. D. Critchfield, Melville Gillett, J. S. Jenkins, R. P. Marshall, W. L. Martin, and Wilson Potter, directors. Transfer agents, Security Transfer & Registrar Co., N. Y.; registrars, Metropolitan Trust Co., N. Y. Annual meeting, first Monday in August.

Inc. 1918, in Delaware. Cap. $1,000,000 cum. 8% participating pfd.; and $1,000,000 common shares; $10 par; outstanding $400,000 pfd. and $1,000,000 common.

Balance sheet of March 3, 1920, shows cash, $17,083; accounts receivable, $56,162, and deferred charges, $10,034. Current liabilities were $104,380, and surplus $18,871.

In 1919, company is said to have owned a stock interest (100,000 shares) in **Canario Copper Co., London-Arizona Cons. Copper Co., Owl Head Copper Co.** (100,000 shares), **Tortillita Copper Co.**, and 80% of the stock of the **Compania Cobre Mexicana, S. A.**, a Mexican corporation, capitalized at $10,000.

At various periods these companies were reported to be nearing the dividend stage, and shareholders advised to expect large profits, but no official record of actual operations or dividend disbursements is obtainable.

At last account, January, 1920, company had paid $22,000 on an option on the London-Arizona property, but being delinquent for $60,000 due, the contract was cancelled. Company's holdings in Oct., 1921, are said to be 100,000 shares Canario Copper Co., this Mexican holding company owning shares in two development propositions, the **El Canario Copper Co.** and **Mountain Cons. Copper Co., which see.**

COPPER FAME MINING CO. — **ARIZONA**

Mail returned unclaimed from former address: P. O. Box 692, Kingman, Ariz.

Officers: S. E. Barron, pres.-treas.; R. L. Gray, v. p.; E. L. Betsworth, sec.: above with F. L. Rogers and C. W. Herndon, directors.

Inc. 1917 in Ariz. **Cap.** $1,500,000; $1 par; 250,000 shares offered the public at 10c. to raise funds for development and equipment. Company paid 700,000 shares of stock to the **Gold Cliff Exploration Co.** for its property.

Property: 10 claims, 153 acres, in the Cerbat range, Wallapai district, Mohave county, 16 miles N. of Kingman, adjoins the **Union Basin Mining Co.** property and shows quartz bearing fissure veins in igneous rocks, with ore in shoots.

Development: by many shallow shafts, deepest 60′, and a 110′ tunnel with 15′ crosscut. All openings reported to expose ore, assays being given as $4 to $20 gold, 10 to 20 oz. silver, 3 to 30% zinc and 5 to 23% copper, higher values undoubtedly from picked samples. Presumably idle.

COPPERFIELD PORPHYRY COPPER MINING CO. **ARIZONA**

Dead. See Vol. XIV.

COPPER HILL ARIZONA MINING CO. **ARIZONA**

Address: Lon D. Hall, Prescott, Ariz.

Officers: Lon D. Hall, pres.; C. H. Hooker, v. p.; M. Ford, sec.-treas.

Inc. April, 1917 in Arizona. **Cap.** $1,500,000; $1 par; none issued.

Property: 7 claims, 140 acres, in Agua Fria district, Yavapai county, 2 miles from the idle Big Ledge smelter. Quartz ore containing gold and copper occurs in lenses. **Development:** by 190′ shaft.

COPPER HILL GROUP **ARIZONA**

Idle. Formerly operated by the **Garford Syndicate,** described in Vol. XIV.

Property: 14 claims, 245 acres, in Copper Basin district, Yavapai county.

Ore: copper bearing, with molybdenite, gold and silver, in shoots and streaks in breccia, surrounded by granite, diorite and porphyry. Ore shoots vary from 5′ to 15′. Average assays reported as copper, 3.75%; molybdenite, 4.25%; gold and silver, $1.15. Property has shipped about 200 tons.

Development: by three shafts 45′, 50′ and 140′ deep.

COPPER LODE MINES CO. **ARIZONA**

Mail returned from former address: care Industrial Dev. Corp., 608 South Dearborn St., Chicago, Ill.

Probably defunct. Described in Vol. XIII.

COPPER MOUNTAIN MINES CO. **ARIZONA**

Is a reorganization of the Stoddard Copper Co.

Address: Celora M. Stoddard, Phoenix, Ariz.

Officers: Celora M. Stoddard, pres.; Wm. H. Reynolds, v. p.; M. A. Pickett, sec.-treas., Phoenix, Arizona. S. C. Chaney, supt.

Inc. 1912, in Arizona. **Cap.** $5,000,000; shares $5 par.

Reported that 120,000 shares had been allotted to the president in lieu of salary, November, 1921. Protest has been entered against allowing the sale of 194,000 shares at 5c.

Property: the old Stoddard mine on Copper Mountain, a mile from the Arizona Binghamton, and near Mayer, Ariz.

Development: by 250′ shaft. Operated by lessees to October, 1919. Is a promising prospect, but needs cheaper transportation facilities to be commercially profitable.

COPPER QUEEN CONSOLIDATED MINING CO. **ARIZONA**

Company merged into **Phelps Dodge Corporation,** which see.

COPPER QUEEN GOLD MINING CO. **ARIZONA**

Address: Chas. Cramp, supt., Stoddard, Ariz.

Officers: Louis Goldman, pres., Los Angeles Calif.; E. G. Ball, v. p.-mgr.; A. B. Owens, sec.; V. S. Wardlaw, treas.; with J. K. Bywaters, A. Goldman, C. R. Caldwell, J. H. Gooch and A. N. Rogers, directors.

Cap. $2,000,000; shares; $1 par.

Property: 25 claims, 23 patented, about 360 acres, and a mill-site on the Agua Fria river, 6 miles east of Humboldt, adjoins the Arizona Binghampton. Claims show great beds of silicified schist, cut in places by rhyolite dikes.

Development: by tunnels; No. 1, 593′ long with about 2,500′ of workings, including shaft and workings on 300′ level; No. 2, 600′ long, with 2,100′ of workings on adit level, a 500′ inclined shaft and 3,900′ of workings. On the 900′ level there are two orebodies, 7′ to 12′ wide, containing chalcopyrite and tetrahedrite, with some gold and silver. Diamond drilling said to show good results.

Equipment: consists of two 400 cu. ft. electric driven air compressors and 30 h. p. electric hoist.

Ore reserves are said to be 50,000 tons of 3% copper ore. A 100-ton mill with flotation unit was ordered in July, 1919 and completed February, 1920.

COPPER REEF CONSOLIDATED MINES ARIZONA

Address: Wm. A. Griffith, sec., 1409 Park Bldg., Pittsburgh, Pa.

Inc. Feb. 19, 1910, in Arizona. **Cap.** $5,000,000; $5 par; issued 632,000 shares. Union Trust Co., Pittsburgh, registrar. Annual meeting, first Monday in February.

Property: 125 claims, 2,800 acres, including 600-acre mill site, in the Stanley Butte district, Graham county, 12 miles S. W. of San Carlos, on the Arizona & Eastern Railroad from Bowie to Miami.

Geology: claims are on the W. slope of a high mountain ridge whose E. face shows granite overlaid by 600′ of quartzite covered by limestone, while the western slope is mantled with massively bedded gray limestone. The carboniferous rocks are cut by numerous fractures carrying small replacement bodies of silicious copper ore. The rocks dip down the slope at 35°, and most of the orebodies are either in gash veins or occur along fractures, conformable to the bedding. In the many older pits and shallow shafts, the narrow gash veins were not over 2′ wide and the ore pinched out at 20 to 30′ in depth.

Development: said to aggregate 1 mile, is by main 1,600′ tunnel, the 800′ North Star and 125′ Jessie shafts. The manager estimated in 1914, 80,000 tons developed by 3,600′ of work, which is a liberal estimate. Ores average about 5.4% copper and 68% silica, the copper being partly in the form of chalcopyrite and bornite, mixed with chrysocolla, malachite and azurite, etc. Management claimed average value of 8.65% copper with varying gold and silver up to $12 per ton. Operations were suspended in 1915, and resumed in 1919.

Equipment: includes 240 h. p. gasoline hoists, 4-drill air-compressor and all necessary mine buildings.

Examined by Kirby Thomas.

COPPER RIDGE MINING CO. ARIZONA

Address: Fred Z. Steele, mgr., Ajo, Ariz.

Officers: Fred Z. Steel, pres.-mgr.; John H. Tait, v. p.; Leo E. Rager, sec., E. A. Diehl, treas., with Fritz Schroeder and Wm. Kruse, directors.

Inc. 1920, in Arizona. **Cap.** $1,500 000; $1 par., 635.000 shares issued

Company acquired holdings of Ajo Cornelia Copper Co. and has settled all claims against that company.

Property: 14 claims, adjoining the New Cornelia Copper Co. at Ajo, covers a lenticular deposit of carbonate and sulphide ore in rhyolite. **Development:** by 3 shafts, 40′, 45′ and 70′ deep. **Equipment:** gas engine, hoist and necessary tools.

COPPERROX MINING COMPANY OF ARIZONA ARIZONA

Mail returned unclaimed from former address, 96 Harris Ave., Providence, R. I.

Inc. Jan. 17, 1910, in Arizona, as successor of the Arizona Copper Syndicate of Providence. **Cap.** $1,000,000, $1 par.

Property: .28 claims, 18 patented, and 2 patented mill sites, in the Dragoon Mountains, 3 miles from Courtland, Cochise county.

Development. by 236′ shaft and about 500′ of tunnels on a contact said to be traceable 3 miles, with surface ores carrying gold, copper and manganese, said to assay up to 16.5% copper.

Idle and probably dead.

COPPER & SILVER ZONE MINES ARIZONA

Claims sold to Globe Dominion Copper Co., which see.

COPPER SPRINGS MINING CO. ARIZONA

Office: Globe, Ariz.

Officers: Capt. E. Storer Tice, pres.; R. L. Springer, v. p.; E. F. Hiatt, sec.-treas., with Dr. W. H. Meler, B. G. Stewart and W. H. Hiatt, directors.

Inc. in Aug., 1916, in Arizona. **Cap.** $1,000,000; par $1; 696,230 issued. Exchange Trust Co., Boston, transfer agents; Fidelity Trust Co., Boston, registrar.

Property: 25 claims, about 500 acres, on Mt. Madera, in the Schultz ranch section of the Pinal mountains, about 6½ miles from Miami, in a rough section of the country. Property is reached by wagon road.

Development: by 8 tunnels, aggregating about 1,400'. Work reported to show considerable leaching and some silicates of copper in the upper tunnels. Nos. 5 and 6 tunnels are reported to have cut carbonates and sulphides of copper running from 1½% to 4%.

Property is a prospect promoted by the firm of Temple H. Fay & Co., of Boston.

COPPER STATE MINING CO. **ARIZONA**

Office: 936 Plymouth Bldg., Minneapolis, Minn. **Mine address:** Copper Creek, Ariz.

Officers: Martin E. Tew, pres.; John A. Nelson 1st v. p.; E. E. McCarthy, 2nd v. p.-treas.; S. H. Hudson, sec., with Otto Hanson, A. M. Anderson and Walter De La Hunt, directors.

Operating officials: W. C. Steubing, mgr.; Geo. S. Croyle, supt.; Gilbert O. Tew, store mgr.

Inc. 1915 in Ariz., as a successor to the **Calumet & Copper Creek Mining Co.**, the **Old Reliable Copper Co.**, the **Copper Creek Mining Co.** and other companies. **Cap.** $7,500,000; $2,000,000 issued. All stock certificates held in trust under a pooling agreement until the financing of the company has been completed.

The president, Mr. Tew, informs us that "all stock is still pooled. No officer or director receives salary or cash commission and all the money raised in 1918-19 has come from business men who have visited the property."

Company is controlled (51%) by **Chemical Copper Recovery Co.** The loss of company's quasi-title to the Sombrero Butte property by adverse decision of the Court, ends that controversy, but does not affect the principal holdings on Copper Creek.

Property: 55 claims, including 100-acre mill and smelter-sites, and 100 acres miscellaneous lands; also 28 patented claims under option, making total area 1,500 acres in the Copper Creek, or Bunker Hill district, Graham and Pinal counties, Ariz. Properties are in the Copper Creek basin, on the western slope of the Galiuro Mountains, 31 miles S. E. of Winkelman and Hayden, on the Arizona Eastern R. R. Claims include the Sycamore Flat, Cumberland, Sioux Chief, Silver Reef, American Eagle, Copper Giant and Old Reliable groups.

Geology: and **Development** fully described in Volume XIV.

Equipment: includes a 150-ton concentrator, electric hoist, compressors, drills, smithy, machine-shop, etc.

Production: by former owners in 1914 was 8,400 tons of ore, making 758 tons of concentrates averaging 28.26% copper, or a total of 428,421 lb. copper. Production from Nov., 1916, to Jan. 1, 1918, was 746 tons of concentrates, averaging 24% copper, from ore extracted in development work. The total output has been 8,000 tons of 3% and 12,000 tons of 1.75 to 2.5% ore, yielding 650,000 lb. of copper, equal to 1.6% recovered. This product was hauled 31 miles by wagon, and then 400 miles by rail to smelter.

COPPER VALLEY MNG. CO. **ARIZONA**

Inc. April, 1917. **Cap.** $1,000,000; shares $1 par.

Property: the Ehle group, 10 claims, in Copper Basin, about 4 miles from Skull Valley, Yavapai county, said to show a mineralized schist belt over 100' wide and carrying some ore of commercial grade.

Development: by 3 shafts, 30', 45', 60' deep.

A prospect only. Idle and company probably defunct.

COPPER VAULT MINING CO. ARIZONA

Owner: J. J. Sherwin, Bellevue, Ariz. Not incorporated.

Property: 28 claims, 8 miles N. E. of Ray Cons. A 4′ vein is said to contain 6 to 34% copper, 10 oz. silver, $3 gold per ton. This vein is in diabase and schist with N. E.-S. W. strike and dip of 55°.

Development: by tunnels and shaft to depth of 150′; 500′ of workings. No shipments by present owners, but was worked for silver in early days.

COPPER WORLD MINING CO ARIZONA

See Commercial Mining Co., Arizona.

CORDOVA COPPER CO. ARIZONA

Property taken by creditors who organized new company called **Lecora Copper Co.**, which see.

CORNCOB MNG. & DEV. Co. ARIZONA

See Korncob Mng. & Dev. Co.

CORNELIA AJO COPPER CO. ARIZONA

Name changed to **Cornelia Cons. Copper Co.**, which see.

CORNELIA CONSOLIDATED COPPER CO. ARIZONA

Name changed from **Cornelia Ajo Copper Co.**, April, 1918, to avoid confusing it with other Ajo companies. Company was promoted by Cameron, Michel & Co.

Office: W. O. Mickel, sec., 9 Colt St., Paterson, N. J. **Mine address:** F. G. Myer, supt., Ajo, Pima Co., Ariz.

Officers at last account: J. A. Hunter, pres.; J. S. Keegan, v. p. H. B. Haines, H. H. Munroe, H. L. Martin, and J. B. Wright, directors. Security Transfer & Registrar Co., transfer agent; Corporation Trust Co., Wilmington, registrar.

Inc. 1916, in Delaware. **Cap.** $2,500,000; $1 par; 449,700 outstanding; fully paid. 200 Cornelia Ajo Copper Co. shares sold for $31 the lot at public auction on Dec. 16, 1920.

Property: 46 claims, 800 acres, adjoining the New Cornelia Copper Co. holdings at Ajo. Ore contains gold and silver. **Development:** by shallow shafts and some diamond drilling.

CORNELIA EXTENSION MINING CO. ARIZONA

Reported to be developing the Myers group, adjoining the New Cornelia at Ajo, Pima county.

CORNELIA WEST MINING CO. ARIZONA

E. E. Ganz, trustee, Phoenix, Ariz. See Vol. XIV. for such information as is available.

CORONADO COPPER & SILVER MINING CO. ARIZONA

Addresses: 503-4 K. of P. Bldg., Indianapolis, Ind.; and care E. W. Fisher, 35 E. Adams St., Phoenix, Ariz.

Officers: E. W. Fisher, pres.; J. W. Pringle, v. p.; C. A. Chambers, sec.-treas., with C. O. Patton and H. H. Dils, directors.

Inc. June 5, 1918, in Arizona. **Cap.** $35,000; par 1c; 1,500,000 issued.

Property: 24 claims, 250 acres, in Pioneer district, Pinal county. Ore occurs in a fissure in schist and porphyry, and carries gold, silver, copper and lead. The outcrop is 1,500′ long. Examined by W. M. Owens of Phoenix, Ariz.

Development: by 400′ incline shaft and 1,000′ of workings.

Equipment: 65 h. p. hoist, compressor, pump, etc.

Production: one carload of 20% copper ore has been shipped.

No recent report received

CORONADO MINING CO. ARIZONA

Address: Clifton, Greenlee county, Ariz.

Inc. July 12, 1902, in Maine. **Cap.** $1,000,000; shares $1 par. Phelps Dodge Corp. owns nearly the entire capital stock, the larger part acquired through the Arizona Copper Co. (q. v.) merger.

Property: 30 claims, 400 acres, patented, near Metcalf, adjoins the mines of the Morenci Branch of Phelps Dodge Corp. and the Coronado mine (see Arizona Copper Co.). Mine has a 2-compartment shaft, on the Garnet claim, showing some ore on the 200′ level; also several shallow shafts and short tunnels.

Property sold Sept. 26, 1921, at public auction to satisfy judgment obtained by the Arizona Copper Co.

COWBOY MINING & SMELTING CO. ARIZONA

Address: A. Bell, Twin Buttes, Ariz. **Owners:** O. S. Stapley and associates of Mesa.

Property: 18 claims in the Twin Buttes district, Pima county, formerly known as the Old Mormon claims. Ore reported to average 7 oz. silver and carries arsenic. Developed by shaft 300′ deep besides numerous old caved shafts and tunnels. Old workings stated to have shown large bodies of disseminated chalcopyrite ore.

Equipment: includes 25 h. p. gasoline engine and a 3-drill compressor. Small shipments made.

CRATER MINING CO. ARIZONA

Controlled by U. S. Sm., Ref. & Mng. Explor'n Co., 55 Congress St., Boston, Mass. C. W. Plumb, mgr.

CRESCENT MINING CO. ARIZONA

For which, see Vol. XIV.

CRITIC MINE ARIZONA

Address: Joseph Nolachek, lessee, Wenden, Ariz. Geo. B. Layton, New York, owner.

Property: in Cunningham Pass, Yuma county, developed to depth of 440′. Ore contains gold, silver and copper. Has been operated by leasers during recent years who have made regular shipments assaying from $15 to $75 gold, 10 to 25% copper, with a few ounces of silver. Calaverite, a telluride of gold reported from 400′ level. Equipped with 15 h. p. hoist.

Production: said to total about $700,000.

CROWN CITY GOLD MINES CO. ARIZONA

Idle. **Last address:** John C. Dalton, 6 Union Savings Bank Bldg., Pasadena, Cal. Tom Reed Gold Mines Co. has a $40,050 investment in company. See Vol. XIII.

CUPEL MINING CO. ARIZONA

Described in Vol. XIV.

CUPRITE COPPER CO. ARIZONA

Mine near Clifton, Greenlee county, Ariz.

Officers: N. W. Lord, pres.; Isaac N. Stevens, v. p.-mgr.; L. B. Kauffman, sec.; Geo. B. Kauffman, treas.; Frank A. Ray, engr., with Frank B. Laine, directors.

Inc. March, 1904, in Arizona. **Cap.** $1,000,000 $1 par.

Property: 26 claims, 490 acres, in the Copper Mountain district, opened by shafts of 30′ and 320′ and tunnels of 150′ and 260′. The leached zone carries isolated pockets of rich ore. Company also owns about 2,000 linear feet of strong hematitic outcrops, ranging 5 to 100′ in width. Property considered promising, but company doing only limited amount of work since 1916; awaiting developments on adjacent properties.

CUPRITE INVESTMENT CO. ARIZONA

Address: Wenden, Ariz.

Property: the Wikinson mine, 9 miles north of Wenden, Yuma county, adjoins the Little Giant on the S. W. Developed by shallow tunnels and a 100′ shaft. At 50′ depth, report vein 18″ wide showing gold and copper.

CURRY MINING CO. ARIZONA

Wm. Curry, mgr., Superior, Ariz.; John T. Rurey, Phoenix, sec.; J. D. Cox, Hornell, N. Y. and Fred H. Schulz, directors.

Inc. 1917, in Arizona. **Cap.** $1,000,000; authorized to sell 200,000 shares

Property: 7 claims, the Curry group, 3 miles north of Magma, near Silver King, shows a vein of silver-lead ore.

Development: mostly by open cuts and pits, which show copper and lead ore.

CYCLOPIC MINE. ARIZONA

Property: 6 claims in Gold Basin district, 25 miles north of Chloride, in the Cerbat range. Ore occurs in fissure vein, said to average $12 gold per ton. Developed by shafts 75′ deep.

Equipment: includes 150-ton mill, 50-ton cyanide plant, 12 h. p. hoist and compressor. Operations resumed in 1919 and shipments of $12 ore made.

DAILY ARIZONA CONSOLIDATED COPPER CO. ARIZONA

Address: 48 West Pennington St., Tucson, Ariz.

Officers: Dr. W. H. Martin, pres., Kokomo, Ind.; J. G. Hancock, v. p.; R. W. Langworthy, sec., Tucson; W. H. Daily, v. p. and gen. mgr., Tucson; J. W. Daily, treas. and supt.

Cap. $2,000,000; shares $1 par; 1,000,000 shares issued in payment for property; 627,000 shares in treasury.

Property: 22 claims, 5 patented, about 400 acres, in the Old Hat district, near Oracle, Pima county, developed by 2,000′ of work, mostly by tunnels, longest 400′, but including several shallow shafts. This work develops 70,000 tons of sulphide ore averaging 3% copper and $2 in gold and silver. The Princess orebody is said to be 300′ long, 50′ wide and opened to depth of 500′. The Road, the Bull Dog and the Precious metal orebodies are barely prospected as yet. A new tunnel, in 300′, cut 6′ of ore assaying 4% at 175′. Ore as shipped averaged 6% copper and $2.00 in gold.

Geology: the ore is a garnet rock carrying chalcopyrite; it is an inclined bed of limestone altered and mineralized by contact metamorphism. Though of low average grade, there are local masses of richer shipping ore. The deposit is quite similar to that of the adjacent mine owned by Phelps Dodge Corp. The deposits are large, and if a sufficient tonnage is proven by development, can be mined and milled by flotation methods at a profit, provided cheap transportation is possible, since the mine is on a high mountain top and far from a railway. A new State highway from Oracle to the Old Hat district, a distance of 22 miles, was completed in 1920.

Equipment: includes 100 h. p. boiler, compressor, several buildings, a 2½-ton truck, drills, assay office, and dwellings.

DAISELL MINING CO. ARIZONA

Address: M. B. Dudley, pres.-mgr., Kingman, Ariz.

Property: the old Twins mines, a group of 5 claims, at Cerbat, Mohave county. Ore occurs in a vein 6-20′ wide, showing gold, silver, lead, zinc and copper.

Development: by an old 300′ incline with main working level at 130′. Considerable development work was done during 1918-19, but discontinued in 1920 to allow concentrating of all efforts on developments of the C. O. D. mine, operated by same interests.

DARDANELLES MINING CO. ARIZONA

Address: Chloride, Arizona.

Officers: Anna E. Durkee, pres.; S. Ford Eaton, mgr. **Inc.** 1920.

Property: Memphis group of 5 claims, 75 acres, a mile from Chloride, Mohave county, developed by 175′ shaft and 225′ of drifting, said to expose an orebody for 300′ in length and up to 12′ in width, averaging 1.5 oz. gold and 20 oz. silver. Ore occurs in quartz veins in granite. Shipments of 9 cars of ore from development work made to the Humboldt smelter up to July, 1921, reported to have averaged $40 per ton.

DAYLIGHT MINING CO. ARIZONA

Probably dead. Had a lease on part of property of **Rosemont Copper Co.**, which see.

DEAN MINING CO. ARIZONA

Address: F. P. Aylwin, Kingman Ariz.

Property: in Hualpai Mtns., Mohave county, about 15 miles E. of Kingman, developed by 400′ shaft and tunnel. Ore contains gold and silver.

Equipment: includes 60-ton mill and flotation unit, completed July, 1921.

DENN-ARIZONA COPPER CO. ARIZONA

Office: Bisbee, Cochise County, Ariz.

Officers: Thos. Bardon, pres.; Lemuel C. Shattuck, treas.; J. G. Williams, sec.; with Byron M. Pattison, Thos. Bardon, A. M. Chisholm and H. L. Mundy, directors. Arthur Houle, supt.

Inc., Jan. 14, 1907, in Minn., as successor of Denn-Arizona Developmet Co. **Cap.** $3,500,000; $10 par; fully issued; increased June, 1917, to $5,000,000, and 55,000 shares new stock offered for sale, at $10. Listed on Boston Curb.

Property: 13 claims, patented, 200 acres, in the Warren district Cochise county, immediately east of the Junction shaft of the Calumet & Arizona. The Dividend fault traverses the company's ground for about 4,500′, and big orebodies have been found on adjoining properties near this fault.

Development: by 1,800′ shaft, started in conglomerate, but penetrating limestone at 840′, with over 3 miles of workings. The 1,000′ and 1,100′ levels show considerable leached ore, with little commercial ore, though carrying occasional small bodies of rich cuprite. The 1,250′ and 1,350′ levels also show large areas of leached ore, with some low-grade sulphides on the 1,250′ level, and a little native copper on the 1,350′ level. The 1,600′ level has a little ore of 12 to 15% copper tenor. The 1,700′ and 1,800′ levels show small bodies of rich oxide and carbonate ore running about 14% copper. The leached ore bearing zone is about 300′ wide, containing ore in the form of oxides and carbonates. About $1,500,000 has been expended in development work since 1917.

Management estimates the average tenor of ore developed almost exclusively oxides and carbonates, at 8% copper. Apparently some good orebodies may be developed at 1,800′, or deeper, though the ore is erratic. The mine is wet, and has two 1,000-gal. triple-expansion pumps on the 1,000′ level and five 800-gal. sinking pumps.

Equipment: includes a 1,600 h p. steam plant, with 6-drill and 25-drill air compressors and an 18x36″ Ottumwa Corliss first-motion hoist, raising doubledeck cages. There is a railroad spur to the mine.

Production: in 1920, was 2,768,362lb. copper, 168 oz. gold and 6,557 oz. silver.

In November, 1920, all operations except pumping ceased, pending an improvement of the copper market.

The Denn has an excellent chance of making a big mine, the claims covering an extension of the big ore zone of the camp, but the ore horizon at this point is lower than on the other properties. The deep development of the Junction, C. & A., and Saginaw properties will drain this ground as well as prove it, and further exploration will be easily and cheaply done. Property is splendid prospect. It may be several years before it makes a mine, but eventually, we believe, will be a very valuable one.

DESERT MINING & DEVELOPMENT CO. ARIZONA

Dormant or defunct. See Vol. XIV for description.

DETROIT COPPER MINING CO. OF ARIZONA ARIZONA

Fully described under title of Phelps Dodge Corporation (Morenci Branch.)

DEVELOPMENT COMPANY OF AMERICA ARIZONA

Practically defunct. T. G. Norris receiver, Prescott, Ariz.

Company has small interests in several subsidiary concerns, none of them prosperous. Stock considered worthless. Fully decribed in Volumes X-XIII. Property of its subsidiary, **Tombstone Cons. Mines Co., Ltd.**, acquired in 1915 by Phelps Dodge Corp., and now operated by its branch, **Bunker Hill Mines Co.**

DIAMOND JOE MINE. **ARIZONA**

Taken over by **Silver Trails Mining Co,** which see.

DIANA MINE **ARIZONA**

Taken over by **Arizona Ore Reduction Co.,** which see.

DISTAFF CHLORIDE MINING CO. **ARIZONA**

Officers. J. R.Evans, pres.; D. L. Parham, v p.; B. W. Evans, sec.-treas. **Inc.** 1916 in Arizona.

Property: 4 claims, 70 acres, in Chloride district, Mohave county. Ore carries silver, with some gold and lead.

Development: by 285' shaft with 5 levels. All work on the Distaff vein has been done by lessees.

Equipment: includes 25 h. p. gas. engine, compressors, etc.

Production: totaled $200,000 to end of 1916. Presumably a regular shipper, but no later figures available.

DOLPHIN MINE **ARIZONA**

Frank Ritzel, mgr.

Property: near Poland, Yavapai county. Shaft 125' deep. Gold predominant near surface, changing to silver content at 100'.

A suit for foreclosure of a labor lien was filed in Prescott against the company, July, 1921. A prospect.

DOME MINING CO. **ARIZONA**

Property is a prospect, idle, and company probably moribund. See Vol. XIV.

DOS CABEZAS GOLD RIDGE MINING CO. **ARIZONA**

Office: P. O. Box 987, Tucson, Ariz. **Mine address:** A. J. Welty, gen mgr., Dos Cabezas, Ariz.

Officers: J. H. Huntsman, pres.; S. B. Brown, v. p. and W. A. Julian sec.-treas.

Inc. in Ariz. **Cap.** $1,000,000; shares $1 par; 600,000 issued. Annual meeting first Monday in January.

Property: 10 claims, in the Dos Cabezas district, said to show a schistose fissure vein in granite and limestone carrying silver and copper sulphides with gold. Oreshoot reported as 4 to 34' in width with assays from $12 to $1,912.

Development: by new 700' tunnel, a 200' shaft and old 1,700' tunnel to be connected by winze with new tunnel 125' below. Equipped with 30 h. p. hoist. Said to have 75,000 tons of ore partly developed. No recent returns.

DOS ORIS SILVER MNG. CO. **ARIZONA**

Address: care J. B. Tomlinson, Prescott, Ariz.

Property located 14 miles from Prescott, consisting of the Dos Oris, Buzard and Raven silver mines, formerly property of R. H. Burmister, reported to have produced about $200,000 in the '80's. **Development:** by shaft and drifts, opening a 7' orebody on the 160' level. Under development and shipments made to Hayden smelter in 1920-21.

DOUGH BOY COPPER CO. **ARIZONA**

Address: Geo. A. Thayer, Globe, Ariz.

Directors: Frank L. Littleton, John A. Hook, Chas. Zoller, Jos. Laule, Wm. Burnett and E. E. Sluss, all of Indianapolis and Geo. A. Thayer, Globe, Ariz.

Inc. 1921, in Arizona. **Cap.** $50,000; 1c. par.

Property: 11 claims, surveyed for patent, in Globe mining district, Gila county.

DOUGLAS COPPER CO. ARIZONA

Officers: at last account: T. C. Hendricks, pres.; H. M. Foster, v. p. Chas. Davis, supt.

Inc. Aug., 1910, in Arizona. **Cap.** $1,125,000.

Property: 35 claims, about 30 miles from Globe on the wagon-road, and midway between the towns of Ray and Superior, Pinal county. Lands are traversed by several N. W.-S. E. fissure veins in limestone and quartzite, carrying gold, silver and copper in oxidized ores or as bornite and chalcopyrite.

Development: by 2 tunnels, a shallow shaft and a number of open cuts, all on one large vein. Property lies west of the limestone uplift in which the Newman group is located. From personal inspection, the claims are regarded as of highly speculative value.

Nothing is known of operations since 1917 and mail is returned from former address, box 421, Globe, Ariz.

DRAGOON MINING & DEVELOPMENT CO. ARIZONA

Address: Wickenburg, Ariz.

Officers: J. G. Scarborough, pres.; F. L. LaForce, v. p.; E. P. Truitt, sec.; H. Hertz, treas.

Property: 248 acres in Wickenburg district. In May, 1918, shaft was 250′ deep with 1,000′ of workings. The ore is said to contain gold, silver, and vanadium.

Equipment: includes 25 h. p. gas engine and hoist, compressor, 60 h. p. gas engine, No. 2 Cameron pump, and a 50-ton mill.

Mine is operated by lessees.

DRAGOON MOUNTAIN MINING CO. ARIZONA

Mine office: Johnson, Cochise County, Ariz.

Developed: by 300′ vertical and 400′ inclined shafts. Reported to have shipped 11 cars of ore in Aug., 1918.

DRIPPING SPRINGS COPPER CO. ARIZONA

Amalgamated October 5, 1920, with the **Universal Mines Co.** and described under **Dripping Springs Mines Corporation,** which see.

DRIPPING SPRINGS MINES CORPORATION ARIZONA

A consolidation of the **Dripping Springs Copper Co.** and the **Universal Mines Co.**

Offices: Central Bldg., Phoenix, Ariz.; 303 Farwell Bldg., Detroit, Mich.; 1112 Story Bldg., Los Angeles, Calif.

Officers: A. P. Campbell, pres.; A. D. Bailey, v. p.; W. Scheifele, sec.; A. MacLaren, treas.; A. L. Water, cons. engr.; C. H. Gowman, gen. mgr.

Inc. 1920. **Cap.** $1,500,000, $1 par.

Property: Columbia group, 415 acres, in Dripping Springs Wash, Gila county, 10 miles from Christmas; and the Pearl group near Mammoth. The ore occurs in fissure veins and along contacts of a diabase intrusion in limestone. Vein "D", is reported to be 42′ and vein "E" 14′ wide, assaying 4-10% copper with gold and silver.

Development: in 1920 about 3,000′ of work was done.

Equipment: dry concentrating plant, compressor, hoist and drills.

DUNDEE-ARIZONA COPPER CO. ARIZONA

Address: 404 Natl. Bank of Arizona Bldg., Phoenix, Ariz.

Officers: Alex. Mackay, pres.; W. C. Foster, v. p.; Arthur J. Smith, sec.-treas.; with L. H. Chalmers, F. S. Stephen, Wm. Ferguson, C. A. Stauffer, directors. W. E. Defty, cons. engr.

Inc. March 21, 1916, in Arizona. **Cap.** $500,000; increased March, 1921, to $1,000,000; $1 par; 637,500 shares issued. Equitable Trust Co., New York, transfer agent. U. S. Corporation Co., New York, registrar. Listed on New York Curb as a prospect.

Financial report covering operations from March 31, 1916, to December 31, 1920, shows current assets, $25,839; mine development, $183,160;

machinery and equipment, $38,241. Liabilities include, loans and interest, $108,320; accounts payable, $10,512, profit and loss, $8,075.

Property: 2 claims, the Greenup and Greenflower, lying between United Verde Extension on the east and Jerome Verde on the west, at Jerome; also a half interest with the United Verde Extension Co. in Jerome Tunnel Co., consisting of 5 claims and tunnel rights.

Claims show a blanket deposit of 5% conglomerate ore on the surface, 900′ long.

Development: shaft sinking, temporarily stopped by water, was completed to 950′ depth, December, 1920. Property gradually draining through tunnel of United Extension Co., which is connected with the Dundee, providing also an outlet for ores. Total workings on 940′ level amount to 2,750′. Company reports about 69,000 tons of oxidized ore in sight, averaging 4-5% copper, also that a promising contact of schist and quartz-porphyry passes through the property, which it considers important geologically. During 1920 a total of 978′ of development work was done, including drifts, raises and crosscuts, proving the continuation of the orebodies, said to be 10-12′ wide.

Equipment: includes 75 h. p. hoist, 800 cu. ft. compressor, 3 electric motors, pumping plant, etc. A one-ton experimental leaching plant was in operation for 4 months in 1921, making a product that averages 75-80% copper.

In Dec., 1921, company announced that an examination of the company property by H. V. Winchell, has shown that conditions do not warrant expense of pumping and deep exploration, unless work from other mines should drain the ground.

Ore reserves reported increased during 1921.

DUQUESNE MINING CO. — **ARIZONA**

Closed down since 1917. Fully described in Vol. XIV.

DUQUESNE MINING & REDUCTION CO. — **ARIZONA**

Main office: 53 State St., Boston, Mass.

Officers: Geo. Westinghouse, Jr., pres.; H. H. Westingham, v. p.; W. Grosvenor Calkins, sec.-treas.; Murray G. Day, gen. mgr.

Property: the Duquesne or Westinghouse mines, comprises half a dozen mines, 84-claims, patented, 1,000 acres, near the Pride of the West and 5 miles south of the Mowry, in the Washington camp, Patagonia district.

Mine shows a contact deposit between limestone and granite-porphyry, carrying argentiferous and auriferous chalcopyrite, sphalerite, galena and pyrite. Molybdenite occurs with the copper in the contact metamorphosed limestone, and is concentrated to a product carrying 45% molybdenum sulphide.

Development: by shafts, 650′ and 120′ deep.

Equipment: includes a 50 h. p. electric hoist, compressor, mill and oil flotation unit.

From 1917-19 the company is said to have made a profit of $185,000 from operations. Closed down owing to the low prices of copper.

The property and its history, geology, etc., is fully described in U. S. Geological Survey Bull. 582, pp. 321-334, 1915.

EAGLE GOLD & COPPER MINING CO. — **ARIZONA**

Idle and perhaps dead. See Vol. XIV.

EAGLE MOUNTAIN COPPER CO. — **ARIZONA**

Probably dead. Col. P. T. McGrath, gen. mgr., at last account.

Property: the Copper Queen group, 27 claims, in the Riverside district, is slightly developed. Idle several years and lands of doubtful value.

EAST BLACK RANGE MINING CO. — **ARIZONA**

Address: W. S. Tarbell, 307 Denham Bldg., Denver, Colo.

Inc. 1916. Fifty thousand shares of stock were offered to the public in April 1916, at 15c a share.

Property: 6 claims, adjoining the Black Range Mng. Co., at Oatman, Arizona. It is a prospect.

EL CAPITAN COPPER & SILVER M. CO **ARIZONA**

Address: M. A. Williams, supt., Miami, Ariz.

Property: 5 claims in Globe district, Gila county, said to show a vein 3′ wide, carrying up to 30 oz. silver and 7¼% copper per ton. The old workings have been unwatered and a 100-ton mill erected. Reported, September, 1921, that 2,000 tons of ore, assaying 24 oz. silver, are available.

ELEPHANT HEAD MINING & MILLING CO. **ARIZONA**

Probably closed down. Mail returned unclaimed. Described in Vol XIV.

ELKHART MINES CO. **ARIZONA**

See **Cerbat Silver Mining & Milling Co.**

EL TIRO COPPER CO. **ARIZONA**

For full description of property, See Vol. XIII.

Address: G. D. Bouton, v. p.; Drexel Bldg., Philadelphia, Pa.

Company reports "all properties, real and personal, of El Tiro Copper Co., were sold at public sale at Tucson, Ariz., Jan. 15, 1919, under mortgage foreclosure sale instituted by the Empire Trust Co., trustee for bondholders, and brought a sum only sufficient to refund the Receivers' certificates that had been issued for the preservation of the properties, the Trustees' fees, attorney's fees. Receiver's compensation, court costs, ets., etc., leaving nothing for distribution to bondholders." It is reported the property was purchased by G. D. Bouton as trustee for the bondholders, and is being operated under a 5- year lease and option. See **El Tiro Leasing Co.**

EL TIRO LEASING CO. **ARIZONA**

Address: Percy Williams, mgr., Silver bell, Ariz.; J. C. Low, supt.

Officers: H. S. Corbett, pres.; Percy Williams, v. p.; W. H. Buchman, sec.-treas., with R. K. Shelton, Ernest Russell, Victor Palmer, C. Stonecypher, Wm. G. Moore, M. Clyne, directors.

Inc. April, 1919. **Cap.** $500,000; $1 par; 100,000 shares outstanding.

Receipts from ore sales in 1920 amounted to $227,062, and a 5% dividend or $5,000 was disbursed.

Property: 13 claims, 234 acres, Bell district, Pima county, adjoining the Imperial mine 70 miles west of Tucson and formerly owned by the El Tiro Copper Co. Claims show contact deposits between quartz porphyry and limestone carrying cuprite, melaconite, chalcocite and chalcopyrite with a gangue of decomposed porphyry and limestone. Two orebodies under development are irregular in shape, of about 10 acres in combined area and proven to depth of 400′.

Development: by several shafts to depth of 400′, with 25,000′ of workings. Recent work on the 300′ level reported to have opened a body of ore assaying 7.18% copper.

Equipment: includes a steam plant, electric plant and a 120 h. p. gasoline plant, with a 16x20″ 250 h. p. doubledrum hoist, good for 1,000′; 3 gasoline hoists and air compressors of 18 drills aggregate capacity.

EMERALD ISLE COPPER CO. **ARIZONA**

Address: Robt. Jacobson, cons. engr., Chloride, Ariz.

Officers: A. J. Brawley, pres.; J. C. Stricker, v. p.; J. H. Conway, treas.; Carl G. Krook, sec., with James Robertson, W. C. Gould and R. C. Jacobson, directors.

Cap. $500,000, increased May, 1920 to $1,500,000; $1 par.

Property: about 3 miles S. of Chloride. Reserves said to be 200,000 tons of 2.85% copper ore.

Equipment: electric power, compressor, hoist, 50-ton electrolytic precipitating plant. Closed down, February, 1919.

EMERSON MINE. **ARIZONA**

Property: 6 claims, 5 patented, in Chloride district, Mohave Co., has an 18″ vein said to carry 19% copper, 3 oz. silver and $2.80 gold per ton.

Development: by 175′ shaft and 3 tunnels, longest 600′, also 108′ winze below one tunnel.

Equipment: 80 h. p. gas engine, 6-drill compressor, 25-ton mill, etc.

No recent returns, presumably idle.

EMERY-WHITCOMB TUNGSTEN CO. ARIZONA

Acquired by **International Tungsten Corp.**, which see. The claims and milling plant were sold at sheriff's sale, December, 1919, to satisfy a judgment obtained by Jas. H. Emery, who held a mortgage for $25,000 on the **Emery-Whitcomb Tungsten Co.** and the **National Tungsten Co.**

EMPIRE COPPER & GOLD MINING CO. ARIZONA

Mail returned unclaimed from Los Angeles, Cal., and from Dragoon, Cochise Co. Ariz.

Officers at last account: Leon V. Shaw, pres.-treas.; P. E. Woods, v. p.; Chas. R. Van Tilburg, sec., with M. J. Gress, H. Hermanson, C. J. Nordquist, R. W. Pigeon and C. R. Lawrence, directors.

Inc. Jan 31, 1905, in Arizona. **Cap.** $1,500,000; $1 par; issued 953,814 Annual meeting, second Monday in October.

Property: 3 separate groups of claims, near Johnson and Dragoon, on the Southern Pacific Railway. The Empire group, 16 claims, 2 miles S. E. of Johnson, shows limestone and quartzite cut by porphyry and traversed by N. W. fissures carrying ore.

Development: by the 380′ Empire 2-compartment incline shaft, with about 500′ of drifts, so wet that it was abandoned, temporarily; also the 125′ Bridge, 158′ Copper Whale and a 2,000′ tunnel shaft started. Mine shows auriferous and argentiferous copper ore.

Equipment: includes a 25 h. p. hoist and 1-drill air compressor. Buildings include an engine house, smithy, bunk house and boarding house.

No recent returns. Probably idle.

EMPIRE STATE MINING CO. ARIZONA

Last address: 182 Buick Ave., Utica, N. Y.

Idle since June, 1914, and probably dead. Fully described in XIV.

EMPRESS COPPER MINING CO. ARIZONA

Company formed, 1917, to reopen and work the old Swallow mine, 12 miles east of Wickenburg, in the Castle Creek district.

Mail returned, and company probably defunct. See Vol. XIV.

ENTERPRISE MG., REDUCTION & IMPROVEMENT CO.

Kingman, Mohave county, Ariz. Maj. W. A. Mensch, Pres. and gen. mgr., 1729 29th St., San Diego, Cal.

Property and equipment reported sold at sheriff's sale for a debt of $2.169 in 1914. Described in Vol. XI. Copper Handbook.

EQUATOR MINING & SMELTING CO. ARIZONA

Office: 20 Exchange Place, New York, N. Y. **Mine office:** Jerome, Yavapai county, Ariz.

Officers: Wm. A. Clark, pres.; Jas. A. MacDonald; v. p.; Harry H. St. Clair, sec.-treas., with Chas. W. Clark and Jas. H. Anderson, directors.

Inc. March 19, 1900, in West Virginia. **Cap.** $500,000; shares $5 par; issued, $250,000. Annual meeting, third Monday in February.

Property: the Iron King mine, on Equator hill, adjoining the Copper Chief, 6 miles by wagon road, south of Jerome, shows a lenticular, canoe-shaped body of pyrite ore in schist near a granite porphyry contact. Mine owns north half of the Copper Chief orebody.

Closed down since 1904.

ESPERANZA EXPLORATION CO. ARIZONA

Address: Joseph Krauss, pres.-mgr., P. O. Box 149, Oatman, Ariz.

Officers: E. L. Terwilliger, v. p.; Jos. Kielen, sec.-treas.

Inc. Dec. 6, 1915, in Ariz. **Cap.** $150,000; shares 10c par; 884,000 issued, plus 100,000 to be issued at 25 cents in Dec., 1920.

Property: 10 claims, 170 acres, in San Francisco district, Mohave county, which shows an E.-W. 15′ fissure vein, with 15° dip N. Ore carries gold, average value being $3 per ton.

Development: by 217′ shaft. **Equipment:** 25 h. p. engine, 320 cu. ft. compressor, etc.

ESPERANZA MINE ARIZONA

Near Twin Buttes, Pima county, Arizona. Operated by E. A. Pike, J. C. Shell and Edward Thornton, at last account.

Mine was owned in 1913 by the **Chesterfield Copper Co.** which went into bankruptcy. Company was reorganized in 1914 as the **Blanche Rose Mining Co.** (g. v.), but has not operated since 1914 and is practically dead.

ESTALEAH CERBAT SILVER MINING CO. ARIZONA

Property: formerly owned by J. H. Kane of Cerbat, said to have produced rich gold-silver-lead ore. Reported taken over by **Columbia Divide Mining Co.,** Nevada, in December, 1919.

EUREKA GOLD AND COPPER MINING CO. ARIZONA

Last address: Jerome, Yavapai county, Ariz. Dr. A. J. Murietta, pres.; A. A. Macpherson, sec.-treas.

Property: 8 claims, 7 miles south of Jerome, near the Iron King mine, is opened by 2 tunnels, showing a 30′ vein with an 8′ paystreak carrying bornite and chalcopyrite, with occasional visible gold, but has not developed ore in commercial quantities. Mainly idle, for some years, excepting annual assessment work.

EVA CONS. MINING & LEASING CO. ARIZONA

Property taken over in 1920 by the **Magwood Copper Mines Co.,** which see.

EXCELSIOR GOLD & COPPER CO. ARIZONA

Address: Gus Mudersbach, pres., Bouse, Yuma county, Ariz.

Inc. Aug. 1, 1902, in Arizona. **Cap.** $2,000,000; $1 par; stock owned by two Flagstaff men and the president. Is the successor of the Record Mines Co.

Property: the Mudersbach mine, with 34 claims, 8 miles S. of Bouse.

Fully described in Vol. XIV.

EXPOSED REEF TUNGSTEN CO. ARIZONA

See **Tungsten Reef Mng. Co.**

EYRICH GOLD MINES CO. ARIZONA

John F. White, mgr. Reported developing a property in Winifred district, Maricopa county, 18 miles north of Phoenix. A 360′ shaft is said to have opened ore averaging $28 gold per ton. Equipped with 15-ton Nissen stamp mill.

FAIRVIEW GOLD & COPPER CO. ARIZONA

Address: John Slak, mgr., Mayer, Ariz. Fully described in Vol. XIV. Property now owned by **Grand Central Copper Co.,** which see.

FERGUSON GROUP (AZTEC GROUP OR LOGOS MINE) ARIZONA

Under lease and bond to Argonne Copper Co., at last account.

Address: F. E. Andrews, Prescott, Ariz., owner. Property formerly under bond and lease to the Logos Mng. Co. and previously to Aztec King Mng. Co., described in Vol. XIV.

FESSENDEN GOLD MINING CO. ARIZONA

Property closed down, and company practically out of existence. Described in Vol. XIV.

FLUX MINE ARIZONA

Address: Patagonia, Ariz.

Officers: F. B. Kollberg, mgr.; Thos. Safford, supt.; John McGregor, sec.-treas. R. R. Richardson, owner.

Property: at Patagonia, Santa Cruz county, was formerly owned by Hardshell-Flux Mng. & Dev. Co., dissolved in 1910.

Development: by 130′ shaft and 5,000′ of workings, including a 130′ winze. There is said to be 60,000 tons of carbonate ore assaying 5 oz. silver and 10% of lead, and 40,000 tons of sulphides blocked out. Recent work reported to have disclosed 22′ of ore running $25 in lead, silver and zinc.

Equipment: includes compressor, gas engine, jack-hammer drills and a mill completed in 1920.

FORD GOLD & SILVER MINING CO. **ARIZONA**

Address: Prescott, Ariz.

Reported having acquired the Promoter group in Crook canyon from C. E. Warren and B. F. Peters of Prescott.

A tunnel and shaft are said to have developed a 4′ vein of concentrating gold ore. Company intends to sink shaft deeper and install a hoist and compressor.

FORD MINING CO. **ARIZONA**

Probably dead. Described in Vol. XII.

FORTUNA CONSOLIDATED MINING CO. **ARIZONA**

Mail returned from former office: Superior, Pinal county, Ariz.

Officers: H. K. Welch, pres.; E. D. Farley, v. p.; Calvert Coates, cons. eng. D. M. Stevenson, Patrick Miller and Sanford Makeever, directors.

Inc. in Arizona. **Cap.** $1,000.000; $1 par; outstanding 750,000.

Property: described in Vol. XIV.

FORTUNA MINES CORPORATION **ARIZONA**

Presumably idle.

Addresses: 31 State St., Boston, Mass., and F. G. Hobbs, Sharon Bldg., San Francisco, Calif.

Officers: F. E. Boland, pres.; Frank G. Hobbs, sec.-treas., with Thos. Pascoe, J. E. Manders, directors. T. C. Woodworth, cons. eng.; F. B. Keever, mgr.; W. H. Enderton, supt.

Inc. 1913, in California. **Cap.** $500,000; $1 par; 423,960 issued. Listed on Boston Curb. Federal Trust Co., Boston, depositary.

Property: the Fortuna mine, 18 claims, 7 patented, 359 acres, 15 miles S. of Blaisdell station on the S. P. R. R., and 22 miles S. E. of Yuma, Ariz.

Mine has a good record and company has several eminent stockholders, but promotion record has been disappointing.

No recent information is available. See Vol. XIV for detailed description.

FORTUNA MINING CO. **ARIZONA**

Now property of the Fortuna Consolidated Mining Co., which see.

FORTUNE MINING CO. **ARIZONA**

Dead. See Vol. XIV.

Property: the Wizard mine and other claims in the Big Bug mining district, Yavapai county, purchased at mortgage sale by the Boone County Bank. Is a gold mine in which some high-grade copper ore occurs.

Development: 1,200′ tunnel on the vein.

FOUNTAIN HEAD MINE **ARIZONA**

A. C. Goodwill, Kingman, Ariz., has an option on this mine at Stockton Hill, near Kingman. The vein on the surface is reported to be 80′ wide with values of gold, silver, copper and lead. Developing and shipping, but no figures available.

FRANCO-AMERICAN COPPER CO. **ARIZONA**

Office: Box 338, Prescott, Ariz.

Officers: F. S. Clark, pres.; Fred Bowler, v. p.-mgr.; J. E. Russell, sec.-treas. G. W. McGarvey, supt.

Inc. Nov. 15, 1918, in Arizona. **Cap.** $5,000,000; 10c par; issued 50,000 shares; 250,000 shares reported under option to English interests.

Property: 15 claims, 5 patented, 8 miles S. E. of Humboldt, Yavapai county. Ore with gold, silver and copper occurs in a steeply dipping 8′ contact vein between schist and porphyry.

Development: shaft is 250′ deep with 900′ of workings said to block out 300 tons of ore. Operated in 1912 by Yavapai Metals Mining & Red. Co.

A small production of copper-silver ore was shipped to the Humboldt smelter in 1920.

FRISCO GOLD MINES CO. **ARIZONA**

Address: C. A. Lindsley, sec.-treas., 23 Conn. St., Orange, N. J. Ray L. Dimmick, mine supt., Kingman, Ariz.

Officers: C. S. Merrill, pres.; P. G. Bartlett, v. p., with Robt. Brown, directors.

Inc. 1913 in Maine. **Cap.** 3,000,000 shares; 2,920,000 issued.

Property: the Tragedy group, 8 claims, at Union Pass, San Francisco district, Mohave county, shows a highly silicified rhyolite flow with gentle dip, carrying gold. Developed by several tunnels and a 200′ shaft. Production ceased in 1914, but some development has since been done.

Equipment: includes 125-ton cyanide plant, crude oil engine, etc.

GADSDEN COPPER CO. **ARIZONA**

Office: Bisbee, Arizona. **Mine office:** Jerome, Ariz.

Officers: M. J. Cunningham, pres.; Arthur Houle, v. p.; Fred Sutter, sec.; M. Newman, treas., with W. B. Gohring, W. H. Brophy, and L. C. Shattuck, directors. J. K. Hooper, supt.

Inc. Dec. 2, 1916, in Delaware. **Cap.** $1,000,000; shares $1 par; 300,000 issued for property. Control is held by the Calumet & Arizona Mining Co., which has an option on 70% of the stock. For each dollar expended in development work by the C. & A. Co. it receives one share of the stock of the Gadsden Copper Co. To July, 1921, approximately $664,044 had been spent in this development work. Annual meeting, second Wednesday in January. Listed on Boston Curb.

Property: 39 claims, about 600 acres, including the Monster, News Mining Co., Walker-Larrimore and Howe groups. Land lies between the United Verde Extension and Green Monster properties.

Development: a 4-compartment shaft to 1,200′ depth with 5,619′ of drifting and cross-cutting. Work was retarded by bad ground and much water, but a depth of 1,230′ had been reached by September, 1918. Crosscut on 1,200′ level driven towards the North and South fault, cut it about 1,800′ to N. W. in December, 1919, and in their S. W. drift opened up ore running 8-10% copper, 3 oz. silver, and $3 gold. The rock is a decomposed schist showing occasional evidences of chalcopyrite and bornite.

The site selected for the shaft is in the limestone covered area, north of the great Verde fault and about ½ mile from the Verde Combination shaft. Although this site shows no mineralization whatever, it was calculated by C. & A. engineers to reach underlying geological conditions of promise. Schist was cut at 400′ and quartz and jasper at 700′ in depth. Operations were discontinued in 1920, after work had failed to show ore.

Equipment: includes electric hoist good for 2,000′ depth and pump. Average flow of water is 600 gal. per minute.

GALIURO MOLYBDENUM CO. **ARIZONA**

Address: W. R. Ramsdell, Tucson, and Mammoth, Ariz.

Property: the E. W. Childs mine, 7 claims, on Copper Creek, 14 miles N. E. of Mammoth, developed by tunnels, raises, etc., totaling 850′. Ore is said to carry gold with about 2% molybdenite.

GARFORD SYNDICATE **ARIZONA**

Out of business. See Vol. XIV. One of Geo. M. White's questionable promotions.

Property: known as the **Copper Hill** group, and described under that title.

GATES AJAR MINING CO. **ARIZONA**

Address: J. L. Craig, 246 S. Thirteen E. St., Salt Lake City, Utah, or N. Bigler, mgr., Kingman, Ariz.

Property: near Kingman, Mohave county, developed by 390′ tunnel driven on a vein said to be 9½′ wide.

GENERAL METALS CO. **ARIZONA**

Described in Vol. XIV. Operated the Copper Age mine, S. of Chloride, owned by the Arizona Ore Reduction Co.

GENERAL MINES CO. **ARIZONA**

Property: the Amulet mine, near Walker. An old mine, with previous production estimated at $100,000. From drifts on 200′ level of new shaft a shipment of 200 oz. silver ore was reported. The ore is a silver galena with some gold.

Equipment: includes hoist, compressor. No recent returns.

GEORGIA MINING CO. **ARIZONA**

Probably dead. Fully described in Vol. XIV.

GERMAN COPPER CO. **ARIZONA**

Idle. **Office:** Chas. H. Trotter, sec., 10 No. New Jersey St., Indianapolis, Ind. Mine at Globe, Ariz.

Officers: John H. Murdoch, pres.; Chas. H. Zollner, v. p.; John A. Hook, treas., with Wm. Elwarner, Jos. Lauler, Wm. Burnett, John I. Carson and J. B. McMurray, directors. P. H. Pernot, cons. engr

Inc. March 25, 1911, in Arizona. **Cap.** $3,000,000; $5 par; 142,373 issued; outstanding debt, $95,000. Annual meeting, second Tuesday in October. Company is successor, 1911, of the Arizona-Colorado Belt & Gold Mining & Milling Co.

Property: 14 claims, 270 acres, in the Globe district, Gila county. Ore occurs in a large fissure vein cutting through diabase, quartzite and limestone, and as contact ores between diabase and sedimentary rocks. Vein strikes N. E.-S. W., dips 55°, is reported as 9′ wide, proven to depth of 900′, and said to carry 2% copper, 2 oz. silver and slight gold values per ton, principally as chalcopyrite, on 800′ and 900′ levels. Ore developed above 800′ estimated at $125,000.

Development: by 863′ shaft, and a total of 3,000′ of underground work. The 800′ level is said to block out 2,000 tons of ore with 18,000 tons of 2½% ore reasonably certain.

Equipment: includes 100 h. p. steam hoist, pump and 7-drill air compressor. Arizona-Eastern railroad is 1 mile from property, which is well located and has merit. Assessment work only being done at last accounts.

GERONIMO MINING CO. **ARIZONA**

Address: Miami, Ariz.

Inc. in Arizona, 1916. **Cap.** $3,000,000; $1 par.

Incorporators: N. C. Dandy, D. J. Shea and A. M. Cobb, of Miami. J. W. Sterling, cons. engr.; R. F. Fitzgerrells, gen. mgr.

Property: at Geronimo, Graham county. Churn-drilling for copper ore was started in 1916, one hole cutting 4½% ore at 85′.

This is one of the many companies launched during the boom in 1916. Presumably dead.

GIBSON CONSOLIDATED COPPER CO. **ARIZONA**

Successor to **Gibson Copper Co.**

Address: 505 5th Ave., New York, or N. P. Moerdyke, sec., 811 Washington Bldg., Los Angeles, Calif. **Mine office:** Bellevue, Ariz.

Officers: A. B. Harlan, pres.; F. F. Towle, v. p.-treas.-gen. mgr.; N. P. Moerdyke, sec., with Geo. Beidler, H. T. Wayne, L. M. Brown and C. E. Kaltenhach, directors.

Inc. May, 1917, in Delaware. **Cap.** increased to $1,250,000; $1 par; 1,024,605 shares issued. Authorized funded debt, $200,000. 1st sinking fund convertible gold 7s dated March 15, 1920, due March 15, 1930; $123,000 issued. Financial statement for 1920 shows current assets, $15,556 and current liabilities, $31,372. Columbia Trust Co., New York, registrar.

Property: the Gibson mine, 16 claims, 8 patented, 300 acres, about 8 miles W. of Globe, Gila county. For history of mine, see Vol, XIV of this book.

Geology: country rock is Pinal schist and granite carrying 3 approximately parallel fissure veins, having a N. E. strike. The Summit and Pasquale are the principal veins, the former, of 4 to 7' width, traceable for the entire length of the property, a distance of 1¼ miles. These 2 veins are about 250' apart, and the Intermediate vein is about 75' E. of the Pasquale. Ore occurs in the Summit and Pasquale veins in well-defined shoots, pitching 50 to 65° S. their lenticular form being in some cases due to strike faulting and movements. Ore is mainly massive chalcopyrite, with a little bornite. Gangue is quartz with some calcite and small quantities of specular hematite and gypsum. Two veins show high-grade ore and some low-grade ore has been developed in 5 veins. The McKinley vein, undeveloped, shows a strong outcrop.

Development: to 500' depth by main incline shaft 600' deep with 26,000' of work, from shaft and tunnels. The Pasquale tunnel, driven on the Pasquale vein, is about 200' below the collar of the incline shaft. The Reynolds tunnel is to intersect the vertical shaft at 1,800' from the portal, a depth of 500'. Six levels show that the Summit vein runs N. 21° E., dips 56° N. W., the main pay streak carrying 8 to 15" of chalcopyrite ore assaying 20 to 30% copper, throughout the various levels. The shaft has 5,915' of workings on the Summit vein, besides drifts on the Pasquale and Intermediate vein, reached by crosscuts on the 3rd and 4th levels.

The Pasquale vein differs from the Summit in that it cuts across the bedding of the schist, instead of following the bedding planes as does the Summit, having a strike of N. 20° E., with dip of 35 to 50°. Apparently the Pasquale vein is better defined, more continuous and stronger than the Summit, the fissure being of 5 to 10' width, carrying a pay-streak, from a few inches to 3' in width, of ore assaying up to 33% copper. Ore occurs in the Pasquade vein in shoots pitching to the south, similar to the ore occurrence of the Summit.

The Intermediate vein, with drifts of 225' length on the 3rd and 4th levels, has a strike of 12° E., with dip of 5.° N. W., and is only about 8" wide, with firm walls and, as developed, is not of great importance, but has possibilities. The ground is heavy and treacherous, requiring timbering for practically every foot of drifting and concrete posts have been used.

Ore reserves: in 1919, the official estimate of ore exposed and on dumps was 550,000 tons; while the total possible ore was 1,000,000 tons of which 80% can be extracted. The average is 2.25% copper.

Equipment: at the incline shaft includes two 250 h. p. boilers, a 14x16" hoist and a 6-drill air compressor. The plant at the vertical shaft includes two 200 h. p. water-tube boilers, a 16x20" double-drum hoist, good for 1,000' depth and a 10-drill cross-compound air compressor, with a 132' smokestack of 42" diameter. The vertical shaft has pumps with a capacity of 192,000 gal. daily. A 150 ton mill and flotation plant started work in Aug., 1919.

Production: the gross value of ore produced by the old Gibson Copper Co., 1906-09, has been estimated at $1,250,000. It was shipped to the Old Dominion smelter, a distance of about 18 miles, by 10-horse teams, and required careful selection, owing to the extremely high cost of transportation, returning better than 20% copper. In 1917 production was 1,262,275lb. copper; in 1918, 662,033lb.

GIBSON COPPER CO. ARIZONA

Fully described in Vol. XII of this book. Property sold May, 1917, to Gibson Cons. C. Co., which see.

GILA CANON CONSOLIDATED COPPER CO. ARIZONA

Mine Office, Chilito, Pinal Co., Ariz.

Inc. 1916 in Ariz. **Cap.** $750,000; shares 50c. par.

Officers: J. C. Callaghan, Phoenix. Ariz., pres.; R. W. Hollis, E. M., v. p.-gen. mgr.; R. A. Lewis, sec-treas, with C H. McArthur and F. J. Dawson, directors.

Property: the Schneider group 17 claims, adjoins that of London Arizona on W., in Banner district, Gila county, 4 miles from Ariz. Eastern R. R. and only 6 miles from A. S. & R. smelter at Hayden. Was purchased from **Gila Canyon Copper Co.**

Development: principal work done from crosscut tunnel 1,800′ long at depth of 350′ to 400′, with total of over 3,950′ work. During 1918, new work totaled 425′, exclusive of surface work.

Property shows ore at many places, but gives no indication of disseminated or porphyry ore, such as those of Miami and Ray, and though it is a contact metamorphic deposit, it is quite unlike that of Christmas. The geologic character observed and the presence of commercial ore at many points is indicative of diffused mineralization, with workable concentrations of ore in one marked bedding horizon, where cut by fractures. Deep development work to date disappointing, ore not going down to tunnel level, but several very promising veins are practically undeveloped, as yet. Can be operated at a profit if development expenses were eliminated, shipments having paid for all development to date. Forty men employed. Company derives revenue from lessees' production. Much surface ore is too low grade to ship and experiments have been made with leaching but owing to lime content, acid treatment cannot be used; the Benedict ammonia process, used by Calumet & Hecla Co. in Michigan, is applicable.

Production: from Aug., 1916, to Jan., 1919, 225 railway cars of ore were shipped to the Hayden smelter, netting $129,384.

Examined and reported on by W. H. Weed in 1917.

GILA CANYON COPPER CO. **ARIZONA**

Dead. Described, Vol. XII. Property sold to Gila Canon Consolidated Copper Co, which see.

GILA COPPER SULPHIDE CO. **ARIZONA**

Office: 26 Cortland St., New York. **Mine office:** Christmas, Ariz.

Company was in hands of receivers, Allan Forbes and Geo. D. Morris, and was operated by them until reorganization late in 1919. F. T. Perkins, Boston, pres.

Inc. 1909 in Ariz., as a subsidiary of the Development Co. of America, which bought the property from the Saddle Mountain Mining Co., which still retains a 20% interest. **Cap.** $2,500,000; $10 par; 150,000 issued in treasury for bond conversion, $690,800; treasury stock, $309,200. Before their maturity, company had retired $309,200 of its $1,000,000 outstanding 1st mtge. 5-r. 6% convertible bonds due April 1918.

On Sept. 18, 1919, stockholders approved a contract with the Western Securities Co., which provides that latter company shall supply $690,800, the amount of the par value of the Gila Co. bonds outstanding and due since April 1st, 1918, and extension of these bonds until Oct. 14, 1926, at 8%, and for issuance to the Securities Co. of 50,000 shares of treasury stock.

Company spent over $500,000 developing its property at Christmas before it was obliged to stop operations and give a lease on it to the American Smelting & Refining Company. This was cancelled in 1918 by mutual agreement, but a smelting contract is still in force.

Property: 2 groups, 53 claims, 817 acres, 49 patented, and 640 acres coal land. Holdings include Christmas mine and claims in Banner district Gila county, and coal, gold and copper claims in the Saddle Mountain district, Pinal county, all within a radius of 10 miles.

The Saddle Mountain group of gold and silver patented claims, 265 acres, with 3,450′ of workings, shows base dry ore, with little lead and zinc and traces of copper, an average of 300 assays showing $13 per ton in gold and silver values.

There are also 640 acres of patented coal lands, in the lower basin of Deer Creek, showing two veins of dirty bituminous coal, developed by a 75' incline shaft and 800' of workings, equipped with a small steam hoist and pump. There is a bee-hive coke oven for testing the coal.

The Saddle Mountain group and the coal lands have not been sufficiently developed to prove or disprove their value.

The Christmas mine is at the junction of Christmas canyon with the Gila river, on the north side of the stream, 8 miles from Hayden. The mine was opened 1883, but being on the San Carlos Indian Reservation, was idle until the lands were restored to the public domain, 1902.

Geology: the basal rock is a pre-Cambrian formation, known as Pinal schist, overlain by conglomerates, shales and quartzites of probable Cambrian age, covered by Paleozoic limestone. All these rocks are cut by intrusions of a quartz-mica-diorite porphyry and granite, and altered by intense contact metamorphism, to marble garnetite, etc.

Ore occurs mainly as replacements in limestone, largely garnetiferous, extending outward for a distance of 10' to 100' from the contact. The ore carries copper sulphides, mainly chalcopyrite, but with bornite and some copper glance. The contact zone has shown copper ore for 4,000'. The orebodies so far mined range from 4 to 135' in width. In places the ore contains nucleal blocks of undigested limestone reducing the average grade, which as mined assays about 3% copper and 30 cents gold per ton.

Development: at Christmas is by 4 shafts to depth of 850', all showing oxidized and sulphide ores. The mine has 30,000' of workings. Mining is confined to a block between the 350' level and surface, but orebodies are developed on the 500' and 800' levels. Improvements include the construction of an aerial tram, connecting the mines with the Arizona Eastern railroad, crusher plant, compressor, pumps, etc., all electrically operated.

Production: from the time mining operations were begun in 1916 to Dec. 31, 1918, the company produced 1,800 oz. gold, 70,000 oz. silver and 1,500,000 lbs. copper, valued in excess of $3,360,000. During 1920 regular daily shipments of 250 tons running 3% copper were made to the Hayden smelter. Closed down December, 1920, owing to high costs and low metal prices. The Saddle Mountain group is being operated by lessess (1921).

GILA COUNTY CINNABAR MINING CO. ARIZONA

Mail returned unclaimed from Phoenix, Ariz. Owned claims in the Sunflower district, Mazatzal mountains, Maricopa county, 30 miles from Phoenix. Ores occur in ancient schists, and consist of cinnabar and an opaline silica.

Erected a 30-ton furnace for recovery of the quicksilver. Geology described by Ransome, U. S. Geological Survey Bull. No. 620, pp. 111-128.

GILA COUNTY EAST VERDE MNG. & SM. CO. ARIZONA

Address: Payson, Gila county, Ariz.

Inc. 1917 in Ariz. **Cap.** $750,000; shares $ 1 par.

Directors: W. W. Brooker, E. R. Oliver, F. H. Gardner, T. S. Rush, O. Scribner, E. R. Lindsey and F. W. Washichek.

The articles of incorporation show the usual preamble, but specify no special property to be developed as yet.

GILA DEVELOPMENT CO. ARIZONA

Address: C. H. Barney, 185 Devonshire St., Boston, Mass.

Officers: Ralph W. Bartlett, pres.; Chas. M. Barney, sec; J. C. Devine, mng. director.

Cap. $1,000,000; $1 par; 850,000 shares oustanding, October, 1921. State Street Trust Co., Boston, registrar.

Property: in Cave Springs wash, 3 miles N. E. of Kelvin, Pinal county, shows an 8' vein containing free-milling gold ore, opened by 200' shaft with drifts on the 100' and 200' levels. A 30-ton Lane mill was installed early in 1920 and company estimates 20,000 tons of free milling ore available for treatment.

GILA MONSTER MINING CO. ARIZONA

Address: W. H. Seaman, mgr., P. O. Box 561, Globe, Ariz.

Officers: W. E. Clark, pres.; Dr. J. L. Adams, v. p. Dr. J. Q. Grave sec-treas., with O. O. Clark, directors. Transfer office, Monroe, La. Stock control reported held by Albany Divide Mng. Co. of Nevada, a Bostor promotion.

Inc. 1917, in Arizona. **Cap.** $1,000,000; $10 par; 40,000 outstanding.

Property: 27 claims, in Richmond Basin, 9 miles from Globe, including the MacMorris, Richmond and La Plata mines. Said to show a NE-SW contact vein between diorite and diabase, the ore running 40 oz. silver and 1% copper.

Development: by shaft and tunnel to a depth of 800', 3,000' of workings

Equipment: 50-ton cyanide plant, 90 h. p. engine and crusher. Operated by lessees.

GILLESPIE MINING CO. ARIZONA

S. A. Hobson, mgr., Mayer, Ariz.

Property: Gillespie mine in Bumblebee district, S. of Mayer, Yavapai county, closed down June, 1921.

GILT EDGE MINES CO. ARIZONA

Address: Oatman, Ariz.

Officers: E. A. Burns, pres.; E. A. Shaw, v. p.; S. W. Klass, sec.-treas Kingman, Ariz.

Inc. in Arizona. **Cap.** $150,000; 10¢ par; 800,000 in treasury. Listed o San Francisco and Los Angeles exchanges.

Property: 95 acres, 2 miles S. W. of Oatman, adjoining the Old Vivia mine, said to show 4 parallel veins varying from 4' to 60' in width.

Development: 4 tunnels, one claimed to have opened a vein for 50 with gold values from $5 to $12 per ton. Company sank a shaft, 250' deep April 26, 1916, at which depth altered andesite was found, said to show quartz and spar of fair value. Crosscutting done on the 100' and 200' level

Equipment: includes 25 h. p. hoist and a 52 h. p. air compressor. Presumably idle.

GIRARD MINING CO. ARIZON

Address: Oatman, Mohave county, Ariz. H. B. Magill, sole owner. Company is not incorporated.

Property: 4 claims, adjoining the Della claim of the Tango group. The ore is free milling and amenable to flotation treatment.

GLADSTONE UNITED METALS CO. ARIZON

Address: Phoenix, Ariz. F. C. Smith, supt., Chloride, Ariz.

Officers: F. C. Smith, pres.; W. B. Twitchell, v. p.; W. T. Smith sec.-treas.

Inc. 1916, in Arizona **Cap.** $150,000; $1 par.

Property: 7 claims, 3 miles E. of Chloride, Mohave county, Ariz. Claim show igneous rocks, which at surface show much alteration and subsequent mineralization. Rhyolite dikes run into one main dike, in which are the veins.

Development: by 140' shaft sunk on hanging wall, drifts, and tunnel.

Equipment: hoist, blacksmith-shop, bunk-house.

No recent reports; presumably idle.

GLANCE MINE ARIZON

Address: J. E. Wood, city collector, Tucson, Ariz. Dan Ellison, sup

Property: formerly known as the Providencia, 1 mile W. Lincoln Cam Papago district, bonded by J. E. Wood and W. G. Hurd. Ore occurs 40' vein in andesite. Assays reported as high as 100 oz. silver, 58% co per per ton.

GLANCE MINING CO. ARIZON

Address: Twin Buttes, Ariz.

Officers: E. G. Bush, pres., treas. and gen. mgr.; G. H. Langworth sec.; S. J. Gunn, supt. Is a close corporation.

Inc. in Ariz., in 1916

Property: 3 claims, patented, held under option for Twin Buttes Mng. & Smelting Co., and a 2-year lease on the Twin Buttes railroad. The ore occurs in shoots at intersection of cross fractures with a main fissure in altered limestone near and roughly parallel to a granite contact. The ores contain copper glance, chalcopyrite and iron pyrite, with rather low gold-silver content, and run 7% to 9% by smelter return.

A small but presumably regular shipper.

GLOBE BULLION MINING CO. ARIZONA

Inc. by P. J. Minck of New York, W. Buckland and G. B. Pert of Globe.

Property: south of Miami, shows gold-bearing ore. Press reports stated that the company's slogan was, "Pick your own samples and the company will pay for the assay." Caveat emptor. Mail returned unclaimed. Presumably dead.

GLOBE COMMERCIAL COPPER CO. ARIZONA

Property: the California group, near Copper Hill, Gila county, shows silver and manganese ore. Developed by 45′ shaft.

Shipped about 1,500 tons of ore from lessees' operations, 1916-17. Idle.

GLOBE DOMINION COPPER CO. ARIZONA

Address: P. O. Box 432, Globe, Ariz.

Officers: H. W. Clark, pres.; M. S. Clarke, v. p.; T. A. Pascoe, treas.

Inc. in Arizona. **Cap.** $1,500,000; $1 par; 1,213,108 outstanding; 1,000 shares (with other stocks) sold at public auction in New York on Dec. 22, 1920, for $100 the lot.

Property: 25 claims, about 425 acres, in diabase area, 1 mile east of Globe, adjoining the Old Dominion on east and south, was originally worked for silver, lead and copper, found near the surface. Development has proven the existence of copper at depth. Property was formerly known as the Copper and Silver Zone Mines, owned by W. R. Martin, El Paso, Texas.

Development: by the 103′ Clark and 108′ Faught shafts on the Old Ironsides claim from which ore shipped has returned 1.25 to 3.5% copper, $19 to $236 silver, or an average of $21.60 per ton. Shipments from development work near surface said to have been worth $16,000. Present company has sunk the shaft to 800 level. Property was reported on by Sydney H. Ball for Luke, Banks & Weeks, of 14 Wall St., who are financing it.

Production: in January, 1921, 70 tons of ore shipped to old Dominion smelter returned 18.59 oz. silver, .5% copper, 32% manganese and 9% iron.

GLOBE & LOST GULCH SILVER-COPPER MINES CO. ARIZONA

Mary E. Brooke, pres. and gen. mgr.; H. A. Wimbush, sec.

Inc. April 1, 1907, in Arizona. **Cap.** $1,000,000; $1 par.

Property: 10 claims, patented, 180 acres, and other locations; also a mill site at the head of Lost Gulch, Gila county, 1½ miles N. of Inspiration and Miami, showing quartzite, granite and limestone, cut by porphyritic dikes.

Development: shows silver-lead ore in diabase, with indications that copper ore will come in at depth; also shows silver-chloride ore in granite and limestone, and copper carbonate ore in dacite. Mail returned unclaimed, from Denver office; company probably defunct.

GLOBE-MIAMI COPPER CO. ARIZONA

Address: D. F. Beggs, pres., 286 Fifth Ave., New York.

Officers: Victor Gilsey, sec.-treas., with F. W. Geiler, J. F. Daley, and E. R. Terry, directors.

Inc. 1917 in Delaware. **Cap.** $200,000; $1 par.

Property: 21 claims near Inspiration and Black Warrior ground in Globe-Miami district, upon which $200,000 is said to have been spent in development and purchase. Some gold ore has been extracted.

All the literature available on the property is from a brokerage house in New York. No record of operations obtainable.

GLOBE MINING CO. ARIZONA

Globe, Gila Co., Ariz. Now the Moline & Arizona Copper Co., which see.

GLORIANA MINE ARIZONA

Address: Andrew Smith. owner, Cordes, Ariz.

Property: 4 claims, 100 acres, in Bumblebee district, Yavapai county, S. of Mayer, adjoining the Gillespie mine and first operated about 75 years ago. Ore occurs in shoots, containing gold and silver.

Development: by 125′ shaft. A prospect.

GLORY HOLE BONANZA MINES CO. ARIZONA

Address: Salome, Yuma county, Ariz.

Officers and Directors: Dick Wick Hall, pres.-mgr.; E. S. Jones, v. p.; H. W White, treas.; E. G. Jesson, sec.

Inc. Feb. 5, 1916, in Arizona. **Cap.** $150,000; 10¢ par; 1,250,000 outstanding.

Property: 12 claims, seven 8 miles N. W. and five 10 miles N. of Salome.

Geology: quartz vein, with N. W.-S. E. strike, in andesite and schist, shows small high-grade and large low-grade shoots of gold ore and some copper.

Development: by 4 tunnels aggregating 825′ in length. Workings to 175′ depth total 1,500′.

Equipment: Fairbanks-Morse engine, 4-drill compressor, machine-drills.

Is an aftermath of the spectacular discovery of specimen gold ore made a few years ago. Advertising was decidedly lurid in local Arizona papers.

GOLCONDA CONSOLIDATED ARIZONA

Taken over by Union Metals Corporation, which see.

GOLCONDA EXTENSION MINING CO. ARIZONA

Address: O. D. M. Gaddis, Kingman, Ariz.

Officers: J. E. Perry, pres.; C. Metcalfe, sec.-treas.; with O. D. M. Gaddis, directors.

Cap. 1,000,000 shares, all issued, 85% held by Messrs. Gaddis and Perry.

Property: 19 claims, 3 patented, includes the Oro Plata mine, adjoining the Golconda mine on the N., 16 miles N. of Kingman. A number of mineralized veins run through property.

Development: by main 354′ shaft, and considerable openings. Lessees extracted 2,500 tons of $80 ore. At 280′ there is said to be 4′ of ore running 17-27% zinc and $6-$27 gold and silver per ton.

Production: totaled $500,000 to end of 1916.

Regarded as promising but needs development. Idle several years and property for sale.

GOLCONDA MINE. ARIZONA

See **Union Basin Mining Co., and Highland Mining Co.**

GOLD BACK MINING CO. ARIZONA

S. S. Wold, pres.; H. T. Widney, sec.; both of Pasadena, Cal.

Property: 2 claims owned and 2 under option, 2 miles south of Chloride Mohave county, showing fissure vein carrying complex gold-silver-lead-copper-zinc ore. **Development,** on 150′ level said to show 7′ of ore assaying $5 gold and silver, $20 lead, $15 copper, and $9 zinc. No recent report.

GOLD BAR MINES CO. ARIZONA

Address: F. A. Muller, mgr., Wickenburg, Ariz.

Officers: J. W. Miner, 2nd v. p.; H. W. McMunn, sec., 615 Union Bank Bldg., Pittsburg, Pa.

Property: 34 claims of the Interior Mining & Trust Co., 15 miles N. E. of Wickenburg. Developed by 750′ shaft. At 300′, ore is gold-copper, at 500′, copper sulphides beginning to appear.

Equipment: includes 12 Nissen stamps of 100-ton daily capacity.

Idle.

GOLD BLOSSOM MINING CO. **ARIZONA**

Address: G. M. Spicer, Prescott, Ariz. **Inc.** in Arizona.

Property: the old Perry silver mine, 40 acres, patented, 9 miles S. of Prescott, Yavapai county. Lies immediately W. of Mary E. mine. Shows complex silver-gold-lead copper-zinc ore.

Development: by 360′ incline shaft and levels.

Equipment: 25 h. p. engine, hoist. Idle. Mine under water.

GOLD CHAIN MINING CO. **ARIZONA**

Office: 625 Market St., San Francisco. Mine address: C. F. Nourse, supt., Kingman, Ariz.

Officers: Edwin S. Shanklin, pres.; D. W. Shanks, v. p.-gen. mgr.; Andrew Aitken, sec.

Inc. 1920, in Nevada **Cap.** $2,000,000; par $1. Transfers at company's office. Annual meeting, Dec. 20,

Property: 11 claims, 220 acres, in Union Pass section of the San Francisco district, 3 miles E. of the Katherine, shows a quartz vein in granite porphyry, with 45° dip to N. Gold-silver ore occurs in shoots.

Development: by 100′ shaft and 1,100′ total workings.

Equipment: includes 15 h. p. gasoline hoist.

Mine is still in prospective stage.

GOLD CLIFF EXPLORATION CO. **ARIZONA**

Address: Geo. B. McDevitt, P. O. Box 412, Oatman, Ariz.

Officers: Thos. Devine, pres.; Harry C. Keyes, v. p.; Geo. B. McDevitt, sec.-treas.-mgr., with Walter L. Kohlberg, and Robert Rae, directors. **Ex. Com.:** F. L. Sims, H. L. Rice, and J. P. Connolly.

Inc. April, 1914, in Arizona. **Cap.** $1,000,000; $1 par; 500,000 shares outstanding.

Property: 18 claims, 285 acres, adjoining the Tom Reed Gold Mines Co.'s property, near Oatman, Mohave county. Developed by shallow openings.

Is a prospect.

GOLD DUST MINING CO. **ARIZONA**

Successor to the Orion Mining & Milling Co.

Officers: G. E. Burnell, pres.; C. J. Rhodes, v. p.; Wm. H. Wise, sec.-treas.; F. Weidman, supt.

Inc. 1919 **Cap.** $1,000,000; 10¢ par; issued 700,000 shares. Listed on Los Angeles Stock Exchange. 25,000 shares sold for $55 the lot at public auction in New York on Dec. 31, 1920.

Property: 170 acres, all patented, at Oatman. Has been developing for several years by different companies. Vein said to be 8′ wide on 200′ level with milling ore of $8 to $15 per ton in gold, increasing in width and value on 300′ level. Several thousand tons of milling ore were reported developed.

Development: by several shafts from 100 to 550′ deep, a 100′ tunnel, drifts and crosscuts.

Equipment: includes 360′ cu. ft. compressor, 75 h. p. electric hoist, old stamp-mill and cyanide plant. The mill is to be re-modeled.

Regarded favorably as a prospect. Idle in 1921.

GOLDEN BELL MINING CO. **ARIZONA**

Address: care E. W. St. Charles, pres. and mgr., Kelvin, Ariz.

Officers: above with E. F. Goodwin, treas.; W. R. Blackman, sec., Hibernian Bldg., Los Angeles, Calif., with D. S. Enison, directors.

Inc. 1910. **Cap.** $1,000,000; outstanding 550,000 shares.

Property: 56 claims, near the Southern Pacific railway, 5 miles west of Kelvin, shows gold-silver-copper ore in veins in altered diorite.

Developed: by 270′ tunnel, 175′ shaft and crosscuts, with about 1,500′ of workings. Equipped with 25 h. p. hoist and air compressor.

GOLDEN CROSS METALS CO. ARIZONA

Address: 10 N. Second Ave., Phoenix, Ariz.

Officers: W. B. Twitchell pres.; W. J. Sims, v. p.; Shirley Christy, sec.-treas.; F. C. Smith, supt., Chloride, Ariz.

Cap. $150,000; par 10¢; outstanding 882,800 shares.

Property: 3 claims near Chloride, said to show a fissure vein in granite with 8′ of gold ore; pay streak said to be 12″ in width and to assay $20 in gold and 2 to 3 oz. in silver.

Development: by 75′ shaft and drifts.

Equipment: includes a 15 h. p. hoist.

GOLDEN DRAGON M. & M. CO. ARIZONA

Address: J. Gardner Scott, pres.-gen. mgr., Prescott, Ariz. Leo Stephens, sec.-treas.

Property: the Emporia and Briganza groups, near Groom creek.

Development: by 180′ shaft and 400′ of drifting on the Briganza claim.

GOLDEN HAMMER. ARIZONA

Owner at last account: F. C. Smith, Chloride, Ariz.

Property in Mineral Park, south of Chloride, developed during 1918 by Mineral Development Co., reverted to owner and was reported sold in June, 1920. Ore carries gold-lead-zinc. Developed by shaft and 300′ tunnel.

GOLDEN REEF MINES CO. ARIZONA

Property: the "Boyer" claims, 35 miles north of Phoenix. Slightly developed claims, said to have 4 quartz veins, 4′ wide carrying free milling gold.

Idle and company presumably dead.

GOLDEN STAR MINES CO. ARIZONA

Office: 32 Broadway, New York. **Mine:** Polaris, via Mohawk, Yuma county.

Officers: D. M. Hyman, pres., J. L. Tilton, sec.; H. B. Baruch, treas.; with Rich. P. Lydon, E. M. Rogers, E. L. Grover, H. M. Robinson, directors.

Inc. Dec., 1908, in Maine. **Cap.** $2,000,000; $5 par; 400,000 issued Empire Trust Co., registrar.

Property: undeveloped gold claims at Polaris, 50 miles N. of Mohawk.

GOLDEN STAR MINES, INC. ARIZONA

Address: Geo. Williston, supt., Mineral Park, via Kingman, Ariz. Controlled by M. B. Dudley interests.

Property: at Mineral Park, Mohave county, adjoins the Rural on the south. **Ore:** occurs in fissure vein, 2-9′ wide, carrying gold and silver.

Development: a 2-compartment shaft is being sunk and lateral work is in progress on the 160′ and 200′ levels.

Equipment: includes hoist, compressor and 150 h. p. motor.

Regular shipments to Humboldt smelter were said to have started, December, 1920.

GOLD KEY MINING CO. ARIZONA

Probably idle. Mine near Old Trails, Mohave county, Ariz.

Officers at last account: W. H. Wise, pres.; H. M. Hall, v. p.; E. B Shaw, sec.; with W. K. Ridenour and Raymond A. Carr, directors.

Inc. 1915, in Arizona. **Cap.** $1,250,000; shares $1 par. Stricken from New York Curb listing, August, 1918.

Property: the Treasure Key group, 4 claims, 50 acres, between the Boundary Cone and Orion groups, west of Old Trails and near Oatman Ariz. Contains the Oatman type fissure veins in andesite, showing gold quartz ore.

Development: by a 310′ shaft with drifts on 300′ level. The east drift exposes an ore-shoot 75′ long and 4′-6′ wide, showing 3′ of $30 ore. A

second shoot 75′ to the west is said to average $12. No recent information received. Property is a likely prospect.

GOLD KING MINING CO. ARIZONA

Office: 518 Pythian Bldg., Indianapolis, Ind.

Officers: E. O. Hind, pres.; W. E. Toohey, v. p.; Geo. A. Brownlee, sec.-treas.; with John F. Rissing, Wm. Purcell, I. C. Strohm, Jos. Stafford, Fred Elliott and Grover Plummer, directors.

Inc. Jan., 1904, in Arizona. **Cap.** $100,000; $10 par; 500,000 outstanding. Bonds authorized, $100,000; issued, $10,000. Annual meeting second Monday in January. Operating expenses amounted to about $20,000 in 1919 and in 1920, with a cash balance on hand of $4,000 and $5,000 respectively. Stock was being offered in 1920 at $1 per share to raise $50,000 for further development.

Property: 22 claims, 450 acres, in the Peck and Crown King districts in Bradshaw mountains, 22 miles S. E. of Prescott.

The deposit is a contact in slate and porphyry, ore carrying copper, silver, and gold, the two former predominating.

Development: 4 tunnels, 600, 800, 1,100 and 1,500′ long, have opened the mine to depth of 600 ft. Total workings amount to 7,000′. Developing.

GOLD ORE MINING CO. ARIZONA

Address: A. C. Werden, Goldroad, Ariz.

Officers: A. C. Werden, pres.-mgr.; S. M. Warmbath, v. p.; I. W. Werden, sec.; A. F. Pollack, treas., with E. A. Shaw, directors.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par; 819,310 issued. Listed on Los Angeles Stock Exchange. H. E. Teter & Co., Los Angeles, transfer agents; Security Trust & Savings Bank, Los Angeles, registrar.

Property: 6 claims, 120 acres, ½ mile N. of the gold Road mine. Mohave county, which the Gold Ore is said to resemble and which has yielded $5,000,000.

Development: by 700′ main shaft and over 2000′ of drifts, etc. Levels have been driven at 350′, 530′, 650′ E. and W. along the vein. On the 650′ level is a shoot 4′-6′ wide, 75′ long and 200′ high. Drifting under way on 650 and 700′ levels.

GOLD PRINCE MINING CO. AKIZONA

J. H. Huntsman, pres.; A. J. Welty, mgr., Dos Cabezos, Arizona.

Property: a group of 17 claims, including the Basin mine, at Dos Cabezos, Cochise county, reported under development and shipping in 1919-20. Equipped with concentrating mill and 100 h. p. oil engine.

Herbert A. Lowdermilk, as receiver for the Central Bank of Willcox, filed suit against the company, June, 1921 for $1,849 and the holdings are under attachment by the sheriff.

GOLD RANGE DEVELOPMENT CO. ARZONA

Office: Oatman, Ariz.

Officers: F. T. Torpey, pres.; M. M. Miles, sec., Los Angeles, Calif. E. M. Rogers, supt.

Inc., 1918 **Cap.** $150,000; 10¢ par.

Company planned to purchase 7 claims formerly owned by the Gold Range Mining & Milling Co. in the San Francisco district, near Oatman. Shaft 300′ deep. Some gold ore developed, said to assay $4 to $8. Both companies presumably moribund.

GOLD RANGE MINING & MILLING CO. ARIZONA

See Gold Range Development Co.

GOLD REED MINING & MILLING CO. ARIZONA

T. L. Welp, supt., at last account.

Property: claims in Oatman district, developed by 570′ shaft and drifts. Presumably moribund.

GOLD ROAD ANNEX MINING CO. ARIZONA

Office: Goldroad, Mohave Co., Ariz. L. M. Hopkins, pres.

Company received permit to sell 300,000 shares at 25¢ each in Dec., 1920.

Property: near Gold Road mine, Oatman district. Prospects fair. Presumably idle.

GOLD ROAD BONANZA MINING CO. ARIZONA

Address: Goldroad, Ariz. **Officers:** F. T. Torpey, pres. and treas.; W. B. Ross. v. p.; W. P. DeWolf, sec. E. M. Rogers, supt.

Inc. in Arizona. **Cap.** $1,000,000; shares assessable; $1 par. In treasury, 250,000 shares. Assessment of 1¢ per share levied June, 1919.

Property: 90 acres, adjoining the Gold Road mine on the S. W. Shaft sunk 600', with considerable drifting. Vein on the 450' level said to be 2' to 6' wide and for 100' averaging $12 per ton. Holdings reported taken over by **Kingman Silver-Gold Mines Co.** in 1920.

GOLD ROAD MINES CO. ARIZONA

Dead; see Vol. XIV for description. Consolidated in 1917 with the **U. S. Smelting, Refining & Mining Co.**, which see.

GOLD TRAIL MINING CO. ARIZONA

Out of business. See Volume XIV.

GOLD TRAILS MINING & MILLING CO. ARIZONA

Succeeded by **Gold Trail Mining Co.**, now defunct.

GOLD WARRIOR MINING CO. ARIZONA

Officers: O. S. Wakeling, pres.; A M. McOmie, v. p.; D. C. MacIver, sec.-treas.; foregoing, with P. H. Osborne and J. R. Esposito, directors.

Inc. 1916 in Arizona. **Cap.** $500,000; $1 par; outstanding, 210,000.

Property: 6 claims in the Hassayampa district, 11 miles from Prescott and about three-fifths mile from the Big Pine mine, at which mill Warrior ore was to be treated.

Geology; gold-silver contact deposit in blue diorite and quartz-diorite, dipping 45°, with N. E.-S. W. course.

Development: by 100' tunnel on the vein.

Mail returned and company probably dead.

GOLDZONA-SCOTCHMAN MINING CO. ARIZONA

Address: Bouse, Yuma county, Ariz.

Inc. by R. King, W. C. Miller, B. A. Kipp and others, of Los Angeles

Property: 600 acres, on which $100,000 was reported spent.

Equipment: gasoline hoist, compressor, drills, buildings. Probably dead.

GOOD HOPE GOLD & COPPER CO. ARIZONA

Name changed in 1920, to **Grand Central Copper Co.**, which see.

GORDON COPPER CO. ARIZONA

Former Address: Tucson, Ariz.

Property: 10 undeveloped copper claims in the Rincon district, 15 miles east of Tucson.

GOULD PROPERTY. ARIZONA

Was under bond and lease to R. McClelland, Newhouse Bldg., Salt Lake City, Utah, at last account.

Property: 12 claims in the Amole district, 18 miles W. of Tucson, adjoins Mile Wide mine. Shaft 350' deep. Ore on 100' level said to average 3.5% copper . Presumably idle.

GRANBERG SILVER MINES CORPORATION. ARIZONA

Office: Oshkosh, Wis. **Mine office:** H. Johnson, Kingman, Ariz.

Officers and Directors: H. O. Granberg, pres.; H. Johnson, v. p.; N. Granberg, sec-treas.

Inc. March, 1918, in Arizona. **Cap.** $500,000 $1 par; issued 270,000.

Property: 4 unpatented claims in the Black Mtns., Chloride district, Mohave county, said to show 3.5' fissure vein in pegmatite and schist, course S. 35° E., dip 78°. Ore carries silver and lead, with some gold and zinc.

Development: by 90′ incline shaft with 110′ of workings, showing 18″ to 24″ shipping and 18″ low-grade mining ore. Assessment work only being done.

GRAND CENTRAL COPPER CO. **ARIZONA**

Successor to **Good Hope G. & C. Co.**, which succeeded **Fairview G. & C. Co.**

Address: John Slak, Mayer, Ariz.

Officers: John Slak, pres-gen. mgr.; D. H. McDonald, v. p.; E. H. Ford, sec.-treas., with J. A. Martin and B. C. Jones, directors.

Inc. October, 1920, in Arizona. **Cap.** $1,500,000; $1 par; 59,000 shares issued, March, 1921. Security Transfer & Registrar Co., transfer agent.

Property: 9 claims, 180 acres, in the Peck district, Yavapai county, 1 mile E. of Turkey Creek, and said to lie on Blue Bell contact. Claims reported to show an orebody, 200 to 300′ wide, of oxidized ore, strongly leached, with gold, silver, and copper.

Development: plan sinking vertical shaft with drifts and crosscuts at 100′ intervals.

GRAND GULCH MINING CO. **ARIZONA**

Office: 204 McIntyre Bldg., Salt Lake City, Utah.

Officers: Wm. H. McIntyre, pres.; Frank R. Snow, v. p.; W. P. Jennings, sec.-treas.; with Jas. E. Jennings, F. W. Little, Jos. A. Jennings, directors. W. P. Jennings, mgr.

Inc. Sept. 15, 1874, in Utah. **Cap.** $30,000; 10¢ par; issued 240,000.

Dividends: total $64,758 to Dec. 31, 1918. Annual meeting, first Monday in February.

Property: 9 claims, 1 patented, 180 acres, in the Bentley district of Mohave county, but more easily accessible from Nevada than from southern or central Arizona.

Geology: property shows sandstone and limestone carrying an apparently circular zone of copper impregnations, also having copper in the bedding planes. Ores carry cuprite, melaconite, malachite, azurite and chalcocite, estimated by management to assay 10% to 35% copper and 4 oz. silver per ton. Shipped some cars of 50% ore.

Development: by a 500′ shaft. Mine is 45 miles from St. Thomas, Nev., railroad terminal on the Salt Lake Route. The mine has been in practically continuous operation since 1899.

Equipment: includes a 22 h. p. gasoline hoist, good for 800′ depth, 50 h. p. semi-Diesel engine, air-compressor, etc. There are 9 buildings and a small and antiquated smelter, of no present value.

Production: in 1918 shipped 1020 tons of ore containing 11% to 35% copper. Property temporarily closed down.

GRAND ISLAND MINING CO. **ARIZONA**

Address: Jerome, Yavapai county, Ariz. Chas. Anderson, supt.

Officers: R. E. Moore, pres.-mgr.; H. M. Gallagher, v. p.; E. Rucker, sec.; F. P. Jones, treas. with J. S. Eberman, directors.

Inc. 1908 in Arizona. **Cap.** $1,500,000; $1 par; 1,422,710 shares issued.

Property: 14 claims, in the Jerome copper district, adjoining the Copper Chief and Shea mines on the south. Idle from 1912, until company secured funds during the boom of 1916. Claims show a quartz vein 4′ wide on surface and 8′ wide on 200′ level, in porphyry-schist and sheared diorite. Ore carries copper with gold-silver values; 3 other narrow veins said to outcrop on property.

Development: by 520′ three-compartment shaft with S. W. crosscut on 200′ level in jasper and schist. Small hoist, compressor, etc., installed. Considered a fair prospect.

GRAND PACIFIC COPPER CO. OF ARIZONA. **ARIZONA**

Company address: W. E. Barrow, sec.-treas., Franklin, Pa. **Mine address:** L. I. Rehfus, mgr., Superior, Ariz.

Officers: J. French Miller, v. p.; with Chess Lamberton, Dr. T. A. Irwin, J. J. Van Dresser, and H. W. Breckenridge, directors.

Inc. August 17, 1916, in Arizona. Amended, May 14, 1919. **Cap.** $2,000,000; $1 par; 1,242,000 outstanding. Listed on New York Curb. Security Transfer & Registrar Co., New York, transfer agent. Annual meeting on April 1.

Financial statement on June 1, 1919, showed current assets of $9,548 and liabilities of $5,000. Buildings, mine equipments, roads, development, were valued at $174,000. Income account showed $265,358 from sale of shares and loans, and $38,738 from ore shipments.

Property: 35 claims, 7 patented, 2 miles S. of the Magma mine, Pioneer district, Superior.

Geology: there are 5 principal and 2 lesser mineralized fault-fissures crossing the uptilted limestone and quartzite beds at right angles. The Sandal fissure lode cuts obliquely through limestone with course N. 60° E., dip 60° N. and is similar in geological occurrence to the nearby Magma mine. The Sandal vein, 20′ to 50′ wide, is developed for a total length of 600′, showing two main ore shoots. The ore usually occurs in the hanging-wall limestone above a clay gouge seam, the rest of the vein is oxidized and leached.

Ore occurs in both bedded veins and fault fissures as shoots with 30° dip and E. W. course. Oxide ore shipped averaged 17% copper, with some precious metals. A bedding plane lode and a silver lode also occur on the claims. Geologic conditions are favorable and sulphide ore should be found at water-level.

Development: mainly on the Sandal vein by 3 tunnels; the lowest one, with branch, 1,405′ long, should cut the ore-shoot if continued. A 530′ shaft has been sunk from No. 3 tunnel, water being found at that depth. Shaft sunk in hanging of vein which appears to straighten and pitch in the opposite direction, similar to an occurrence in the Magma mine. At 450′ in shaft, a station was cut and a crosscut driven several hundred feet, cutting a fault which has shifted the vein. Workings total 3,620′.

Equipment: includes Fairbanks-Morse hoist and Sullivan compressor and accommodation for 25 to 50 men.

Production: 990 tons of 17% ore in 1918.

GRAND REEF MINE ARIZONA

Now owned by **Aravaipa Leasing Co.**, which see.

GRAND TRAVERSE & ARIZONA MINING CO. ARIZONA

Idle since 1910.

Office: Manistee, Mich. Mine near Cave Creek, Maricopa Co., Ariz. Owns 3 patented claims. Fully described Vol. X, Copper Handbook.

GRANITE POINT SILVER-LEAD MNG. DEV. CO. ARIZONA

Property: old-time silver-lead mine in the Hualpai range, Mohave county, near the Leviathan molybdenum mine, reported reopened by E. Hausman and W. D. Kinsey, of Jerome, Ariz., in 1917.

Development: by 300′ tunnel. Average sample of the main ledge is reported to assay $16.40 in gold-silver-lead.

Mail returned unclaimed, and company probably dead.

GRAY EAGLE REDUCTION CO. ARIZONA

Plant at Gray Eagle, via Mayer, Arizona, leased to **Mayer Ore Purchasing Co.**, which see.

GRAY METALS CO. ARIZONA

Office: 408 Fleming Bldg., Phoenix, Ariz.

Officers: Douglas Gray, pres.; John True, v. p.; Maurice Clark, gen. mgr., with C. D. Garrison, W. H. Stilwell, H. R. Tritle, and Geo. H. Luhro, directors. Frank J. Orth, sec.-treas.

Cap. $150,000; $1 par.; 40,000 shares of stock offered at 50¢ a share June, 1920.

Property: 6 claims and a fraction, in the Huachuca Mtns., Cochise county 16 miles from Hereford, the nearest railroad point, showing an interbedded deposit of lead-zinc ore in limestone and a copper deposit along a lime granite contact.

Development: by 350′ shaft, and 1,390′ of diamond drill holes from the 350′ level, said to have opened up 20′ of ore running 4-6% copper and $5 in gold and silver. Work estimated to have exposed 5,000 tons of ore in the mine, with 1,200 tons on the dump. About 500 tons have been shipped, averaging 17 oz. silver, 7.5% lead and 22% zinc.

Equipment: includes pump, 30 h. p. boiler, gas engine and buildings. A 20-ton mill is planned.

GREATER AJO COPPER CO. **ARIZONA**

Address: Miami, Ariz. **Officers:** G. F. Senner, pres.; A. E. Soderman, v. p.; J. Considine, sec.-treas., with A. B. Saling, R. L. Payne, E. Becher and B. S. Garcia, directors. **Cap.** $5,000,000.

Property: 68 claims, at Palomas, Yuma county, Ariz.

The prospectus—if it can be called such—of this company was unique. It predicts the Greater Ajo will be "The biggest mine in the State of Arizona."

Presumably died a natural death.

GREATER MIAMI COPPER CO. **ARIZONA**

Address: Box 14, Miami, Ariz.

Officers: A. Dumontier, pres.; F. Kiernan, v. p.; J. W. Murphy, sec.; T. M. Jackson, treas.; with C. Stewart and E. Graham, directors.

Inc. Feb., 1916, in Arizona. **Cap.** $1,500,000; $1 par; 8,000 outstanding.

Property: 32 claims. Pinal county, 9 miles N. of the Ray Cons., and 16 miles S. W. of Globe and Miami.

Reported July, 1918, under bond and lease to Major A. E. Pickerel and associates, of Jerome. No recent information.

GREAT RAY COPPER CO. **ARIZONA**

Address: C. A. McDonald, Citizens Bank & Trust Co., Bisbee, Ariz.

Property: 44 claims on both sides of Sulphide canyon, about 1 mile W. of the town of Ray, Pinal county adjoining holdings of **Ray Consolidated Copper Co.** and the western group of the Ray Hercules Co.

Geology: Great Ray is outside the area of secondary enrichment—unlike the developed deposits of the district—but shows abundant copper stains and some copper sulphide in both the granite and schist rocks exposed in the walls of Sulphide canyon. The area of most intense primary mineralization is at least 1,500′ broad and 3,000′ long. This ground warrants drilling to determine the copper content.

Considered a speculative mining venture to see if the ground contains a primary deposit with 1% or better copper in it.

GREAT VERDE EXTENSION COPPER CO. **ARIZONA**

Address: Shea Bldg., Jerome, Ariz. J. W. Hubbard, supt.

Officers: W. P. Geary, pres.; O. S. Wakeling, v. p. and gen. mgr.; H. H. Major, sec.-treas.

Inc. 1916 in Arizona. **Cap.** $750,000; shares 25¢ par. U. S. Corporation Co., New York, registrar & transfer agent.

Property: 9 fractional claims, adjacent and E. of the United Verde Extension, at Jerome.

Development: by 3-compartment shaft, down 53′, Oct., 1917, in sandstone and limestone and reported to show carbonates, chalcopyrite and some copper glance.

One of the many speculative promotions formed during the 1917 boom at Jerome. No recent information.

GREAT WESTERN COPPER CO. ARIZONA

Address: Courtland, Cochise County, Ariz. Wm. J. Young, Jr., pres Courtland, Ariz.; Edward A. Young, sec.; C. H. Young, treas., Clinton, Ia Wm. Holmes, gen. supt.

Inc. Oct. 22, 1900, in Arizona. **Cap.** $1,000,000, $10 par; fully issued

Property: 23 patented claims, 407 acres, in the Turquoise district, Co chise county, acquired 1899.

Geology: limestone is intruded and altered by monzonite and quartz monzonite porphyry. The Humboldt, first opened, yielded high-grade or from the surface to 150', where it apparently ended. In 1908, good ore wa opened in the Mary to 200', and high-grade ended here also. Five diamond drill holes during 1918 failed to disclose ore at depth, but a 6th encountere good ore in virgin ground. On this a 265' prospect shaft was sunk and a 250 crosscut opened up a body of chalcopyrite and bornite ore. Lessees ar mining ore from the Mary, Humboldt, Maine and Chance claims. Sulphid ore opened in the Maine in 1909, and produced until 1914.

Development: 26 000' of workings from 5 shafts, 310', 300', 430', 200 an 365' deep, respectively.

Equipment: includes a 150 h. p. electric plant driven by steam powe and having one 150 k. w. generator, a 600 cu. ft. air compressor, 2 electri hoists, electric pump, etc.

In 1919, 830,321lb. copper; 356 oz. gold; 1,076 oz. silver; in 1920, 561, 884lb. copper; 232 oz. gold and 2,563 oz. silver.

GREAT WESTERN GOLD & SILVER CO. ARIZON

Idle for years. Dragoon, Cochise Co., Ariz. Inc. about June, 1908.

Property: in the Dragoon Mountains, shows lead and copper ores wit gold and silver.

GREAT WESTERN SMELTERS CORPORATION ARIZON

Dead. Property and assets transferred December, 1919, to **Mayer Sme ter Corporation,** described in Volume XIV. The plant is now owned b H. A. Wagner, Mayer, Arizona.

GREEN MONSTER MINING CO. ARIZON

Address: G. S. Wallace, sec.-treas., Jerome, Ariz.

Officers: W. W. Lawhon, pres., Phoenix, Ariz.; David Morgan, v. and cons. engr., Jerome, Ariz.; with T. A. Riordan and N. E. Bailey, dire tors.

Inc. Dec. 8, 1915, in Arizona. **Cap.** $750,000; 50¢ par; 1,200,000 shar outstanding. Annual meeting first Monday in December.

The financial statement of October 31, 1920 shows cost of propertie $365,081; buildings, machinery, etc., $61,137; current assets, $62,826; su plies, $6,940 accounts payable, $475; reserves, $216,143.

Liquid assets on Oct. 31st., 1921, were cash, $39,464.30 and Liberty Bon at par, $15,000, total $54,464.30.

Property: 70 claims, 32 patented, all but two in one group, situated to 4 miles S. E. of Jerome the 2 other claims adjoin the Calumet & Jeron and the Verde Combination. The group includes the Cliff mine, once t property of the **Geo. A. Treadwell Mining Co.**: also the Brookshire min The tract shows several large jasper outcrops, that of the Cliff claim sho ing commercial ore at the surface.

Development: is centered at two points, the Gorge tunnel and t 930' Dorothy May, shaft, where the company camp and power plant are l cated—work for 1918 included 620' of shaft sinking and 2,312' of tunne in 1919, a 155' tunnel was driven, and a 200' incline shaft sunk on t Silver Tip claim. In the Gorge tunnel on the Cliff claim the ore-body a pears to have bottomed in a quartz porphyry formation.

The Dorothy May shaft is 930' deep, bottomed in diorite. On 5 level, the N. W. crosscut cut the Revenue Vein and encountered quar porphyry contact at 600', which contained some chalcocite and chalcop

rite in a highly kaolinized leached zone. On 900' level contact 160' from shaft showed slight iron mineralization. The Cliff shaft connects with the Gorge tunnel. Drifts started both east and west on a mineralized quartz porphyry-diorite contact developed a low grade ore-body which 100' below seemed to be bottoming in quartz-porphyry when work was discontinued.

Property contains very promising surface outcrops, perhaps the best seen in the undeveloped ground of the district, but failing to find ore in commercial amount, directors decided, in March, 1919, to suspend operations for an indefinite period.

GREEN QUARTZ GOLD MINING CO. ARIZONA

Address: Oatman, Ariz.

Officers: R. H. Hodges, pres.; L. Harpending, v. p.; C. C. Bryant, sec.-treas., with Frank Champion, directors.

Inc. 1917 in Arizona. **Cap.** $1,000,000; $1 par; 500,000 treasury shares.

Property: has 3 veins all of usual Oatman type, with gangue of quartz calcite, adularia, etc., containing free gold and telluride. Vein croppings are from 4' to 20' wide and show 3' to 4' of pay ore at several points.

Development: by 160' shaft being sunk to 400 depth. A Gibson mill reported installed, June, 1920.

GREY EAGLE DEVELOPMENT CO. ARIZONA

Office: Oatman, Ariz.

Property: in the Oatman district, Mohave county, developed by 3 inclined and 1 vertical shaft, deepest 400', connecting with 1,600' adit tunnel at 340' depth. Vein is in granite; ore-shoot is stated to be "over 500' long in the 200' level and to have yielded shipments of 500 tons that averaged .83 oz. per ton."

Production during the '70's and '80's said to have been about $750.000.

GRIJALVA NUEVA MINING CO. ARIZONA

Company started operations in Dec., 1915, and went out of business in 1917. See Vol. XIII for details.

GROWLER MINES ARIZONA

Owner: Geo. H. Morrill, 155 Pearl St., Boston, Mass. Bought at sheriff's sale.

Property: 26 patented claims, 15 miles S. W. of Ajo, Pima county, with quartz vein, developed by shafts 330" 260' and 135' deep, and a tunnel 85' long. Ore carries copper with precious metal values.

Equipment: 26 and 70 h. p. steam hoists and an 8 h. p. pump.

Shipments: last shipment of ore made in Sept., 1917, netted $1,000 or 20 per ton. Property worked for many years, though only in a small way.

GUNSIGHT DETROIT MINING & MILLING CO. ARIZONA

Property: included the Bullion Bar and the Black Bess mines, in Gunsight camp, Pima county, about 24 miles E. of Ajo. Ore carries gold and tungsten.

GUNSIGHT GOLD & TUNGSTEN MINING CO. ARIZONA

Described in Vol. XIV. Succeeded by **Gunsight Mines Co.**, which see.

GUNSIGHT MINE ARIZONA

Operators: J. D. Mitchell, L. L. Scott and Paul Fernald, of Ajo, have 10-year bond and lease.

Owners: First National Bank, Canyon City, Texas.

Property: the old Gunsight mine bought at sheriff's sale in 1918. Reported to show a fissure vein in granodiorite, pay streak varying from 12" to 6' in width, with lead and silver value. Old workings said to show ore averaging above $20 per ton.

Development: 400' shaft, various tunnels, etc., totaling over 2,000'. Property seems to warrant development.

GUNSIGHT MINES CO. ARIZONA

Address: A. W. Bramwell, Gunsight, via Ajo, Ariz.

Property: holdings of **Gunsight Gold & Tungsten Mng. Co.,** acquired in 1920, includes Wonder and Burro claims, in the Gunsight district, Pima county. Ore contains copper, silver and gold. Equipped with cyanide plant.

HACKBERRY CONSOLIDATED MINING CO. **ARIZONA**

Address: Wm. Neagle, mgr., Hackberry, Ariz.

Inc. March, 1917. **Cap.** $2,000,000; $1 par; 1,000,000 shares issued. Security Tr. & Reg. Co., N. Y., transfer agent.

Property: the old Hackberry mine, located in 1874 by W. B. Ridenour, in the Peacock district, 26 miles N. W. of Kingman, Arizona.

The mine is credited with a production of $2,000,000 in high-grade silver ore. In the early days a 500′ incline, giving a vertical depth of 360′, was sunk on the vein. At this depth water stopped operations. A new shaft sunk on vein to depth of 900′, has, it is said, developed 200,000 tons milling ore above the 600′ level, containing 20 oz. silver, $1.50 in gold, besides lead and zinc. Vein is said to be from 4 to 16′ wide, stopes up to 400′ long. High-grade ore is also found in the vein. The 600′ level has been driven 700′, and 278 samples averaged 32 oz. silver per ton.

Equipment: over $500,000 has been spent on development and machinery, including a 250-ton flotation mill finished in April, 1919, employing ball-mills and four K. & K. flotation machines. Recovery was 85% in September. The monthly income was then between $30,000 and $40,000.

In Dec., 1919, the mill was closed down on account of insufficient ground open for stoping, but high-grade silver ore was to be shipped to smelter.

HALE MINING & MILLING CO. **ARIZONA**

Constellation, Yavapai County, Ariz. Felix X. O'Brien, supt. Has gold and copper ores in veins. Equipped with gasoline power. Inactive save for yearly representation work.

HALF MOON COPPER CO. **ARIZONA**

Officers: F. I. Hobson, pres.; O. B. Kemp, treas.-mgr., Mayer, Ariz.; C. L. Wilson, sec., Prescott, Ariz.

Inc. June 23, 1916, in Arizona. **Cap.** $1,500,000; $1. par; 750,000 shares in treasury. Registrar & Transfer Co., N. Y., transfer agents.

Property: 14 claims, 280 acres, in Agua Fria district, Yavapai county about 4 miles N. of Mayer, shows copper glance in sericite schist, over a zone 50′ to 200′ wide and traceable a half mile. Property equipped with gasoline hoist and air drills. Development work begun in 1917; and in May, 1920, a 12″ streak of 49% copper ore was reported opened at 170′ in a drift on the bottom, or 500′ level.

HANEY COPPER CO. **ARIZONA**

Company owned properties at Ramsgate, 12 miles west of Prescott with pyritic ore of very low gold-silver-copper values.

HAPPY JACK MINING & REDUCTION CO. **ARIZONA**

Office: 516 Land Title Bld., Philadelphia, Pa.

Mine office: Patagonia, Santa Cruz county, Ariz.

Officers: Alfred W. Barnett, pres. gen. mgr.; W. H. Barnett, v. p. Henry W. Scattergood, sec.treas.; with Martin Stotz and Theo. Myer directors.

Inc. Oct., 1908, in Arizona, as successor of Happy Jack Mining Co. **Cap.** $1,000,000; $1 par; fully paid; issued 304,709 shares.

Property: 12 claims, being surveyed for patent, 9 miles from Patagonia shows several veins, carrying silver-lead ore with gold and copper.

Development: by 3 tunnels, longest 950′. Total workings, 4,000′.

Has shipped considerable ore averaging 42% lead, 2½% copper,, 20 oz silver and $2 gold. Several hundred tons of concentrating ore reported on dump.

Assessment work only being done.

HARDSHELL MINING CO. **ARIZONA**

Address: 101 Park Ave., New York City. **Mine address:** H. K. Welch, pres.-mgr., Patagonia, Ariz. Thos. Fraser, supt.; Calvert Coates, chief engr.

Officers: H. K. Welch, pres.; W. Murray Sanders, v. p.-treas.; D. M. Stevenson, sec., with Malcolm S. McKay and E. M. Steiger, directors.

Inc. 1918 in New Mexico. **Cap.** $1,000,000; increased to $2,000,000; $1 par. U. S. Corp. Co., New York, registrar and transfer agent. Listed on New York Curb.

Mine formerly worked by the Hardshell-Flux Mng. & Dev. Co., dissolved in 1910.

Property: 45 claims, in Harshaw district, Santa Cruz county, 9 miles from Patagonia, 20 claims of which are being developed under 5-year lease and bond to 1923, from the owner R. R. Richardson. The other claims are operated by lessees.

Development: a new shaft is 435′ deep and exploratory work is in progress to cut the vein on the 420′ level.

Production: in 1920 by lessees amounted to 500 tons averaging 40% lead and 34 oz. silver per ton.

HARQUA HALA GROUP **ARIZONA**

Owned by **Yuma Warrior Mining Co.** and described thereunder.

HARQUA HALA RIDGE M. & M. CO. **ARIZONA**

Controlled by Ranier Mines Corporation (q. v.) through ownership of 90% of stock.

Offices: Room 216, 27 School St., Boston, Mass. **Mine office:** Wenden, Ariz.

Officers: Angus McEachren, pres.; M. A. Blood, sec.-treas., with W. A. Dean, directors. W. T. Gnash, mgr.

Inc. Feb. 28, 1917, in Arizona. **Cap.** $3,000,000; $1 par 1,800,000 outstanding. Annual meeting first Wednesday in February.

Property: 30 claims, in the Harqua Hala mountains, Elsworth district, Yuma county, about 7 miles S. of Wenden, said to show a contact deposit between quartzite and porphyry, 100′ wide and traceable for 1,200′ in length, containing copper, gold and silver.

Examined by W. J. Stake in 1919.

Development: by tunnels and shafts, with a total of 1,200′ of workings.

HARRIS COPPER CO. **ARIZONA**

Address: C. C. Harris, of Findlay, Ohio, pres.

Officers: W. J. Martin, v. p.-mine supt.; Harry W. Moore, sec.; W. J. Sease, Los Angeles, and Fred F. Harris, directors.

Inc. July 10, 1910, in Arizona. **Cap.** $1,000,000; $1 par; issued, $710,001. Annual meeting, second Tuesday in January.

Property: 34 claims, 550 acres, in the Tip Top district, Yavapai county, about 50 miles north of Phoenix and 30 miles east of Wickenburg, on the Agua Fria river, at the mouth of Black Canyon creek. Claims, partly purchased with stock and partly located by the company, show schists cut by diabase intrusions. The company's map shows 2 groups, the Cascadilla, or western, being in part 3,000′ wide and 1,200′ long, and covering 3 veins running N. and S. Development is meagre; one shaft in diabase and 2 tunnels with an aggregate of 800′ of work, costing $9,000.

The Copper Reef, or east group, covers 2 veins, one along the Agua Fria river claimed to be an extension of the vein mined by the Kay Copper Co. Company claims 1,000 tons of $15 ore blocked out, which is reasonable. One vein said to be 500′ wide and another 90′ in width, the observers evidently including altered schist as vein matter.

The president of the company wrote the editor as follows: "We insist that the report speaks the truth quoted as we make the report to you, and if any establishment is placed on the wording of our report, it must conform in meaning to give the information that can be construed from the wording that we give."

The property may have a great outcrop and it may contain copper in commercial quantities, but we defy any mining engineer to find out what the company does have on its property, from the report issued by the management and reprinted as a gem of humor in the "Mining & Scientific Press." and in part reproduced herewith. "COPPER—A red, ductile, tenacious, malleable metal of great and varied use, originally called brass of cypress, copper sand, alacaunte, C group of minerals, mostly soft, included C. suprite, malaconite, malachite, cheesylite, chrycopyrite, olivnite, etc. Black C ore, malaconite, gray C ore, Chalcocite, C Purite, yellow C ore, variety Chalcopyrite, the common ore.

"The formation of the Harris Copper Co. have blended with the iron lime and porphyrv with quartz. Many of the above minerals, but more especially the commoner forms with oxides condensed formation on the top with the iron and lime, with a great amount of carbon and sulphur in the schist formation, with an amalgamated condition of the various mineralizations where gold and silver predominates. The schist in the lower rocks, I am led to believe from the geological lay of the uplift that is now held and owned by the Harris Copper Co., there is beneath the surface of this great iron-capped ledge a great body of copper ore."

Despite the unfavorable impression created by the company's literature it is understood that the property has genuine merit, has orebodies, and with cheaper transportation will make a good mine. Part of property reported leased to Wilson Foster of Los Angeles in 1914 for ten years; lessee is required to spend $20,000 and company to receive 15% of gross output.

HARTFORD-ARIZONA COPPER MINING CO. ARIZONA

Address: Hamburg, via Garces, Cochise Co., Ariz. Henry Hamburg pres. and mgr.

In Sept., 1913, the Arizona Corporation Commission authorized the company to incur a $100,000 6% bond issue, for further mine development.

Property: the Wisconsin group in the Huachuca Mts., Cochise county. Surveyed a line for tramway to wagon-road and planned shipping to Hereford or to a point on Fort Huachuca branch of the El Paso & S. W. R. R. Developed by tunnels, has steam plant and compressor. Company employed 30 men at last accounts. No recent returns secured.

HAUXHURST MINE ARIZONA

Jas. Hauxhurst owner and mgr, at last accounts.

Property: 900 acres, in the Big Horn district, Maricopa county, about 65 miles W. of Phoenix and 27 miles S. W. of Wickenburg. Mine formerly owned by the Hauxhurst Copper Co., was under bond for about 2 years to the United States Copper Mines, Inc., which forfeited same, 1909, leased to F. C. Alsdorf, 1913, but relinquished. See Vol. XI, Copper Handbook.

Shipments of copper ore, carrying gold and silver, were made in 1911.

HAVALINA MINING CO. ARIZONA

Sold its Santa Nino property, Patagonia Mtns., S. W. of Duquesne, Santa Cruz county to J. Wells Smith, Feb., 1913. Property was being developed by 800' tunnel to reach a rich copper shoot said to have been found in the mine. Claims said to show molybdenum ore. Litigation has stopped work.

HAYDEN COPPER SMELTER ARIZONA

Owned by the **A. S. & R. Co.**

Office: 120 Broadway, New York. **Operating** address: Kuno Doerge. mgr., El Paso, Texas. **Works address:** H. A. Eye, mgr., Hayden, Ariz.

Has an annual capacity of 580,000 tons.

HAYDEN DEVELOPMENT CO. ARIZONA

Operated the Copper Chief mine of the Copper Chief Mining Co. from 1916-1918. Lease cancelled and mine returned to owners, November 1918.

HAYES & GRACEY SYNDICATE ARIZONA

M. P. Hayes and T. H. Gracey, Los Angeles, Cal., owners. Succeeds the Dragoon Copper Mining & Smelting Co., now dead.

Property: the Christmas and Eureka claims, carries replacement deposits with silver-lead-copper ores. **Development:** by a 550′ shaft.

Equipment: includes steam power and air compressor. Presumably defunct as no returns have been sceured for years.

HAYNES COPPER CO. ARIZONA

Succeeded 1916, by **Jerome-Victor Extension Copper Co.**, which in 1917 was absorbed by **West United Verde Copper Co.**

HELENS DOME MINING CO. ARIZONA

Operating company holding bond and lease.

Owner: T. J. Quillin, Bowie, Cochise Co., Ariz.

Property: 18 claims, 14 miles S. of Bowie in Apache Pass, Paradise district. Ore contains gold, silver and lead with 2% copper. Hoist and small mill on property.

HELVETIA COPPER CO. ARIZONA

General offices: 907 Metropolitan Life Bldg., Minneapolis. **Secretary:** 1140 McKnight Bldg., Minneapolis; **Treasurer:** 85 Devonshire St., Boston; **Oil operations:** 513 Natl. Bank of Commerce Bldg., San Antonio, Tex.

Officers: C. C. Prindle, pres.; Wm. A. Paine, v. p.; Robt. H. Gross, treas., with John S. Pillsbury, Russel M. Bennett, B. H. Woodworth, and John R. VanDerlip, directors. H. C. Machall, sec.

Inc. March 3, 1899, in New Jersey, and reorganized Oct. 4, 1905, in Arizona. **Cap.** $5,000,000; $25 par; 10,000 shares fully paid and 190,000 shares, $16.50 paid, are outstanding. Listed on Boston Stock Exchange. Levied 50¢ assessments, payable July, 1908; April, 1909; February, 1910; Feb., 1911; June, 1918; July and Sept., 1919. Last assessment, No. 11, of 50¢ was paid in Sept., 1920, making the stock $16.50 paid in. State Street Trust Co., Boston, registrar. Boston Safe Deposit & Trust Co., transfer agent; both of Boston. Annual meeting, first Monday after first Tuesday in October.

Financial statement of July 1, 1920 shows: total assets, $3,294,447, which includes mining properties, $2,158,260; oil account including supplies and leases, $246,842; current assets (cash and accounts receivable) $46,424. Capital stock was $3,290,000; current liabilities, $4,447. Oil operations showed net receipts from sale of 5,600 bls., $11,740; production cost, $4,015; royalties, $559. May 31, 1921, current assets were $29,804; current liabilities, $1,376, receipts from ore sales, $22,460.

Property: 38 patented claims, also 8 patented mill-sites and 960 acres of scrip land, giving total holdings of 1,673 acres, 30 miles S. E. of Tucson, at Helvetia, Pima county, at the west foot of the Santa Rita mountains, 18 miles S. of Vail, on the Southern Pacific, and El Paso & Southwestern railroad.

Geology: the formations resembling those of Bisbee, include Carboniferous and older limestones lying north of a great granite mass with porphyritic intrusions. The limestone has many iron outcrops, underlain by orebodies occurring as replacements. These have an average strike of N. 35°, W., with average dip of 45°, carrying ore of 2 to 4% copper.

For full description of properties and developments, see Vol. XI, Copper Handbook.

It is said that company spent over $2,000,000 trying to develop property into a paying copper mine, but was unsuccessful in discovering any large body of commercial ore. During the war some molybdenum and copper ores were shipped at a profit.

Company now has leases on 1,650 acres of oil-land near San Antonio, Texas, and has 25 producing wells, which were yielding a total of 4,000 bbl. of high gravity oil per month. The oil sells for $1 per barrel (July, 1921).

One drill is still at work in place of four. Considerable stock speculation resulted from these developments.

HERSHEL MINING CO. ARIZONA

Douglas Gray, mgr., Tombstone, Ariz.

A silver-lead property in the Charleston district which shipped during 1919. Small mill on property.

HICKEY COPPER CO. ARIZONA

Address: Canon, Ariz.

Incorporators: Philip J. Hickey, Philip J. Hickey, Jr., and Geo. Ellias. **Inc.** in Arizona. **Cap.** $2,000,000; $1 par.

Property: at the mouth of Black Canyon creek, on the Agua Fria river, Yavapai county, near the Kay mine, 22 miles S. of Turkey, the nearest railroad point. Legal notice of resumption of operations given November, 1921.

HIGGINS ESTATE, THE ARIZONA

Address: 201 Higgins Bldg., Los Angeles, Calif. Mine office: Bisbee, Ariz. Jas. L. Flanagan, mgr., M. F. Ryan, supt.

Officers: Jas. O. Sword, pres.; P. J. Higgins, v. p. D. P. Kearney, sec.-treas., with T. S. Word and M. A. Keancey, directors.

Inc. April, 1914, in California.

Property: Higgins mine, 10 patented claims, 180 acres, in the western end of Warren district, Cochise county, lying between the Copper Queen property on the E. and W. and the Wolverine-Arizona on the S. Shaft is 300′ deep. A large body of copper oxide ore was reported opened up early in 1921, between 100 and 200′ levels.

Production: 1916, 1,250,452lb. of copper; 1917, 951,368lb.; 11 months 1918, 3,013,000lb and about 12,000 oz. silver, and about 300 oz. gold yearly. A considerable production is reported for 1919. In 1918, lessees shipped 6,087 tons of 40% manganese ore.

HIGGINS LEASING CO. ARIZONA

Inc. 1912, to prospect the Higgins property for silver-lead and copper ores. Lease has expired and property reverted to owner, Thos. Higgins, estate in 1916.

HIGHLAND CHIEF GOLD MINING CO. ARIZONA

Offices: Alliance, Ohio and Oatman, Ariz.

Officers: Chas. Thompson, pres.; Carl Tanner, v. p.-gen. mgr.; F. W. Fuller, sec.-treas.; with John Eyer, and Creighton F. Thompson, directors. Frank Aspen, supt.

Inc. Aug., 1919, in Ohio. **Cap.** $30,000; par 2¢.

Property: 15 claims, 4 patented, 200 acres, in the Black Mtns. near Oatman, shows 4 quartz veins in andesite. Ore is free milling and is said to assay $4 to $20 gold per ton.

Development: by 2 tunnels, 200′ and 2,050′ in length.

HIGHLAND MINING & MILLING CO. ARIZONA

Address: Chloride, Ariz.

Officers: C. B. Bell, pres.-mgr.; W. J. Cook, v. p.; Alexander Rose sec.-treas.

Inc. April, 1919.

Property: 30 claims, 18 patented, and a mill site, formerly owned by the Union Basin M. Co. and about 6 miles S. E. of Chloride. The Middle Golconda, Golconda, and O'Dea mines were consolidated in April, 1919.

Geology: veins in igneous rocks carry zinc ore, with small amount of lead, in shoots, or expansions of the vein, 6 to 20′ wide. Average sample said to run 20.90% zinc, 11.91 oz. silver, 1.75% copper, 1.50% lead and 0. oz. gold.

Development: the Golconda has been opened by 1,400′ shaft and is credited with zinc production of 15,000,000lb. A 2,000′ adit is being driven on the Big Bethel claim of the Middle Golconda group.

Equipment: includes 80 h. p. gasoline engine, compressor, tramway and buildings. A 100-ton mill is under construction. $60,000 reported spent on development work and equipment.

HI HENRY MINING CLAIMS ARIZONA

Address: H. W. Fabrenbrick, Polaris, via Mohawk, Yuma Co., Ariz.

Property: 23 claims including fractions in the Polaris district, 1.5 miles N. W. of King of Arizona mine, about 50 miles N. of Mohawk, Yuma county. A report states that the quartz-porphyry ledge is 28′ wide with andesite and dacite walls, striking E.-W., and dipping 45° N., traceable for 1,000′ on surface. Ore said to carry gold with a little silver, varying from $2 to $25.

Development: by 50′ shaft with 53′ crosscut also a 293′ crosscut tunnel. Elevation of mine is about 3,500′.

HILLTOP EXTENSION MINES CO. ARIZONA

Office: Box B. B., Douglas, Ariz. **Mine office:** Rodeo, N. M.

Officers: W. E. Hawley, pres.; J. G. Erickson, v. p.; F. H. Fisher, sec.-treas., J. Blumberg, mgr., with John Gaughran, directors.

Inc. in Arizona. **Cap.** $750,000, $1 par; 250,000 shares are promotion stock.

Property: the Lily and Whale groups in the Chiricahua Mountains, Cochise county, 18 miles N. W. of Rodeo, N. Mexico, claimed to have the N. W. and S. E. extensions of the Hilltop veins.

Development by 570′ tunnel, vein said to be 3′ wide, shipping ore carrying 60% lead with 50 oz. silver. Molybdenum is also reported. Developing since 1917.

Examined by Louis D. Huntoon.

HILLTOP METALS MINING CO. ARIZONA

Formerly the Hilltop Mines (not incorporated).

R. O. Fife, trustee-mgr., Rodeo, N. Mexico.

Office. 1321 Otis Bldg., Chicago, Ill. **Mine Office:** Rodeo, N. M.

Officers: J. O. Fife, pres.; P. J. Kasper, v. p.-treas. with F. A. Rehm, . R. Scott, Phil Hoffman, C H. Putnam, F. J. Kasper, O. Kastrup, Jr., irectors. A. C. Jones, sec.

Inc. 1916 in Arizona. **Cap.** $10,000,000, $1 par; outstanding 2,000,000 hares.

Property: 42 unpatented claims, 800 acres, in California district, Chiricahua Mountains, Cochise county, said to show copper-lead-silver ore in quartz veins and contact deposits; strike N. W.-S. E., dip 60° S. W. Oreshoots reported as 2′ to 50′ wide, and 30′ to 110′ long, averaging 1 to 3% opper and 6 to 10 oz. silver. Examined by L. D. Huntoon, Walter Vidler, nd Charles Berkey.

Development: by 4 tunnels, longest 3,600′, reaching a depth of 1,500′.

Equipment: includes a 300-h. p. engine and a 1,000 cu. ft. compressor. onstruction of a railway from the mine to Rodeo, in New Mexico, there o connect with the El Paso & Southwestern, is contemplated; also a mill nd smelter. Management estimates 1,000,000 tons of $30 ore blocked ut. Forty men employed.

It is to be hoped that this heavily capitalized company will actually lock out ore reserves before attempting further ambitious equipment chemes.

HILLTOP MINES (not Inc.) ARIZONA

Now property of the **Hilltop Metals Mining Co.**, which see.

HOLMES MIDNIGHT MINES CO. ARIZONA

Reported sold to 1916 to G. H. Holmes, Salt Lake City, Utah, for 250,000 and transferred to company; 85% of stock held by Mr. Holmes and y Jim Murray estate, Butte, Mont.

Property: 6 claims, 1½ miles S. of Chloride, Mohave county, said o have 25,000 tons of gold-copper ore developed above 300′ level. Orebody n 100′ level, 56′ thick, averages 10% zinc and $7 gold.

Equipment: includes 10-stamp mill and concentrator, with hoist good for 1,000'.

Production: total $100,000 to end of 1916; no data since then.

HOME COPPER CO. ARIZONA

Address: Morenci, Graham county, Ariz.

Officers: H. J. Degener, pres.; W. A. Leonard, v. p.; W. P. Gee, sec.-treas.

Inc. April, 1901.

Property: 35 claims, 700 acres, in 2 groups, also a mill-site on Eagle river. Promoters were unable to inspire confidence and could not raise enough money to prospect the property sufficiently to prove if it has merit. Not a "wild cat," but a mistake. See Vol. XI. Copper Handbook.

HOME PASTIME MINE. ARIZONA

Address: J. M. Prisk or J. E. Hoover, Mineral Park, via Chloride, Ariz.

Property: formerly known as the Rattlesnake, a producer of rich silver ore is in the Wallapai district, Mohave county. Main shaft is 300' deep. A 4' vein opened on the 80' level reported to average 34 oz. silver and $340 gold per ton. Was shipping in 1919 and 1920.

HORSESHOE BASIN GOLD MINING CO. ARIZONA

Now the **Lowell Gold Mining Co.**, which see.

HOSEY GROUP ARIZONA

John and N. A. McDonald, owners, Patagonia, Arizona.

Property: 7 claims, including the Hosey and Augusta mines, in the Wrightson district, Santa Cruz county, 12 miles from Patagonia. The Augusta has 1,000' of development showing 3 veins, 3-15' wide, carrying copper, gold and silver. Equipment: includes compressor and machine drills.

HOWARD COPPER CO. ARIZONA

Address: Ralph Roseberry, managing director, 612 I. W. Hellman Bldg., Los Angeles, Calif.

Officers: H. O. Howard, pres.; J. J. Fagan, sec.-treas., with Ralph Roseberry, directors.

Inc. July, 1919, in Ariz. **Cap.** $1,000,000; $1 par; 500,000 issued.

Property: 17 claims and 2 fractions, 360 acres, 6 miles S. E. of Turkey, Yavapai county, on the Crown King branch of the Santa Fe R. R. The vein at the outcrop is 46' and in the workings 20' wide, with greenstone schist hanging wall and sericite schist foot wall. Ore assays 2-16% copper with low values in gold and silver.

Development: by 1,200' of tunnel work. A new shaft is to be sunk to get below the orebody.

Equipment: includes 35 h. p. engine, compressor, drills, pump and buildings.

HOWARD SILVER MINING CO. ARIZONA

J. J. Fagan, trustee, Phoenix, Ariz.

Property: in the Turkey Creek district, Yavapai county said to show 3' of sulphide ore in a fissure vein. **Development:** by 210' Laheno shaft and 160' drift.

Equipment: compressor being installed and buildings erected.

HUACHUCA TUNGSTEN MINING & MILLING CO. ARIZONA

Probably dead. See Vol. XIV.

HUGHES ARIZONA COPPER CO. ARIZONA

Dead. Fully described in Volume XIV.

HULL COPPER CO. ARIZONA

Address: H. V. Young, asst. sec.-asst. treas. and transfer agent., Clarkdale, Ariz.

Officers: Robt. E. Tally, pres.-treas.; Geo. Kingdon, v. p.; Le Ro Anderson, sec.; with Thos. Taylor and L. E. Kehr, directors.

Inc. 1906, in Arizona **Cap.** $10,000,000; $1 par; non-assessable; a issued.

Chas. W. Clark, trustee, holds 5,181,173 shares, as a result of a compromise of the suit brought in 1917 by minority stockholders.

For year ended Sept. 30, 1921, receipts were $3,120, including $1,795 from leases. Expenses, including $1,537 taxes, were $2,095; cash on hand $1,025; Acct. payable $25,811. Property is valued at $10,001,139 and supplies etc. at $7,933.

Property: 21 claims, partly fractional, 258 acres, shows syenite, diorite and slate, a continuation of the formation of the United Verde adjoining. The "1888" shaft, of 475' depth, has produced a small amount of ore, but not a profit.

Development: the Hull property and that of the Cleopatra Copper Co. have been developed by a 5,200' adit driven from Deception gulch, through Cleopatra ground into the Hull property. A winze has been started on the lode at 5,000' from the portal.

The Dillon tunnel extends completely around two sides of the United Verde ground. There are many drifts branching out from the tunnel and these usually follow a fracture plane in the rock showing 1 or 2' of fractured country rock, which usually shows pyrite and may be slightly copper-stained. These drifts twist and turn in a manner showing lack of system and finally branch out like a tree each branch following a fracture plane, some of which show 2 or 3" of copper ore, and some are not even copper-stained. These fracture planes are described as being "leaders" from the big ore-bodies below, and because the country rock contains a small amount of pyrite disseminated through it, these ragged workings were stated to block out low-grade concentrating ore.

On the Silent claim a drift from the tunnel exposed an irregular body of excellent chalcopyrite from which 2 shipments were made, the ore assaying 8½% copper. The stope is about 60' long, in places is 12' wide and of irregular height. A 160' raise shows it to branch into 2 seams of 2' and 3' wide. An inaccessible winze was said to show 13' of ore, but inasmuch as shipments had ceased, this seems questionable. Beyond this ore-body the tunnel turns the southwest corner of the United Verde property and follows along its western boundary to the "1888" shaft. For part of this distance the tunnel follows a lens of quartz devoid of copper. Aside from the one lens of chalcopyrite mentioned the showing in the tunnel is exceedingly discouraging. The mine has upward of 2 miles of workings. No development work of importance done since 1916, nor is any contemplated.

Equipment: includes a 94 h. p. steam plant and a gasoline engine, with 2 hoists, one being a steam hoist, installed 1909, at the "1888" shaft. There also is a small air-compressor.

HUMBOLDT CONSOLIDATED COPPER CO. ARIZONA

Formerly Shill Gold Mining Co., and name changed, 1917.

Address: Mesa, Ariz.

Officers: F. J. Davis, pres.; G. W. Silverthorne, sec.-treas.; M. G. Shill, Frank Griffin and W. J. Lempke, directors.

Inc. 1914, in Ariz. **Cap.** $1,200,000; shares $1 par. Company offered 50,000 shares at 50¢ in Jan., 1917.

Property: the Mesa Copper group, in Big Bug district, Yavapai county, 1 mile S. of Humboldt smelter, shows veins in Yavapai schist belt.

Development: two shafts with levels at 100', and 200', said to block out 2,500 tons of $12 to $75 ore.

No recent returns. Probably dead.

HUMBOLDT ORE CO. ARIZONA

Dead. Absorbed by **Consolidated Arizona Smelting Co.**

ILLINOIS ARIZONA COPPER CO. ARIZONA

In 1917 acquired holdings of the **Billie Mack Mining Co.**

Office: 19 South La Salle St., Chicago, Ill. **Mine office:** Parker, Ariz.

Officers: L. W. A. Bunge, pres.; H. M. Higinbotham, v. p.; Jerome Smith, sec.-treas., with C. Horix, F. W. Peck, Jr., D. N. Condit, F. C. Low-

ney, W. C. Little, directors. United States Corporation Co., N. Y., transfer agent and registrar.

Inc. 1917, in Arizona. **Cap.** $2,000,000; $1 par; 971,378 outstanding.

Property: 26 claims 11 surveyed for patent, Cienega district Yuma county, 8 miles S. of Parker, including the Billie Mack, Lion, Butte, Jack Rabbit and Malapais groups.

Geology: claims cover an area of pre-Cambrian schist, with limestone whose beds dip steeply N. W. Intrusions of quartz-monzonite, and diabase are said to form dikes or stocks from 100′ to 1,500′ wide, mineralized with iron and showing copper stains, which, it is hoped, indicate copper ore below. The ore found thus far occurs in veins in the limestone and consists mainly of malachite, chrysocolla, and specularite with free gold in porous quartz. As a rule the ore though often very rich, occurs in short bunches.

Development: by 200′ shaft with levels at 100′, 150′, and 200′ and by numerous short tunnels and shafts, totaling over 4,000′.

Production: returns from 489 tons shipped were 8% copper, 1.1 oz. gold per ton. Total production to date estimated at $125,000. Some ore was shipped in 1919, but now idle.

Equipment: includes small hoist, air-compressor, gasoline engine, air drills, etc.

Reported on by H. E. Olund, J. B. Rossman and Y. S. Young.

ILLINOIS EXPLORATION CO. ARIZONA

No recent report. See Vol. XIV.

IMPERIAL COPPER CO. ARIZONA

Company is supposedly dead. Property acquired by the A. S. & R. Co.

Office: 120 Broadway, New York. Operating address: J. Kruttschnitt, mgr. **Mine address:** Edward Thornton, supt., Silver Bell, Ariz.

Property: 52 patented claims, including the Silver Bell mines, in Silver Bell district, Pima county, 35 miles S. of Tucson. Orebodies occur as irregular lenses along shear planes in limestone. Ore is an altered porphyry impregnated with copper sulphides. See Vol. XII for more complete description.

Mine is normally a regular shipper, producing 73,729 tons of 3% ore in 1916; 123,729 tons of 3% in 1917; 120,320 tons of 2.8% in 1918. Production in 1919 was much curtailed and mine was idle in 1920.

INLAND COPPER CO. ARIZONA

Idle. Letters to 1017 Commerce Bldg., Kansas City, Mo., and to the mine at Planet, Yuma Co., Ariz. returned. See Vol. XIV.

INSPIRATION CENTRAL MINING CO. ARIZONA

Address: Chas. B. Yett, mgr. Safford, Ariz.

Officers and directors: W. E. Tester, pres.; J. A. Karlson, v. p.; C. B. Yett, sec.-treas.

Inc. Sept. 28, 1916, in Arizona. **Cap.** $1,000,000; 50¢ par; 800,000 issued. Annual meeting second Monday in February.

Property: 43 claims about 14 miles W. of Geronimo, in the Turnbull and Santa Terressa Mountains, Black Rock district, Graham county.

Geology: vein occurs at contact of schist, porphyry, and limestone dipping 85° S. Ore in streaks, is from 2 to 10′ wide, and contains copper carbonates and sulphides. Average assay is 10% copper, with silver and gold.

Development: by 250′ and 150′ tunnels. Workings total 500′ to depth of 400′. In June, 1919, of 2 lots of ore sent to smelter, one assayed 27% copper and 17 oz. silver, the other 7% copper and 4.3 oz. silver.

Ore is hauled to Geronimo on the Arizona Eastern line, thence to smelters at Globe or Miami. New work in 1920 consisted of 3 miles of mountain road.

INSPIRATION CONSOLIDATED COPPER CO. ARIZONA

Office: 25 Broadway, New York. Mine at Miami, Ariz.

Officers: C. F. Kelley, pres.; W. D. Thornton and L. D. Ricketts, v. p.'s.; Joseph W. Allen, sec.-treas.; W. S. Harper, asst. sec.-asst.-treas.; Thos. H .O'Brien, gen. mgr. D. A. Welch, purch. agt.

Directors: Wm. D. Thornton, Jos. W. Allen, Wm. E. Corey, Chas. A. Corliss, L. D. Ricketts, Wm. G. Rockefeller, John D. Ryan, Chas. H. Sabin, C. F. Kelley, W. Wraith, B. B. Thayer, Theo. Schulze and Albert H. Wiggin.

Inc. Dec. 18, 1911, in Maine. **Cap.** $30,000,000; $20 par; issued and outstanding Dec. 31, 1920, 1,181,967 shares. All bonds have been retired. Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents; Bankers' Trust Co., New York, and National Shawmut Bank, Boston, registrars. Annual meeting fourth Monday in April. Listed on New York and Boston Exchanges.

Range of shares in 1920: $61⅞ high, $28 low; sales on N. Y. Stock Exchange totaled 685,465 shares. In 1921 to October, range was $37⅝ to $29⅜.

In Feb., 1921, company took a 3.45% interest, $3,380,000, in the Copper Export Association's $40,000,000 8% note issue.

Comparative General Balance Sheet, years ending Dec. 31:

Assets

	Prop. & Equip.	Supplies	Cop. on hand	Oth. Current	Total
1920.....	$25,704,812	$1,947,930	$9,746,477	$457,133	$37,856,352
1919.....	25,339,257	1,632,720	6,118,720	6,315,068	39,405,377
1918.....	26,355,613	2,180,333	2,978,099	14,214,507	45,728,556
1917.....	25,465,242	1,932,383	.....	17,229,047	44,626,672
1916.....	24,858,094	1,133,633	.....	15,792,586	41,784,314
1915.....	25,293,529	622,276	1,115,960	411,281	27,443,046
1914.....	22,166,764	439,880	.....	2,641,219	25,247,863

Liabilities

	Capital Stock	Bonds	Current	Surplus	Reserves	Total
1920..	$23,639,340	.....	$2,933,009	$8,036,651	$3,247,352	$37,856,352
1919..	23,639,340	.....	3,288,145	9,879,259	2,598,633	39,405,377
1918..	23,639,340	.....	5,489,095	12,784,433	3,815,689	45,728,556
1917..	23,639,340	.....	4,678,484	14,011,005	2,297,843	44,626,672
1916..	23,639,340	.....*	4,182,003	12,681,501	1,281,469	41,784,314
1915..	18,419,500	6,544,500	1,878,983	600,062	.....	27,443,046
1914..	14,459,160	10,500,000	288,703	.....	.....	25,247,863

*All retired, 1917.

Comparative Income Account, years ending Dec. 31:

	1920	1919	1918
Copper sales	$10,033,707	$11,045,222	$17,516,323
Other income	328,479	237,698	290,063
Receipts	$10,362,186	$11,282,920	$17,806,386
Expenses—Mining	$3,701,140	$3,222,262	$3,743,032
Reduction and Trans. Ore	4,385,210	3,615,690	4,673,143
Refg., Sell. & Tran. Metal	2,151,796	2,777,416	2,323,404
Adm. and Fed. Taxes....	809,189	272,523	1,065,743
Depreciation	648,719	348,633	750,000
Copper on hand-beginning	6,118,332	2,978,099	.....
Total	$17,814,386	$13,214,623	$12,555,322

Profit:	(b)$7,452,200	(b)$1,931,703	$5,251,064
Copper on hand—December 31	9,746,477	6,118,332	2,978,099
Total income	$2,294,277	$4,186,629	$8,229,163
Dividends	4,136,885	7,091,802	9,455,736
Surplus	.....	.....	(b)1,226,573
Previous surplus	.....	.....	14,011,005
Profit and loss surplus	.....	.....	$12,784,432

(a) Includes $151,034 interest paid, (b) deficit.

Dividends: $5.25 in 1916; $8.25 in 1917; $8 in 1918; $6.50 in 1919; $5.00 in 1920; none in 1921 to October.

Net earnings per share: $0.65 in 1915; $17.45 in 1916; $9.37 in 1917; $6.96 in 1918; $3.50 in 1919; $1.65 in 1920.

Company took over properties owned by the Inspiration Copper Co. and the Live Oak Development Co., paying for same in stock. In May, 1912, the mill and camp site of the Black Warrior copper mine was purchased from the Warrior Copper Co. for $175,000. Early in 1914 the property of the New Keystone Copper Co., lying between the Inspiration and Live Oak groups, 219 acres, was purchased for $795,940, payable in 39,797 shares of stock at $20 per share, 9 shares of New Keystone for 1 share Inspiration.

To provide a supply of oil, purchased jointly with the Anaconda Copper Company in 1918, 160 acres of oil land in Bakersfield district, California, organizing the Arizona Oil Company. **Cap.,** $2,500,000; shares, $100 par; issued 16,320 shares. Inspiration owns 50% of the stock issued at a cost of $794,668. The output in 1919 was 456,174bbl.; in 1920, 395,641 bbl. of oil were produced. I. C. C. dividends were $69,360 and $326,400 for 1919 and 1920, respectively.

In 1920, joined with other Southwest mining companies in forming the Apache Powder Co. and subscribed $60,000 to build plant at Benson, Ariz., for manufacturing powder.

Company reported to have purchased in May, 1921, entire holdings of **Porphyry Cons. Copper Co.** (q. v.) for $1,000,000.

Property: the holdings of the company are as follows: mining lands, 2,103 acres; millsite, tailing disposal, water supply, etc., total 4,449 acres, 8 to 10 miles W. of Globe, includes Montgomery group of 16 patented claims, 233 acres, acquired from the Warrior C. Co. in 1920 for $400,000.

Geology: property carries about 1½ miles of the strike of a mineralized belt of Pinal schist, much crushed, altered and silicified by contact action, due to the intrusion of the great mass of granite forming the hills to the S. W., the shattering having allowed the free circulation of secondarily enriching solutions. The oxidized zone shows carbonates, occasionally of commercial tenor, as in the Clipper tunnel but ore occurs mainly in secondary form as disseminated chalcocite, forming an enriched zone of commercial ore of 50 to 575′ in thickness, estimated by the management to average 180′, with an average of 90 to 100′ of overburden, underlaid by a primary zone of cupriferous pyrite below commercial tenor. About 40% of the values occur in small fissures and veinlets and along the jointing planes and planes of schistosity, copper being mainly in the form of flakes and grains of chalcocite, the balance of about 60% of ore values being disseminated through the gangue of friable Pinal schist, with some quartz. The mineralization also extends into the granite-porphyry contact, about 10 to 15% of the ore developed in the Colorado orebody being in granite. The cupriferous schist is faulted, just east of the Woodson orebody, by the Bulldog fault zone, of about 300′ width.

See Professional Paper, 115, U. S. Geological Survey, 1919, by F. L. Ransome for further details.

The Live Oak group of 14 claims, 200 acres, is about 1½ miles W of Miami, at the western end of the Miami ore belt and separated from the

Inspiration group by the New Keystone group. The geological conditions are similar to those of the Miami belt generally, save that much of the surface is covered by leached white granite, showing brilliant, green-stained outcrops of far more attractive appearance than any other part of the belt. This granite is underlain by schist carrying the ore, but part of the orebody is in granite.

The mine was originally opened on a flat dipping vein, 5 to 12′ thick, carrying high-grade chrysocolla ore, from which shipments running 17 and 18% were made for several years. Much of this material was quartzose and valuable as a gemstone. The vein ended at water level in a mass of low-grade chalcocite ore similar to that of the Miami mine. Orebody was developed by tunnel work and drilling by the Live Oak Development Co. by over 50 drill-holes with 20,000′ of drilling and 5,000′ of underground work. This work blocked out a body of disseminated ore 1,400′ long, 75 to 200′ deep beneath a capping of oxidized material averaging 435′ thick. The orebody as developed averaged 114′ thick and contained 15,000,000 tons of 2.11% copper ore.

The New Keystone Group has about 60 acres underlain by Pinal schist, covered in part by a sheet of granite porphyry, 25′ to 200′ thick. A strong fissure vein crossing the property was mined by the old Keystone Copper Co., the vein being 12′ thick with a paystreak averaging 15″, from which shipments of 19 to 22% copper and 2 to 5 oz. silver per ton were made for some years. Mine yielded, according to report, about $1,000,000. The New Keystone Copper Co. explored and opened up a deposit of disseminated glance ore similar to that of the Miami mine

The Montgomery group developed by 2 tunnels, 1,000′ and 1,200′ in length, shows extensive bodies of oxidized copper ore of good average value; ore mined in 1920 averaged 5.02% copper.

Development: by the new company consisted in blocking out this orebody by underground workings and churn drilling. The Keystone shaft is 330′ deep and at the time the company was absorbed by the Inspiration Cons. Copper Co., had a total of 14,996′ of workings. Churn drilling along 200′ squares was discontinued June, 1912, after company had put down a number of holes with an aggregate of 21,947′ of work. Development blocked out 2,516,000 tons of ore, which sampling showed to have an average of 2.25% copper.

Development under the present company has been of a dual nature, including both extensive underground openings, and churn-drill borings along the same general system as followed in the development of the Ray and Chino mines.

Underground work (in miles) shows:

Year	New work	Total	Destroyed during year	Destroyed previously	Net openings
1920....	17.17	166.35	28.61	70.03	67.71
1919....	21.33	149.18	6.13	63.90	79.15
1918....	14.88	127.85	10.01	53.89	63.95

The Inspiration orebody is being worked by 2 main tramming levels at 326′ and 450′ in depth respectively. The Live Oak orebody is accessible through the Live Oak shafts, but all ore is hauled through the main haulage-tunnel, 6,600′ long, connecting with the bottom level of the Inspiration shafts.

Ore is mined by the so-called Ohio system, locally termed the "Finger Raise" system, undercutting and caving in blocks of about 70′ vertical dimension; the broken and caved ore is drawn off through a system of inclined raises delivering to the haulage-ways below; these raises have a sufficient number of branches immediately below the caved area to reduce the interval between the heads of the raises that tap the caved ore to a minimum of about 8′. The ore is carried in trains of 5-ton cars by air locomotives to the working shafts, where it is delivered to one set of double concrete bins

underground holding 3,700 tons and hoisted to surface through 2 shafts, delivering to a bin of 2,000 tons capacity located between the shafts. Skip loading and hoisting is automatically controlled. Ore extraction is entirely confined to these 2 cement and steel-lined shafts. 585' deep and 107' apart, in Webster gulch, on the north side of the mountain, while men and supplies are lowered and water pumped at the Incline, or Supply shaft on the opposite, or Miami side of the mountain. The 2 shafts are operated from the same hoist house, but have entirely independent units, capable of handling 1,000 tons per hour. The total lift is 630'. The ore is hoisted in skips, passed through crushers and put in 25,000-ton storage bins. From these bins it is carried over the company's 1.6-mile railroad, with 3% grade, to the mill at the old Black Warrior townsite.

Ore extraction: 1916 was a complete operating year, mining confined almost entirely to the Inspiration ground. The output was 5,353,880 tons, averaging 1.548% copper. The greatest day's output was 21,289 tons. The average output of over per shifts work was 17.46 tons. The area undercut was 18.4 acres. The cost of mining was 60.7¢ per ton.

The area undercut in 1920 was 8 acres compared with 7.6 acres in 1919. The output of 1919 was entirely of milling grade, but in 1920, 16,494 tons of ore were shipped direct to smelter, and 2,745 tons of mixed oxidized and sulphide ore to the leaching plant.

From the time the ore is dumped from the chutes into the mine cars no manual labor is required, all operations being entirely mechanical.

The company owns its own railroad of 4½ miles standard-gauge track, connecting the mine with the mill and the mill with the smelter of the International Smelting Co.'s Miami plant, where concentrates are smelted.

The mine and mill are connected with both U. S. Reclamation hydroelectric plant at Roosevelt and with the company's own steam plant, consisting of three 6,000 k. w. turbo-generator units. Additional power installed during 1921.

Ore reserves: at end of each year were:

Year	Mined, tons	Net reserve, tons
1920	5,102,382	72,374,741
1919	4,196,903	77,477,123
1918	5,139,132	82,735,246
1917	3,914,742	87,874,378
1916	5,353,880	91,789,120
1915	.....	97,143,000

No attempt was made during 1918-20 to develop additional ore, but acquisition of property in 1920 will increase reserves.

Equipment: the surface and underground plant is capable of handling 20,000 tons of ore daily. A feature at the main shafts is the electric automatic hoists; coarse-crushing station, ore bins, and tramway to mill. The treatment plant, designed by H. K. Burch, consists of 20 sections, each one with rated capacity of 900 tons per day, making a total of 18,000 tons per day.

The scheme of treatment, stated in general terms, is as follows: at the mine—crushing ore to 4", maximum size in gyratory crushers, crushing this ore to 1½" maximum size by Symons disc-crushers. At the mill—crushing product from the Symons disc-crushers in Marcy ball-mills to pass 48-mesh screen, treatment of this product in flotation machines with separation of flotation tailing into sand and slime. Sand is treated on concentration tables and the slime retreated in flotation machines. Concentrates are dewatered in the filter plant.

While plans were for a 7,500-ton mill to cover 8 acres, adoption of the flotation process has permitted doubling originally planned capacity within space of 3 acres. As a result of this compactness, elimination of elaborate classification and some crushing, the costs of the combined oil flotation and

water concentration in 1916 were 50.385¢ per ton. Mill is equipped with Minerals Separation and Callow flotation machines, also one designed by Rudolf Gahl, formerly metallurgist. Coal tar is the chief component in the frothing mixture. The first unit of the mill went into operation June 29, 1915, the 18th in Feb., 1916, and the 20th a year later. The first ore was caved underground and actual mining started July 25, 1915.

By Aug., 1919, a 35-ton leaching plant had been erected to try this method of treatment on the carbonate and silicate ores.

Production:

	1918	1919	1920
Ore treated, tons	5,110,101	4,151,806	5,078,338
Average per day, tons	14,172	11,501	14,067
Mill feed, per cent copper	1.361	1.304	1.139
Tailings, per cent copper	0.380	0.346	0.320
Extraction, per cent	72.99	74.36	72.68
Concentrates, per cent copper	30.398	28.750	30.161
Water per ton ore, gallons	310	405	374
Steel balls, used per ton ore, lb	1.82	1.71	1.76
Flotation oil, used per ton ore, lb	1.35	1.34	1.01
Refined copper, lb	98,540,041	78,038,306	79,543,740
Cost per lb. of copper, cents	11.259	13.412	14.173

Production for first two months in 1921 was 9,500,000 lb.

In 1917, production was decreased by the I. W. W. strike which caused a shut down of the property early in July. Work was resumed in the mill Sept. 1, but production was slow in returning to normal.

An average of 15 mill-sections were operated in 1918, 12 in 1919 and 14 in 1920. During 9 months ended May, 1920, company treated 28,640 tons of ore for account of the Iron Cap Copper Co

"As the stocks of metal were as large as should be carried, while curtailed production could only be made at excessive cost," property was closed down in March, 1921, except for development work and maintenance.

INSPIRATION EXTENSION COPPER CO. **ARIZONA**

Address: F. O. Augustin, 433 Broome St., New York. Wm. H. Correa, pres.; A. L. Rosengarten, v. p.

Inc. Feb., 11, 1913, in Delaware. **Cap.** $1,000,000, increased to $1,500,000 in 1915; $5 par; all issued. Annual meeting February 11th. Company's holdings are under bond and lease to the **Castle Dome Development Co.**, 43 Cedar St., New York, which owns 97% of this company's stock.

Property: 95 acres, patented, in the Miami district, Gila county, partially surrounded by claims of the Inspiration Cons. Copper Co., underlain by schist. Also 29 claims, unpatented, about 500 acres, on Porphyry Mountain, about 5 miles W. of the first group and adjoining the Continental mine of the Old Dominion Copper Co. This group shows disseminated ore in granite, said to be enriched near an intrusion of diabase, developed to date principally by tunnels and churn drill holes.

Development: of the Miami tract includes a 500′ shaft disclosing primary sulphides.

INSPIRATION-MIAMI COPPER CO. **ARIZONA**

Mine address: Geo. W. Danehy, sec.-treas.-mgr., Box 1287, Globe, Ariz.

Officers: H. Kjershow, pres., 207 Monihon Bldg., Phoenix, Ariz.; F. A. Shaffer, v. p.; with Geo. W. Danehy, F. C. Carlsen and Tor Folkedal, directors.

Cap. $10,000,000; $1 par; 6,000,000 shares outstanding.

Property: several detached groups, 77 claims, adjoining the Inspiration Miami Extension, 3 miles W. of Burch, a station on the Ariz. Eastern R. R., in the Sleeping Beauty district, Gila county. The Kleinfelder group of 30 claims, is the only one considered promising by the management. Orebody part of same mass of altered monzonite porphyry said to average 1.5% copper, as that of the Louis D'Or and Inspiration-Miami Ext.,

lying above lime-diabase contact of Sleeping Beauty mountain. Controlled by same interests as Inspiration Miami Extension.

In October, 1920, suit was filed by the original claim owners against the Inspiration-Miami and Inspiration-Miami Extension companies, for $500,000, plaintiffs alleging that the claims were never paid for.

11,000 shares sold, with 2,100 shares of Ins. Miami Ext., for $60 the lot at public auction in New York on Dec. 22, 1920.

INSPIRATION-MIAMI EXTENSION COPPER CO. ARIZONA

Address: Geo. W. Danehy, sec.-treas.-mgr., Box 1287, Globe, Ariz.

Officers: H. Kjershow, pres., 207 Monihon Bldg., Phoenix, Ariz.; F. A. Shaffer, v. p., with Geo. W. Danehy, directors.

Cap. $2,000,000; $1 par; 1,200,000 shares outstanding.

Property: 5 patented claims, adjoining Louis D'Or M. & M. Co. and Inspiration-Miami C. Co., in Sleeping Beauty district, Gila county, near Globe, and supposed to have the continuation of the Louis D'Or orebody.

INSPIRATION NEEDLES COPPER CO. ARIZONA

Office: P. O. Box 1056, Miami, Ariz.

Officers: D. R. Williamson, pres.; Wm. Phillips, v. p.; F. W. Hamm, sec,; A. D. Williamson, treas., with Geo. J. Stoneman, directors.

Inc. Jan. 4, 1912, in Ariz. **Cap.** $2,000,000; $1 par; issued 1,465,213. Security Transfer & Registrar Co., New York, transfer agent and registrar. Listed on New York Curb. Annual meeting first Monday in February.

Annual statement dated Dec. 31, 1920, shows current assets, $6,146 and current liabilities $1,254 (accts. payable).

Property: 42 claims, 740 acres, 3 miles from Miami, Globe district, Gila county adjoins Southwestern Miami on the W., lies 1 mile S. W. of Inspiration Cons. property. Surface shows Gila conglomerate, Pinal schist and Schultze granite formation.

Development: consists of a number of shafts, none over 100′ in depth, and tunnels, none over 200′ in length.

August, 1916, two churn-drills operating at holes No. 1, 1,000′ deep, and No. 2, 551′ deep. Both holes were in Pinal schist, the last 100′ of No. 1 was in leached schist, showing small amounts of native copper.

Idle since 1917.

INTERNATIONAL COPPER & MINING CO. ARIZONA

Dead. Described in Volume XIV.

INTERNATIONAL SYND'TE OF MINES & SMELTERS ARIZONA

Officers at last account: Judge E. C. Whitesitt of Kansas City, pres.; Dr. L. P. Morgan, cons. engr.

Property: 100 claims in the Copper Basin district, Yavapai county, about 12 miles S. W. of Prescott, including the Arizona Portland 30 claims, Martin Schuber group 26 claims, the Ruth, Brown and Rainy Day groups. The Arizona Portland adjoins the Loma Prieta, and the mines of the Phelps Dodge's Copper Basin Branch on the S., and is reported to carry the extension of the Loma Prieta orebodies. The orebody is reported to be from 50′ to 250′ wide with N. S. strike and easterly dip, carries chalcopyrite with a little gold and silver disseminated through monzonite porphyry.

Development: by 1,000′ of workings, including a 250′ incline shaft and 4 tunnels.

Equipment: includes a 2 drill compressor, hoist and steam power. Operating expenses for 1918 were $8,000. Values so far developed are too low grade to be profitably mined, even with a flotation plant.

Presumably idle.

INTERNATIONAL TUNGSTEN CORPORATION ARIZONA

Office: 42 Broadway, New York.

Officers: Hiram Whitcomb, pres.; Richard Lounsbury, treas.; C. E. Greenough, sec.; A. A. Westerhouse, asst. sec.

Inc. June 16, 1916, in Virginia. **Cap.** $10,000,000; shares $10 par. Company acquired entire capital stock of the Emery-Whitcomb Tungsten Co. and the National Tungsten Co., both incorporated in Arizona.

Property: 26 claims, 8 patented, 493 acres, in the Arivaca mining district, Pima county 65 miles S. W. of Tucson and 23 miles from Amada on the So. Pac. R. R., fully described in Volume XIV.

Reported in Dec., 1918, that James H. Emery had filed suit in the Superior Court to foreclose on a mortgage for $25,000 held on the Emery-Whitcomb Tungsten Co. and the National Tungsten Co., subsidiaries of the International Tungsten Co.; holdings were sold at Sheriff's sale, Dec., 1919.

IRISH MAG LEASING CO. ARIZONA

M. J. Elsing, mgr., Bisbee, Ariz. Has a lease on the Irish Mag claim of the Calumet & Arizona Mining Co., extended in March, 1920. No shipments were made in 1920, but shaft was retimbered between 450 and 1,050' levels.

IRON CAP COPPER CO. ARIZONA

Office: 50 Congress St., Boston, Mass. Mine at Copper Hill, Gila county, Ariz.

Officers: Frank P. Knight, pres.; J. Judson Dean, v. p.; R. H. Knight, sec.-treas.; F. A. Woodward, gen. mgr.; with Alvin T. Baldwin, directors; David Cole, cons. erect. engr.

Inc. Feb. 7, 1911, in Maine. **Cap.** $2,000,000; $10 par; 50,000 preferred and 150,000 common, 4 pfd. and 142,100 com. shares, outstanding. Stock listed on Boston Curb. Annual meeting, third Tuesday in March.

Bonds: $500,000, 8%, 20-year, dated Oct. 1, 1918. State Street Trust Co., trustee and transfer agent. Federal Trust Co., registrar.

Dividends: $2.20 in 1917; $3.75 in 1918; 50¢ in 1919; 50¢ (cap.) in 1920.

Revenue during 1919 totaled $1,248,841. Operations cost $905.017. After deducting $410,967 for interest, taxes, management, and depreciation, there remained a deficit of $67,143. Current assets totaled $946,751, and liabilities, $323,228.

In 1920, gross income was $1,599,438 and net $268,877, after deducting operating expense of $1,163,909 and $166,652 for taxes litigation, etc. After depreciation and depletion there was a net loss of $142,271 for the year. Current assets amounted to $824,263 and liabilities, $303,831.

Property: the Iron Cap and Bird groups at Globe, 20 patented claims, dividing two Arizona Commercial groups and adjoining the Old Dominion property. Also 7 claims in Lone Star district, Arizona.

Geology: claims show shale and quartzite cut by diorite at depth, traversed by a fissure vein running N. E. and S. W., and dipping at 70°

Development: by 1,300' Williams shaft, with levels at 660', 765', 868', 968 and 1,068'. Vein is opened for about 1,000' in length.. The Iron Cap shaft is 1,551' deep, with levels at 800' 920', 1,020', 1,120', 1,400' and 1,500.' Vein is opened for about 1,400' from that shaft.

During 1920, good ground was opened on 1,000 and 1,100' levels, and work at 1,500' indicates that vein is wider and more mineralized than on 1,400'.

Smelting ore contains from 1 to 6 oz. silver. 4 to 11% copper. Concentrating ore runs from 0.5 to 0.7 oz. silver, with about 3% copper.

Litigation: in Feb., 1919, the Arizona Commercial Mining Co. brought two suits against the Iron Cap (1) alleging wrongful extraction of ore, and (2) for a share of pumping expense. This was brought in the State of Massachusetts, but in September, the Supreme Court of that State refused to hear the charges, on the plea of Iron Cap, and directed that they be heard by a court in Arizona. Arizona Commercial immediately brought suit again under Massachusetts laws to be tried by court and jury, and also brought suit in the courts of Maine asking an injunction against Iron Cap from disposing of any of its assets until a settlement was made. Iron

Cap however brought action in Arizona in October, 1920, to quiet title to property in dispute and proceedings in Maine were stayed pending a decision.

Equipment: 2 double-drum hoists, 2,200 cu. ft. and 3,600 cu. ft. air-compressors, and a 750 h. p. boiler plant and power-line to the Inspiration Cons. plant. A 300-ton concentrator was completed in June, 1920, connected with I. C. shaft by 24" gauge railway, transportation to cost 7c. per ton. Preliminary crushing is done at mine; mill is equipped with rod mills, roughing tables, classifiers and flotation section. A mine fire protection system has been installed.

Production: including smelting and concentrating ore:

Year	Tons	Copper, lb.	Silver, oz.	Rec'd*
1920.....	91,326	8,235,670	113,323	17.44
1919.....	64,540	7,156,270	104,458	18.92
1918.....	84,690	9,441,000	153,585	24.18

*cents per lb of copper.

During 1920, 15,180 tons of ore were shipped to the Inspiration mill and 50,186 tons were treated by company mill. Average assay of mill feed was 3.04% copper and 1.49 oz. silver, and tailings assayed 0.38% copper and 0.18 oz. silver; copper extraction was 93.73%. Milling cost was $2.17 per ton of ore; cost of production for all copper was 4.178c. per lb. Ore and concentrate are shipped to the International smelter.

Operations were curtailed at end of 1920 and in March, 1921, mill was running at one third capacity.

The future of this property appears to be good.

IRON QUEEN MINING & SMELTING CO. ARIZONA

Address: Wm. T. Read, 15 William St., New York City. **Mines** near Mayer, Yavapai County, Ariz.

Directors at last account: F. W. Wood, Wm. T. Read, A. D. Barnhart I. D. L. Williams and H. B. Bishop.

Cap. $3,500,000; shares $10 par. Company formed to take over, subject to a mortgage for $130,000, the greater part of the former holdings of the **George A. Treadwell Mining Co.** sold at tax and foreclosure sales. The organizers of the Iron Queen offered stock at 75c a share to stockholders of the Treadwell Co.

Property: fully described in Vol. XIV.

Smelter was bought by the Big Ledge Copper Co. interests and an operating company formed, known as the Great Western Smelters Corp., which in turn was unloaded on the Big Ledge Co.

No recent returns.

IVANHOE CONSOLIDATED MINES CO. ARIZONA

Reorganized April, 1918, as Ivanhoe Gold Mining Co. which see.

IVANHOE GOLD MINING CO., REORGANIZED ARIZONA

Office: 591 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman Ariz.

Cap. $150,000; 10c par; assessable. Formerly Ivanhoe Consolidated Mines Co., but reorganized April, 1918, under above title. Assessment of 1c per share was due June 10, 1918, to pay debts and to continue exploration.

Property: 5 claims and 2 fractions in N. W. part of Oatman district, Mohave county, and covering 3,000' along the strike of the veins.

Development: by 500' shaft and total working of over 2,500', up to mid-1919, when work was resumed on 500' level of the Nancy Lee claim, where 60' of low grade ore was cut at 204' from shaft.

Property considered of promise.

IVANHOE MINE ARIZONA

Address: Patagonia, Santa Cruz county, Ariz. Formerly owned by Ivanhoe Mining Co., which has been dissolved. Property now owned by A. H. Ives, of Minneapolis, and J. E. Hurd.

Property: the Ivanhoe mine and various claims, 25 in all, 500 acres, in the Wrightson district, 4 to 6 miles S. W. of Patagonia, the nearest rail point. The group shows rhyolite, andesite and diorite, with brecciation zones carrying orebodies of which 5 are estimated by owners to average 27′ in width, carrying silver chloride ore, gray copper and chalcocite, estimated by management to average 16% copper, 6% lead and 225 oz. silver per ton.

Development: by the 200′ Commercial shaft, with considerable cross-cutting, developing, it is said, large bodies of milling ore. There are also several tunnels, with 2,700′ of workings, estimated to show 100,000 tons of ore.

Equipment: includes a 70 h. p. steam plant with a 50 h. p. hoist good for 1,000′ depth. There are 5 buildings, and water is supplied by a 6 h. p. gasoline pump.

Was producing in 1919.

I. X. L. MINE — **ARIZONA**

Address: Kingman, Ariz. Controlled by M. B. Dudley. G. D. Atlee, supt.

Property: in the Stockton Hill section of the Kingman district, 1½ miles S. of the C. O. D. mine. Developed to depth of 350′ and equipped for further work to 500′ depth. Report a vein of high-grade ore on the 250′ level, 19′ wide and running 200 oz. silver, 29% lead and $2 gold.

JEMISON MINES CO. — **ARIZONA**

Head office: Wallace, Idaho. **Mine office**: Chloride, Ariz.

Officers: G. W. Kays, pres.; Henry Kehoe, v. p.; Charles McKinnis, sec-treas. and gen. mgr., with C. G. Crook and J. P. Smith, directors.

Inc. 1917, in Arizona. **Cap.** $1,500,000; shares $1 par.

Property: 4 claims and fractions, 17 miles N. of Kingman in the Walapai district, Mohave county, ½ mile from the well-known Golconda mine.

Development: main tunnel 500′ long, being extended E. 350′ to connect with old workings above. Ore shoot has been proven continuous for 300′ and is from 3 to 7′ wide, with $25 to $48 per ton in gold, silver and copper values. Operated by lessees at last account.

Equipment: 25 h. p. Fairbanks-Morse hoist, 5-drill compressor, pump, houses, etc.

JEROME BISBEE COPPER CO. — **ARIZONA**

Formerly **Jerome Portland Copper Co.**

Office: Jerome, Ariz.

Officers: Geo. Brockshire, pres.; L. H. Beyerle, sec-treas.

Cap. $750,000; par 50¢; outstanding about 800,000 shares, issued in exchange for Jerome Portland stock.

Property: in Jerome district, at site of old Equator smelter, near Copper Chief mine.

Development: shaft over 500′ deep, cutting diorite at 515′ with 2,800′ of workings. Idle and mine under water.

JEROME CENTRAL MINING CO. — **ARIZONA**

Address: E. L. Bartholemew, supt., Jerome, Ariz.

Officers: C. T. Joslin, pres.; Peter Gordon, v. p. and treas.; Dr. Almer Harding, sec.

Inc. 1918, in Arizona. **Cap.** $1,000,000; shares $1 par; 500,000 shares issued; permitted to sell 100,000 additional shares treasury stock at 50¢., Dec., 1920.

Property: 3 claims, adjoining the Verde Combination, 2 miles from United Verde. A 12′ vein of ore opened in May, 1921, said to average 7% copper. Developing.

JEROME COPPER MINING CO. — **ARIZONA**

Idle.

Officers at last account: E. A. Kastner, pres. and treas.; H. Brinkenmeyer, v. p.; G. N. Hoffman, sec., all of Prescott, Ariz.; with Homer King,

F. M. Burdick, Gus Zorke, B. M. Orde, F. Wellington Hay, Geo. A. Gilbert and H. E. Crawford, directors.

Inc. Nov. 25, 1916, in Arizona. **Cap.** $2,000,000; shares $1 par.

Property: 5 patented (one fractional) claims, N. and W. of the Green Monster at Jerome, and long known as the Hooker Ewing group.

Development: 1,025′ tunnel to cut a diorite-schist contact exposed in a 98′ shaft at 860′ from portal. About 1,800′ of tunnels, crosscut, etc., were driven, the results of which are said to have been unsatisfactory.

Option held by the General Development Co. has been abandoned.

JEROME DAISY COPPER CO. — ARIZONA

Address: Box L., Jerome, Ariz., or P. O. Box 502, Phoenix, Ariz.

Officers: J. F. Mowles, pres.; R. Kingdon, v. p.; A. J. Kisselburgh, sec.; J. J. Cain, treas., with J. F. Hubbard, H. D. McVay and A. G. Dulmage, directors. J. F. Mowles, supt.

Inc. Oct. 5, 1916, in Arizona. **Cap.** $1,000,000 50¢ par; 1,129,975 issued.

Property: 22 claims at Jerome, said to show a copper bearing contact vein between quartz porphyry, schist and diorite with limestone capping.

Development: by 235′ shaft, bottomed in sandstone, making 70 gal. water per min. Crosscutting under way on 230′ level in 1917 was said to have exposed a gossan body 17′ wide, on which a winze is sunk.

Equipment: 500 cu. ft. compressor, 75 h. p. engine, 25 h. p. hoist, pump, etc.

A prospect. Idle.

JEROME DEL MONTE COPPER CO. — ARIZONA

Office: Room 1018, 50 Congress St., Boston, Mass. **Mine Address:** Harry D. Stull, supt., Jerome, Ariz.

Officers: Thos. S. Woods, pres.; A. B. Ewing, treas.; with E. P. Thompson, Fred Sutter, E. S. Armstrong, Tasker L. Oddie, directors.

Inc. in Arizona. **Cap.** $2,000,000; $1 par; 303,000 issued. Bankers Trust Co., N. Y., registrar.

Property: 41 claims, about 700 acres, surveyed for patent, in the Verde district, Yavapai county. Property being developed by 3-compartment shaft down 500′ in 1917 and sunk in limestone; much water encountered.

Equipment: electrically-driven hoist of 1,500′ capacity, compressor, 400-gallon centrifugal pump.

A prospect. Assessment work only being done since January, 1918.

JEROME GRANDE COPPER CO. — ARIZONA

Address: Box 836, Jerome Ariz.

Officers: J. J. Cain, pres.; J. W. Hubbard, v. p.; J. C. Scott, sec-treas.; with A. B. Colwell, and W. Hales, directors.

Inc. July, 1917, in Arizona. **Cap.** $1,000,000; shares 50¢ par.

Property: 5 patented claims, 71 acres, on southern slope of Smelter Hill, the United Verde mine being on the opposite slope. Lands formerly owned by **Verde Grande Copper Co.**, which suspended operations in 1909. In 1917 bondholders, who were also stockholders in that company, foreclosed mortgage and the property was bought in at Sheriff's sale by J. C. Scott, as trustee, for the bondholders, who then organized present company.

Development: by 838′ shaft, with 560′ crosscut from it. Also two tunnels with about 400′ of workings. Claims show diabase, diorite, slate, and altered schist, with stringers of ore carrying chalcocite, and auriferous chalcopyrite disseminated through the schist, but not in commerical quantity. Management offers treasury stock to finance the company, planning to extend the crosscut beyond 400′, where ore in commercial quantity is expected. Property is favorably situated, but like most of the non-producing Jerome properties is a mining gamble.

Idle, pending financing of company. Authorized, September, 1921, to sell 119,249 treasury shares at 25¢ each.

JEROME NEW YORK COPPER CO. ARIZONA

Mail returned unclaimed from Jerome, Ariz.

Inc. June, 1917, in Arizona. **Cap.** $2,000,000; shares $1 par.

Property: 2 claims in the Verde district with reported good surface indications. Stock offered at 25¢, October 20, 1917. Probably dead.

JEROME-OATMAN MINING CO. ARIZONA

Office: Jerome, Ariz. **Mine office:** Oatman, Ariz.

Officers: Walter C. Miller, pres.; D. J. Shea, v. p.; S. F. Denison, sec.; H. W. Lewis, treas.; with H. E. Campbell and Henry Lovin, directors. Jas. P. Rice, supt.

Inc. July, 1915, in Arizona. **Cap.** $150,000; shares 10¢ par; 442,251 shares in treasury, Oct., 1915.

Property: 11 claims, in San Francisco district, 3 miles N. W. of Oatman, Mohave county, shows gold-silver ore in quartz cutting andesite and rhyolite. The veins run N. W.-S. E. and dip N. 70°.

Shut down in 1917 on account of water on the 390′ level. As practically no commercial ore was proved by 390′ shaft and 600′ of drifts, the resumption of work is indefinite. No recent returns.

JEROME-PACIFIC MINING CO. ARIZONA

Address: Jerome, Ariz.

Officers: C. V. Hopkins, pres.; Wm. P. Harlow, v. p.; C. Earl Cree, sec., Raymond Sargeant, treas., with L. R. Ford, I. M. Sutton and J. B. Harper, directors.

Inc. Sept. 16, 1916, in Arizona. **Cap.** $750,000; 50¢ par; 750,000 issued

Property: 36 claims in Verde district, Yavapai county, 5 miles S. E. of Jerome, on the E. slopes of the Black Hills.

Geology: replacement bodies in schists, dipping 80° N. and pitching E.-W. Surface conditions are similar to those at the United Verde and United Verde Extension mines, that is, they carry large jasper outcrops, and show oxidized ore, which assays up to 18% copper, 8 oz. silver, and $6.80 gold per ton.

Development: by 2 vertical shafts, 35′ and 65′ deep; also 6 tunnels from 35 to 270′ in length. Expenses in 1916 totaled $9,000, covering 2½ miles of road and assessment work.

The property warrants development work, which will, it is said, be started when company is financed.

JEROME PORTLAND COPPER CO. ARIZONA

Reorganized as **Jerome Bisbee Copper Co.**, which see.

The decision rendered in the suit filed by the minority stockholders in 1917, against the president of the company, A. B. Frame, stipulated that Frame return to the treasury 469,000 shares of stock fraudulently obtained by him. The company assets were bought in for debts at receivership sale for $14,000, by parties interested in the welfare of the company and an option given to the Jerome-Bisbee Copper Co. to purchase the property at the same figure. According to advices, stock was exchangeable share for share into Jerome-Bisbee stock until July, 1919, upon payment of transfer charge of 3¢ per share.

JEROME PRESCOTT COPPER CO. ARIZONA

Address: W. A. Cline, Prescott, Ariz.

Officers: W. A. Cline, pres.; A. J. Matthews, v. p.; F. R. Dyas, sec.-treas.; with F. O. Smith and W. E. Sanders, directors.

Inc. in Arizona. **Cap.** $1,500,000; shares $1 par; 500,000 issued. Registrar and Transfer Co., New York, registrar and transfer agent. Kastel & Co, 20 Broad St., N. Y., fiscal agents.

Property: the Hub, or Sanders group, of 33 claims, about 660 acres, several miles west of Copper Basin in Skull Valley, 4 miles from the railway and 12 miles from Prescott, Yavapai county. Claims cover a schist belt 30′ wide, along a monzonite contact, which shows green copper stains;

also several quartz veins carrying gold values and one containing hornblende with associated chalcopyrite. Some development work was reported in 1920 and in April, 1921, property was leased for three years to W. E. Sanders and associates.

An examination by W. H. Weed showed the property worthy of very modest development for gold, but lacking any of the earmarks of a successful copper mine. Promoters distributed garbled copy of above report, with all unfavorable comments and opinions eliminated. Stock was boosted by rigging to $6.75 per share, breaking to 25¢. per share, when manipulation ceased.

JEROME-ST. LOUIS COPPER MINING CO. ARIZONA

Address: W. P. Burke, pres., Jerome Ariz.

Officers: A. Brockman, v. p.; J. M. Sullivan, sec.; G. Brookshire, treas.; with J. E. Burke, E. E. McFarland and J. H. Sontag, directors J. Riley, supt.

Inc. Nov. 13, 1916, in Arizona **Cap.** $750,000; shares 50¢. par.

Property: 8 claims, 3 miles S. of Jerome, between the Green Monster and the Jerome Portland, crossed by great Verde fault.

About $10,000 said to have been spent on the property to date. No recent information.

JEROME SUPERIOR COPPER CO. ARIZONA

Address: Bert Campbell, supt., Clarkdale, Ariz. or 644 Title Insurance Bldg., Los Angeles, Calif.

Officers: Melville T. Frasier, pres.; H. G. Bockins, v. p.; G. D. Case, sec.-treas.; Geo. Mitchell, gen. mgr., with M. P. and L. J. Selby, directors. At a meeting held Nov. 24, 1920, the directorate was ousted and the following directors elected: G. A. Kobold, pres.; L. J. Selby, sec.-treas., with Jas. A. Brower, Wm. Steel, F. A. Flory, E, C, Joannes and G. Egelhoff-Rindell.

Financial: statement dated April 15, 1920, shows cash in bank, U. S bonds and notes totaling $225,000; accounts payable $2,400.

Inc. May, 1916, in Arizona. **Cap.** $750,000; 50c. par. Stock offered at $3 per share, April, 1920; 1,300,000 shares outstanding. Permit for additiona stock sales issued, late summer of 1921.

Property: 202 claims in Verde district, Yarapai county, 1 mile N. o Jerome and 1 mile N. W. of Clarkdale includes Sutcliffe and Stanridge groups.

Development: shaft 900′ deep, Sept. 1, 1920 said to have an encouraging showing of chalcocite and copper iron sulphides. Water handled 160,000 gal. daily.

Equipment: includes 80 h. p. hoist, 6-drill compressor, pump, electri power, assay office, etc.

The new Verde Tunnel and Smelter R R. crosses the property for 2½ miles.

Stockholders and management are involved in litigation, and the A-zone Corporation Commission is investigating the books of the company o the complaint of stockholders charging mismanagement. Property close down, December, 1920.

JEROME VERDE COPPER CO. ARIZON

Fully described in Vol. XIV. Property sold to **Jerome Verde Develo ment Co.**, which see.

JEROME VERDE DEVELOPMENT CO. ARIZON

Mine office: Jerome, Ariz.

Offices: care Edwin O. Holter, 60 Broadway, New York; and 845 Tit Ins. Bldg., Los Angeles, Calif.

Officers: E O. Holter, pres.; Thos. J. Edwards, v. p.; I. M. Sutto sec.-treas.; Robt. Trease, asst. sec.-asst. treas.; with Chas. B. H. Delle Walter Cook, Jr., and F. V. Henshaw, directors.

Inc. April 18, 1921, in Delaware, to take over property of **Jerome Verde Copper Co.**, for details of which see Vol. XIV. **Cap.** $750,000; par 50¢; 1,151,000 shares outstanding.

Sale of property by J. V. C. Co. to the J. V. Development company was ratified May 5, 1921. Stockholders of J. V. C. were offered 1 share of J. V. D. for each 10 shares of J. V. C.; at same time agreeing that an option on 628,078 shares of new company should be given to the United Verde Extension for $464,039 and to permit the latter to develop property. Proceeds will be used to meet debts of J. V. C. of about $80,000 and future development expense. October 9, 1921, was the final date for exchange of stock. Reported that deeds of conveyance for a $420,000 consideration were filed in November, 1921.

Property: 28 claims patented, 480 acres, lying E. of the United Verde and adjoining the little Daisy mine of the United Verde Extension, shows an iron gossan with outcrops of copper ore in limestone capping on the Verde and Columbia claims.

Development: by 1,060′ three-compartment Columbia shaft, with 12,000′ of workings, mainly on the 1,100′ level, which corresponds with the 1,400′ level of the U. V. X. The workings expose the typical mineralized schist of the ore-bearing formation beneath limestone and lava capping; and in many places oxides, carbonates, and sulphides of copper occur. Average assays were reported by former management, at 8.4% copper. Recent work has been confined to the shear zone on the Maintop claim, largely on the 1,100′ level.

Old company and U. V. X. under a former option, have persevered in exploration and diamond-drilling, and indications have from time to time been encouraging, but commercial ore has been found only in small bodies.

Equipment: includes electric hoist, good for 1,500′ depth, and 1,500 cu. ft. air-compressors. Current is taken from the Arizona Power Co.

Production: by former management was intermittent; but fairly steady shipments to the Humbolt smelter were made in 1919 and were continued up to March, 1920. Total, probably 10,000 tons of ore with copper value of 8 to 12%. Operations ceased in August, 1920.

JEROME-VICTOR EXTENSION COPPER CO. **ARIZONA**

Property sold in October, 1917, to the **West United Verde Copper Co.** described in Vol. XIV, and now owned by **United Verde Extension Mining Co.**

JEROME-WENDEN COPPER CO. **ARIZONA**

Address: A. J. Humbert, Wenden, Yuma county, Ariz.

Is a reorganization of the Nuevo Mundo Mining Co. Vein said to be up to 5′ wide, carrying copper, developed by 3 short tunnels. A prospect, and presumably Idle.

JEROME YEAGER COPPER CO. **ARIZONA**

Officers at last accounts: J. W. Hudgeons, pres.; H. Wilson, v. p.; F. Hawkins, sec.-treas.; also directors.

Cap. $1,000,000 50c par. Of the 2,000,000 shares, 800,000 are pooled, being given to the owners of the property, subject to complete financing. Stock was offered at 25c in 1917.

Property: 360 acres in Yeager canyon, developed by shafts.

J. & J. MINING CO. **ARIZONA**

Address: O. W. Blickenstaff, mgr., Prescott, Ariz.

Officers: O. W. Blickenstaff, pres.; F. H. Herbert, v.-p.-supt.; G. W. Worthrup, sec.-treas., with Mrs. Emma Klein, directors.

Inc. June 24, 1919, in Arizona. **Cap.** $1,500,000; $1 par; 330,000 shares outstanding.

Property: Silver Reef mine, 21 claims and mill site, 430 acres, in Copper Basin district, Yavapai county. Ore occurs in fissure vein in porphyry schist, reported to average 40 oz. silver per ton.

Development: by 3 tunnels, 215′, 425′ and 235′ long, with a total of 871′ of workings. Reserves estimated at 100,000 tons blocked out.

Equipment: includes compressor, and 150 h. p. engine. Developing.

JOHNSON COPPER DEVELOPMENT CO. ARIZONA

Office: Frankfort, Ky. **Mine address:** J. T. Tong, mgr., Johnson, Cochise Co., Ariz.

Officers: Henry S. Krug, St. Louis, Mo., pres.; Ralph R. Wilson, v. p.; A. A. Hazelrigg, sec.-treas., Mt. Sterling, Ky.; with P. S. Head, R. R. Wilson, E. H. Elliott, Baily D. Berry, A. C. Van Winkle, R. O. Duncan and H. P. Hubbell, directors.

Inc. March 13, 1908, in Arizona. **Cap.** $2,000,000; $1 par; issued 1,650,000. Annual meeting, second Monday in October.

Bonds: $100,000 5-year 6% 1st mortgage gold bonds authorized, interest payable on Dec. 21. Principal due Dec. 21, 1921; $38,000 outstanding.

Property: 8 claims, 3 fractional, unpatented, 125 acres, known as the Climax group, in center of the Johnson camp, between the Peabody, Peacock, Republic and Black Prince mines. Claims show granite and limestone, with replacement deposits carrying malachite, chrysocolla, bornite and chalcocite, averaging 4% copper and 5 oz. silver per ton for the several thousand tons thus far developed. Orebody has a flat dip, averaging 32°, and is about 2′ wide on the 250′ level.

Development: by 240′ shaft giving a depth of 740′ on the orebody, with total of 2,500′ of workings. Shaft reported to be bottomed in bornite disseminated in limestone. The 100′ level has about 500′ of crosscuts and drifting, much of it in ore, but ground is leached and broken. The 250′ level has N. and S. drifts, 500′ of workings on a 2′ vein. A 500′ winze was sunk from the S. drift. Development is said to show large bodies of low-grade carbonates near the surface and some sulphides at 400′ depth. Only work done in 1919 was a crosscut to the Republic mine on the 740′ level.

Equipment: includes a 40 h. p. gasoline hoist, 5-drill compressor and 5 buildings.

JUANITA MINING & MILLING CO. ARIZONA

Company defunct. Fully described in Vol. XIV.

Property: 16 claims, 300 acres, and a 5-acre mill site about 4 miles from the Senator mine in the Hassayampa district, Yavapai county, about 17 miles S. of Prescott.

In June, 1917, D. M. Jennings, and others of St. Louis, received a deed on the property from the Sheriff.

JUNIATA GOLD & COPPER CO. ARIZONA

Dead. See Vol. XIV.

JUNO MINE ARIZONA

Property: one of the earliest locations in the Chloride district, Mohave county.

Development: by 570′ shaft and 2,000′ open-cut. **Production:** totaled $500,000 to end of 1916. No recent information received.

KAABA MINING & MILLING CO. ARIZONA

Address: C. H. Wagner, Round Valley, Mail Box, Kingman, Arizona.

Property: consists of several vanadium bearing claims.

KAIBAB CONSOLIDATED SMELTING CO. ARIZONA

See **Union Metals Corporation.**

KAIBAB SMELTING CO. ARIZONA

Name changed to **Kaibab Cons. Smelting Co.**, which late in 1921 was in process of consolidation with **Union Metals Corp.**

Office: 336 Citizens Natl. Bank Bldg., Los Angeles, Calif.

Officers: J. H. Hull, pres.; Jas. Westervelt, sec.

Inc. in Arizona. **Cap.** $1,000,000; par $10; 100,000 shares issued. Annual meeting in August.

Property: a copper mine, 10 claims (2 patented); 200 acres, on Buckhorn or Kaibab plateau, Coconino county, N. of the Colorado river, about 154 miles from Lund, Utah, the nearest rail point. Freight is taken into Ryan by way of Hurricane, Utah. Is a likely prospect, but inaccessible.

KATHERINE EXTENSION MINING CO. ARIZONA

Controlled by C. N. Miller, 617 Pacific Bldg., San Francisco, Cal.

Mine address: E. R. Abadie, Katherine City, Ariz. E. A. Shaw, agent, Kingman, Arizona.

Officers: Wm. M. Steele, pres.; C. N. Miller, v. p.; E. N. Bannon, sec.-treas., with Chas. F. Ainsworth and E. A. Shaw, directors.

Inc. June 16, 1921, in Ariz. Cap. $2,000,000; par $1; 950,000 issued; no bonds. Annual meeting in September.

Operating expenses for 1921 were $27,000; cash, $10,000 and $15,000 receivable, Nov., 1921.

Property: 14 claims, 260 acres, patent applied for, N. E. of the Katherine mine, in the Union Pass section, San Francisco district, near Gold Roads, Mohave county.

Geology: claims cover gold bearing fissure veins of quartz and calcite in pre-Cambrian granite.

Development: by 245′ shaft, with 130′ of cross-cutting to reach the Katherine vein.

KATHERINE GOLD MINING CO. ARIZONA

Office: Kohl Bldg., San Francisco.

Mine address: L. H. Whitney, asst. supt., Kingman, Ariz.

Officers: Chas. Sutro, pres.; R. L. Dimmick, v. p.-gen. mgr., Kingman, Ariz.; Sidney L. Schwartz, sec.-treas., with E. L. Dow, Allen E. Ware, W C. Howard and Phillip I. Manson, directors.

Inc. in Arizona. **Cap.** $2,000,000; $1 par; fully paid. Registrar, Mercantile Trust Co., San Francisco. Property acquired from New Comstock Mng. Co. (q. v.) on Aug. 29, 1921. Permit to sell stock has been granted by Arizona Corp. Com.

Property: the Katherine mine, 9 claims (1 patented) covering 4,700′ along course of the Katherine vein, in the Union Pass (San Francisco) district, Mohave county, 1¾ miles E. of the Colorado river, 30 miles W. of Kingman, and 26 miles from Union Sta. on Chloride branch of A. T. & S. Fe R. R. The Katherine is a quartz-adularia vein in gneiss, with value largely in gold, which outcrops a short distance before disappearing beneath overlying gravels; width at surface 60′ to 75′, average 32′. Ore is chiefly low grade, but high grade lenses occur.

Development: by 400′ shaft, with 4 levels at 100′ intervals, and crosscut through vein at 50′ intervals, has opened an ore shoot from 287′ to 533′ in length; total workings, 7,800′. In November, 1921, a winze from the 400′ level had been sunk 90′ in ore said to assay $20 to $50; to be continued to the 700′ level. Official estimates give 190,000 tons of ore blocked out, of which 94,000 tons average $11 and 96,000 tons, $14.45, a total of over $2,500,000.

Equipment: includes hoist and compressor. Preliminary plans already made for a 300-ton all sliming continuous counter-current decantation cyanide mill.

On Aug. 25, 1921, 500,000 shares were offered for sale, at a price of $1.25 for first 100,000 shares only. Property appears to have the making of a first class gold mine.

KATHERINE MOHAWK MINING CO. ARIZONA

Controlled by F. T. Torpe.

Inc. 1921. Company has permission from the California Corp. Commission to sell 200,000 shares of treasury stock.

Property: the Mohawk group, 6 claims, in the Union Pass section, San Francisco district. **Developing:** 1921.

KATHERINE-NEVADA MINING CO. ARIZONA

Address: care Geo. Probasco, Kingman, Ariz.

Property: a prospect in Union Pass section, San Francisco district, Mohave county.

KATHERINE RAND GOLD MINES CO. ARIZONA

Address: Carson City. Nev. F. M. Walsh, mgr., 330 Sansome St., San Francisco, Calif. Wm. Smith, supt., Kingman, Ariz.

Officers: F. M. Walsh, pres.; W. A. Smith, v. p.; Wm. H. Houston, sec.-treas., with Wm. Y. McGill and E. S. Dougherty, directors. Wayne Hubbs, asst. sec.-asst. treas.

Inc. October 25, 1921. **Cap.** $1,500,000; 25¢ par.

Property: 6⅓ claims, about 130 acres, in Union Pass section, San Francisco district, Mohave county.

Development: by 40′ shaft. Work begun late in 1921.

KATHERINE REVENUE MINES CO. ARIZONA

Successor to **Oatman Revenue Mines Co., Inc.**

Address: J. M. Savage, mgr., Kingman, Ariz.

Officers: Henry Johnson, pres.; T. J. Hudspeth, v. p.; C. M. Leonard, sec.-treas., with E. E. Armour and Chas. J. Phillips, directors.

Inc. 1921, in Arizona. 100,000 shares treasury stock offered at 10¢ per share, June, 1921. Permission to sell additional stock was granted, late summer, 1921.

Property: in the Union Pass section, San Francisco district. Mohave county. An undeveloped prospect, upon which operations were to be resumed, November, 1921.

KATHERINE TREASURE VAULTS CO. ARIZONA

Address: E. A. Shaw, Kingman, Ariz.

Incorporators: C. T. Cohee, C. B. Outten and L. S. Mackey, all of Wilmington, Del.

Inc. 1921, in Delaware. **Cap.** $1,500,000; $1 par.

Property: a prospect in Union Pass section, San Francisco district, Mohave county.

KAY COPPER CO. ARIZONA

Address: Heard Bldg., Phoenix, Ariz.

Officers: Geo. W. Long, pres.-gen. mgr.; S. J. Tribolet, Phoenix, Ariz., v. p.; F. J. Elliott, sec.-treas., with F. W. De Foe and Frank R. Poss, directors.

Inc. 1909, in Arizona. **Cap.** $2,000,000; $1 par; 1,570,633½ shares issued. Principal stockholders are: The William H. Yawkey Estate and Frank R. Poss, of New York, Geo. W. Long and S. J. Tribolet, of Phoenix, Ariz.

Property: 42 claims, 4 patented, and townsite of 592 acres, situated at mouth of Black Canyon creek, on the Agua Fria river, in Yavapai county, about 40 miles south of Prescott. About $400,000 has been expended in developing the property to date. Ore occurs in Yavapai schist. Considerable chalcopyrite ore has been shipped and company estimates 296,000 tons of commercial ore developed.

Development: by inclined shaft 600′ deep, drifts, crosscuts and diamond drilling. Work at present is confined to the new 1,000′ 3-compartment working shaft, which is electrically equipped and 600′ deep, July, 1921.

Equipment: 75 h. p. compressor and 112 h. p. hoist being installed.

KELVIN-SULTANA COPPER CO. ARIZONA

Fully described in Vol. XIII. Company was a reconstruction o the **Sultana-Arizona Copper Co.**, financed by the Baldwin Syndicate o Chicago.

Property was sold by receivers in January, 1919, to bondholders, who then reorganized under the name of **Ray Boston Copper Co.**, which see.

KEYSTONE CONSOLIDATED MINING CO. **ARIZONA**

Mail returned from former address: 908 City Natl. Bank Bldg., Los Angeles, Calif.

Officers: G. S. Holmes, pres.; W. O. Kay, v. p.; T. H. Fitzgerald, sec.-mgr.; John Schneider, treas., with A. Patterson and A McNally, directors.

Inc. May. 1916, in Arizona. **Cap.** $2,000,000 $1 par; assessable; all outstanding. Bonds authorized $660,000; outstanding $125,000.

Property: 5 claims, including the Keystone mine, in Mineral Park, Cerbat range, formerly owned by Ross D. McCausland of Kingman.

Ore: lead-silver-zinc-copper bearing, containing 2 to 4% copper, 12 to 24% zinc and over 30 oz. silver per ton, as sampled from dumps.

Development: by 300′ shaft, with 3 levels and total of 3,500′ workings.

Probably a fair mine, but had a wrongly-designed plant rushed up before it was needed. Company was consolidated with the Silver Keystone Co. in 1917.

Production: totaled $150,000 to end of 1916.

Property was sold at sheriff's sale, August, 1921, to G. S. Holmes, the president, to satisfy judgment of $30,000 obtained by him.

KEYSTONE COPPER MINING CO. **ARIZONA**

Office: Newton, Kans. Mine at Johnson, Cochise Co., Ariz.

Officers: W. W. Miller, pres.-gen. mgr.; A. Bannow, v. p.; T. C. Miller, sec.; W. J. Trousdale, treas.; Doane Merrell, state agt.; U. R. Miller, supt.

Inc. 1908, in Ariz. **Cap.** $900,000; $1 par; 823,000 shares outstanding.

Property: the Bannon group, 16 claims, surrounding the St. George claim and 1½ miles from the Arizona United property, said to show a large deposit of iron ore and to have cut several veins dipping 38°.

Development: by 635′ shaft, to be sunk deeper; 3,000′ underground workings said to block out 500,000 tons of sulphide ore. Reported, October, 1921, that power plant and mill were under construction.

KEYSTONE DEVELOPMENT CO. **ARIZONA**

Property: the Isabella mine, 20 miles from Casa Grande, Pinal county. Reported to have some 7% copper ore. No recent returns; probably idle.

KING COPPER CO. **ARIZONA**

Office: W. F. Dreher, sec., 536 First Natl. Bank Bldg., Denver, Colo.

Mine office: Rodeo, N. M.

Officers: N. P. Wilson, pres.-mgr.; C. E. Welch, supt.

Inc. 1917, in Arizona. **Cap.** $1,000,000, 50c par.

Property: about 1,000 acres in the Paradise district, Cochise county, Arizona, 12 miles north of Rodeo, N. M. Company says a 200′ dike crosses property, also several fissure veins. Assays as given are 5.2% copper, 8.6% lead, 2.5 oz. silver per ton.

Development: by 2,000′ and 300′ shafts and numerous tunnels. Good grade ore reported on 300′ level.

Equipment: includes 200 h. p. gas engine, 700 cu. ft. compressor and concentrating mill.

KINGMAN CONS. MINES CO. **ARIZONA**

Address: Will Halloran, Kingman, Arizona.

Officers: H. H. Patterson, pres.; W. H. Robinson, v. p.; J. H. Palmer, sec.; H. C. Veeder, treas.; Robt. Linton, cons. engr.

Inc. 1920, in Arizona. **Cap.** $3,000,000; $1 par Company succeeds **Arizona Butte Mines Co.**, described in Vol. XIV. Stock exchanged share for share.

Property: the Stockton Hill group, 30 claims, 18 patented, 250 acres, including the Banner mine, 12 miles from Kingman, Mohave county. The mine is held under lease from the U. S. Smelting Ref. & Mng. Co. **Ore:** sulphides of lead and zinc with gold and silver, occurs in fissure veins.

Development: by 165′ and 400′ shafts, with 5,000′ of lateral workings, including 2,300′ Banner tunnel.

Equipment: includes compressor, drills, and 150-ton mill, put into commission, October, 1920.

KINGMAN ZINC MINING CO. ARIZONA

Office: B. X. Dawson, Kingman, Ariz

Cap. $1,000,000; shares $1 par; 800,000 shares outstanding.

Property: 6 miles from A. T. & S. F R. R. in the Chloride district, Mohave county. Some hand-sorted silver-zinc ore has been shipped by lessees.

Not favorably regarded, as the promotions of Mr. B. X. D. are looked upon with suspicion by many people.

KING PLACER CO. ARIZONA

Address: Juan Brittingham, mgr., Quartzite, Ariz.

Property: placer ground in Quartzite district, Yuma county, purchased 1916 from the **Yuma Cons. Mng. Co.** Idle.

KIRKLAND ARIZONA COPPER CO. ARIZONA

Property: in the Walnut Grove district, Yavapai county, 12 miles S. E. of Kirkland.

In October, 1921, is reported to have filed suit vs. **Zonia Copper Co.** to quiet title to certain claims.

KOFA QUEEN M. & M. CO. ARIZONA

Address: Wm. H. Westover, agent, Yuma, Arizona.

Inc. June, 1921, in Arizona. **Cap.** $1,000,000; $1 par.

KORNCOB MINING & DEVELOPMENT CO. ARIZONA

Address: care Chas. E. Walker, v. p. of Consol. National Bank, Tucson, Ariz.

Is a dormant corporation. Bond and lease on the Apache & Del Monte group of claims at eastern base of Catalina Mountains, 75 miles by road from Tucson, has expired.

Claims show garnet containing copper pyrite, as a contact metamorphic product, along a granite limestone contact.

Geological report on property made by A. F. Tolman, Jr., of Leland Stanford University, May 24, 1912.

LA ANOZIRA GOLD MINING CO. ARIZONA

Dead since 1917. See Vol XIII.

LA BELLE MINING CO. ARIZONA

See Vol. XIV. **Last address:** Vicksburg, Yuma Co., Ariz.

Property was abandoned as development proved it of no value All machinery and improvements sold, and company probably defunct.

LADY MINES CO. ARIZONA

Address: care S. H. Beecher, Kingman, Arizona.

Property: in Union Pass section, San Francisco district, Mohave county.

LAKE SHORE MINE ARIZONA

Address: Frank M. Leonard, owner and mgr., 3543 Third St., San Diego, Cal. **Mine address:** Casa Grande, Ariz.

Property: 35 claims, 3 patented, 50 miles W. of Tucson and 35 miles S. of Casa Grande, in Pinal county, carries a contact deposit in granite and andesite. The ore zone runs N.-S. and dips 45°. Over one million tons of oxidized copper ore, averaging 3% copper, have been developed above water level.

Development: by 285′ shaft, bottomed in sulphide ore of payable tenor.

Mine produced and shipped about 3,000 tons of 5 to 6% ore in 1917. Is regarded as a good mine, needing further capital for equipment and development.

Churn drilling was under way in 1919.

LAKE SUPERIOR & ARIZONA MNG. & SMG. CO. ARIZONA

Fully described in Vol. XII. Properties sold in 1916 to **Superior Arizona Copper Co.**, which was absorbed by **Magma Copper Co.** in 1920.

LAKE SUPERIOR & WESTERN MINING CO. ARIZONA

Office: 208 Glencoe Bldg., Duluth, Minn.

Officers: A. Hagberg, pres.; A. Bjorkman, v. p.; A. Borgquist, sec.; A. Johnson, treas., with Magnus Olson, John Peterson, A. R. Norman, Ed. Falk and A. Kolstad, directors.

Inc. 1912, in Arizona. **Cap.** $1,000,000; $1 par; $250,000 issued; assessable, subject to calls from 60¢-$1. Authorized bond issue $300,000; $134,000 outstanding. Annual meeting, first Tuesday in February. Is a holding company, owning a ½ interest in the Big Pine Cons. Mng. Co., which see.

Property: the Mascot gold mine and a 100-ton cyanide plant at Crown King. After expenditure of $250,000 on the mine and mill, ore proved to be too low-grade to pay and property was abandoned. In 1915 a consolidation was effected with the **Big Pine Cons. Mng. Co.**, a $500,000 corporation, on the following basis: 200,000 shares of the Big Pine C. M. Co. stock were issued for the Big Pine properties and 200,000 shares and $32,150 in cash paid the Lake Superior & Western Co. for its mill, which was moved to the Big Pine ground. No recent information received. Corporation is now a holding company, whose only asset is apparently its 200,000 shares Big Pine Cons. Mng. stock.

LAUREL CANYON MINING CO. ARIZONA

Property: a lease on a group of claims in Graham county, owned by R. V. Dey. The mine has been sub-leased and is presumably producing.

LAVELL GOLD MINING CO. ARIZONA

Fully described in Vol. XIV. Property reported sold at sheriff's sale, August, 1920, and now owned by **Aztlan Gold Syndicate.**

Officers at last account: G. B. Leighton, pres.; C. P. Woodbury, v. p.; St. John Smith, sec.-treas., 66 Broadway, N. Y.

LAWLER; ESTATE OF JOHN ARIZONA

Address: care Ed. W. Wells, Prescott, Ariz.

Property: 6 patented claims in the Eureka district, Yavapai county.

Vein is 1.5′ wide, 3,330′ long, developed by tunnel, shaft and 10,000′ of lateral work. Average grade of ore is given as $23 in gold and silver; ore reserves 40,000 tons.

Mill equipped with 5 stamps, Wilfley tables and slimers, capacity about 15 tons. Now idle.

LAWTON MINES FINANCE CO. ARIZONA

Address: 1265 Broadway, New York, and Bank of Arizona Bldg., Phoenix, Ariz.

Owns a 50-ton custom mill near Turkey, Yavapai county, known as L. T. S. mill. Also controls the **Silver Cross Mining Co.**

LAYMAN SYNDICATE ARIZONA

Address: B. B. Smith, mgr., Patagonia, Ariz. Not an incorporated company.

Property: owned by Jas. M. Layman, consists of 13 claims, 220 acres, in Harshaw district, Santa Cruz county, known as the "Blue Nose," and also as the Abe Lincoln mine. **Development:** to depth of 160′. Credited with past production of $250,000 in lead-silver ore. See p. 278, Bull. 582, U. S. Geological Survey.

The mine had been closed down for 30 years. Present management cleaned out the old shaft, added a new compressor, and, at last account (1919), was shipping 4 cars of silver ore per week, yielding $1,000 net each.

LAZY BOY GOLD MINES CO. ARIZONA

Idle. **Address:** Oatman, Ariz.

Officers: W. K. Ridenour, pres.-treas.; J. A. George, sec.; J. H. More, v. p.

Inc. Sept. 9, 1915, in Ariz. **Cap.** $1,000,000; $1 par; 604,500 issued. Listed on San Francisco Exchange.

Spent $51,000 on development work, 1916-1917. Had $4,000 cash on hand, March 1, 1919. Authorized, November, 1921, by the state to sell 25,000 shares at 5c.

Property: 9 claims, 150 acres, in San Francisco district, Mohave county, shows several veins in andesite carrying gold values.

Development: by 220′ vertical shaft, with total workings of 750′.

Equipment: includes 300 cu. ft. compressor, 3 jackhammer drills, 40 h. p. gasoline hoist. Is considered one of the good prospects of the camp.

LEADVILLE ARIZONA MINES CO. ARIZONA

Office: Wenden, Ariz.

Officers: J. H. Finnegan, pres.; R. O. Worley, v. p.; A. F. Kinsman, sec.; J. M. Campbell, treas.

Cap. $150,000; 10c par.

Property: 5 claims on the south side of the Harqua Hala mountains.

LEADVILLE MINING CO. ARIZONA

Address: Courtland, Cochise county, Ariz.

Officers: Wm. Holmes, pres.-gen. mgr.; W. D. Monmonier, sec.; Pearce, Ariz.; Calvin Glenn and W. A. Stilson, directors.

Inc. 1905, in Arizona. **Cap.** $600,000; $1 par.

Property: 13 claims, 199 acres, patented, in the Turquoise district, includes the Leadville and Maid of Sunshine mines, showing contact deposits between monzonite and limestone. Ores are mainly malachite, azurite, and chrysocolla, with some chalcopyrite, and pyrite showing in the Maid of Sunshine mine. The orebodies said to carry an average of about 8% copper. Company is developing the Lower group on the 300′ level. There are 5 shafts, deepest 365′, and a 60′ tunnel.

Equipment: includes a 250 h. p. steam plant, 2 hoists and air compressor.

Property was under bond, 1916-17, to the **Needles M. & S. Co.**, for $600,000, and extensively churn-drilled, but bond given up in July, 1917. In 1920 the property was operated intermittently on company account.

LECORA COPPER CO. ARIZONA

Idle. **Office:** 500 Lonsdale Bldg., Duluth, Minn. **Mine office:** Globe, Gila county, Ariz. David Fairchild, treas. The old **Cordova Copper Co.** was taken over by its creditors and renamed.

Property: 21 claims, aggregating 270 acres, north of the Old Dominion mine and west of the Arizona Commercial.

Development: by the 1,225′ three-compartment Gem shaft with extensive crosscuts on the 1,100′ and 1,200′ levels, cutting the Gem and Future veins, which have shown a little ore occasionally, but nothing of commercial size.

Shipments made from a vein 5 to 8′ wide on the 1,200′ level, averaged 3.35% copper, 33% iron, 35% sulphur, with $1.30 in gold and silver.

Equipment: includes hoist and 12-drill air compressor. Management has struggled faithfully to make a mine, both east and west of Globe. No recent information received.

LEONARD COPPER CO. ARIZONA

Address: Gleeson, Cochise county, Ariz. J. W. Bennie, gen. mgr., Clifton, Ariz. J. E. Penberthy, supt., Gleeson.

Inc. 1910 as a subsidiary of the **Shannon Copper Co.**, which see.

Property: the Copper Belle mine, 8 claims, in the Turquoise or Courtland district, is opened by a vertical shaft and about 1 mile of workings, developing several orebodies on 3 different contacts. Ore is nearly solid pyrite, with considerable chalcopyrite and some bornite.

Equipment: includes steam plant with 2 hoists, compressors, repair shop, etc. Output normally about 150 tons per day, loaded directly into railway cars at mine and shipped over the A. E. & S. P. Railroad to Clifton.

LE ROY CONSOLIDATED MINES CO. ARIZONA

Address: Norman D. Lindsley, supt., Dos Cabezos, Arizona.

Property: a group of 7 claims near Dos Cabezos, Cochise county. Ore contains gold, silver, lead. A prospect.

LESZYNSKY COPPER MINE ARIZONA

Address: J. Leszynsky, owner, 32 Broadway, New York. **Mine address:** Clifton, Ariz. John Christy, lessee.

Property: 38 claims, 24 patented, in Morenci-Metcalf district, Greenlee county, showing a deposit of low-grade disseminated copper ore, said to average 2½%.

LEVIATHAN MINES CO. ARIZONA

Office: 512 Sellwood Bldg., Duluth, Minn. **Mine office:** Yucca, Ariz.

Officers: Theo. Hollister, pres.; G. Carlson, v. p.; W. T. Smith, sec.; C S. Tremelling, treas.

Inc. Oct. 14, 1914, in Arizona. **Cap.** $1,000,000; $1 par; 893,902 shares issued. Annual meeting first Tuesday in December.

Property: the Whale & Copper Wonder mines, 7 claims, about 120 acres, in Copper canyon, Cedar district, Mohave county, shows copper-molybdenite-silver ore in 2 quartz veins traversing an altered granite. The main orebody, said to be 7′ wide and proven for 600′ in length, runs N. 8° E. and dips 80° E. Ore said to average 1% molybdenum, with some copper and silver. Veins reported to be 14′ wide at 100′ level.

Development: 250′ shaft and 2 tunnels, 60′ and 400′ long, with 252′ and 400′ drifts.

Ore reserves: estimated at 100,000 tons blocked out.

Equipment: includes 100 h. p. and 50 h. p. oil engines, with complete concentrating plant of 50-70 tons daily capacity and flotation unit Refining plant at Vernon, Cal., for retreating concentrates and manufacture of ammonium molybdate, molybdic acid, calcium molybdate, etc.

Operations suspended December, 1919, owing to poor market for molybdenum.

LEXINGTON-ARIZONA MINING CO. ARIZONA

Office: I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oldtrails, Arizona.

Officers: Dr. C. H. Phinney pres.; Dr. C. M. Heberton, v. p.; H. R. Woods, sec.-treas., with R. M. Keeney and C. E. Woods, directors. H. E. Woods, mgr.

Inc. Feb. 12, 1912, in Ariz. **Cap.** $1,000,000; shares $1 par; 894,000 shares issued. Stock listed on Los Angeles Stock Exchange. Annual meeting, 4th Tuesday in September.

Property: 15 claims, 8 patented, 155 acres, at Oldtrails, in the Tom Reed-Goldroad district, Mohave county, shows fissure veins, from 6′-25′ wide, running N. W.-S. E. and dipping 75° N.-N. E. Ore occurs as quartz-spar, in andesite, and is said to assay from $2-$14 gold per ton.

Development: by numerous shafts from 45′ to 280′ in depth, the 3-compartment vertical shaft is to be sunk deeper.

Equipment: includes hoist, compressor, Cornish pump and electrical pumping equipment. Company also owns the townsite of Oldtrails. Idle.

LIBERTY COPPER MINES ARIZONA

Office: I. W. Hellman Bldg., Los Angeles, Calif.

Officers: E. M. Coplen, pres.; J. A. S. Furlonge, v. p.; G. C. Barnes, v. p.; J. L. Richardson, sec.-treas., with F. Huttig, C. B. McClusky and F. W. Morrissey, directors.

Inc. 1917, in Ariz. **Cap.** $10,000,000; $1 par; outstanding 4,915,937 shares. Annual meeting, 2nd Monday in June.

Property: the Jean group, 27 claims, 540 acres, near Copper Mountain, 3½ miles N. E. of Mayer, traversed by a ledge of mineralized schist, said to be from 50 to 150′ wide, and to carry gold, silver and copper values.

Development: 3-compartment vertical shaft to depth of 340′.

Equipment: 35 h. p. hoist, 200 cu. ft. compressor and pump.

Reported on by F. J. Hobson, D. G. Kidder, G. R. Fansett, R. W. Hart, C. P. Basye.

Mine still in prospective state; company too heavily capitalized.

LIBERTY SILVER MINES CO. ARIZONA

Formerly the **Arizona Consolidated Copper and Mining Company,** name changed by permission of the Arizona Corporation Commission, February, 1918.

Officers: C. H. James, pres.; M. J. Fink, v. p.; E. A. Abrahams, sec.-treas., with J. C. Forney, J. B. Anderson and J. C. Anderson, directors.

Inc. 1918, in Ariz. **Cap.** $1,500,000; $1 par; issued in payment for properties 750,000 shares. Security Transfer & Registrar Co., N. Y., transfer agent.

Property: St. Louis group, 15 claims at Greaterville, Pima county, reported to show 10 veins varying in width from a few inches to 20', occurring as a stockwork. A 30" sample at 90' depth reported to have assayed $2.80 gold, 16.9 oz. silver, 2.2% copper, 41.2% lead, 12.1% zinc. Developed by several shafts, deepest 200'.

Mail returned from former New York office and property reported sold at auction, Sept. 27, 1921, to satisfy a judgment.

LITTLE AJO COPPER MINING CO. ARIZONA

Officers: W. A. Knox, pres., Apex, Mo.; C. C. Wheeler, v. p.; O. T. Richey, sec.; C. E. Walker, treas., all of Tucson, Ariz.

Inc. 1917. **Cap.** $1,000,000; shares $1 par. First allotment of 100,000 shares treasury stock offered at 25 cents.

Property: 3 claims adjoining the mines of the New Cornelia, Ajo Consolidated and Cornelia Ajo, at Ajo, Pima county. Greater portion of the claims is covered with conglomerate, while the bottom of a 50' shaft is said to show slightly altered porphyry. Prospected by diamond-drilling, at 1,000', low-grade copper ore is said to have been encountered, continuing to bottom or 1,900' in sulphides. No recent returns.

LITTLE BOBBIE MINING CO. ARIZONA

Office: I. J. Lipsohn, sec.-treas., Phoenix, Ariz. Scott Lintner, mgr., Ray, Ariz.

Officers: W. J. Graham, pres.; J. Pollard, v. p.; S. J. Ross, sec.-treas., with Geo. Hershman and J. A. Ganz, directors.

Inc. 1917, in Arizona. **Cap.** $450,000; $1 par; 312,500 issued.

Property: the Bisbee group, 9 claims, 175 acres, 1½ miles S. E. of Ray, Pinal county, Ariz., adjoining the Ray-Broken Hill and Ray-Silver-Lead mines.

Ore: silver-lead in limestone, with some gold and copper.

Development: by 465' tunnel.

An option on the Little Bobbie held by Ray-Broken Hill M. Co. in 1919 was allowed to expire.

LITTLE EGYPT COPPER MINING CO. ARIZONA

Address: Mayer, Ariz.

Wm. A. Davidson, of Prescott, mgr.; A. L. Blumenauer, supt.

Inc. 1918, in Ariz., to take over the copper property of C. A. Vivian of Humboldt and W. O. Belford of Mayer. A grass root tunnel was driven in expectation of taking out sufficient ore to pay for development, and shipments made in 1919. Reported to be in financial difficulties necessitating reorganization, at last account.

LITTLE GIANT MINE ARIZONA

Operated by the **Black Giant Mines Co.,** which see.

LITTLE JUDGE MINING CO. ARIZONA

Address: care Elmo Bollinger, Kingman, Arizona.

Property: in Union Pass section, San Francisco district, Mohave county.

LITTLE TREASURE M. & D. CO. ARIZONA

Address: T. J. Prescott, Phoenix, Ariz.

Property: in Saddle Mountain district, near Christmas, Gila county, said to contain high-grade silver ore.

LOCEY PABST GOLD MINES CO. ARIZONA

Dead. Listed in Vol. XIV.

LOGOS MINES CO. ARIZONA

Dead. Claims re-located and known as the **Ferguson Group**, which see.

LOMA COPPER CO. ARIZONA

Company is a reorganization of the **Loma Prieta Mines Co.**, stockholders getting share for share.

Address: care T. G. Norris, Prescott, Ariz.

Officers: Arthur Hendy, pres.; J. I. Gardner, v. p.; R. H. Burmister, sec.-treas.

Inc. 1918, in Arizona. **Cap.** $2,500,000; shares $1 par. Annual meeting, 3rd Monday in Sept. 4,000 Loma Prieta shares sold for $31 the lot at public auction in New York, Dec. 16, 1920.

Property: 28 claims, 500 acres in the Copper Basin district, Yavapai county, 12 miles S. of Prescott, adjoining the Commercial mine of Phelps Dodge Corporation.

Ore: minerals are primary, chalcopyrite occurring with secondary quartz, and while high-grade bunches of sulphides appear, the deposit will be mined as a mass of low-grade concentrating ore of disseminated character. Samples show an average of about 2% copper, and 36 to 48c silver per ton. One carload shipped in 1917 assayed 8.6% copper, $1 gold and 1.5 oz. silver per ton.

Development: by 414′ shaft with drifts and crosscuts at 400′ level.

Equipment: includes steam hoist and compressor.

Is a property likely to develop a large tonnage of low-grade concentrating ore. Idle.

LOMA PRIETA MINES CO. ARIZONA

See **Loma Copper Co.**

LOMA VERDE MINE ARIZONA

Address: M. N. Andrews, mgr., Humboldt, Ariz.

Property: 2 miles S. E. of Humboldt, Yavapai county, known as the Lone Pine, when it was worked as a gold mine, is said to show copper-gold values, in a small body of concentrating ore. Developed by shallow tunnel and shaft. New equipment reported installed in 1920 and shipments planned to Humboldt smelter.

LONDON-ARIZONA CONSOLIDATED COPPER CO. ARIZONA

Office: 416 Ivestment Bldg., Los Angeles, Calif. **Mine office:** Hayden Junction, Gila county, Ariz.

Officers: J. E. Cowles, pres.; Frank Benedict, v. p.; Robt. J. Simpson, sec.-treas., with W. C. Thomas, J. E. Coffin, J. Knapp, B. P. Cheney and R. E. Sloan, directors.

Inc. Sept. 18, 1913, in Maine, as a merger of the London Arizona Copper Co., London Range, London Shamrock and Ball Copper companies. **Cap.** $12.000,000; $5 par; 920,500 shares outstanding. **Bonds:** $253.000 6% outstanding. Commercial Trust & Savings Bank, Los Angeles, trustee. U. S. Corporation Co., New York, registrar. Annual meeting first Tuesday in October.

Property: 132 claims, 2,100 acres, in the Banner district. (Ray quadrangle), 5 miles N. of Hayden. Claims form a compact group covering an extensive, well-mineralized area.

Geology: the tract shows a series of 1,500′ of well-bedded limestone, quartzite and shales resting on a laccolithic mass of diabase; these rocks are broken, faulted and later intruded by dikes and sheets of diorite porphyry, presumably the offshoots of an underlying batholithic mass of

granite material. The ore occurs in contact metamorphic deposits and replacements, especially in the limestone. Much of the ore consists of garnet (andradite, the lime and iron species) intergrown with specular hematite, copper sulphides and a variety of iron-magnesian lime silicate minerals. The copper ore occurs largely in "blanket" deposits, but also in fissures and vertical contacts. The main ore outcrop is 10 to 30′ wide and about three-fourths of a mile long, lying between beds of limestone and quartzite. Silver-lead ores do not occur in the contact deposits, but are found in limestone along the dike contacts where contact alteration is not noticeable.

Development: includes the 300′ Curtain and 182′ Arizona shafts developing the copper and the 90′ O'Carroll shaft developing the silver-lead deposits. Total development aggregates 11,000.' The O'Carroll ore bed has been opened by 60 shallow tunnels, covering a distance of 2,000′ along the outcrop, and management states ore has been extracted from practically all of them, sulphide ore having been encountered in four.

Production: to date from development, 15,443 tons copper ore, 1,016 tons lead ore, 51 tons zinc ore, 14,437 oz. silver.

The ores are shipped to the Hayden plant of the A. S. & R. Co.

LONDON-ARIZONA COPPER CO. ARIZONA

Office: 416 Investment Bldg., Los Angeles, Calif.

Officers: Chas. E. Finney, pres.; F. B. Pugh, v. p.; Robt. J. Simpson, sec.-treas., with Edward W. Brooks, D. C. Kurtz, S. F. Parrish, R. E. Sloan and B. P. Cheney, directors.

Inc. 1907, in Arizona. **Cap.** $10,000,000; $10 par; 592,260 outstanding.

September, 1913, the company transferred title to its property to the London-Arizona Cons. Copper Co. for 753,045 shares of stock of the latter, which it now holds in its treasury. For description of property see **London-Arizona Cons. Copper Co.**, also under same title in Vol. XI of this Handbook.

LONE STAR CONSOLIDATED COPPER CO. ARIZONA

Officers: Wm. H. Powers, pres., 209 Washington St., Boston, Mass.; Henry H. Folsom, sec.; A. G. Smith, treas. Chas. B. Spaulding, supt., at last accounts.

Inc. Aug. 6, 1906, in Maine, practically as successor of **Maravilla Copper Co.**, listed in Vol. VI. **Cap.** $5,000,000; shares $10 par.

Company controls the **Mineral Mountain Copper Co.**, through ownership of a two-thirds share interest, and, through majority stock ownership, the **Chase Creek Copper Co.** (Vol. XIV.).

Property: 32 claims, includes the Little Clara mine, developed by tunnel and shaft, and the Lone Star mine, in the Gila range, Lone Star district, Graham county, 10 miles N. of Solomonsville. The 900′ shaft is said to show a 5′ vein of sulphide ore carrying 8 to 10% copper, with fair silver values and a little gold, and also shows stringers of ore giving assays of 5 to 20% copper. Equipped with compressor and drills. Idle several years.

LONGFELLOW EXTENSION COPPER MINING CO ARIZONA

Address: Clifton, Arizona.

Officers: C. H. Thompson, pres.; W. J. Riley, v. p.; I. N. Thompson sec.

Property: 38 claims on Chase creek, Greenlee county, near Clifton, developed by 400′ tunnel with still some distance to go, to be under the mineralized copper ledge showing at surface. Presumably idle.

LOOKOUT COPPER CO. ARIZONA

Officers: T. G. Norris, pres., Prescott, Ariz.; A. W. Edwards, v. p. Geo. D. Morris, sec.-treas.

Property: the Lookout group, 5 copper claims; Mark Twain group, silver-lead claims; Davis group, 8 gold-silver-copper claims, in the Slate Creek district; Bodie group, 13 silver-lead claims, in the Hassayampa district; all in Yavapai county.

Development: a 100′ shaft was sunk on the Lookout with short levels t 45, 60 and 100′; 800′ north of the shaft are other workings, consisting of a rosscut to the vein and two drifts north and south with a 60′ winze nd raise to the surface from the north drift.

On the Bodie group of mines a good deal of development work was lone: a shaft was sunk some 340′, with levels at 55, 85, 170, 230 and 335′, ll said to show ore. The 3-compartment vertical shaft was started at a entral point.

Company work was stopped on all the Lookout properties in 1910. Part of the company's property was operated under lease in 1917. No re- ent returns. Fully described in Vol. XIV.

LOS ANGELES GEM CO. **ARIZONA**

E. E. Peck, pres. and gen. mgr.; C. W. Morrell, sec.-treas., at last ccounts.

Property: includes a variscite mine in Esmeralda county, Nev., but the rincipal property is the George Washington group of 6 claims in Mineral 'ark, Wallapai district, Mohave county, near Kingman. This property arries a vein of 18 to 24″ width, developed by a 143′ upper tunnel and a 70′ lower tunnel, said to show ore assaying up to 4% copper, 200 oz. silver nd $4 gold per ton. The company mined turquoise from the claims for ome years, before developing copper.

Equipment: includes gasoline hoist. Shipping in 1919.

LOS CONQUISTADORES MINING CO. **ARIZONA**

Office: Benson, Ariz.

Property: about 14 miles N. of Benson, in Cochise county, developed y 3 shafts, 80′, 115′ and 118′ deep. Gold quartz ore occurs in diorite, ematie and schist dikes. Probably idle.

LOST TREASURE MINING CO. **ARIZONA**

Out of business. See Vol. XIV.

LOUIS d'OR GOLD MINING CO. **ARIZONA**

Reorganized 1916 as **Louis d'Or Mng. & Mlg. Co.**, which see.

LOUIS d'OR MINING & MILLING CO. **ARIZONA**

Is a reorganization of the **Louis d'Or Gold Mining Co.**, which com- any was practically a reconstruction of the **Lost Gulch United Mines Co.** ontrolled by **Baldwin Syndicate,** 732 Monadnock Blk., Chicago, Ill.

Office: 372 Boylston St., Boston, Mass. **Mine address:** C. E. Hart, en. mgr.-purch. agent, Box 1899, Miami, Ariz.

Officers: I. W. Whitmer, pres.; G. M. Eggleston, v. p.; G. P. Baldwin, reas., with Theo A. Steller, Chas. E. Hart, O. M. Gale and H. S. Camp- ell, directors. G. O. Swarts, sec.

Inc. Nov. 29, 1916, in Ariz. **Cap.** $3,000,000; $1 par; increased in 1921 o $40,000,000; $10 par; 2,400,000 shares issued and held in escrow to Jan. 1922.

Property: 33 claims and fractions, 500 acres, partly patented, in Globe strict, said to show disseminated chalcocite ore in porphyry, the ore one underlying 180 acres, with a fairly uniform thickness of 400′. Entire lass is reported to average 1.15% copper.

Development: totaled 9,000′ of drilling for 12 holes. A new 2-compart- ient shaft was down 225′, October, 1921.

Company reports $123,000 available for immediate needs and official nnouncement is reported to have been made, November, 1921, that $6,- 00,000 is to be spent on a railroad, development and a mill of 12,000 tons aily capacity.

On the assumption that the above description is correct in every detail, his undertaking seems to be worthy of serious consideration, and might ven warrant the very large capitalization, but to develop what amounts o some 250,000,000 tons of ore with but 12 bore holes is not conservative ractice and certainly requires imagination.

LOUISIANA-ARIZONA COPPER MINING CO. ARIZONA

Address: R. A. Clampitt, Bisbee, Ariz.

A silver-lead prospect, 6 miles west of Bisbee, Cochise county.

LOWELL GOLD MINING CO. ARIZONA

Formerly **Horseshoe Basin Gold Mining Co.**

Mail returned address to A. F. Borrego, sec.-treas., Bisbee, Ariz. **Mine:** Quijotoa, Ariz.

Officers: J. L. Winters, pres.; J. P. Williamson, v. p.

Cap. 200,000 shares.

Property: 6 claims in the Quijotoa Mtns., Pima county, with a 28′ vein said to assay from $6 to $28 in free milling gold. Developed by numerous pits and an 80′ prospect shaft. Idle and probably dead.

LOWER CALIFORNIA METALS CO. ARIZONA

Plant sold and company defunct. See Vol. XIV.

LUCKY BOY MINING & MILLING CO. ARIZONA

Office: 581 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Ariz.

Officers: F. W. Remy, pres.; N. A. D'Arcy, v. p.; W. S. Tarbell, sec.-treas.-gen. mgr.; R. A. Watson, supt.

Inc. 1915, in Ariz. **Cap.** 1,000,000 shares; 10c par; 775,000 shares outstanding. Stock listed on San Francisco and Los Angeles Exchanges.

Company received permit to sell 25,000 shares at 5 cents each in Dec. 1920.

Property: 200 acres in the Tom Reed district, Mohave county, adjoining the Telluride on the S. and the Tom Reed on the S. W., said to show gold ore occurring in stringers of quartz and calcite. The shaft on the Friday claim is 425′ deep. Crosscut lacks about 100′ to cut vein. The Friday, Lucky Boy, Lucky Boy Annex and Hackshaw No. 6 claims reported April 1, 1919, leased on a royalty basis for a period of 5 years. In July, work was proceeding on the 450′ level, but in December, 1919, operations were reported suspended.

Equipment: includes 25 h. p. hoist, 200 cu. ft. air-compressor, 35 h. p. engine, compressor and jackhammer drills. Property considered promising. Idle in 1921.

LUCKY SAM MINING CO. ARIZONA

Mail returned from former office, 678 I. W. Hellman Bldg., Los Angeles, Calif.

Officers: W. S. Tarbell, pres.; G. M. Gilbert, v. p.; Geo. E. Fairhead, sec.-treas.; L. C. Randall, supt.

Inc. 1915, in Ariz. **Cap.** $100,000; shares 10c par.

Property: 12 claims, 235 acres, in the Tom Reed district, Mohave county, carries 2 main parallel veins, 4-6′ wide. Developed by 2 shafts, deepest 163′. A prospect and probably idle.

LUCKY SEVEN GOLD MINING CO. ARIZONA

Probably dead. See Vol. XIV.

LUCKY STRIKE MINING CO. ARIZONA

Address: J. S. Odorn, sec., Prescott, Ariz.

Property: 16 claims, including the Lucky Strike mine, in Hassayampa district, Yavapai county. Ore contains gold-silver-lead and iron.

Development: by crosscut tunnel, in 240′, April, 1921.

LUCKY STRIKE MINING CO ARIZONA

Office: 415 National Bank of Arizona Bldg., Phoenix, Ariz.

Officers: J. C. Brown, pres.; Arthur Luhrs, v. p.; A. G. Hulett, sec.-treas.

Inc. 1917, in Ariz. **Cap.** $1,200,000; $1 par.

Property: 160 acres, including the Old Stein property, in the Walnut Grove district, Yavapai county, 9 miles S. E. of Kirkland, said to have an iron vein, 3′ wide containing gold, silver and from 1.5% to 17% copper. Developed by 160′ shaft with 170′ of workings. Gold values are about $1.80 per ton No recent returns.

LYON COPPER CO. ARIZONA

Reorganized as **Arizona Merger Gold & Copper Co.**, which see.

MADIZELLE MINING CO. ARIZONA

Address: 410 Fleming Bldg., Phoenix, Ariz.

Officers: G. U. Young, pres.; E. C. Moore, v. p.; G. N. Cunningham, sec.-treas.; above are directors.

Inc. 1905, in Arizona. **Cap.** $500,000; $1 par.

Property: 25 patented claims, 2½ miles N. of Copper Basin, Yavapai county, and 6 miles W. of Prescott, said to show a quartz vein with schist hanging and porphyry foot-wall. Ore carries copper as chalcopyrite and bornite, with gold and silver values, and assays from $12 to $40 per ton. 25,000 tons and 5,000 tons in reserve, respectively.

Development: by tunnels from shafts, 500, 700, 800' and 130' long, with total of about 5,000' of workings.

Equipment: includes steam hoist, compressor, pump, steam and gas power, and 5-stamp mill.

MAGMA CHIEF COPPER CO. ARIZONA

Address: Box 247, Mesa, Ariz.

Officers: Geo. A. Johnson, pres.; K. Pomeroy, v. p.-gen. mgr.; F. T. Pomeroy, sec.-treas., with D. D. Moffat and and W. T. MacDonald, directors.

Inc. Oct. 4, 1913, in Arizona. **Cap.** $2,000,000; $1 par; 1,750,987 issued. Stock offered at 25c September, 1920. Annual meeting, 3rd Monday in September.

Receipts for 5 years were $285,206; balance Aug. 25, 1921, was $122. Current liabilities over assets were $5,013.

Property: 17 claims in Pioneer district, Pinal county. Examined by W. H. Hollis, F. M. Gordon, C. A. Kumke. The work on this property by tunnels and drill-holes gave disappointing results.

Company is now actively developing **Sombrero Butte Copper Co.'s** holdings, in the Copper Creek district, consisting of 9 claims, near Mammoth, Pinal county, which were acquired in December, 1918.

Development: by 300' shaft with levels at 120, 200 and 300'; an adit connects with shaft on the 120' level; in 8 months during 1920, extensions totaled 665', largely in ore. Ore shipments were made in 1919 and 1920; shipping ore carries 14-28% copper and up to 10 oz. silver; copper yield in 1920 was $8,570; total ore sales have been $14,615. Available ore is said to total 250,000 tons, averaging 9% copper and 6 oz. silver.

Equipment: includes hoist and 50 h. p. compressor.

The Superior property was energetically and well prospected, but is now closed down, probably for good. The Sombrero Butte mine appears to have the earmarks of a good producing property.

Operations were suspended Oct. 26, 1920. One year later a part of Sombrero Butte property was sold by the sheriff to satisfy a judgment, and plan to reorganize and refinance company was in contemplation, and to this end stockholders' proxies have been solicited on two different occasions, the last on Dec. 1, 1921.

MAGMA COPPER CO. ARIZONA

Office: 14 Wall St., New York. Mine office: Superior Pinal Co., Ariz.

Officers: Chas. F .Aver, pres.; Theo. Schulze and Wilbor Judson, v. p's H. T. Dodge, sec.-treas.; with Francis J. Oakes, Jr., John F. Alvord and T. A. Corliss, directors. T. A. Mackenzie, asst. sec.-asst. treas.; W. C. Browning, gen. mgr.; E. H. Lundquist, mine supt.; John H. Wattson, mill supt.; Erich Weber, pur. agt.

Inc. May, 1910, in Maine. **Cap.** $1,500,000; $5 par; 249,050 shares issued all Superior shares are converted into Magma. Transfer agent, Guaranty Trust Co., New York. Registrar, Bankers' Trust Co., New York. Listed on New York Curb.

Controls the **Patagonia Superior Copper Co.**, which see. Company owned also majority interest in **Superior Arizona Copper Co.** and, in October, 1920, its property and assets were acquired. Shareholders of the Superior company were entitled to receive $2 per share in cash, or during a period of 90 days from Oct. 20, 1920, they could exchange Superior shares for those of Magma on the basis of 20 shares of Superior for 1 of Magma. Also, has joined other Southwest companies in capitalizing the **Apache Powder Co.** by the purchase of $6,000 of stock; a plant for the manufacture of powder is to be erected at Benson, Ariz.

Balance Sheet:

Assets—

Year	Property & Plant	Investments	Cash & Copper	Other Current	Supplies	Total
1920.....	$1,398,818	$356,084	$1,328,271	$117,000	$188,960	$3,389,133
1919.....	1,143,093	365,468	1,262,903	752,152	205,109	3,728,725
1918.....	1,125,360	242,037	911,742	669,187	184,731	3,133,057
1917.....	1,060,129	242,037	1,073,743	381,080	165,821	2,922,810

Liabilities—

Year	Capital Stock	Current	Reserve	Surplus	Total
1920.....	$1,200,000	$373,336	$85,358	$1,730,440	$3,389,133
1919.....	1,200,000	831,823	69,008	1,627,894	3,728,725
1918.....	1,200,000	306,591	.....	1,626,466	3,133,057
1917.....	1,200,000	135,695	.....	1,587,115	2,922,810

Income Account:

	Metal Sales	Total Income	Total Expenses	Net Income	Dividends	Year's Surplus
1920.....	$2,364,557	$2,375,528	$2,272,983	$102,545	.....	$102.545
1919.....	2,208,038	2,252,235	2,074,157	178,078	.....	178,078
1918.....	2,897,823	2,916,689	2,397,339	519,350	$480,000	39.350
1917.....	3,235,070	3,246,206	2,178,220	1,067,986	504,000	563,987

Dividends: quarterly of 50c per share began September 30, 1915, were continued quarterly during 1917 and 1918 with an extra 10c Red Cross dividend during 1917. None since Jan. 6, 1919.

Property: in Pioneer district, Pinal Co., 531 acres, formerly known as the Silver Queen mine. Company owns a compact group of claims of 1,772 acres, of which 480 acres are patented, also 395 acres of mill sites, of which 31 acres are patented. Total, includes 358 acres of Superior Arizona, and other acquisitions of 1919 and 1920.

Geology: The known orebodies of the mine occur in a strong fault fissure filled with porphyry and cutting diabase, quartzite and limestone. The ore, with some bornite, is mainly chalcocite. Chalcopyrite appears on the 1,400′ level and in the diamond-drill holes. On the east end the vein is wide and leached, and is not considered to be of commercial grade, although on the 1,500′ level, a 5′ orebody has been followed for 1,200′, assaying 1.71% copper, 6.1 oz. silver and 0.025 gold.

On Superior ground, ore occurs along contacts of Upper and Lower Carboniferous limestones and especially where the bedding fault is cut by a cross fissure . Ore is oxidized to greatest depth developed and consists largely of iron and manganese oxides, though residual sulphides occasionally appear.

Development: on Magma, by old 800′ shaft, two new shafts, 1,838 and 2,082′ deep (Jan. 1, 1920) and a 1,628′ lower main tunnel on 500′ level connecting with all 3 shafts. Levels have been opened at 500′, 650′, 725′, 800′, 1,000′, then at 100′ intervals to 1,800′. No. 3 will be main working shaft and tunnel will handle shipping ore. A ventilating shaft (No. 4), 1,000′ E. of No. 2, had reached 189′, December, 1920. Extensions in 1919 and 1920 were 11,395 and 6,515′, respectively; total workings, Jan. 1, 1921, 64,238′ Consider

able exploratory work is done by drilling also, and in 1917 commercial ore was indicated at depth of 2,200; and in 1919 one hole found 19′ of ore, assaying 5.42% copper and 2.4 oz. silver.

In 1919, work was done on all levels between 1,200′ and 1,800′; width of orebody was 5′8″ to 13′, and length was 1,000′ on the 1,600′ and 800′ on the 1,800′ level; assays showed 4.9 to 10.8% copper and 2.1 to 5.1 oz. silver. In 1920, length of orebody was opened for an additional 300′ on the 1,600′ and for 600′ on the 1,800′ level; the average width on the latter was then 21.5′. **On Superior,** the principal working is the Charlton tunnel, which for 2,000′ follows the mineralized fracturing along the bedding plane between Devonian limestone and quartzite. This tunnel is 130′ vertically below the Holt tunnel, is connected with the latter by a 165′ winze on the dip of the vein and is 3,000′ long, showing ore assaying up to 30% copper. At the northern end of this long tunnel, there is an incline shaft sunk along the bedding plane at 26° inclination for 1,800′ with short levels at various intervals.

Some development was done during 1917 and 1918, when the production was 768,673 lb. copper from 4,130 tons of 10.08% ore, mainly by lessees; 0 tons of 43.78% manganese ore also was shipped. Some production is reported for 1919 also.

Development of Patagonia-Superior ground was not encouraging and work was stopped in November, 1920.

Ore reserves: estimated Jan. 1, 1921, as 827,000 tons copper sulphide ore assaying 5.0% copper, 3.0 oz. silver and .02 oz. gold per ton; 20,000 ons of lead-zinc ore, assaying 13.5% zinc, 2% lead and 12 oz. silver per ton.

Equipment: is electrical throughout but includes a 160 h. p. steam oist, now driven by compressed air, at No. 3 shaft, a Nordberg-Westinghouse hoist good for 3,000 depth, 2 air compressors one of 1,500, the other f 900 cu. ft. capacity, driven by a 225 h. p. motor and 3 vertical Aldrich umps, each driven by a 75 h. p. motor.

In August, 1914, the company completed a concentration and flotation ill, having a monthly capacity of 6,000 tons. Mine and mill are connected y a 2,600′ aerial tram. The Callow flotation process is used in the mill nd treats the tailing from the finishing tables. Recovery averages 94%.)re and concentrates are shipped to the plant of the A. S. & R. Co. at Hayden, Ariz. Alleging infringement of its flotation patents, Minerals eparation started suit against Magma early in 1919. Mill capacity was increased in 1919-20, and further increase is contemplated..

The company owns substantially all the shares of the **Magma Arizona Railroad Co.,** completed in 1915, a 31-mile narrow gauge road from Superior o Magma Junction, a station on the Arizona Eastern R. R. This line met xpenses in 1919 and 1920.

A 15-mile electric power line, with steel towers, connects with the line om Roosevelt Dam at Miami. The company has a contract for several ears with the U. S. Reclamation Service for electric power, at an approxiate cost of $49 per year and has constructed a 32-mile power line, connecting at Goldfield.

Production: in 1920 was 8,854,917lb. of copper, 303,258 oz. silver, ,437 oz. gold. The average selling price of the copper produced was 18.-2c. per lb. and cost 18.295c. (not including depletion), compared with 14.-2c. in 1919 and 16.425c. in 1918.

Crude ore shipped was 9,219 tons, assaying 17.105% copper, 8.389 oz. ilver, and $2.21 gold per ton. Mill ore; 91,653 tons, averaged 3.704% opper and 2.911 oz. silver. Tailing contained 0.382% copper and 0.38 oz. ilver per ton.

Total gross production has been 62,689,494 lb. of copper, 2,946,250 oz. ilver and 27,196 oz. gold from 560,063 tons of ore. Except for development, perations ceased on March 31, 1921, to await better market conditions.

Magma is regarded very favorably. It is one of the lowest cost copper producers of this country.

MAGMA EXTENSION COPPER MINING CO. ARIZONA

Mail returned unclaimed from former address: 110 N. First Ave., Phoenix, Ariz. Mine at Superior, Ariz.

Officers: John Cowan, pres.-treas.; Geo. A. Mauk, v. p.; H. F. W. Lampker, sec. with J. W. Spray, directors

Inc. 1917, in Arizona. **Cap.** $1,500,000; shares $1 par.

Property: 135 acres in Pioneer district, Pinal county, between the Magma Copper, and Silver King mines, geological conditions are reported to be similar.

No information received since organization.

MAGMA QUEEN COPPER CO. ARIZONA

Officers J. C. Callaghan, C. R. Bone and G. A. Mac Donald of Phoenix incorporators

Inc. Dec. 2, 1916, in Arizona. **Cap.** $1,500,000; shares $1 par.

Property: 10 full and 2 fractional claims, 208 acres, known as the Black Diamond and Magma King groups, at the northern end of the Pioneer or Superior district, Pinal county.

Geology: the Black Diamond ore deposit is a gently dipping bed of garnetized limestone, 12′ to 20′ thick, containing scattered grains and clusters of oxidized copper ore. This occurs at the contact between the limestone series of the region and the Silver King stock of granitic rock. The ore is flecked and spotted with stellate masses of micaceous hematite. Selected material for shipment shows 15% copper, 34.5% insoluble and 25% iron, but the average copper content of the deposit, so far as opened, was less than 2%. The Black Diamond orebody is 225′ long. Other claims show geological conditions which warrant prospecting work.

Development: work is limited to an incline, 48′ long, and various open cuts. The 450′ Black Diamond tunnel, 100′ below the ore bed, had not reached ore at last accounts.

Regarded as worthy of prospecting, at points not thus far attacked. Presumably idle.

MAGMA RAY COPPER CO. ARIZONA

Address: A. H. Woollacott, 261 I. W. Hellman Bldg., Los Angeles, Cal.

Property: 420 acres, known as the McSherry group, near Ray Junction, Pinal county. Probably idle.

MAGMA-SUPERIOR COPPER CO. ARIZONA

Address: care of Samuel Newhouse, Salt Lake City, Utah.

Property: is south of, and adjoins, what was originally known as the Lake Superior & Arizona claims, now owned by Magma Copper, at Superior. Pinal county. Geological conditions said to be favorable. Idle several years.

MAGMA SURPRISE MINING CO. ARIZONA

Idle

Officers at last account: G. J. Stone, pres.; V. B. Andreas, v. p.; J. J. Boyce, sec.-treas., with R. Krakauer and P. Howle, directors. **Cap.** $1,000,000; $1 par.

Property: 21 claims, 1½ miles S. W. of Superior, Pinal county.

MAGMATIC COPPER CO. ARIZONA

Address: 514 Mill Ave., Tempe, Ariz. Mine at Superior, Ariz.

Officers: J. C. Goodwin, pres.; T. J. Goodwin, v. p.; G. A. Goodman, sec.-treas.

Inc. 1917, in Arizona. **Cap.** $100,000; shares 10c. par.

Property: 21 claims, 440 acres, 1½ miles S. of the Magma Copper Co. mine, Superior, Pinal county.

Geological conditions are similar to the other parts of the district. Shaft 140′ deep is said to have passed through 20′ of rock carrying 18% of manganese, 34% of iron, with small gold, silver and copper. This shaft was being deepened at last account.

MAGNATE COPPER CO. ARIZONA

Adress: M. Brooks, treas., Liberty Bldg., Philadelphia, Pa.

Officers: C. Z. Jones, pres.; Carl M. Kneass, v. p.; J. R. Richards, sec.; Dr. T. M. Smith, gen. mgr., 44 W. Congress St., Tucson, Ariz.

Inc. Nov. 19, 1916, in Del. **Cap.** $5,000,000; $1 par; 2,499,500 in treasury. Empire Trust Co., New York, transfer agent.

Property: 29 claims, in Twin Buttes district, Pima county, 32 miles from Tucson and 4½ miles from railway at Twin Buttes. Reported to have option on Lucky Strike and Mesa mines.

Geology: surface shows appearance of producing "porphyry-copper" areas. Basal rock is a grano-diorite of varying grain. Most of the area is covered by a dense fine grained rock very greatly altered, but probably monzonite. Mineralization proceeded along dominant N. E.-S. W. fractures which are filled with quartz, pyrite and chalcopyrite. Erosion with oxidation of the pyrite, forming acid water, further changed the altered rock and formed a deposit of disseminated ore whose extent is not yet determined.

Development: by shafts, 150′, 118′ and 40′ deep, also by 3 drill holes. From the 118′ or No. 3 shaft, levels were driven at 35′ and 85′ depths with 625′ of workings. The deposit thus far developed shows veins and stringers of highgrade copper glance as a network in the disseminated material. Careful sampling showed 1½ to 2½% copper, 1½ oz. silver per ton. Ore contains a cupriferous turquoise.

Diamond drilling has gone some distance in confirming favorable predictions based on surface examination. Holes No. 1 and 2, indicate a blanket deposit 65′ thick; hole No. 3 is reported to show over 100′ of ore. Assays ran from 1.77 to 2.2% copper as averages. The overburden is slight. Only very little development work was done 1919-21.

MAGWOOD COPPER MINES CO. ARIZONA

Address: Geo. W. Magwood, pres., 304 Owl Drug Bldg., San Diego, Calif.

Inc. 1920 **Cap.** 2,000,000 shares; 450,000 shares reported underwritten by the **Standard Securities Co.,** of New York.

Property: 10 claims, formerly owned by the Eva Cons. M. & L. Co., in the Wickenburg district, Maricopa county. There are said to be 8 veins traversing the property. About 500′ of work has been done, and some $26 ore opened. Mine had been idle for several years.

MAJESTIC COPPER CO. ARIZONA

Office: First National Bank Bldg., Kansas City, Mo. **Mine office:** Oracle, Pinal county, Ariz.

Officers: E. A. Hosier, pres.; W. A. Neiswanger, v. p.; E. T. Wilder, sec.-treas.

Inc. as **Inspiration Mining Co.,** but sold its property, in the Globe district, to the **Inspiration Copper Co.,** and changed its name, March, 1909, to present title. **Cap.** $3,000,000; shares $1 par; $2,707,000 outstanding; bonds authorized, $25,000; $14,350 outstanding.

Former property: 6 claims near Oracle, on which assessment work was done for several years, has been abandoned. Company received from the sale of the Inspiration mine about $1,500,000. Inactive since 1917.

MALAPAI MINING CO. ARIZONA

W. R. Shanafelt, mgr., Kirkland, Yavapai county, Arizona or Canton, Ohio.

Property: near Kirkland, developed to depth of 320′. Ore contains gold.

MAMMON COPPER CO. ARIZONA

Formerly the **Mammon Gold & Copper Co.**

Address: W. M. Boyce, mgr., Parker, Yuma Co., Ariz.

Officers: E. S. Osborne, pres.; J. M. Patterson, v. p.; F. M. Hall, sec.; Geo. E. Farrell, treas., 69 E. Mohawk St., Oswego, N. Y.

Property: 32 claims in Cienega district, Yuma county 10 miles E. of Parker. In 1904 several carloads of oxidized copper ore were mined. Property passed through several hands until present owners acquired it.

Geology: ground largely covered with basalt. Schists show in watercourses and on lower slopes. The copper and accompanying hematite occur in distinct but small fractures, also in a persistent bedded or blanket deposit, apparently conformable to the overlying gneiss. The bedded vein has been the source of the ore mined, and must be relied upon as the main source of ore. Where fissures cross the orebed, ore occurs in fair quantities.

Development: by 178′ shaft and 2,000′ of tunneling said to have opened up a 13′ vein of 10% copper ore. Churn drilling was begun in 1917 and continued to depth of 420′. In 1920 a road was built to the east side of the property and diamond drilling is planned for 1921.

Production: about 500 tons, shipped at various times, ore averaging well in copper.

Is a property worthy of careful exploration by drilling.

MAMMON GOLD & COPPER CO. ARIZONA

Name changed in 1920 to **Mammon Copper Co.**, which see.

MAMMOTH COLLINS MINE ARIZONA

Owned by **Saint Anthony Mining & Development Co.**, which see.

MAMMOTH DEVELOPMENT CO. ARIZONA

Reorganized as **St. Anthony Mining & Developing Co.**, which see.

MANHATTAN DEVELOPMENT CO. ARIZONA

Idle. **Address:** W. G. Rice, sec.-treas., Post Office Blk., Houghton, Mich., J. H. Rice, pres.

Inc. March, 1905, in Arizona. **Cap.** $200,000; $10 par; $5.50 paid in.

Property: 37 claims, 600 acres, owned in fee, in the California district, near Paradise, Cochise county, covers upwards of 2 miles of the outcrop of a mineralized zone lying W. and N. of the holdings of the **Chiricahua Development Co.**

Development: by several shallow shafts, deepest 80′, and a 450′ crosscut tunnel, latter showing leached ore and a little high-grade ore, with indications of persistent values at greater depth.

In 1913, company purchased the **Arnold Mining Co.** property, near Santa Cruz, Sonora, for $88,000. This property is developed by a 300′ shaft and has shipped 12% ore to the Cananea smelter. The company's previous operations have been mainly in the Yaqui region of Sonora.

MANIFEST COPPER & SILVER CO. ARIZONA

Address: Box 494, Globe, Ariz.

Officers: W. Kitzmiller, pres.; W. R. Henry, v. p.; W. W. Crawford sec.-treas., with J. W. Morrell and (Mrs.) C. Kitzmiller, directors.

Inc. in Arizona. **Cap.** $3,000,000; $1 par; 35,000 outstanding.

Property: 43 claims in Pioneer district, Pinal county, 20 miles from Globe and 12 miles from Hayden. Was silver producer in the 80's.

Development: to 85′ depth, totaling 2,000 feet.

Geology: sulphide ore occurs in a contact fissure in quartzite. It is reported to carry 10 to 30 oz. silver, $1.50 gold, 10 to 35% lead, and 1½ to 6% copper.

Under bond in 1921 to Beard & Komiski, who erected a 10-ton concentrating plant.

MANITOU HILL COPPER CO. ARIZONA

Idle and probably dead. Mail returned unclaimed, 1919.

Company was a reorganization of the Pinto Creek Mining & Smelting Co., and by consolidation later acquired the property of the Five Points Copper Mining Co. Fully described in Vol. XIV.

MANSFIELD MINING & SMELTING CO. ARIZONA

Office: 317 Ridge Bldg., Kansas City, Mo. **Mine office**: Patagonia, Santa Crutz county, Ariz.

Officers: Frank D. Reasor, pres.; H. A. Sutermeister, v. p.; C. E. Sweet, sec.; Chas. L. Cookson, treas.; preceding with Harry J. Richards, A. W. Safford, and A. E. White, directors.

Inc. May 26, 1906, in Arizona. **Cap.** $8,000,000; shares $1 par; shares issued 7,156,905. Bonds, $100,000 authorized, at 6%, all outstanding. Annual meeting second Monday in January. Company owns no mining property but in reorganization proceedings, 1914, acquired stock interests in **Ruby Copper Co.** and **Southern Arizona Mining Co.**, now the **Cons. Southern Arizona Mining Co.**, which see. Also see Vol. VIII and XI. Copper Handbook, for early history.

MARICOPA MINES CO. NEVADA-ARIZONA

Dead. Fully described in Vol. XIV. Property now owned by **Austin Nevada Mines Co.**, Nevada, which see.

MARS CONSOLIDATED CO. ARIZONA

Probably dead. **Address**: care F. J. Webber, Colorado Springs, Colo. Company is the successor of the Heckley Gold & Copper Mining Co.

Property: 13 claims, in 3 groups, on Copper Hill, in the Black Rock district, Yavapai county, shows 3 veins developed by a 268′ tunnel.

MASCOT COPPER CO. ARIZONA

Office: 71 Broadway, New York. Mine Offices: Dos Cabezos, Cochise Co., Ariz.

Officers: T. N. McCauley, pres.; D. S. Stevenson, v. p.-treas.; R. V. Dixon, v. p., H. J. Jilbert, J. W. Phillips, N. Poon Chew, A. Johnson, A. W. Rathbun, O. Rich, A. R. Orr, E. A. Ely and F. M. Utt, directors. J. W. Prout, Jr., gen. mgr.

Inc. July, 1907, in Arizona. **Cap.** $15,000,000; $10 par; outstanding, 1,412,200 shares.

Financial statement dated Aug. 31, 1920, shows current assets, $12,733 and current liabilities, $472,780, including loans, $218,355, and matured Bond Interest coupons, $193,140.

Property: 56 claims, 22 patented, 1,100 acres, about 800 acres being classed as mineral lands, in the Dos Cabezos district. Company also owns a town site near Dos Cabezos, and miscellaneous lands, including placer claims, total holdings over 1,100 acres.

Property shows limestone near a granitic area, intruded by diabase dikes and quartz porphyry with a covering of rhyolite, on part of the ground. The limestone shows in the lower hills on the south. Granite constitutes the two pillars known as Dos Cabezos. The ore occurs in lenses in contact deposits between altered lime and diabase. In many instances chalcopyrite is found in the diabase magma and shows a metasomatic replacement. Ores cary chalcopyrite in a gangue of contact minerals with 3 to 20% copper, the average being 5%, and small gold-silver values.

Development: by the 450′ Oregon shaft, and 2 tunnels, longest the 1,800′ Consolidated tunnel, connecting with the shaft at the 4th level. Total underground openings aggregate 33,000′, and ore in sight is estimated by the company at about 1,000,000 tons, containing 5% copper. About 32,500′ of diamond drilling has been done in various parts of the property.

Equipment: includes 100-ton concentrating plant, two 250-h. p. distillate engines, two 12-drill air compressors, machine shop, electric lighting plant, smithy, telephone system and boarding house, with about 80 buildings. The company finished building the Mascot & Western R. R. a 15-mile line connecting the town of Mascot with the S. Pac. R R. at Willcox, Arizona. A 10,-

000' aerial tram, capacity 1,200 tons per day, is used for carrying ore and supplies between mine and railway.

Production: 1918, 13,276 tons containing 3% copper and 0.5 oz. silver.

Property is reliably reported as promising. In 1920, **Central Copper Co.** of Arizona took a 20-year lease on holdings of the Mascot Copper and is actively developing both properties.

MASCOT MINING CO. **ARIZONA**

Letters returned from last address: 1318 Majestic Bldg., Detroit, Mich. Company not favorably regarded. See Copper Handbook, Vol. XI. for full description of properties. Presumably dead.

MATT PERRY MINING & MILLING CO. **ARIZONA**

Owned a gold property, near Quijotoa, Pima county, 80 miles west of Tucson; is reported under bond and lease to A. F. Borrego, and J. R. Hibbs, at last account. Property has an old mill which needs overhauling.

MAVERICK COPPER CO. **ARIZONA**

Mail returned from former address: Florence, Pinal county, Ariz.

Property: the Iron Spring mine, 35 claims shows a strong outcrop, carrying finely disseminated chalcocite, estimated to average 3% copper.

Development: by a shallow shaft and a number of prospect pits and shafts. Annual assessment work only has been done since 1910, when the Copper Queen Co. relinquished its $100,000 bond on the group.

MAVIS MINE **ARIZONA**

Address: F. G. Heath, National Bank Bldg., Long Beach, Cal.

Property: 5 patented claims in the Cienega district, Yuma county, 10 miles N. of Parker, adjoining the Empire Arizona Cons. Co.

Development slight. A 25' shaft furnished 14 tons of ore running 19 to 30% copper, and $15 to $18 gold

MAYER ORE PURCHASING CO. **ARIZONA**

Address: P. O. Box 134, Mayer, Ariz. H. A. Wagner, mgr.

Cap. $300,000; $1 par; all issued,

Does a general custom sampling business. Also buys ores, operates a custom concentrator, assay-office, ore-testing plant, etc., and is installing a leaching department for oxidized copper ores.

Company leased and remodelled the Gray Eagle mill, to which all shipments are consigned.

MAYER SMELTER CORPORATION **ARIZONA**

Dead. Fully described in Volume XIV. Plant sold at foreclosure sale in 1920 to John Borg, who deeded the property to H. A. Wagner, of the Mayer Ore Purchasing Co., Mayer, Arizona.

MAY MINING CO. **ARIZONA**

Office: Sidney, Ohio. **Mine**: Mayer Ariz.

Officers: M. L. Heffelman, pres.; J. D. Barnes, sec.; H. C. Heffelman, mgr.

Cap. $200,000 $1 par.

Property: 2 patented claims, in Big Bug district, Yavapai county, adjoining the Blue Bell on the north. Copper ore occurs in a fissure vein in schist, claimed to be 2' wide and to be a continuation of the Blue Bell lode. Developed by 200' shaft with 700' of workings. Has been idle of recent years. Appears to be worthy of further exploration and development.

MAZATZAL MINING CO. **ARIZONA**

Former address: Globe Ariz.

Officers at last account: W. C. Stanley, pres.; A. J. Crossley, sec.-treas., with G. B. Peart and W. Thomas, directors.

Inc. Jan. 25, 1917, in Arizona. **Cap.** $3,000,000; $1 par; 1,029,000 issued

Property: 65 claims, 1,300 acres, in Mazatzal district, Gila county, said to show gold-silver-copper deposits in granite, schist and porphyry. Veins dip 70° N. E., and pitch N. W. Ore is both oxide and sulphide.

Development: by 1,000′ tunnel, in which 3 fissure veins were cut varying from 1 to 3′ in width, and showing copper ore assaying from $4 to $125 per ton. Reserves reported fairly large.

Presumably idle since 1918.

McCRACKEN SIVER-LEAD MINES CO. **ARIZONA**

Office: 622 Higgins Bldg., Los Angeles, Cal. **Mine P. O.:** Yucca, Ariz. Mines at McCracken, Ariz.

Officers: W. B. Van Horne, pres.; H. H. Mather, v. p.; J. H. Hoffman, sec.-treas.; Leonard Hoffman, gen. mgr.

Cap. $1,500,000; $1 par; 1,200,000 issued.

Property: owns the Atlanta Extension group of 10 claims and controls the adjoining Ostego mine, in Greenwood district, Mohave county.

Development: by tunnels and 300′ shaft with 2,500′ of drifting. Company estimates ore reserves of about 400,000 tons, worth $15 per ton. Mill ore contains from 5 to 15% lead and 6 to 15 oz. silver per ton. Two carloads crude ore shipped are reported to have returned 71% lead, 4.3 oz. silver.

Equipment: includes air-compresor, hoisting engine and 100-ton mill, employing dry concentration. The first shipment of concentrate was made late in September, 1919.

McKINLEY MINING & DEVELOPMENT CO. **ARIZONA**

Fully described in Vol. XIV. Company without funds, was reorganized 1920 as **Capital Copper Co., which see.**

McMAHON GROUP **ARIZONA**

Address: Zonia, via Kirkland, Yavapai County, Ariz. Owned by C. H. McMahon and brothers, under option to Zonia Copper Co., care of P. Gibbon Spilsbury, P. O. Box 1123, Phoenix, Arizona.

Property: the Cuprite mine and a group of 8 claims, south of Zonia. Ore zone reported as 700′ long, containing 8 shoots 50 to 75′ long and 3 to 20′ wide, assaying 2 to 9% copper in oxidized zone.

Development: consists of several shallow shafts. Shipments were made in 1919 to Douglas, Arizona.

McMILLEN-STONEWALL MINING CO. **ARIZONA**

Address: Globe, Gila county, Ariz. V. Y. Smith, pres-gen. mgr.; C. N. Lightle, sec.-treas.

Inc. March, 27, 1907, in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: 34 claims, in the Richmond Basin, 16 miles N. E. of Globe, Gila county, carry 3 miles of the strike of the Stonewall Jackson vein, of 25 to 35′ average width. It includes the Stonewall Jackson mine, worked 1876-83, with an estimated production of about $500,000 of silver ore, of high average grade.

Development: by the 300′ three-compartment McMillen shaft and the old 600′ Stonewall Jackson shaft, latter showing no stoping done below 230′. The mine is said to have considerable ore carrying 5 to 50 oz. silver per ton, with about 40,000 tons of low grade silver ore on the old dumps.

Equipment: includes an old stamp mill and a small cyanide plant. A full and favorable report on the property was made May, 1912, by R. B. Wagner.

In 1914, property was bonded to G. H. Hayes and explored by diamond drilling, which proved unsatisfactory owing to the broken nature of the ground. No recent reports. Mail unanswered. Probably idle.

MERRIMAC MINE. **ARIZONA**

Owned by Geo. Cleeland of Philadelphia, Pa., but bonded to J. C. Rankin in June, 1917. A. W. Henning, supt.

Property: a mile west of Chloride, Mohave county, is developed by 400′ incline and new shaft sunk in 1917. The vein is said to be 22′ wide, and cuts through porphyry and diorite. Ore carries gold, silver, lead and zinc.

Production: totaled $175,000 to end of 1916. Nothing reported since then.

MIAMI CONSOLIDATED MINES CO. **ARIZONA**

Address: P. O. Box 1446, Globe Ariz.

Officers: R. L. Pinyan, pres.; with J. A. Pinyan, J. H. Thomson, Theo. Phillips, G. J. Davis, Irva Linley, J. B. Kendall and E. G. Schulze, directors. Chas. W. Slack, sec.

Inc. 1916, in Arizona. **Cap.** $2,500,000; $1 par; 1,336,000 issued.

Property: about 200 acres S. of and adjoining Inspiration Consolidated, Southwestern Miami, and Inspiration Needles properties at Miami. Originally held by 19 different owners. In 1915, prospectors shipped 272 tons of 2.6 to 5% copper ore, in 1916, 100 tons of rich ore, and previously 500 tons of 3 to 6% ore, all coming from two well defined areas, north-central and southern.

Development: churn-drilling was continued during 1918. No. 1 hole down about 1,000', is said to have passed through sulphide ore at 420'; No. 2 found sulphides at 585', this ore understood to be an extension of the Live Oak ore body of the Inspiration Co. No. 3 hole reported to have struck chalcocite ore.

Property warrants further drillling to determine extent of orebody. Only assessment work being done owing to lack of funds.

MIAMI COPPER CO. **ARIZONA**

General offices: 61 Broadway, New York; Du Pont Bldg., Wilmington, Del. **Mine office:** Miami, Gila county, Ariz.

Officers: Adolph Lewisohn, pres.; J. Parke Channing, v. p.; cons. eng.; Sam A. Lewisohn, treas.; with J. H. Susmann, Wm. H. Nichols, Walter T. Rosen, E. H. Westlake, F. W. Estabrooke, B. Hochschild and Theo. L. Herrmann, directors; Herman Cook, sec; F. W. Maclennan, mgr.; J. H. Hensley, Jr., mine supt.; F. W. Solomon, mill supt.; R. B. Yerxa, asst. mill supt.; F. J. Pearce, pur. agt.; W. F. Williams, chief clerk; Arthur Stonham, auditor.

Inc. Nov. 30, 1907, in Delaware. **Cap.** $4,000,000; shares $5 par; originally $3,000,000 increased Nov., 1909, to $3,500,000, and again increased Aug., 1910, to present amount. Of this last increase in capitalization, 60,000 shares were offered to stockholders at $18 per share. Of the issued stock, 300,000 shares were given, Nov. 1907, in payment for lands; 20,000 share were issued April, 1908, at $5 per share; 100,000 shares were issued Aug., 1908, at $10 per share; 60,000 shares were issued Aug., 1910, at $18 per share, and of the balance, 88,236 shares were set aside for conversion of bonds, and 52,886 shares remain unissued. **Debentures,** $1,500,000 first-mortgage 10-year 6% gold bonds have been retired .

Sales on N. Y. Stock Exchange during 1920 totaled 163,735; range was $26 in January and $14⅛ in December. In 1921 to October 1 range was 24⅛ to $15¾.

The company is controlled, through stock ownership, by the **General Development Co.** Mechanics & Metals National Bank, New York, and Old Colony Trust Co., Boston, registrars; Bankers Trust Co., New York, and American Trust Co., Boston, transfer agts. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, third Wednesday in April.

Comparative General Balance Sheet:

	Assets:					
	Property & Equip.	Devel.	Metal on Hand	Other Current	Stock Invest.	Total
1920....	$29,658,835	$1,197,331	$2,035,943	$1,822,122	$5,843,431	$40,557,662
1919....	25,085,584	780,837	3,720,549	1,041,119	4,457,818	35,085,907
1918....	25,207,559	825,688	2,897,773	1,624,294	5,103,920	35,659,234
1917....	25,279,255	946,418	1,721,784	2,589,688	1,929,354	32,466,499
1916....	4,582,483	1,207,071	5,419,056	1,893,412	100,000	13,202,022
1915....	4,593,765	1,416,994	3,017,566	299,163	100,000	9,427,488
1914....	4,465,743	1,535,208	966,489	471,712	100,000	7,539,152

Liabilities:

	Capital Stock	Res. for Mine Depl.	Capital Surplus (a)	Accounts. Pay	P. & L. Acct.	Total
1920....	$3,735,570	$12,509,689	$21,861,035	$2,451,368	...(b)....	$40,557,662
1919....	3,735,570	8,239,751	18,672,204	2,279,496	$2,158,886	35,085,907
1918....	3,735,570	6,433,002	18,672,204	2,478,894	4,338,564	35,659,234
1917....	3,735,570	4,160,165	18,672,204	1,187,565	4,710,995	32,466,499
1916....	3,735,570	423,588	1,995,412	831,816	6,215,636	13,202,022
1915....	3,735,570	.....	1,995,412	521,161	3,175,345	9,427,488

(a) Premium on shares, less expense of issue. (b) Adjustment of depletion and depreciation of $1,932,182 for years 1913 to date gives a year's deficit of $186,528.

Income Account

Year	Revenue *	Operating Expenses	Deprec. and depletion	Dividends	Year's Surplus
1920.....	$10,146,088	$6,638,153	$2,093,741	$1,494,228	$ 80,034†
1919.....	10,756,647	8,966,095	2,102,444	1,867,785	2,179,677†
1918.....	14,616,298	8,779,906	2,846,811	3,362,013	372,432†
1917.....	10,823,336	5,581,231	2,037,845	6,537,247	3,332,988†
1916.....	13,163,895	5,164,293	2,147,042	4,295,906	1,556,654

* Includes copper on hand, and other income. † Deficit.

Dividends: $1.50 per share in 1912; $2.00 in 1913; $1.50 in 1914; $2.25 in 1915; $5.75 in 1916; $8.75 in 1917; $4.50 in 1918; $2.50 in 1919: $2.00 in 1920: $2.00 in 1921; 50c. on Feb. 15, 1922. Shareholders have received over $8,000,000 in the last 4 years.

Property: 222 acres, mining claims, patented, 555 acres held for the mill and power plant and 345 acres for water rights, in the Miami district, 6 miles west of Globe.

Geology: claims cover an area of silicified schist at and near a contact with a great intrusive body of granite, known as Schultze granite. The altered schist belt averages about 1,200′ in width and has a generally E.-W. direction. The granite merges into granite porphyry at its borders, and this and offshoots, or dikes of the granite in the schist, are mineralized along the ore belt. This is seen in a dike with E. W. strike, of 40 to 60′ width, mineralized in the same manner as the schist.

The schistose area is netted with contraction fractures and later fissuring due to metasomatic changes of volume, accompanying mineralization and alteration. The ore belt is marked by silicification and intense alteration of the schist, a change that fades out into natural gray schist a few hundred yards north of the Miami and Inspiration mines. The ore zone is oxidized and leached to an average depth of 210′, this part containing small seams and veinlets of oxidized ore. Below this leached belt a few feet of mixed ore is succeeded by the zone of disseminated glance, a rather soft, much altered rock, specked with tiny grains and films of chalcocite.

See also Professional Paper 115 of U. S. Geological Survey by F. L. Ransome.

Mining Methods: the mine contains two separate orebodies known as the Main and Captain. In the former, topslicing produces 3,000 tons per day; in the latter, which consists of lower-grade ore, a system of shrinkage stoping with undercutting and caving of the pillars is used. The production by this method is also approximately 3,000 tons per day.

In the topslicing methods, haulage levels are laid out 150′ apart vertically, with drifts spaced 50′ apart horizontally, and along these drifts raises to the slicing levels are spaced 50′ apart. One sub-level 50′ above the haulage level is installed for the purpose of distributing air from the fans through the

raises to the various slices. The slices are mined in blocks 250′ square and 10′ high. Each block is a unit in itself, being served by its own supply raise and manway. The extreme horizontal dimensions of this orebody are 1,000′ x750′.

During 1919, the undercut caving system was adopted also for the Main orebody, the 570′ haulage level being at present used for this purpose.

The Captain orebody is about 350′ thick, with extreme horizontal dimensions of approximately 500′ square. This is developed by a haulage level below the orebody, and hand tramming levels at suitable vertical intervals above the haulage level in the orebody. The hand tramming level consists of drifts 25′ apart, with drawing off chutes spaced along them at intervals of 6¼′ apart on the alternate sides of the drifts, thus tapping the orebody at intervals of 12½′ apart in all directions. The ore is soft, and caving, is induced by putting up narrow shrinkage stopes at right angles to the drawing off drifts, and subsequently caving the pillars between them by undercutting. The ore is drawn off from the chutes uniformly and trammed in 20 cu. ft. cars and dumped through raises to the haulage level, where it is transported to the shaft in trains made up of 30 cars of 3.3 tons capacity, by 6-ton electric trolley locomotives.

Reported in 1919 that the ore then available in the Captain orebody would be exhausted by May, 1920.

Development: by extensive underground operations, supplemented by churn drilling. Up to the end of 1918 drill holes of 640′ average depth had been drilled to the number of 117. Drill-holes were put down at the corners of 200′ squares. Drill borings in the vicinity of the mine have shown commercial ore to at least 115′ additional depth below the 720′ level of the mine.

The mine is operated through a 4-compartment shaft, with a main hoist capable of hoisting 10,000 tons of ore per day, and an auxiliary hoist for hoisting timber and supplies. These hoists are operated from their own boiler plant using oil as fuel. California crude oil is used for fuel for which storage capacity for 1,000,000 gals. is provided.

A new shaft, No. 5, similar in size to No. 4, the present main working shaft, has been sunk to a depth of 936′ so as to safeguard the continuous operation of the mine and to facilitate the segregation of the ore into two classes; it will also provide a haulage level and ore pocket for the deepest ore at present known to exist on the property. This shaft has been concreted.

During 1919-20, connection was made between old workings and No. 5 shaft on the 320, 570, 720 and 850′ levels; the 720′ will be the main haulage level for mining the orebody between it and the 570′ level.

Extensions were 42,118′ in 1916; 25,476′ in 1917; 14,872′ in 1918; 14,552′ in 1919; 41,925′ in 1920. The total is 73.4 miles.

Ore reserves: Jan. 1, 1921, figured at 10,723,410 tons of 2.26% sulphide ore and 36,000,000 tons of 1.06% sulphide ore. In addition there are 6,000,000 tons partly developed mixed sulphide and oxide ore of an approximate grade of 2% copper. These figures are reliable, because of the unusually thorough manner in which the ore has been developed and blocked out and the well-known conservatism of the management. A very large part of this ore is actually blocked out underground, and the estimated average percentage is based upon thousands of careful assays, made of samples taken at 5′ intervals, throughout the workings. It is probable that further development of the mine will develop more or less additional ore, possibly above what is considered the present payable limits.

Power generation: the power house contains four 600 h. p. water tube boilers, one 530 h. p. water tube boiler, and two additional boilers, each of 610 h. p. capacity. The power house also contains two 4,000 cu. ft.

steam-driven air compressors and three 1,000 k. w. 4-cylinder triple expansion steam driven electric generators, and two independent steam driven condensers. Installations in 1919 have increased the total boiler capacity to 8,000 h. p. and that of the power plant to 7,000 k. w., with spares of about 3,500 k. w.

The main shaft has 2 Nordberg hoists, the larger for raising ore having 2 drums of 10′ diameter with 55″ face, capable of handling 1,000′ of 1⅜″ rope. An auxiliary hoist has 16x16″ cylinders with a drum of 8′ diameter and 6′ face for hoisting the man cage. The ore hoist raises two 7½-ton skips which are dumped directly into the pockets of the crusher building.

The crusher building, at No. 4 shaft, of 6,000 tons daily capacity, has Chalmers-Williams crushers, breaking ore to 1¼″ size, the product being fed through two 4x10′ trommels to four 62x18″ rolls that crush oversize to half-inch cubes. Ore then goes by belt conveyor, Miami type, heavy duty Traylor, to the mill bins.

In 1919, a new shaft-house, head frame, and 250 h. p. auxiliary hoist was installed at No. 5 shaft; equipment including crusher plant was completed in 1920-21.

The concentrator, originally designed by H. Kenyon Burch, with initial capacity of 2,000 tons daily, since increased by remodeling to 6,000 tons daily is on a hillside south of the ore deposit, permitting gravity handling, and with a large acreage nearby, available for tailings. The mill building is of steel and stands on concrete foundations and in interior construction steel and concrete are used almost exclusively.

Ore treatment: in the crusher building ore is reduced by gyratory crushers and rolls to pass a ¾″ hole, and is then delivered by belt conveyors, equipped with automatic weighing device, to bins behind the mill, with a total capacity of about 10,000 tons.

The mill proper is divided into six sections described as follows: from the bins, ore is carried by belt conveyor to an 8′x36″ Hardinge mill loaded with 4″ balls. The product of this mill passes to a Dorr classifier, where the finished product made up to this point is separated. The oversize from this classifier is divided between two 8′x30″ Hardinge mills loaded with 2″ balls, each operating in closed circuit with a Dorr classifier, and in these, the reduction of the entire feed to finished size (minus 48-mesh) is completed. The ore-pulp is then subjected to treatment by flotation in pneumatic flotation cells, which are a modification of the original Callow design.. These cells are fitted with air bottoms covered with a porous medium through which is admitted air for aeration of the pulp. The total area of air bottoms in one section is 539 sq. ft. Air is supplied by a Root's blower with a capacity of 5,000 cu. ft. of air per minute at 6-lb. pressure, driven by a 150 h. p. motor. After flotation, the sand contained in the flotation tailing is subjected to treatment on Deister sand and slime tables. Concentrates pass through tunnels to the concentrate handling plant. The original plant consisted of round tanks with filter bottoms subjected to vacuum, but this is no longer used, and concentrates are now prepared for shipment by filtering. This plant consists of four Dorr thickeners 60′ diam. by 12′ depth, from which the thickened product passes to three 12′ Oliver filters. From these the concentrates are delivered by belt conveyor direct to railroad cars.

The above description represents the latest flow-sheet adopted for the plant. Concentrates produced in the mill assay about 42% copper, and are being shipped to the International smelter at Miami.

Experiments on the treatment of the oxidized ore are being tried out in a 100-ton test plant; results have been encouraging, though not definite.

Water supply for the mill comes from the Old Dominion mine at Globe, and from two 16" wells equipped with centrifugal pumps, at the lower end of the Miami wash. Here is the main pumping plant, equipped with two Nordberg pumps of a capacity of 1,250 gal. per minute each. Water is delivered to the mill through a 14" pipe to two steel storage tanks with a capacity of 500,000 gals. each.

Buildings include machine shop, ware houses, change house, store, boarding house, bunkhouse and upwards of 150 frame dwellings for employes, all lighted by electricity. There is a substantial office building erected at a cost of $15,000, a club house and recreation hall, and a hospital owned jointly with the Inspiration Consolidated Copper Co.

Early in 1917 a Y. M. C. A. building was erected in the town of Miami at a cost of $85,000. This is operated by the Industrial Branch of the Y. M. C. A., and membership is open to all residents of the district.

Mine is served by an extension of the Arizona Eastern railroad from Globe to Miami.

Production: begun March, 1911—

	Tons Treated	Oper. Cost p. Ton Mine	Mill	Total	% Cu.	% Rec.	% Cncts.	Cu. Lb. Rec.	Cu. Net Prod. Lbs. Cu. (a)	Cost* per Lb.	Selling* Price
1920.....	1,801,958	$1.301	$0.827	$2.522	1.968	82.48	43.540	32.47	55,581,328	11.898	18.69
1919.....	1,698,446	1.540	.924	2.915	2.040	82.38	43.868	33.60	54,221,638	15.812	18.27
1918.....	2,132,941	1.360	.722	2.417	2.026	71.15	40.147	28.82	58.407,563	14.833	25.195
1917.....	1,640.206	1.268	.691	2.284	2.032	69.25	43.040	28.15	43,863,699	12.51	29.150
1916.....	1,842,017	1.119	.589	1.937	2.07	73.88	42.492	30.58	53,518,331	9.523	24.469
1915.....	1,348,122	1.016	.579	1.878	2.17	75.17	41.91	32.66	41,832,059	8.765	17.331
1914.....	1,096,633	1.188	.499	1.959	2.28	69.93	39.31	31.96	33,296,010	9.204	13.349
1913.....	1,058,784	1.603	.572	2.465	2.30	71.06	38.09	32.68	32,867,666	10.609	15.240
1912.....	1,040,744	1.203	.659	2.042	2.39	69.39	37.02	33.21	32,832,609	9.588	16.582
1911.....	445,036	1.213	.627	2.011	2.48	73.37	40.36	36.39	15,385,783	9.103	13.03

(a) Smelter returns. * Cost and selling price is cents per pound.

In 1921, production averaged about 4,250,000 lb. per month.

Production was lessened by the 1917 strike which started July 2; the property was closed down for seven weeks and after resuming work normal production was not reached until the end of the year. I. W. W. and Union recognition were the basic troubles.

In 1914 the Minerals Separation Co. brought suit against the company fo rinfringement of patent, and in the final decision given in 1917 by the U. S Circuit Court on appeal, Miami was declared to have infringed the M. S. patents. An accounting is still in progress. It is said that the process now used is entirely different from that employed when the suit was started, yet in November, Minerals Separation had started further suit for alleged continued infringement, and prayed for a supplemental injunction which the court refused. The request of Miami on May 26, 1920 to reopen original proceedings, was also refused.

Exploitation of Miami orebodies has become largely a routine matter which made it possible in 1920 to reduce mining costs by 24c per ton from those of 1919. Miami sells its metal independently and has been forced to curtail its operations during 1919 and 1920 by about 25% only, and has continued to pay dividends, although at a reduced rate. It was one of the few large copper producers to continue production throughout 1921.

The Miami is a property of demonstrated worth and the management is thoroughly experienced and capable. Company is particularly frank in giving information concerning all operations.

MIAMI MERGER CO. **ARIZONA**

R. C. Ellwood, pres., Miami, Ariz.

Inc. 1916, in Arizona. **Cap.** $2,500,000; $1 par.

Property: 1,350 acres of land "controlled" by the company. So far as we know, no work of any consequence was ever done on this property, promoters' efforts being confined to selling worthless stock at high prices

to the innocent speculator or investor. The market was created through the manipulations of Harry Lefkovitz, who also handled **Miami Cons. Mines Co.** and Inspiration Needles. Mr. Lefkovitz who has changed his name to Lefko, was arrested in Los Angeles, Dec., 1918, by the Federal authorities, put on trial, in New York and convicted Dec., 1919.

This company was a rank fraud from start to finish.

MIAMI MINING & MILLING CO. **ARIZONA**

Address: Box 764, Globe, Ariz.

Officers: P. R. McDowell, pres.-treas.; W. D. Hunter, v. p.; M. W. Tanner, sec.-gen. mgr.; with K. W. Holbert and C. L. McDowell, directors.

Inc. in Ariz. **Cap.** $1,000,000; $1 par.

Property: 50 acres at Doak, in the Globe district, Pinal Mountains, is said to show 8 veins, containing gold, silver and lead.

Development: by 900′ crosscut tunnel.

Equipment: 50 h. p. air-compressor installed in 1918. The 250-ton mill of the Arizona Butte was purchased from W. J. Porter, of Globe, July, 1919.

A prospect. Idle, pending reorganization.

MIAMI MOTHER LODE MINING CO. **ARIZONA**

Address: Miami, Ariz.

Officers: W. Schafer, pres.; F. W. Solomon, v. p.; G. D. Barclay, sec.-treas., with A. Reid, E. Schafer, H. W. Faust and H. E. Gragge, directors.

Inc. in Arizona. **Cap.** $5,000,000; shares 50c par.

Property: consolidated claims of Manitou and other companies, totaling 1,100 acres, in Miami district, Gila county.

Development: by 325′ shaft said to have cut 18″ vein on the 200′ level and disclosed several lenses of ore in other workings.

No recent returns, presumably idle.

MIAMI NEEDLES COPPER CO. **ARIZONA**

Idle and probably dead.

Officers: D. R. Williamson, pres., P. O. Box 1056, Miami, Ariz.; F. Beston, v. p.; F. W. Ham, sec.-treas., with Geo. J. Stoneman, directors.

Inc. 1912. **Cap.** $500,000; $5 par.

Property: 11 claims on Needle mountain, about 5 miles west of Miami, Gila county, slightly developed.

Is apparently succeeded by **Inspiration Needles Copper Co.**, which see.

MIAMI SMELTER **ARIZONA**

Works address: L. O. Howard, supt., Miami, Ariz.

A copper smelter owned by **International Smelting Co.**, and described thereunder.

MICHIGAN & ARIZONA DEVELOPMENT CO. **ARIZONA**

Office: 905 Metropolitan Life Bldg., Minneapolis, Minn. Mine near Helvetia, Pima county, Ariz.

Officers: C. C. Prindle, pres.; R. M. Bennett, v. p.; Chas. W. Sexton, sec.-treas. This company reorganized the **Helvetia Copper Co.**, under a plan explained in Vol. V. Formerly owned a considerable share interest in the Helvetia.

MICHIGAN VERDE COPPER CO. **ARIZONA**

Probably dead. Mail returned from Jerome, care of **Western Copper Syndicate**, P. O. Box 325, Phoenix, Ariz.

Officers at last account: L. B. Eaton, pres.; A. M. McLillan, v. p. and treas.; E. D. Bowles, sec.

Inc. 1916, in Arizona. **Cap.** $2,000,000; 50c par; 800,000 shares held indefinitely in pool by Arizona Corporation Commission to enforce its orders.

Property: 29 claims, 535 acres, which according to the company's literature and "ex-geologist" Bethune, contains "outcrops" in a connecting belt of schist and diorite. No development is claimed, but the stock-sellers advertised that the property is owned outright and the money derived

from stock sales (offered at 50c in June, 1917), would be used for development.

The Michigan Verde was one of the worst of the many very questionable promotions of the boom days in 1916. The manner of its promotion and the character of its sponsors were open scandal in the camp, and when the company lost its option and the Arizona Corporation Commission ordered the return of its promotion stock and forbade the sale of shares, it was thought that the last had been heard of it. It is apparent that in 1919 a new and different directorate was successful in getting by the Commission prohibition, since the Western Copper syndicate, which had a postoffice box at Phoenix, Ariz., was advertising stock and sending out the same old hackneyed stories about the United Verde mine, and among other misleading statements alleging that the property end-lines the United Verde Extension property, whose mine workings are 1½ miles away, though an outlying undeveloped group of claims belonging to the latter, does lie between Michigan Verde and the U. V. mine.

From the known dip and extent of the orebodies of the United Verde and its neighbor, United Verde Extension, it is certain that the Michigan Verde is entirely outside of any possible extension of those ore deposits. The geologic report published by the company is a rank example of supposedly technical writing.

MIDDLE GOLCONDA MINES CO. ARIZONA

Holdings now owned by **Highland Mining & Milling Co.**, which see.

MIDDLE HACKBERRY MINING CO. ARIZONA

Address: Kingman, Ariz.

Officers: W. H. Raplee, pres.; T. J. Sparkes, v. p.-gen. mgr., with W. B. Ridenour, directors. J. H. Townsend, sec.-treas.; T. D. Walsh, cons. engr.

Inc. 1920, in Arizona. **Cap.** $150,000; 10c. par.

Property: near Kingman, Mohave county, is to be developed by 500′ shaft.

MIDDLEMARCH COPPER CO. ARIZONA

Now **Arizona Middlemarch Copper Co.**, which see.

MIDDLETON MINE, INC. ARIZONA

Address: C. C. Clark, Tucson, Ariz. B. G. Addams, supt.

Property: 600 acres, 40 miles S. W. of Casa Grande in the Black Range district, Pinal county, contains copper, gold and silver bearing ore. Planning erection of leaching plant.

MIDLAND COPPER CO. ARIZONA

Office: E. G. Bush, P. O. Box 1206, Tucson, Ariz. **Mine:** Twin Buttes, Arizona.

Officers: E. G. Bush, pres.-treas.-mgr; J. R. Ricketson, v. p.; G. H. Langworthy, sec.; S. J. Gunn, supt.

Inc. 1917, in Arizona. **Cap.** $2,000,000; $5 par; issued 600,000.

Property: the Queen group, 5 claims in the Twin Buttes district, Pima county, formerly owned by the **Twin Buttes M. & S. Co.** Silver-copper sulphide ore occurs in contact veins between porphyry and limestone with dip of 55°, course E. W.

Development: by 600′ shaft and 2,700′ of workings.

Equipment: 150 h. p. semi-Diesel engine, compressor and hoist.

Production: about 600 tons of ore per month, averaging 8% copper.

MIDWAY MINING & MILLING CO. ARIZONA

Described in Vol. XIV. Succeeded by **Midway Moss Mining Co.**, which see

MIDWAY MOSS MINING CO. ARIZONA

Successor to **Midway M. & M. Co.**, described in Vol. XIV.

Address: A. B. Allison, sec., 1311 S. Figueroa St., Los Angeles, Calif.

Officers: Wilbur Atkinson, pres.; Jas. A. Fay, v. p.; D. A. McMillan, treas., with F. E. Shaffer, C. L. Egar and F. A. Link, directors, all of Los Angeles.

Inc. May, 1919, in Arizona. **Cap.** $1,000,000; $1 par; 500,000 shares issued. Security Transfer & Registrar Co., N. Y., transfer agent. Annual meeting 2d Monday in May.

Property: 14 claims, patent pending, 173 acres, in San Francisco district, Oatman, Mohave county, adjoining the Arizona Mossback and said to cover 5,365′ of the Moss vein.

Development: by 202′ shaft, to be deepened to 500′.

Equipment: includes 3 gas engines, two compressors, air drills, two pumps and several buildings, installed and completed in 1920.

MILDRED GOLD MINING CO. **ARIZONA**

Address: Leonard White, supt., Stanton, Ariz. H. M. Canover, pres.

Property: 14 claims near Congress Junction, Yavapai county.

Development: 4,000′ of shafts, drifts, etc. Tunnel 1,150′ long has been driven from mill level connecting with main vein and incline shaft at depth of 520′.

Equipment: 2 hoists, 10-stamp mill and water supply 1¼ miles long.

MILE WIDE COPPER CO. **ARIZONA**

Main office: Tucson, Ariz.

Officers: C. P. Reiniger, pres. and mgr.; L. E. Jettinghoff, sec.; Prescott Lyon, treas. The president with C. W. Freeman, E. C. Carter, W. H. Singer and F. C. Douds, directors.

Inc. May, 1916, in Arizona. **Cap.** $5,000,000; shares $5 par; all outstanding. Annual meeting, July 7th.

Property: about 55 claims and 2 mill sites, about 1,400 acres, on the south side of Amole Peak, 18 miles from Tucson. Claims are divided into groups: the Copper King, Orient, Copper Mountain and Esperanza, with the Oro Fina placer claims and Copper King and Copper Crown mill sites.

Geology: fully described in Vol. XIV.

Development: main development on the Copper King group is by 300′ incline shaft with levels at 100′ and 200′.

Production: During 1918 reported shipping 4 cars monthly, averaging about 8% copper, to the Sasco smelter, from three of the ore "pockets."

Equipment: 25 h. p. gas hoist, 500 cu. ft. compressor, 100 h. p. F. M. gas engine, 60 h. p. gas engine and hoist, store and buildings.

The properties of this company do not come up to the very rosily-painted descriptions given out by the brokers who held an option for 51% of the stock, the balance being owned by the company's manager.

Property closed down early in 1919 and application made for a receiver in February, 1920, stockholders claiming mismanagement and misappropriation of company funds by the company. Litigation still pending.

MINE OPERATORS CO. OF AMERICA **ARIZONA**

Address: Wm. D. Steadman, Miami, Ariz.

Incorporators: W .D. Steadman, W. J. Scott, of Miami, Ed. Arhelger, . Cubitto, J. H. Mayer and F. W. Rolando of Globe Ariz.

Inc. 1918, in Arizona. **Cap.** $3,750,000; $5 par.

Property: low-grade copper-manganese mine in Globe district, Gila ounty.

A prospect.

MINERAL HILL CONSOLIDATED COPPER CO. **ARIZONA**

Office: 1014 Frick Bldg., Pittsburgh, Pa. **Mine office:** Tucson, Pima ounty, Arizona.

Officers: Robt. Law, Jr., pres.; E. B. Reeser, v. p.; Jas. A. Dunn, sec.-reas. and F. A. Minard, cons. engr.

Inc. March, 1904, in Arizona, as successor of Azurite Copper & Gold Mining Co. **Cap.** $3,200,000; shares $1 par.

Property: the Azurite mine with 26 claims, 12 patented, 520 acres, in the San Xavier district, 18 miles S. W. of Tucson, said to have produced $555,000 worth of ore under former ownership. Company also controls the American group of 8 claims and the Mineral Hill group of 5 claims. The mine is claimed to have a large body of sulphide ore averaging about 3.5% copper.

Developments: on the 500 and 600′ levels said to have disclosed a large body of 4% copper sulphide ore. Has shipped about 60,000 tons of carbonate ore in past.

Development: by 74 pits and open cuts, 8 tunnels, longest 250′ and 3 shafts, deepest 600′, mine having a total of about 2 miles of workings.

Equipment: includes gas engines, electric generators, air compressor, pumps, etc.

Operations suspended, April, 1921.

MINERAL PARK MINES, INC. **ARIZONA**

Address: M. B. Dudley, Kingman, Ariz.

Property: includes the Toledo and Argo claims, in Mineral Park district, Mohave county, N. W. of the Rural Mines and under same management.

MINES & DEVELOPMENT CORPORATION **ARIZONA**

Address: Martin Fishback, mgr., Johnson, Ariz.

Property: the **Arizona & Michigan Development Co's.** group of 7 patented claims, 140 acres, in Cochise county, taken over in Aug., 1919, on a 10-year lease.

Principal formations are porphyry and limestone. Claims said to carry 4 orebodies, one opened by vertical and incline shafts and tunnels, showing a 5′ vein with poorly defined walls and impregnations in the limestone hanging and porphyry footwall. Has a 450′ two-compartment main shaft with 24 openings showing cuprite, malachite and copper sulphides said to give average assays up to 12% copper, 18 oz. silver, and $1 gold per ton.

Equipment: 60 h. p. gasoline engine with double-drum hoist, 200 h. p. boiler and compressor. Company owns a short railroad connecting with the Southern Pacific Railway at Dragoon. Developing at last account.

MINGUS MOUNTAIN COPPER CO. LTD. **ARIZONA**

Office: 516 Grant Bldg., Los Angeles, Cal. Mine near Jerome, Yavapai County, Ariz.

Officers: W. W. Thomas, pres.; A. Gleason, v. p.; J. R. Thomas, sec. with A. M. McDermott, A. J. McDermott, and E. R. Jeffrey, directors.

Inc. June, 1900, in Arizona .Cap. $3,000,000; shares $1 par; issued $2,400,000.

Property: 5 claims, 100 acres, in the Black Hills district, 12 miles south of Jerome, the nearest railroad point, has good surface showings of carbonate ores. Assays from 2,800′ vein traversing property, N. E.-S. W., are reported to show .02 oz. gold, $1.45 silver and 6.39% copper Orebody claimed to be 45′ in width, with dip of 60° E., but ore has only been found in bunches and streaks.

Development: by 4 shafts, deepest 430′, with several tunnels, giving a total of 4,240′ of workings.

Equipment: includes 50 h. p. steam plant, with 2 hoists, good for 1,000 each, and several mine buildings. Out of cash and idle some years.

MINNESOTA-CONNOR MINING & MILLING CO. **ARIZONA**

Address: P. S. Virgin, mgr., Chloride, Ariz.

Officers: H. B. Hanford, pres.; J. T. Jackson, v. p.; J. S. Freeman sec.; J. O. Kerbaugh treas.; the first three of Philadelphia Pa.

Property: 13 claims, 1½ miles S. of Chloride, Mohave county, said to carry the outcrops of 17 distinct veins.

Development: by 725′ vertical steel-lined shaft, also 4 inclines from 100 to 530′ deep. At 600′ depth the main vein is 15 to 25′ wide, but of low grade. At 700′ it is 38′ wide, also poor. West of the shaft is a 20′ vein, the Pluto, which is expected to join with the Minnesota below 700′.

Equipment: three 100 h. p. boilers, 75 h. p. hoist, 900 cu. ft. compressor, lighting plant, mill engine and 150-ton concentrator.

Production: totaled $1,150,000 to end of 1916. Work was suspended late in 1916 for want of funds.

MISSOURI-MOHAVE MINING CO. **ARIZONA**

Address: G. W. Marks, mgr., Cerbat, via Kingman, Ariz.

Property: in the Cerbat range, Mohave county, reported to have opened up a 4′ vein of lead-zinc ore carrying gold, on the 100′ level. No recent returns.

MOHAVE MOLYBDENUM CO. **ARIZONA**

Idle; perhaps dead. See Vol. XIV.

MOHAWK CENTRAL MINING CO. **ARIZONA**

Property: the Mohawk mine at Mammoth, a once profitable silver-gold mine. In recent years, the lead molybdate of the dumps and old workings proved valuable here as it has at the adjacent Mammoth mine. Idle.

MOHICAN COPPER CO. **ARIZONA**

Office: 304 Wilcox Bldg., Los Angeles, Cal. **Mine office**: J. V. Allison, Supt., Bouse, Ariz.

Officers: W. G. Miller, pres.; B. A. Kipp, v. p.; Rol. King, sec., with G. M. Swindell and Christ Walter, directors.

Inc. March 25, 1914, in Ariz. **Cap.** $2,000,000; $1 par; 1,200,000 issued. Transfer office: Security Transfer & Registry Co., New York. Listed on New York and Boston curbs. Balance sheet of March 31, 1918, showed that from March 26, 1914, to March 31, 1918, development cost $86,514, and $14,673 was expended for equipment. There was $480 cash on hand, and $3,500 notes payable.

Property: 31 claims, 9 patented, 5 miles W. of Bouse, in Plomosa district, Yuma county, said to show copper sulphide ore, with some gold.

Development: by 512′ shaft with others 35, 60 and 110′ deep, and total workings of 2,683′. At depth of 300′, 500′ from shaft, a 50′ vein wes cut. It was leached, but contained lenses and streaks of high-grade copper ore. On No. 1 level, and in a winze below No. 2 there is ore.

Equipment: includes hoist and compressor.

Examined by J. W. Finch, W. A. Farish, and T. A. Keegle. Reported, December, 1921, that a little development is being done.

MOLINE & ARIZONA COPPER CO. **ARIZONA**

Formerly the **Globe Mining Co.**

Office: Moline, Ill. **Mine office**: Globe Ariz.

Officers: B. F. Baker, pres.; J. F. Harper, v.-p.; R. C. Schallberg sec.-treas., Moline Ill. with J. F. Heckman, F. B. Walker, G. A. Schallberg, directors.

Inc. 1918, in Arizona. **Cap.** $2,000,000; $1 par; 860,000 outstanding.

Property: 21 claims, patented, 335 acres, 2½ miles north of Globe, shows granite-porphyry, syenite, quartzite and diorite ,carrying fissure veins in diorite of 2 to 100′ width, with gossans giving assays of 2 to 6% copper, 4 to 30 oz. silver and $2 to $28 gold per ton. The Mineral Farm group includes the Vacey-Constance mine, worked 1886 for silver, and said to have produced upwards of $100,000 worth of ore under former ownership. this group having upwards of 20 old pits and shafts, of 10 to 165′ depth. The Mineral Farm group shows altered sedimentary and igneous rocks, with iron dikes and a complex fissure system. The Mineral Farm

vein, of about 4′ width, gives assays of 4.8% copper and up to 132 oz. silver and $7.44 gold per ton, and the group also shows a 20′ vein, said to sample 22% copper, 9% zinc, 2 oz. silver and $4.96 gold per ton, which seems excessive. Developed by 400′ vertical shaft, short tunnels, etc. The Eagle Pass group has a 215′ two-compartment shaft, between 2 iron outcrops.

Equipment: includes a 60 h. p. boiler, 10″x14″ hoist and air compressor. There are 6 mine buildings. Examined and favorably reported, on by F. Tovote, J. T. Bickel.

Property idle pending financing of company.

MOLLY GIBSON-CHLORIDE MINES CO. ARIZONA

Address: Chloride, Ariz.

Officers: R. C. Ferguson, pres.-mgr., Chloride, Arizona; E. N. Phillips, v. p.; J. A. Gilbert, sec.; J. C. Wilson, treas., with C. H. Hortenstein, F. W. Ferguson and H. M. Thompson directors.

Inc. 1916, in Arizona. **Cap.** $150,000.

Property: 3 claims, and a fraction, 1,000′ S. W. of the Tennessee mine, Chloride district, Mohave county. Ore carries silver and lead, with some gold and copper, occurring in fissure veins, 4-7′ wide.

Property is a meritorious prospect, which present managment plans to develop by sinking a 200′ shaft, 135′ deep, August, 1921, and driving a crosscut to connect the two main veins.

Equipment: includes a 25 h. p. hoist, and a 10 x 10″ Sullivan compressor. **Production:** totaled $100,000 to 1916.

Company promoted by W. B. Twitchell of Phoenix and others.

MOLYBDENUM MINING CO. ARIZONA

Officers: F. J. Wharton, pres.-mgr.; J. M. McBride, sec. Tucson, Ariz.

Inc. 1909, in Ariz. **Cap.** $1,000,000; $1 par.

Property: about 200 acres of land in the Baboquivari Mtns., Pima county, 50 miles S. W. of Tucson, with 4 shafts, deepest 80′. Claimed to have a ledge 300′ wide. In 1917 the State Corporation charged that company was selling stock without a permit. A prospect.

MOLYBDENUM PRODUCTS CO. ARIZONA

Officers: F. H. Hereford, pres.; Harold Steinfeld, v. p.; Alan Kissock sec.-treas. and mgr., with Hiram Corbett, R. K. Shelton, K. G. Smith and Maxwell Miltors, directors.

Inc. June, 1916, in Arizona. **Cap.** $100,000; $1 par; 30,000 issued

Company owns no mines but operated a reverberatory, and electric furnace at Tucson, buying wulfenite ores, mainly from **Arizona Rare Metals Co.** Was one of the largest producers of ferro-molybdenum in the United States in 1917.

MONARCH MINING & SMELTING CO. ARIZONA

Closed down. **Former Address.** Wickenburg, Ariz.

Officers at last account: W. O. Donovan, Vidalia, Ga., chairman; J. H. Mulholland, pres. and gen. mgr.; Jas. R. Vaughan, v. p.; J. B. Everridge, v. p.; J. H. Mulkey, sec.-treas.; officers are directors. A. D. Akin, cons. engr.

Inc. Aug. 1904, in Ariz. **Cap.** $1,000,000; increased to $1,500,000 in 191 and to $3,000,000 in 1914.

Bonds: $100,000 1st mtge., issued 1913; $57,400 outstanding. Assets of company given as $62,523 over liabilities, Jan. 1915.

Property: 6 claims, patented, 100 acres, known as the Ryland or Three Black Buttes group, in the Black Rock or White Picacho district, Yavapai county, 9 miles N. E. of Wickenburg, shows diorite and schist carrying oxidized ores changing at shallow depth to chalcopyrite and occasional bornite, said to assay 2 to 20% copper and estimated by management to average 1 to 3 oz. silver and $3 to $15 gold per ton.

Development: several shallow shafts and tunnels of 600 and 300′ with about 1,500′ of underground workings and several thousand feet of surface trenching.

Equipment: includes a 50 h. p. distillate engine, 5x8" Rumsey triplex pump, and a 4-drill Sullivan compressor. There are about 26 buildings, all owned by the company. Water is taken from the Hassayampa river through 7 miles of 4" pipe-line.

Development proved surface ores to be badly broken, not continuous and occurring in pockets. Former management counted on raising funds for deep development by milling surface ores, but with wet concentration process used in 100-ton mill, major part of oxides and carbonates was lost in the tailing. Mill was therefore closed down after trial run.

MONROE COPPER MINE **ARIZONA**

Address: John Curran, owner, Walker, Yavapai county. Mine, once owned by the **Monroe Cons. Mines Co.** long dead, is near the Junction of Knapp gulch and Lynx creek, near Prescott. Formerly worked as a gold mine and said to have a 50' dike carrying copper ore on the 300' level.

Development work consists of various tunnels.

Idle.

MONSTER CHIEF MINING CO. **ARIZONA**

Mail returned unclaimed from former office: 27 William St., New York. Mine south of Jerome, Ariz.

Officers at last account, the late Wm. Barret Ridgely, was pres.; A. P. Thompson, cons. engr.; George Graham Rice, fiscal agent.

Cap. $2,000,000; $1,050,000 issued for property. All available information on the company was from George Graham Rice's house organ. Stock 1c bid, 12c asked at Jerome, October 20, 1917. No present quotations obtainable.

Property: 22 claims, 400 acres, adjoining the Green Monster on the southeast and the Jerome-St. Louis on the east. Mine is wholly undeveloped and without camp or equipment. Is an undeveloped prospect.

A report by Arthur Perry Thompson, geologist, describes a big vein called the Green Monster, crossing the Revenue claim of the Green Monster Co., into the Monster Chief group. Idle and probably moribund.

MONTANA-ARIZONA COPPER CO. **ARIZONA**

Probably dead. Described in Volume XIV.

MONTE CRISTO MINING & MILLING CO. **ARIZONA**

Address: Wickenburg, Ariz.

Officers: Ezra W. Thayer, pres. and chief owner, Phoenix, Ariz.; A. F. Pickett, sec.

Inc. Nov. 23, 1903. **Cap.** $2,000,000; $1 par.

Property: Monte Cristo silver mine, adjoining the **Arizona Copper Belt** mine near Constellation, in Black Rock district, Yavapai county. The mine shows very remarkable high-grade native silver ore which in the bottom of the mine is changing to copper ore.

Development: by 1,100' shaft with over 6,000' of workings.

Mine reported sold in 1920, to W. H. Worthington and Grover Hubbel, Wickenburg. The new owners installed a 10' K. & K. flotation plant making a 95% recovery.

MONTE DE COBRE COPPER CO. **ARIZONA**

Dead. Listed in Vol. XIV. See **Barbara mine.**

MONTEZUMA MINING & MILLING CO. **ARIZONA**

Officers at last account: J. P. Waldron, pres.; Philip Nohe, v. p.; P. Fink, sec.; A. Waldron, treas., 121 N. Wasatch Ave., Colorado Springs, Colo., with F. Fink and M. Devaul, directors.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: 7 claims, 5 patented, 120 acres, in Pine Grove district, Yavapai county, 4 miles from Crown King. Shafts and tunnels reported to have opened some high-grade silver-lead ore. Main tunnel 700' long. A 5-stamp mill installed in 1919 and shipments made to El Paso.

MONTORO MINING CO. ARIZONA

Address: 500 Wright Bldg., Denver, Colo., or Chloride, Ariz.

Officers: A. J. Fowler, pres.; J. L. Smith, v. p.; E. L. Brock, sec.-treas.; H. L. McCarn, mgr.

Cap. $500,000; shares $1 par.

Company organized in 1919 to take over the property of **Rainbow Mountain Mining Co.**

Property: 9 claims, on Rainbow Mt., 2 miles E. of Chloride, Wallapai district, Mohave county. Claims said to show a vertical vein containing gold-silver-lead-zinc ore.

Development: work totals 3,000' including 780' of tunnels and 450' shaft, with 4 levels opened up. Former company claimed to have 10,000 tons of ore partly blocked out, May, 1917, mostly on South ore-shoot.

Equipment: includes an 80 h. p. hoist and 2-mile aerial tram, 300 cu. ft. compressor, Cornish pump.

Production: Shipments to Needles smelter, totaling 3,000 tons, of silver-gold-lead ore, to end of 1916, yielded $140,000. Shipments of high-grade ore reported made by lessees in 1920.

MORNING GLORY MINE ARIZONA

Address: Chas. B. Wilson, owner and manager, Patagonia, Santa Cruz county, Ariz.

Property: 12 claims, 240 acres, 12 miles from a railway, in the Harshaw district of the Patagonia mountains. Claims said to show 4 veins 6' wide in limestone and prophyry, carrying sulphide ore, estimated by owner to average 3% copper, 3 oz. silver, 60¢ gold, 35% iron and 35% sulphur per ton. A shoot of zinc-copper ore is reported to have been opened in 1916, from which shipments were made in 1918.

Development: 2 shafts of 80' and 200', with about 1,475' of workings, are estimated by owner to show 50,000 tons of 3½% copper ore blocked out for stoping. Ore is hand-sorted. Crosscut tunnel is in over 700' with good indications. **Equipment:** includes a small hoist.

Production: over 10,000 tons to date. Mine has been worked for over 30 years.

MOSS MINES CO. ARIZONA

Office and mines: Goldroad, Mohave county, Ariz.

Officers: A. C. Worden, pres.; L. F. Hammel, v. p.; I. W. Worden, sec.-treas.

Cap. $150,000; 10c. par; 250,000 shares issued as promotion stock; total issued 513,781 shares.

Property: one claim. This is a well-known old mine that has produced some exceptional gold ore, though only opened to a shallow depth. Idle in 1921.

MT. TURNBULL COPPER CO. ARIZONA

Address: C. B. Barnhard, mgr., Phoenix, Ariz.

Property is a prospect, with a group of claims that adjoins Inspiration Central ground.

MOUNTAIN CONSOLIDATED MINING & MILLING CO. ARIZ

Letters returned unclaimed from Globe, Ariz., and Payson, Ariz.

Officers at last account: G. B. Reed, pres.; J. W. Reed, v. p.; W. B. Haynie, sec.; A. T. Hammons, treas., with W. H. Shenk, A. C. McKillop and J. Nugent, directors.

Inc. March 22, 1917, in Arizona. Cap. $3,000,000; $1 par; 1,285,000 issued.

Property: 66 claims, 1,260 acres, in Payson and Brown districts, Gila county, said to show gold-silver-copper-lead-vanadium quartz veins in schist, slate and diorite. Ore occurs as veinlets. Copper minerals are sulphides.

Development: by 214' shaft and 270' tunnel. Estimated reserves are 36,200 tons, but as only 98 feet of lateral work had been done to June, 1917

this amount must include probable ore based largely on outcrops. The Black Rattler claims in the Brown district are reported to have a silver-copper vein 10,500′ long and from 40 to 100′ wide, in a slate-schist contact, which outcrops from 50 to 75′ above the surrounding country. Presumably idle.

MOUNTAIN DRIVER & CALAMITY JANE MINES **ARIZONA**

Last address: Alex Denny, Chaparral, Yavapai county, Ariz.

Property: two claims, 40 acres, near Henrietta, in Big Bug district, 8 miles from Humboldt smelter. Ore occurs in quartz-porphyry and carries copper and gold.

Development: consists of 150′ shaft. Idle since 1916.

MOWRY MINING CO. **ARIZONA.**

Owner: A. J. Hazeltine, Warren, Pa.

Property: 21 patented claims, near Mowry, Santa Cruz county, 12 miles from Patagonia, operated during the Civil War by Lieut. Mowry, who was accusd of furnishing lead from this mine to the Confederates. The ores are lead-silver. The mine, closed down in 1917, after producing several million dollars, was re-opened in 1916. Average ore contains about 20% lead, and 20 oz. silver per ton. Reported to have crosscut a lens of ore 25′ wide on the 250′ level, containing carbonates and sulphides.

Shipments to El Paso smelter resumed in 1919 and continued during 1920-21.

MUDERSBACH MINE **ARIZONA.**

See Excelsior Gold & Copper Co. in Vols. XIV and XV.

MUMME MINING CO. **ARIZONA.**

Probably dead. See Vol. XIV.

MURDOCK MINING & MILLING CO. **ARIZONA.**

Address: Oatman, Mohave County, Ariz.

Officers: S. R. Porter, pres-treas-supt.; D. Gibson, v. p.-sec.; F. L. Porter, asst.-sec., with D. P. Wright and G. D. Page, directors.

Inc. Dec. 3 1915, in Ariz. **Cap.**. $1,000,000; $1 par; 690,000 issued. Stricken from list on the N. Y. Curb in 1918.

Property: near Oatman, shows a vein in andesite. Ore is gold-bearing and of the usual dense quartz type. Presumably idle.

NANCY LEE MINING CO. **ARIZONA.**

Address: P. O. Box 27, Bisbee, Ariz.

Officers: John Olson, pres., F. T. Bragonier, v. p.; Robert. B. Manson, sec.-treas., with Henry Lovin, Robert Ferguson and H. J. Hierl, directors.

Inc. 1915, in Arizona. **Cap.** $1,000,000; $1 par; issued 420,000 shares. Permission to sell stock was given, July 1921.

Property: 6 claims, 3 fractions and mill site in Secret Pass section, San Francisco district, Mohave county, 9 miles N. of Oatman. Elevation 3,000′; water on property.

Ore occurs in a fissure vein filled with quartz, calcite and adularia, with fragments of andesite, rhyolite and a generous distribution of manganese oxide. This vein of subsequent origin cuts through the andesite, and also two N. W. fissures filled with rhyolite.

Development: by 180′ incline shaft and connecting tunnel 320′ long; total workings, 1,000′. Practically all work confined to the fissure vein. Vein assays from a trace to $12.50 per ton. Values are mostly in gold, with some silver.

Examined by John Tait Milliken and R. D. Johnson. Mine warrants further development. Idle since 1916; operations resumed late in 1921.

NARRAGANSETT COPPER CO. **ARIZONA.**

Address: care W. R. Ramsdell, 30 So. Stone Ave., Tucson, Ariz.

Officers: W. R. Ramsdell, pres.; R. J. Williams, v. p.; James S. Kelso, sec-treas.

Inc. 1917, in Arizona. **Cap.** $3,000,000; $1 par; $1,250,000 shares outstanding. Gross earnings in 1918 were $265,665.

Property: 21 claims, at Rosemont, Helvetia district, Santa Rita mountains, Pima county, Ariz. Mine is 20 miles S. of Vail on the S. P. R. R.

Geology: the ore occurs in a replacement deposit between limestone and quartzite, which dips 30° E., and has a N. E., pitch. Shoot has been opened for 1,000′ along the strike. Both oxide and sulphide ores occur and contain both copper and silver. Average of 7.01% copper, 1.15 oz. silver reported for 13,248 tons shipped during 1918. During 1915-16-17-18, reports shipping 34,331 tons with a net smelter return of $835,860.

Development: by tunnel; workings, total 3,000′ to depth of 450′, said to have exposed 80,000 tons containing from 2½ to 4% copper, including ore in dumps.

Production: in 1917 was 1,611,429 lb. copper. Over 1,200 tons monthly were shipped 1918. Shipments continued throughout 1919, but no figures are available.

In August, 1919, Albert Steinfeld & Co. of Tucson, brought suit against company to recover $300,000 loaned on notes. Judgment was awarded plaintiff, plus interest, a total of $330,000.

NATIONAL CONSOLIDATED MINING CO. ARIZONA.

Presumably idle. Described in Vol. XI, Copper Handbook.

NATIONAL FIVE GOLD MINES CO. ARIZONA

Address: Chas. H. Burlock, Oatman, Ariz.

Property: a group of 45 claims, near Oatman, Mohave county, adjoining the Arizona Mossback holdings and reported acquired in 1921 by that company.

NATIONAL METALS RECOVERY CO. ARIZONA.

J. W. Stockholm, mgr., Tombstone, Ariz.

Company has leased several old mine dumps at Tombstone, Cochise county, and will operate the Guard mill.

NATIONAL TUNGSTEN CO. ARIZONA.

Acquired by International Tungsten Corp., which see in Vols. XIV and XV.

NAVAHO COPPER CO. ARIZONA.

Idle. Had offices in Babbitt Block, Flagstaff, Ariz. in 1918. Is a consolidation of **Navajo Pacific** and **Navaho Copper** companies.

Company was a promotion of the late E. J. De Sable and is said to have had backing of several great financiers.

Property: 120 miles N. of Flagstaff, in Coconino county, contains sandstones impregnated with copper carbonates. According to a report by H. C. Carr, the tract contains 7,000,000 tons of 2% ore. Other engineers gave one to two million tons of 5% copper ore. The ore does not persist far either horizontally or downward, but covers extensive areas. It is all oxidized, mostly carbonate and rests on fossiliferous Silurian rocks. The presence of copper chlorides indicates marine deposition of granitic sands. Shipments were made by motor truck for several months but cost proved too high for profit.

Stock nearly valueless; 50 shares selling for $2 at auction, Dec. 22, 1920, and 500 for $3, Oct. 15. 1921.

NAVAJO MINES CORPORATION OF ARIZONA ARIZONA.

Office: Vicksburg, Yuma Co., Ariz.

Officers: E. P. Heald, pres; William Vincent, 1st v. p.; O. B. Lefurgey, v. p.; C. Y. DeLay, sec-treas-gen. mgr., with H. M. Anthony, O. P Posey and Eugene Schutz, directors.

Inc. in Arizona. **Cap.**, $3,000,000· $1 par; 1,800,000 issued. National Security Co., New York, transfer agents.

Property: the Desert mines, comprising the Golden Mound and Gold Eagle quartz claims, and Safe Deposit placer, all patented, 51½ acres, 2½ miles from Vicksburg on the railroad.

Geology: rocks are pre-Cambrian schist, with overlying quartzite, cut by diorite dikes. There are reported to be 3 quartz veins 1 to 10′ wide, also a mound 400′ across, 140′ high at center. Ore contains gold, with small lead and copper content and average assay is given as $8 per ton. Quartz in small hill is said to carry 4.3% copper and $17.15 gold and silver per ton.

Development: veins traced 800′ by pits, tunnels, open cuts and a 275′ tunnel with 2 crosscuts, 90′ and 40′ long. Ore reserves were estimated by G. R. Boggs at 100,000 tons. W. Forstner estimates orebody 400′ long by 140′ high to contain 13,500 tons of $20 ore and 1,500 tons of $50 ore.

Equipment: includes concrete reservoir, buildings for 50 men, etc. Prospectus truly said: "This is not a stock for everyone." Development is, in our opinion, too meagre to warrant the estimates given of either quantity or quality and mining and milling cost of $2 per ton will be hard to attain on a small scale. Reported June, 1917, there were 5 carloads of ore ready for shipment, nothing later known.

NAVY GROUP M. & M. CO. **ARIZONA**

Office: 912 Higgins Bldg., Los Angeles, Calif.

Officers: Dr. Geo. P. Waller, pres.; F. M. Townsend, sec-treas.; R. E. Zuver, agent at Gold Road, Ariz.

Inc. 1915. **Cap.** $1,000,000; shares $1 par.

Property: 3 claims, 48.26 acres, in Tom Reed-Goldroad district, Mohave county, developed by 750′ tunnel. Inactive or defunct.

N C-4 SILVER MINING CO. **ARIZONA.**

Address: Wm. Clevenger, Prescott, Ariz.

Property: in Hassayampa district, Yavapai county, reported to show high grade silver ore. A 300′ shaft being sunk and equipment installed.

NEBRASKA & ARIZONA COPPER CO **ARIZONA.**

Out of business.

Inc. Jan., 1910, and merged June 25, 1910 with the California & Paradise Mng. Co., in the **California & Paradise Cons. Mng. Co.**

NEEDLES MINING & SMELTING CO. **ARIZONA.**

Company was liquidated Dec., 1917, and its property and assets turned over to the **U S. S. R. & M. Co.,** which see.

Inc. 1909, in Me., as successor of Arizona-Mexican Mng. & Sm. Co. For full description see Volumes XIII and XIV.

NELLIE GOLD MINING CO. **ARIZONA.**

Address: Oatman, Ariz.

Controlled by Howland Bancroft and Julius Bache. Mine operations were carried on by the Woods Investment Co. of Los Angeles, who also control the Lexington and have a big interest in the Lazy Boy and United Western. Idle.

NELLIE MINING CO. **ARIZONA.**

Idle. Mine office: Oldtrails, Mohave county, Ariz. Address: Woods Investment Co., Los Angeles Calif.

Officers: F. M. Woods, pres.; R. C. Wilson, v. p,; E. T. Walmsley, sec-treas.; H. E. Woods, mgr., with C. S. Buck, directors.

Inc. July 3, 1906, amended Aug. 4, 1915, in Ariz. **Cap.** $1,000,000; $1 par. Stock is listed on the San Francisco, Salt Lake and Los Angeles exchanges. Registration Surety Co., 205 Russ Bldg., San Francisco, registrar. Annual meeting, first Wednesday in June.

Property: 11 claims, 190 acres, in Oatman Goldroad mining district, 5 miles S. of Oldtrails, shows a fissure vein in andesite and andesite tuff, with gangue consisting principally of the grain quartz and adularia and calcite. The values are exclusively gold, although traces of copper stain are found in the 2 altered dikes which strike out from the main lode, having a general strike N. 52° W., with dip about 55° N. E. Assays said to average $5.90 gold per ton. Developed by 530′ two-compartment vertical shaft.

Reported that on the 350′ level 200′ of drifting opened ore worth up to $35 per ton. At 435′, in shaft No. 2, vein is reported to be 24′ wide, and on 500′ level 25′ wide, 10′ of it assaying $5.31 per ton. Drifting on 500′ level to encounter ore-shoot outcropping on surface 300′ east at last account.

Equipment: includes 100 h. p. gas hoist, 55 h. p. compressor, pumps, 3,600′ water pipe line, bunk and boarding houses. Property reported on by A. G. Keating.

NELSON MINING CO. ARIZONA.

Defunct. Property acquired by **Philadelphia Mining Co.**, which see.

NEVADA-ARIZONA MINES CO. ARIZONA.

Office: 510 Odd Fellows Bldg., St. Louis, Mo. **Mine office:** Hackberry, Mohave county, Ariz.

Officers: John Schmoll, pres.; Chas. E. Hamilton, v. p.; A. E. Louis, sec.; J. Wm. Seller, treas., with J. Phillips, Aug. Richter, Jr., C. D. Morley, Edward J. Ryan and Wm. Burmeister, directors. T. D. Walsh, supt.

Cap. $1,500,000; shares $1 par. Reported, March, 1919, to have issued $150,000 in bonds; indebtedness, $28,569.

Property: 17 patented claims, about 340 acres, in the Music Mountains, said to show gold and silver values. Ore occurs in fissure veins, 4-10′ wide, in granite formation. Average assays reported at from $10-50 per ton.

Development: includes the 700′ Lucknow shaft and 700′ Roosevelt tunnel, latter in milling ore for 200′. At depth of 515′ the Lucknow vein is reported to be 12′ wide, of good grade ore.

Equipment: includes compressor, small concentrator with a Chilean mill, and gas hoist. No production data available.

NEW ARIZONA RAY COPPER CO. ARIZONA.

Formerly the **Arizona Ray Copper Co.**

Mail returned from former address: 115 N. First Ave., Phoenix Ariz.

Officers: W. A. Stuart, pres.; F. M. Dorsey, v. p.; J. L. Milligan, sec., with Fred. E. Young, L. L. Wallace and W. Laurence Barnard, directors.

Inc. in Arizona. **Cap.** $1,000,000; 10c par; 5,000,000 shares paid promoters for the claims.

Property: 12 claims, adjoining the Ray Consolidated, at Ray, Pinal county, considered to be outside the ore-zone and valueless.

Former company was exposed and denounced by the California Corporation Commission, by the "Mining & Scientific Press" and by the "New York Tribune." The expose drove the promoting firm out of California and to Phoenix, Ariz., where its business is said to have been bought out by the Arizona Securities & Trust Co. Arizona Ray was considered a fraud of the worst type.

Nothing new is known of operations, since name of company was changed.

NEWBURY MNG. CO. ARIZONA.

Property near Cochran, on Ariz. Eastern R. R., east of Florence. To save property from sale, Makeever Bros. of Boston put up $10,000, but after their engineers had examined it, the firm abandoned the property.

NEW COMSTOCK MINING CO. ARIZONA.

Office: Ray L. Dimmick, supt., Kingman, Ariz.

Officers: Chas. Sutro, pres., 410 Montgomery St., San Francisco; W. C. Howard, v. p.-mgr., Kingman, Ariz.; Sidney L. Schwartz, sec.

Permit to sell stock has been granted by the Arizona Corp. Com.

Is a holding company controlling the **Sheep Trail-Boulevard** group of 7 claims (6 patented) and **Pyramid** group of 3 patented claims in the Union Pass (San Francisco) district, Mohave county, 30 miles from Kingman. The latter is near Katherine Gold Mng. Co. (q. v.) holdings, transferred to that company by **New Comstock**, Aug. 29, 1921.

The Sheep Trail discovered in 1865, is 7 miles E. of the Colorado river and shows a vein in granite intruded by rhyolite developed to depth of 428′ by 750′ tunnel, etc.; total workings over 5,000′. A quartz-hematite

ore carries gold. A 20-stamp mill at the river was destroyed circa 1918. Several thousand tons of ore have been produced. The Pyramid lies near the river and is supposed to cover extension of Katherine vein.

NEW CORNELIA COPPER CO. **ARIZONA**

Subsidiary of the **Calumet & Arizona Mining Co.**

Officers: Calumet, Michigan, and Ajo, Arizona.

Officers: Gordon R. Campbell, pres.; James and Thomas Hoatson, v. p.'s; Peter Ruppe, treas.; with Chas. Briggs, W. B. Congdon, J. C. Oliver, James Phillips, Jr.; L. D. Ricketts, T. F. Cole, F. B. Augustine, John C. Greenway, W. B. Mershon, T. H. Collins, and G. N. Newett, directors.

Staff: J. C. Greenway, gen. mgr., Warren, Ariz.; Ira B. Joralemon, asst. gen. mgr.; M. Curley, supt.; H. B. Paull, auditor.

Inc. Sept. 28, 1909, in Delaware, as a reconstruction of the Cornelia Copper Co. **Cap.** $9,000,000, shares $5 par; all issued and outstanding. State Street Trust Co., Boston, transfer agent; American Trust Co., Boston, registrar. Calumet & Arizona owns 1,229,741 New Cornelia shares. Listed on Boston Stock Exchange.

Bonds: Company authorized an issue of $4,000,000 6% 12-year sinking fund gold bonds, dated Sept 1, 1915, maturing Sept. 1, 1927, convertible into stock at $10 per share, to finance the purchase of necessary equipment and construction work. All subscribed at par. All bonds have been converted.

In Feb., 1921, company took a 4.07% interest, $1,628,000 total amount, in the Copper Export Association's $40,000,00 note issue.

Financial statement, years ending Dec. 31:

Assets

Year	Property	Construction	Investments	Current	Total
1920.....	$24,865,020	$4,320,724	$554,684	$5,819,400	$35,559,828
1919.....	25,786,049	4,946,994	517,184	4,998,488	36,248,715
1918.....	25,577,837	5,205,956	436,574	3,789,637	35,010,000
1917.....	26,000,000	5,895,408	111,000	2,186,004	34,192,412
1916.....	10,187,932	4,972,790	.....	628,780	15,789,503

Liabilities

	Capital	Bonds	Notes Payable	Reserves	Current	Surplus	Total
1920	$9,000,000	.....	$649,564	$159,081	$606,967	$25,144,216	$35,559,828
1919	9,000,000	.....	649,564	257,851	1,288,220	25,053,080	36,248,715
1918	9,000,000	.....	649,564	766,810	643,148	23,950,477	35,010,000
1917	7,024,500	$3,951,000	3,330,559	720,248	263,658	18,902,446	34,192,412
1916	6,012,000	3,976,000	710,000	241,964	14,625	4,834,914	15,789,503

In 1910, the General Development Co. bought 20,000 shares for $20,000,

Income and Expenditure

	Metal Sales, etc.	Operating charges	Depl. Interest	Dividends	Net Balance
1920.....	$7,155,337	$4,530,670	$1,633,530	$900,000	$ 91,137
1919.....	6,750,421	5,149,223	1,583,952	.....	$ 17,246
1918.....	11,073,680	6,282,500	2,263,374	450,000	2,077,806
1917.....	3,810,123	2,136,483	911,229	.....	762,411

Not including copper on hand, current assets were $4,800,000; on Jan. , 1922.

Dividends: initial of 25¢ per share, $450,000 was paid in Nov., 1918; none in 1919; 50¢ in 1920.

History: company's early history and its experiments with new processes are fully described in Vols. VI. VIII. and X. Copper Handbook.

In 1910, the General Development Co. bought 20,000 sahres for $20,000,

spending the money under an option for a stock control, putting down 5 diamond-drill holes, deepest 188′, which showed the ground to be oxidized to a depth of about 30′, followed by sulphides, estimated by the company to average 2 to 2.75% copper. The option was forfeited 1910, and property was leased to H. C. Chamberlain, who shipped concentrates from 800 tons of 4% ore to the Copper Queen smelter. In 1911 the Calumet & Arizona Mining Co. took an option on 76% of New Cornelia stock, and under the direction of John C. Greenway, general manager, and L. D. Ricketts, cons. engr. proved the existence of a large body of commercial copper ore. Laboratory tests showed that the carbonate ore could be treated by leaching with dilute sulphuric acid and the sulphide ore by flotation.

Experimental leaching plants of one ton and later of 40 tons per day capacity were erected at Ajo and tests made for over a year. Results of 310 charges showed; average heads, 1.31% copper; average tails, 0.271% copper; extraction, 79.36%, and 0.881b per k. w. hr.

Meanwhile wells were drilled to locate a water supply, and a shaft sunk on a hole 7 miles from the property found a satisfactory water stratum. In the summer of 1915 the Tucson, Cornelia & Gila Bend Railroad from Gila to Ajo, a distance of 43 miles, was started, and completed in Feb., 1916. Work was immediately started on a 5,000-ton leaching and electrolytic precipitation plant, which started operation in May, 1917.

Property: 55 patented and 38 unpatened claims, and one patented and 14 unpatented mill-sites at Ajo, 44 miles south of Gila Bend, Ariz. Property comprises about 1,704 acres, 75 of which constitute the New Cornelia orebody.

Also, 59 claims (7 patented), 1,150 acres, acquired in July, 1917, from the **Ajo Consolidated Copper Co.**, which adjoin the New Cornelia on the S.; the orebody, an extension of the New Cornelia, covers about 21 acres.

Geology: claims cover an area of rhyolite, lava, breccia and tuff beds, intruded by a huge mass of mononite porphyry, which cuts and uplifts the rhyolite. There were subsequent intrusions of diorite and diabase porphyry, probably connected with the great mass of Tertiary basalt and andesite lava flows which cover the surrounding country. Mineralization has formed a low-grade disseminated deposit with high-grade veins in monzonite and narrow rich veins in the adjoining rhyolite. The disseminated orebody, covering about 75 acres, has a pear-shaped outline. The depth of the ore varies from less than 50′ on the outskirts to more than 600′ in the center, where the bottom of orebody has not as yet been reached.

In the Ajo Consolidated property the disseminated mineralization often extends beyond the monzonite into thoroughly brecciated rhyolite, but in general the ore followed the contact of the two rocks, dipping steeply S. W. and more flatly and irregularly to the S. E. For about 300′ along the contact there is a lens of ore of much higher grade than the average.

The primary mineralization is chalcopyrite and bornite with comparatively little pyrite. Surface alteration has converted the sulphide minerals to malachite to a depth of about 20′ below the deepest arroyos and 150′ below the highest hills. The plane of demarcation between carbonates and sulphides is almost horizontal, agreeing with the present ground water level. Chalcocite is rare in the New Cornelia orebody, but locally of much importance in the Ajo Consolidated ground, particularly in the ore in rhyolite below the water level.

Development: by diamond drill holes and a 250′ three-compartment shaft, connecting with orebody through a 405′ crosscut; levels have been opened at 150′ and 250′ to develop low grade sulphide ore; total workings, 8,875′.

On the 250′ level the orebody is approximately 400′ long by 265′ wide, but its extent to the S. and E. has not been determined. Up to 1918, 144 holes had been drilled, of which 21 bottomed in ore of better than 1% grade; in 1918, 1,825′ of drilling was done; in 1919, 1,900′ in 5 holes.

In March, 1919, a sulphide orebody, 360 x 400', was uncovered on the 361' level of Ajo Cons. ground.

Ore reserves: total estimated tonnage, based on a 1% minimum basis, is 50,514,288 as of Dec. 31, 1921, of which 8,234,460 tons are oxidized ore carrying 1.49% copper and 42,279,828 tons of sulphide ore averaging 1.577%. In addition, drilling has developed 31,155,440 tons of oxidized material carrying 0.83% copper and 29,148,754 tons of sulphide ore of 0.75% copper tenor.

Gold and silver in the carbonate ore are negligibly small, but the sulphide ore carries between 30 and 50c. per ton in precious metals.

All the carbonate ore and about 22,500,000 tons of the sulphide ore are available for steam-shovel mining. The occurrence of ore at the surface obviates stripping and loss of ore or vitiation of grade through admixture of ore with capping.

Reduction Works: about one mile from the orebody, with which it is connected by a double-tracked standard gauge railroad. Ore is loaded into cars by three 100-ton steam-shovels, the cars dumping directly into the large crushers. Five thousand tons are now being treated daily.

Ore is crushed to 10" size in a large gyratory crusher; 4 smaller gyratory crushers reduce it to 3" cubes before it goes by belt conveyors to the storage bins. From the 10,000-ton storage bins the ore is carried by 4 pan conveyors to 15 Symons disc-crushers, reducing it to ¼" in size. The ore is very hard and contains many large boulders. A dust collector was added in 1919.

Crushing practice at Ajo was described by W. L. Dumoulin, in Bull. 152, August, 1919, of the A. I. M. E. The product sent to the leaching tanks ranges between plus 3 and minus 20 mesh; 56.7% is coarser than 6 mesh and 18.3% is finer than 20 mesh.

From the crushing plant the ore is carried by an overhead conveyor 100' long to 11 leaching tanks, each 88' square and 15' deep, built of reinforced cement lined with lead. The conveyor advances across the tanks at 12' an hour. Each tank holds 5,000 tons of ore, and each charge remains in the tank 8 days, the tailings are removed by Hulett excavators and hauled to the dump in a train of twelve 50-ton cars. The acid solution is handled by two 3,500 gal. a minute horizontal centrifugal pumps.

The pregnant solution from the tanks is treated in 4 sulphur dioxide gas towers, 20' in diam. and 40' high, to change ferrous to ferric iron, and then pumped into the 152 electrolytic tanks, holding 77 cathodes. The anodes are of lead, and the starting cathode sheet is 3' square, weighs 16lb., but accumulates copper by the electric current until it weighs 165lb., when it is withdrawn. The discarded solution goes over scrap iron. The sulphur dioxide gas is made by burning pyrite in 4 Wedge furnaces, and purified by the Cottrell process.

A 6-compartment settling tank was installed in 1920 to take care of slimes of the neutral solution before going to the towers and of the reduced iron solution leaving the towers; this will prevent towers becoming unduly clogged. Another change adopted in 1920 involves returning a large part of the cement copper to the solution and recovering the metal as electrolytic copper; the percentage of copper in the form of cement has been reduced from 17.7 in 1919 to 7.0 in 1920.

Acid is obtained from the mother company, Calumet & Arizona, which also does the smelting.

Results during the first year of leaching operations at Ajo are given in great detail by Tobelman and Potter in Bull. 146, Feb., 1919, of the A. I. M. E.

The $1,000,000 power plant has 5 oil-fed 825 h. p. boilers, 2 turbo-generators of 7,500 k. w. capacity each, and four 1,750 k. w. direct current motor-generator sets.

A 500-ton experimental flotation plant was built in 1919, to study the best method for treating the sulphide ores. This plant was closed down on March 1, 1920, after a 6 months run; copper recovery was 84.07% and it was demonstrated that concentrate could be made self-fluxing and might be

smelted economically at Ajo. By 1923, under normal conditions mine will be in position to produce 5,000 tons of sulphide ore per day for treatment by flotation.

Company contemplates building its own railway to a port on the Mexican coast.

Production for years ended Dec. 31:

	Ore tons	Copper %	Elec. Copper lb.	Cem. Copper lb.	Total Copper lb.
1917*.....	780,211	1.685	12,764,848	3,361,283	16,081,131
1918	1,775,000	1.465	31,264,642	10,990,666	42,255,308
1919	1,542,533	1.488	29,640,211	6,368,952	36,009,163
1920	1,727,859	1.525	37,331,586	2,113,985	39,445,571

*8 months.

In addition, high grade ore is shipped direct to smelter; in 1917, 3,401,060 lb. of copper were produced from 60,561 tons of ore; in 1918, 4,694,831lb from 81,417 tons; in 1919, 3,500,298lb from 62,120 tons; in 1920, 249,353lb from 3,598 tons. In 1920 there were also shipped 409,569lb of copper in the form of concentrate from sulphide ore.

Total production in 1917 was 19,482,191lb of copper; in 1918, 46,950,139lb; in 1919, 39,509,461lb; in 1920, 40,104,493; in 1921, 21,150,000lb.

New Cornelia is a big mine in strong hands, and should pay regular dividends for a long time if conditions are normal.

Operations were practically suspended in March, 1921, but leaching plant continued to run at 50% capacity.

NEW CORNELIA WEST MINING CO. **ARIZONA**

Address: J. E. Sayers, Ajo, or Kingman, Arizona.

Officers: J. E. Perry, pres.; Geo. Sayers, v. p.; J. S. Amundsen, sec.-treas., at last account.

Inc. Feb., 1917, in Arizona. **Cap.** $7,500,000; $5 par.

Property: 230 acres, includes the Sayer-Rowley-Thal group, adjoining the New Cornelia at Ajo, Pima county. Ore contains copper-silver-gold. Only assessment work being done.

NEW DOMINION COPPER CO. **ARIZONA**

Office: 2 Rector St., New York. **Mine office:** Globe, Ariz.

Officers: E. W. Mitchell, pres.; P. M. King, v. p.; A. G. Bisgood, sec.-treas., with R. E. Vandruff, F. A. Shaffer and A. C. Black, directors.

Inc. in Arizona. **Cap.** $2,000,000; in 1,400,000 common and 600,000 preferred shares; $1 par. Preferred stock is redeemable any time after Jan. 1 1922.

Property: 21 patented claims and fractions about 1½ miles from the Arizona and Eastern Railroad terminal at Globe, Gila county adjoins the Old Dominion property on the north and the Iron Cap and Big Johnnie to the south and east.

Geology: similar to that of the Old Dominion ground, where the principal oxidized ore is cuprite. The ore occurs in lodes or veins, as masses in limestone, and as an irregular mineralization of shattered rocks. Some sulphide ore has been found along a fault-vein on the 450′ level. The limestone area, according to the geologic map of the U. S. G. S., is much greater than that of the Superior and Boston, but slightly less than that of the Old Dominion. There are 9 veins showing on the surface. Although there is ore in paying quantities in the workings, no large orebody has been blocked out, though surface ores show high silver value and copper up to 21%. The engineers report that big orebodies may be expected at 1,300′ in depth. The former operator shipped several carloads in 1916, averaging 8.31% copper.

History: several shallow shafts were sunk and considerable silver ore shipped in the early 70′ and 80's. In 1906, the property was purchased and some development done by the Globe Consolidated, which was forced to shut-down by the panic of 1907, when the property reverted to the original owners. The New Dominion bought the ground in 1916 and has done considerable development.

Development: by 825′ shaft, with various levels. This is to be deepened o 1,400′, and crosscuts driven to explore the veins at that depth. Several housand tons of commercial ore were mined from the two veins, cut on he 800′ level, the product going to the Old Dominion smelter. Company has o pumping expense, as the Old Dominion mine is working on the 1,800′ evel, and drains the ground.

Equipment: includes a modern machine-shop, 400 h. p. steam plant, ompressor, and several large houses for quartering the men. Operated by essees at last account, June, 1920. It is regarded as a promising property.

NEW DOMINION MINES CO. **ARIZONA**

Idle and no record of recent operations available. Described in Vol. XIII.

NEW ENGLAND & CLIFTON COPPER CO. **ARIZONA**

Sold to Phelps Dodge interests. Described in Copper Handbook, Vol. XI.

NEW JERSEY MINING CO. **ARIZONA**

Mail returned from former address. Ed. Mingle, mgr., Chloride, Ariz. Described in Vol. XIII.

NEW KING OF ARIZONA MINING CO. **ARIZONA**

W. J. Johnson, mgr., Yuma, Arizona.

Property: the old King of Arizona mine, 4 claims, in the Kofa Mtns., 0 miles N. E. of Yuma, Yuma county, which between 1896 and 1910 pro- uced $3,500,000 in gold and silver bullion. Much of ore in upper workings as high-grade but values decreased with depth, and at 750′ was only $3 er ton. A 200-ton cyanide mill was dismantled some years ago. The ore s a silicified andesite porphyry and occurs in brecciated zones; the gold is ree and is present in the ratio of 58 to 1 of silver.

The new company is reported to have uncovered another vein, 10′ wide, hich it is actively developing, a 1,000′ tunnel being completed March, 1921.

NEW LA PAZ GOLD MINING CO. **ARIZONA**

Office: McDaniel & Cordary, fiscal agents, 504 Pacific Finance Bldg., os Angeles, Cal.

Directors: O. L. Grimsley, pres.-gen. mgr., G. A. Scroggs, v. p.-treas.; eo. Renwick, sec.

Inc. May 2, 1910, in Arizona. **Cap.** $1,500,000; $1 par; 1,223,000 shares sued. Balance sheet of Dec. 31, 1920, includes current assets, cash, $19.- 1; current liabilities, $3,434.

Property: 1,596 acres, in La Paz or Weaver district, Yuma county, aid to show a deposit of gold-bearing gravel 6 to 40′ deep, lying on de- mposed granite and porphyry. There are reported to be 5,300,000 cu. yd. f gravel, averaging $2.15 per yard. Operations to be by hydraulicking, for hich a 1,750,000 gal. storage dam and 12″ pipe-line from Colorado river are lanned.

Property reported on by E. Shurley Wilson, A. B. Hall, Geo. R. Fan- tt and E. A. Rasor. Idle.

NEW MESCAL MINING CO. **ARIZONA**

Dead. See Vol. XIV.

Company originally owned 7 claims, but 4 were allowed to lapse and ere jumped. The 3 remaining were sold to J. E. Russell of Prescott, who old them to J. M. Layman, who in turn transferred them to the Verde ombination Copper Co., and they now comprise part of its Jerome holdings.

NEW PLANET COPPER MINING CO. **ARIZONA**

Office: 61 Broadway, New York.

Officers: Alex. Rae, pres.; Geo. S. Barton, v. p.; Herman Cook, sec.- eas., with Julius H. Susmann, Geo. Crompton and T. M. Lloyd, directors.

Inc. July 13, 1909, in Delaware. **Cap.** $4,000,000; $5 par; issued 342,905 hares in which the **General Devel. Co.** (q. v.) has a large minority interest. s a reconstruction of the **Planet Copper Mining Co.**, stock of which was tired by exchange for 240,000 shares of New Planet stock. Farmer's Loan

& Trust Co., New York, registrar. Annual meeting, third Wednesday in June.

Property: the Planet mine, with 31 patented, 10 unpatented, and 3 fraction claims, about 750 acres, in the Harcuvar district, on the southern bank of the Bill Williams Fork River, 21½ miles from Bouse on the Santa Fe cut-off and about 9 miles from Swansea.

Geology: copper occurs mainly as oxidized ore, though nucleal particles of sulphides mixed with specular hematite are seen in the deeper workings. The orebodies are replacements in limstone, the ore bed developed at the Planet shaft lying on the contact between this rock and underlying gneiss. This deposit is 3 to 20′ thick and dips 15° south. Much high-grade ore has been shipped from other parts of the property in past years; it was found as crusts, or shells, about impure hematite in limestone, especially near bodies of amphibolic rock now altered to black gneiss. A deep-seated mass of granite is the not improbable source of mineralization, although later igneous activity is shown in a volcanic plug not far distant and in the basalt flows which cover the surrounding country. The geology is very fully discussed in U. S. G. S. Bull. 451, p. 47, written by Howland Bancroft.

The ore deposits show a heavy iron gossan, mainly of hematite, apparently of workable grade, and it has beeen estimated that the property shows about 500,000 tons of 60% iron ore. The main orebody developed in the Planet shaft is about 300′ in width, has a thickness of 4′ 3″, and an average copper content of 5.9%, according to a report by A. H. Kellar.

Development: aside from open cut and tunnels, is mainly at the Planet shaft, an incline sunk on the ore bed at an average angle of 15° to a depth of 733′. There are drifts, crosscuts, etc., amounting to 2,500′. A vertical 350′ shaft connects with these workings and gives ventilation.

The old workings include 8 tunnels, longest 225′, and 12 vertical pits and shafts, of 25 to 325′ depth. About $150,000 was expended under the management of the General Development Co. in sinking the vertical shaft and putting down a number of churn-drill holes, 3 holes showing low-grade sulphide ore below the old workings.

The Planet mine is probably the oldest copper mine in Arizona. It was opened in 1864, worked in a small way until 1874, and reopened in 1884, when a 36″ circular blast furnace was erected. The property was taken over, 1902, by the predecessor of the present company. The mine produced, 1864-74, upwards of $500,000 worth of high-grade ore, ranging from 15 to 40% in copper, which was presumably shipped down the Colorado river to Guaymas, and thence to Swansea, for reduction.

Equipment: includes a 75 h. p. gasoline plant, with two hoists and 5-drill air compressor. Buildings include a carpenter shop, smithy, shaft houses and 3 dwellings.

Property considered as still unproven, churn-drilling being too limited to determine existence, or non-existence, of large orebodies, and the greater part of the area is unexplored.

Property was under lease to the Northwestern Leasing & Development Co. from October, 1915, to September, 1917, when the lease was surrendered. Since then no operations have been carried on at the property. The lessees, during their operations, shipped ore and paid royalty to the New Planet Co., which enabled it to pay off its debts and company now has about $87,000 in its treasury, $80,000 of which is in U. S. Liberty Bonds and U. S. Certificates.

March 1st, 1920, mine was taken under a 3 year lease by the **Consolidated Arizona Smelter Co.** (q. v.),

NEW STATE MINING & REDUCTION CO. ARIZONA

Idle. Office: 316 New England Bldg., Topeka, Kan.

Property: near Amadoville, Santa Cruz county, 26 claims, showing veins said to carry lead-zinc-copper ores, with gold and silver values.

Development: by 150′ shaft with 950′ tunnel.

Equipment: includes gasoline hoist and compressor. Was planning to erect a 100-ton dry concentrator to treat low-grade ores at last account.

NEW UNITED VERDE COPPER CO. ARIZONA.

Address: 707 Pemberton Bldg., Boston, Mass.

Officers: S. C. Mureh, pres.; L. N. Wombacher, v. p.; H. H. Patten, sec.-treas., with W. F. Burns and F. W. Farnum, directors.

Inc. in Arizona. **Cap.** $1,000,000; $1 par. Company reports that it incurs no debts and issues no financial reports.

Property: the Lucky Dime group of 14 claims, 280 acres, and the Logan mine, 7 claims, 140 acres, located 1½ miles from the Lucky Dime group, in southern part of Cherry Creek district, Yavapai county. The properties are 11 miles from Jerome.

Development: 216′ shaft on Logan property, said by management to block out $175,000 in gold ore. The Lucky Dime group has an 80′ shaft and several test pits said to show copper, gold, lead and silver values.

Equipment: includes a 10-stamp mill on the Logan property.

Management plans starting operations after sale of stock has provided sufficient funds.

NEW YORK-ARIZONA GOLD & COPPER CO. ARIZONA.

Address: Morenci. Graham Co., Ariz.

Officers: A. L. York, pres.; J. F. Cleveland, v. p.; C. E. Tyler, sec.-treas.; John C. Molder, gen. mgr.; J. R. Wester, supt., at last accounts.

Inc. April 15, 1907, in Arizona. **Cap.** $900,000; shares $1 par.

Property: 30 claims, 600 acres, and a 150-acre mill site, 4 miles west of Morenci, in the Copper Mountain district, includes the Buzzard Shadow and adjacent groups. Claims show quartzite, shale and limestone cut by porphyry, with contact deposits, having orebodies, more or less developed, said to range from 10″ to 4′ in width.

Development: by tunnels, 100′, 450′ and 600′ long and the Lillian tunnel, 1,800′, claimed to show a vein carrying several ore shoots. There are 5 shafts, including the 260′ Argentine shaft, said to show copper sulphides.

Equipment: includes a 15 h. p. gasoline hoist, 4 Nissen stamps and a tube-mill. Idle since 1917.

NEW YORK VERDE COPPER CO. ARIZONA.

Mail returned from Jerome, Ariz., and Kingman, Ariz. Is a reorganization of the **Victor Copper Co.**

Property: at Jerome, consists of 1,100 acres in the Southern Verde district Yavapai county, including 700 acres directly south of and adjacent to the Jerome Pacific holdings.

The Kingman property consists of 580 acres in the Maynard district, Mohave county, covering the Copper King vein. Company, at last accounts, drifting at 400′ depth to cut the vein which is said to show 3 to 4′ of copper ore in places. No recent information.

NIAGARA COPPER CO. ARIZONA

Dead. Mine near Bagdad, Ariz. See Copper Handbook, Vol. XI.

NIGHT HAWK LEASING CO. ARIZONA.

Address: James Z. McKenna, supt., Bisbee, Ariz.

Company has expended $92,744 in development work and $6,720 for equipment. Net return from 1920 smelter shipments amounted to $95,275.

Property: a lease, until 1923, on the Night Hawk mine of the Phelps Dodge Corporation, in the Warren district.

Development: under way to depth of 750′. The main orebody said to average 10%. A strike of 20% copper ore was made late 1921.

Production: in 1920, 8,017 tons, yielded 7,019 oz. silver and 1,064,549 lb. copper.

Ore shipped to Douglas for smelting.

NORTH DOMINION C. MNG. & DEV. CO. ARIZONA

Mine at Radium Station, 3½ miles from Globe, Gila county, Ariz.

Officers at last account: L. L. Litchfield, pres.-act. treas.; A. Billard,

v. p.-act. sec.; with Wm. Richards, W. H. Mercer and C. S. James, directors.

Inc. July 31, 1916, in Arizona. **Cap.** $5,000,000; 2,750,000 issued.

Property: 42 claims, about 800 acres, mostly on the east side of Pinal Creek, 3 miles north of Globe. The area is outside of the Globe district proper and is several miles from the producing mines of the Globe and Miami districts. Company claimed that it had spent $20,000 on development to Dec., 1917.

Geology: claims said to show disabase and diorite cut by a mother-lode and offshoots from it. This lode is reported to be 20 to 80' wide and to carry oxdized ores of copper with some vanadium as well as silver and gold values.

Development: consists of 12 prospect shafts from 20 to 115' deep and 6 crosscut tunnels, the total results of 12 years' work, according to company's prospectus.

A report by J. E. Hurd, states "there is not in the whole district a property capable of producing a greater quantity of ore rich in the metals as the N. D. C. M. & S. Corp., which with careful management can be made to furnish work for several thousand people and to pay yearly very large dividends for a great number of years on the large and rich bodies of ore known to exist.' Such statements are not only humorous, but in our opinion are gross exaggerations and not warranted by the limited development work done to date.

In August., 1919, 36 claims of property were advertised for Sheriff's sale to cover a judgmont of $2,405 obtained against company. No later information.

NORTHERN ARIZONA MNG. & ELEC. POWER CO. ARIZONA

Mail returned from Prescott and Supai, Ariz.

Officers: W. I. Johnson, pres., with Geo. Brookshea, W. P. Burke, W. C. Miller and F. Blucher, directors.

Inc. 1916, in Arizona. Cap. 1,000,000 shares; 50c par; pre-organization stock offered on the installment plan for 10c. per share.

Property: 5 claims, 100 acres, in Cataract Canyon district, Coconino county said to show deposits of lead-silver ore, with some vanadium in limestone.

Development: by tunnels, with total workings of 1,000'.

Equipment: includes a 20-ton mill, concentrate reported to assay 65% lead and 25 oz. silver per ton. No recent returns.

NORTH HILL-TOP EXTENSION MINING CO. ARIZON

Address: San Simon, Ariz.

Officers: F. P. Crane, pres.; W. W. Howard, v. p.; G. H. Ebson, sec. Jas. M. Hall, treas., with R. D. Hall, J. L. Hill and C. J. Olden, directors.

Inc. June, 1917, in Ariz. **Cap.** $2,000,000 $2 par.

Property: 30 claims, in California district, Cochise county, 20 miles S. W. of San Simon, said to show silver-lead ore in a number of veins.

Development: by several open cuts and test-pits only.

Is a speculative proposition. Presumably idle.

NORTH PINAL MINING CO. ARIZON

Address: C. W. Cisneey, pres., Box 516, Phoenix, Ariz.

Property: formerly held by **La Coronado Development Co.**, is in the Mineral Hill district 10 miles from Price, Pinal county.

Development: by a 300' shaft, shows a lens of copper ore at depth 260' in the shaft, said to carry up to 70% copper. Ore is mainly bornite.

Equipment: includes a 25 h. p. gasoline hoist and an air-compress

Idle.

NORTHWESTERN INSPIRATION COPPER CO. ARIZON

Address: A. H. Hammond, mgr., Miami, Ariz.

Officers: L. J. Overlock, pres.; C. E. Lucas, v. p.; A. H. Hammon sec.-treas., with J. P. Glass, J. D. Houston and A. C. McKillop, directo

Inc. Jan. 31, 1916, in Arizona. **Cap.** $1,500,000; $1 par; 750,000 in escrow until 300,000 are sold.

Property: 23 claims, 483 acres, at Miami, Gila county, adjoining Inspiration Consolidated Copper Co. for about 4,500′ on the north, and less than half a claim from the Black Warrior mine on the west. Examined by Carl Triechka and A. H. Hammond. Claims reported to show a deposit of disseminated copper ore in schist.

Development: by 500′ shaft. A N. E. drift on the 300′ level driven to reach the Black Warrior and Black copper veins was reported to have cut low grade sulphide ore at 550′.

NORTHWESTERN LEASING & DEVELOPMENT CO. ARIZONA

Described in Vol. XIII. Company had a lease on the New Planet copper mine, now leased to the Cons. Arizona Smelting Co., which see.

OATMAN AMALGAMATED GOLD M. CO. ARIZONA

Address: Flagstaff, Ariz. Sims Ely, mgr., Phoenix, Ariz.; E. A. Ritter, supt., Oatman, Arizona.

Officers: Sims Ely, pres.; T. A. Rickel, v. p.; Chas. Prochnow, sec.-treas., with Fred Hensing, Etienne A. Ritter, H. Babbitt and E. T. McGounigle, directors.

Inc. 1915, in Arizona. **Cap.** $2,000,000; $1 par; 226,441 shares outstanding. Treasury stock offered at 40c. per share in 1920. State permission to sell additional stock given late summer of 1921.

Property: 29 claims, 18 patented, 450 acres, 1 mile W. of Gold Road mine, at Oatman, Mohave county. Ore occurs in a quartz vein in andesite.

Development: by 640′ shaft, with 960′ of workings.

Equipment: 300 cu. ft. compressor, hoist, and 40 h. p. gas engine.

OATMAN CRESCENT MINING CO. ARIZONA

Mail returned from former **Address:** 25 Broad St., New York. **Mine office:** Oatman, Ariz.

Officers: Geo. W. Peirce, pres.-gen. mgr.; W. T. Esser, v. p.; Gowen Peirce, sec.-treas., with A. G. Reynolds, directors.

Inc. 1915. **Cap.** $100,000; 10c. par; 650,000 issued. Security Transfer & Registrar Co., New York, registrar and transfer agents.

Property: 9 claims, 170 acres, 4 miles S. E. of Oatman, Mohave county, said to show 3 strong veins outcropping at surface for 3,000′ in length and giving average assays of $6.13 per ton in gold. The veins strike N. W. and dip steeply S. The Highland Chief vein, from 10-40′ wide, consists of altered and brecciated wall rock with quartz and calcite, associated with black oxide of manganese.

Development: by tunnel, several shallow pits and openings, 1,200′ of drifting and tunnel work.

Equipment: includes 50 h. p. engine, compressor, jackhammers, etc. Is regarded as a promising prospect. Idle and probably dead.

OATMAN-FEDERAL CO. ARIZONA

Address: Mrs. Ida J. Schultz, Kingman, Arizona.

Property in Union Pass section, San Francisco district, Mohave county. Reported October, 1921, that J. C. Callaghan, of Phoenix, with others, is preparing to finance this enterprise.

OATMAN GOLD MINING & MILLING CO. ARIZONA

Office: 1405 Corn Exchange Bank Bldg., Chicago, Ill. **Mine address:** Oatman, Arizona.

Officers: Geo. R. Turley, pres.; H. B. Wilkins, sec. and E. McNeal, treas. Chas. H. Pugh, supt.

Inc. 1915, in Arizona. **Cap** $1.000.000; shares $1 par.

Property: 10 claims, about 160 acres, in the Tom Reed-Goldroad min-

ing district, Mohave county, shows several well-defined veins with stringers of quartz and calcite carrying free gold.

The Kokomo vein is a fault fissure, 40′ wide at surface, and said to show for 4,500′ on company's ground, with strike N. 62° W., and dip 80° N. E. cutting the andesite, or occurring in a contact between rhyolite and andesite.

Development: by 500′ shaft, sunk on the Kokomo vein in 1915, and N. and S. crosscuts.

Equipment: includes compressor and 25 h. p. hoist. Favorably reported on by E. W. Brooks.

No recent work has been done on property but equipment kept up pending resumption of development reported (Nov. 1, 1921) about to begin.

OATMAN GOLD TOP MINE **ARIZONA**

J. P. Loftus and J. K. Turner of Goldfield, Nev., operators. Mine is in the Secret Pass district, 10 miles from Oatman, Ariz.

Has 30-ton ball and amalgamating mill, but whether it treated any ore cannot be said.

OATMAN-JUMBO M. & M. CO. **ARIZONA**

Mail returned from Oatman, Ariz. Described in Vol. XIII.

OATMAN NORTH STAR MINES CO. **ARIZONA**

Idle **Address:** Oatman, Ariz. A. O. Parsons, pres., with C. E. Gilman, R. R. Moore and Lloyd Trevis, directors.

Inc. 1915, in Ariz. **Cap.** $150,000; shares 10c par.

Property: 17 claims, 250 acres, at Oatman, claimed to carry extension of Tom Reed vein system Sinking a 400′ shaft, at last accounts.

OATMAN REVENUE MINES CO., INC. **ARIZONA**

Name changed, November, 1921, to Katherine Revenue Mines Co., which see.

OATMAN SOUTHERN MINING & MILLING CO. **ARIZONA**

Oatman, Ariz. **Property:** 11 claims, 220 acres, in S. W. end of Oatman camp, Mohave county, fully described in Vol. XIII. Operated intermittently, presumably owing to lack of funds.

OATMAN SYNDICATE MINING CO. **ARIZONA**

Address: c/o Geo. W. Long, Oatman, Ariz.

Officers: J. L. McIver, pres.-mgr.; Geo. W. Long, v. p.; C. W. Herndon, sec.-treas.

Inc. Oct. 29, 1915, in Ariz. **Cap.** $100,000; shares 10c. 500,000 shares issued. Valley Bank, Phoenix, Ariz., transfer agent.

Property: the Putney group, 11 claims, 4 patented, about 200 acres, 6 miles S. of Oatman, Mohave county, embraces about 3,500′ on the main Black Range-Nellie lode system. Mine shows a quartz contact deposit surrounded by andesite, rhyolite and granite, with N. W. strike and dip of 45°.

Development: by 400′ vertical shaft. Drifts run both ways on the vein from the 400′ level.

Equipment: includes 40 h. p. hoist, 5 drill compressor and gasoline power. Idle.

OATMAN UNITED GOLD MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Officers: A. F. Andrews, pres.; O. Wimpenny, v. p.; L. Ashmun, sec.-treas.; J. K. Turner, cons. engr.

Inc. 1917, in Ariz. **Cap.** $200,000; 10c. par, assessable; issued 1,588,14 shares. Assessment of ½c. per share called Dec. 1, 1920. Listed on Los Angeles Stock Exchange. Company took over the Oatman United Mine Co.

Property: 120 acres surveyed for patent, 1½ miles N. E. of Oatman Mohave county, adioining United Eastern on N. and Tom Reed on S. W

said to show five gold bearing fissure veins in andesite and along andesite rhyolite contact.

Development: by shaft, to be sunk to 800 and 1,300′ of crosscuts. Exploration by diamond drilling was underway in 1921.

Equipment: includes 5-drill compressor, 40 h. p. hoist and 50 h. p. hoist and 50 h. p. engine. A prospect.

OATMAN UNITED MINES CO. ARIZONA

Company taken over by **Oatman United Gold Mining Co.**, which see.

OCOTILLO COPPER MINING CO. ARIZONA

Office: 502 Corby-Forsee Bldg., St. Joseph, Mo. **Mine office, Bisbee,** Arizona.

Officers: R. A. Grant, pres.; C. A. Blair, v. p. T. G. Sorter, sec.-treas.

Inc. "under the common law" in Ariz. **Cap.** $2,000,000; $1 par; 1,000,000 shares in treasury. Stock offered the public, 1917, at 35c. a share, either on the installment plan or with a 10% discount for cash.

Property: 16 claims, about 320 acres, 4 miles from Bisbee, Cochise county. Formation said to be lime and granite-porphyry.

Company's prospectus devoted mostly to the big producing mines of Arizona, their dividend records, etc., advises investment in the Ocotillo mine, which it states, "will prove as good as any of the large paying mines surrounding us, such as the Copper Queen, C. & A., Shattuck and the Sacramento."

This prospect is in an undeveloped area outside of Bisbee. Investors are warned to await results of development to at least 100′ in depth.

OCTAVE MINES CO. ARIZONA

Office: 882 Drexel Bldg., Philadelphia, Pa. **Mine:** Octave, Yavapai county, Ariz. J. Nelson Nevius, mgr., 809 S. Los Robles Ave., Pasadena, Cal.

Officers: H. C. Gibbs, pres., 60 State St., Boston, Mass.; H. S. Hopper, v. p.; D. S. Leas, sec.-treas.; R. M. H. Harper, Leroy P. Leas and S. T. Gibson, directors.

Inc. Feb., 1913, in Delaware. **Cap.** $1,250,000; $1 par; 950,000 shares issued. Bonded debt, $300,000 1st gold 7s, dated July 1, 1913, due July 1, 1923.

Property: 380 acres in the Wickenburg district including the Octave gold mine, an old mine with a record of $2,000,000 produced. Shows same geologic features as the Congress mine, 10 miles to east. The rocks are granite, intruded by acidic and basic dikes, including some of post mineral age.

Development: to depth of 2,000′ and for 2,000′ along the vein. To the east the veins were cut off by a fault. During 1915-17, new work found the veins beyond the fault and is said to have opened up an orebody 730′ long on the 800′ level. This ore is exposed on the 600′ level and 9 raises are said to prove it between the levels. The same orebody is exposed for 300′ on the 950′ level, and the face of the drift is said to show 4½′ of $26.50 ore. Management claims the mine has positively developed 40,000 tons assaying $13.89, with nearly all working faces in ore, and very important probabilities for further development.

Equipment: includes an old 40-stamp mill and cyanide plant, compressor, engine and drills.

OHIO ARIZONA COPPER CO. ARIZONA

Address: Fred J. Siebert, Silver Bell, Ariz.

Property: in the Silver Bell range, Pima county, near Tucson, Arizona, has been worked intermittently for several years. A 400′ shaft was sunk in 1919 and a 1,365′ tramway from the mine to the road below was completed in 1920.

OHIO MINES CO. ARIZONA

Office: 614 Outlook Bldg., Columbus, Ohio.

Officers: H. W. Whitaker, pres.; L. W. Smith, v. p.; J. F. Rogers, sec.-treas.; preceding officers, R. S. Barbee, Thos. M. Murphy, W. G. Brossman, H. F. Rittenour, Anderson Skinner, and W. H. Jones, directors.

Inc. Jan. 1909, in Arizona. **Cap.** $2,500,000; $1 par; in $200,000 preferred and $2,300,000 common stock; issued 1,810,837 shares; $250,000 first 7% mortgage notes, $50,000 issued. Annual meeting, third Monday in January.

Property: 14 claims, partly patented, 400 acres in Yavapai county, with a 5-acre mill site, and water-rights on the Agua Fria river, 6 miles from the mine, in the Big Bug district, Yavapai county. Property was bought of the Jessie Mines Co., described in Vol. VIII.

Ore: gold, with small silver values occurring in granite.

Development: by 3 shafts, 659', 206' and 200' deep, with 7,000' of workings, and the mine is said to have produced upwards of $750,000 in gold, under an ownership previous to that of the Jessie Mines Co. Property under lease to Chaparral Mining Co., which did some development work in 1916. Idle owing to lack of funds.

OLD DOMINION CO. ARIZONA

Office: 50 Congress St., Boston. **Mine and works office:** Globe, Gila county, Ariz.

Officers: Chas. S. Smith, pres. Walter Douglas, v. p.; with Cleveland H. Dodge, Cleveland E. Dodge, A. C. James, E. H. Ferry, and J. Waldo Smith, directors. Wm. M. Bradley, clerk; Chas H. Altmiller, asst. clerk-treas.; John MacNair, comptroller; W. G. McBride, gen. mgr.; I. H. Barkdall, mine supt.; H. H. Colley, smelter supt.

Inc. Jan. 15, 1904, in Maine. **Cap.** $8,750,000; $25 par; all issued and fully paid, as of July 12, 1921. Annual meeting last Wednesday in March. Stock listed on Boston and New Yerk Stock Exchanges. Bankers Trust Co. and old Dominion Co., transfer agents; Hanover National Bank, New York, and National Shawmut Bank, Boston, registrars.

Financial statement: years ending Dec. 31.

Assets

Year	Property	Equip.	Metals	Supplies, etc.	Cash and accts. rec.	Total
1920....	$13,034,503	$4,028,519	$3,335,764	$554,162	$954,672	$21,907,620
1919....	13,030,753	3,964,732	4,296,188	320,938	308,737	21,921,348
1918....	13,019,253	3,966,961	2,345,841	526,225	440,271	20,298,551

Liabilities

	Capital	Accts. payable taxes accrued	Reserves	Surplus	Total
1920....	$7,426,775	$4,174,472	$7,249,871	$3,056,502	$21,907,620
1919....	7,426,775	4,352,324	6,777,582	3,364,667	21,921,348
1918....	7,426,775	2,677,768	6,106,206	4,087,802	20,298,551

Comparative operating report shows:

	1920	1919	1918
Sales copper, gold, silver.....	$5,548,177	$3,205,879	$5,731,082
Cost copper, gold, silver, sold.....	5,091,062	3,049,120	4,441,178
Gen'l and admn. expenses.....	292,991	208,517	142,823
Operating profit	164,124	51,758	1,147,079
Depreciation	138,948	325,041	142,823
Depletion	333,341	346,335	304,195
State and Federal taxes.....	.....	.....	216,080
Net profits	$308,165*	$723,134	$301,764

*Loss

Reported that, through its selling agents, Phelps Dodge Corp., company has taken a $550,000 interest in the $40,000,000 8% note issue of the Copper Export Association.

Dividends: 50c. in 1905 and 1906; $1 in 1907; 50c. in 1908; $1.50 in 1909, 1910 and 1911; $14 in 1912; $5 in 1913; $4 in1914; $5 in 1915; $12 in 1916; $8 in 1917; $4 in 1918; a total of $14,405,260. Quarterly dividend due in March, 1919, was indefinitely postponed on account of metal market conditions.

The company was formerly a securities-holding corporation only, organized to promote the operations of the **Old Dominion Copper Mining & Smelting Co.**, of New Jersey, and **United Globe Mines** holding about 96% of capital stock of former and all of that of latter;but early in 1917 it acquired all the assets of the Old Dominion Copper subject to its liabilities, paying $10,000,000 in cash, also acquired all of the assets of the United Globe except one claim at $5,000, subject to its liabilities, at a valuation of $4,995,000. By this purchase the Old Dominion Copper and the U. G. mines were eliminated as separate organizations and the charter of the former was surrendered; duplication of office work and double taxation on the same income, were eliminated also.

Property: formerly owned by O. D. C. M. & S. Co., 38 claims and fractions, 5 millsite claims, and 4 placer claims, all patented; included in these is the Old Dominion mine at Globe; the Old Dominion and Keystone claims, 3½ miles north of Globe and the Continental mine at the head of Webster gulch, about 18 miles west of Globe; also the Chicago & New York group of 60 acres and the Geneva mine. The property formerly owned by United Globe Mines, consisted of 60 claims and 4 mill sites, lying west of the Old Dominion group, including the Grey Buckeye and Buffalo claims.

Geology: at the Old Dominion mine, the principal ore zone occurs along a big fault vein having a N.-E. strike with sharp easterly dip. The hanging wall is limestone and quartz, with footwall of diabase of more recent age, faulting evidently occurring both before and after the intrusion of the diabase. The ore favors the hanging wall, but also occurs in lenses along the bedding planes of the limestone and in shattered quartzite, the largest lens yet developed being 60x100x200′ in size. The oxidized ores are mainly cuprite associated with a little malachite and chrysocolla in a gangue of iron oxides and quartz.

Sulphide ores first appear at a depth of about 350′, as chalcocite, with gangue of pyrite and quartz, the lower workings also showing chalcopyrite. All ores are most or less argentiferous, and as a rule, are highly silicious requiring heavy lime and iron fluxes in smelting.

Development: 24,321′ in 1917; 22,163′ in 1918; 25,844′ in 1919; 31,628′ in 1920.

By August, 1919, the A shaft was enlarged to 5 compartments between No. 18 and 19 levels, and its depth was 70′ below No. 19. Little work of importance was done above the 14th level; on the 1½ level near B shaft some small bodies of smelting ore were opened up. On the lower levels the greater part of the work was confined to the 16th, 17th and 18th levels east and the 17th and 18th levels west; the winze on the west side was sunk from the 18th to 20th level and a little drifting and crosscutting done on the 19th and 20th levels. Considerable work was done on the 18th level west, but what ore was discovered was very irregular and did not extend far above that level. The developments on the east side of the mine particularly on the 17th and 18th levels may be considered highly satisfactory, the ore maintaining a good copper content. The fact that Arizona Commercial a little farther east has developed rich ore on its lower levels promises well for further work on the O. D. east side. Development of the U. G. ground is mainly through the workings of the Old Dominion. The Kingdon 1,200 and the Grey are the operating shafts and

they connect with the 1,200′ of the O. D. mine. There are a number of smaller shafts and several tunnels not in present use.

The production of copper from direct smelting ores has decreased somewhat during the past few years, due largely to the disappointing developments in the smelting ore zone between the 18th and 16th levels west; the tonnage developed has been small and grade of ore has been below the average prior to 1918.

In 1920, there was an encouraging discovery of 8% smelting ore on the 19th level W. and an excellent grade of ore across an unusually good vein width was uncovered on the 16th level E. near the Arizona Commercial line and on which the two properties are connected. On the 19th and 20th levels, the Maggie vein was developed from A shaft.

No important changes have been made in mining methods and the heavy wet ground on the west side is still worked by square sets and filling, while the more solid ground on the east side of the mine is stoped by cut and fill with out timber.

The "A" shaft, or main working shaft, on the eastern side of Pinal creek, in the west section of the mine, is connected with the principal workings by underground trolley lines, including a line to handle the ore of the Gladiator mine, which has yielded a notable quantity of smelting ore, and large quantities of concentrating ore. "A" shaft has 5 compartments, 2 equipped for skip hoisting, 2 with cages for lowering men and supplies, and 1 for air and steam lines, water columns and electric cables. Ore and waste, hoisted to surface, is handled in skips.

Ore Reserves: at the end of 1919 were 18,000 tons of smelting ore, 1,172,053 tons of concentrating ore, and 80,000 tons of mixed ore; reserves of former two classes were increased considerably during 1920.

Equipment: at "A" shaft includes a steel engine house, built 1910, having a 17″x31″x48″ compound hoist, good for 2,000′ depth.

"B" shaft, on the eastern side of Pinal creek, bottomed on the 14th level, has 4 compartments. "C" shaft has a 100,000 cu. ft. fan for ventilation, and is bottomed on the 14th level. "D" shaft, 300′ deep, is located on the western side of Pinal creek, about 2,000′ west of the most westerly previous workings. The "K" shaft, 1,400′ deep, also has a ventilating fan. The Transit shaft is about ⅛ mile east of "A". The Grey shaft has a 75 h. p. electric hoist.

Pumping: the mine is very wet, the daily average amount of water pumped being 5,237,000 gal. in 1920. The company sells part of the water pumped to the Miami C. Co., but receipts from this source reimburse it only to a slight extent for the pumping expense.

The mine is equipped with pumps of about 20,000,000 gals. capacity daily, these including a 1,500-gal. pump on the 10th level, having a 12″ water column, discharging 30′ above the collar of the shaft into a storage tank, whence water is drawn for use of the mill and smelter. There are 4 steam pumps on the 12th level, having a rated capacity of 8,000,000 gals. per day, with 4 Gould electric pumps, 2 on the 10 th and 2 on the 14th levels. On the 18th level there are two 1,200 gals. per minute quintuplex electric pumps. New centrifugal pumps were added, 1916, driven by power generated by a Diesel engine. An electrical centrifugal pump was added in 1918.

Early in 1916 drilling in Pinal creek proved the existence of a badly broken and porous area under the creek near the mine workings. Management has been grouting this ground with slime from the mill, thus reducing flood-water entering the mine from this point. Up to 1918 a total of 2,015′ of holes was drilled in the creek bed, and 23,000 tons of slime run into this area through the holes.

Mill and smelter: the mine, mill and smelter are connected by a private railway, equipped with a locomotive and 50-ton ore cars.

A new crusher plant and sampling mill were erected in 1913. Capacity is 150 tons per hour. In 1914 a 600-ton concentrator, using a 300-ton flotation plant to extract copper from the slime, was completed. The old 300-ton concentration mill, erected 1909, will be maintained as a reserve for test purposes.

The smelter does custom work, and was formerly an extensive purchaser of sulphide ores for fluxing the oxidized ores of the Old Dominion and United Globe mines, but these mines developed large quantities of sulphides in the lower workings.

The smelter has 8 double storage bins, holding 1,000 tons of coke, limestone and ore. Mixing, weighing and charging are done automatically, requiring a force of only 4 men. There are 5 blast-furnaces, 3 being 44" x198" at tuyeres, and the other 2 being 44"x231", set tandem, with settlers between, charged automatically from side-dumping cars. The furnaces have a nominal capacity of about 2,400 tons daily, but one furnace is held in reserve. Fuel is New Mexico coke. The smelter is served by an electric locomotive and three 3,000-lb. tilting cars for charging, with a steam locomotive and dump-cars for slags.

In the converter department acid converting was abandoned in January, 1913, and one stand of the basic converter type has handled all of the production since that time and has been particularly successful. A shell removed in 1915 from the stand has been there for 30 months without patching and had during that time produced over 70,000,000 lbs. of copper. Shells are handled by a 40-ton electric traveling crane. The converters take 50% matte, and turn out blister copper of 99.5% copper carrying a little silver.

The power plant at the smelter includes a 2,300 k. w. generator and two 750 k. w. generators, direct-connected to horizontal low-pressure steam turbines, utilizing exhaust steam. All machinery, except hoist and compressors, is actuated electrically. There is a 30 drill compound air compressor, with intercooler and water-jacketed air cylinders, and a complete electric light plant; 5,000 cu. ft. air compressor has also been installed. Furnace blast is supplied by blowers of 45,000 cu. ft. per minute aggregate capacity and an 18,000 cu. ft air compressor furnishes converter blast. Fuel oil is used for the boilers.

Production: smelter tonnage is larger than mine tonnage because the smelter treats a considerable amount of custom ore; the tonnage concentrated also includes custom ores.

	Tons Extr.	% Cu.	Tons Cons.	% Cu.	Tons Charge Smelt.	Costs per Ton Mng.	Conc.	Sm.	Lb. Fine Cu. Prod.	Cost p. Lb. Cts.	Rec'd p. Lb. Cts.
1920	249,111	4.79	244,340	4.41	135,216	.....	.....	.....	22,854,452	.....	.....
1919	253,686	4.28	265,428	4.02	111,533	.....	.....	.....	28,166,396	.....	17.28
1918	230,451	4.52	226,998	3.90	165,028	*	.....	.....	33,378,158	*	25.01
1917	199,888	4.97	199,575	3.78	198,548	$8.08	$1.254	$3.134	32,365,795	....	25.91
1916	152,059	5.88	254,213	3.89	271,367	6.48	1.14	2.79	40,776,611	11.69	26.81
1915	115,459	6.56	173,046	4.34	106,549	5.51	1.21	2.75	27,736.148	8.90	18.61
1914	129,813	7.44	151,893	4.67	207,595	5.20	0.93	2.67	30,210,361	8.22	13.71
1913	169,961	5.88	150,203	3.70	300,926	4.78	0.88	2.63	30,572,863	9.70	15.21
1912	201,181	4.67	166.870	3.77	306,086	4.55	0.75	2.30	27,353,243	10.34	16.42
1911	174,246	5.84	140,230	3.99	231,603	4.18	1.01	2.57	26,482,019	9.15	12.39

* Costs not published.

Production in 1918 included 5,071 oz. gold and 184,981 oz. silver; 5,756 oz. and 137,071 oz. in 1919; 3,484 oz. and 181,010 oz. in 1920.

In May, 1921, stockholders were given opportunity to buy 52,929 treasury shares at par before July 12, on the basis of 1 share for each 5 shares already held. Sale is reported to have been successful, company netting $1,323,225.

Ore reserves in the Old Dominion property are usually sufficient for at least 2 years, production at the normal rate. It is not advisable to have reserves for a longer period than this as it is too expensive to keep the ground open. Ore has been found continuously and consecutively on all levels down to the 18th, (1,400') level, and company has found no difficulty

in opening ore as required. Indications are that production will increase in the future rather than decrease. Management is exceptionally capable and efficient.

Operations, except development, were suspended in April, 1921.

OLD DOMINION COPPER MINING & SMELTING CO. ARIZONA.

Fully described in Vol. XIII.

OLD DOMINION EXTENSION COPPER CO. ARIZONA

Dead. Described in Vol. XIV.

OLD DOMINION EXTENSION MNG. DEV. CO. ARIZONA

Mail returned from office, at Globe and also from Miami, Ariz.

Officers: J. F. Chisholm, pres.; R. G. Thomas , v. p.; L. M. Greenstein, sec-treas.; all of Miami, Ariz., with W. P. Geary, F. Gill and A. R. Malone, directors.

Inc. 1916, in Ariz. **Cap.** $5,000,000; shares $5 par; 474,000 in treasury. 226,000 shares given for property were reported in escrow for an unstated length of time.

Property: 600 acres, adjoining and dovetailed into Old Dominion C. Co. ground, at Globe, Gila county.

Development: by tunnels and several shafts, one 125′ deep, sunk in quartzite and entering limestone. A 200′ drift along the quartzite limestone displacement was reported to show several pockets of ore and an average sample of the black oxide of manganese found showed 13 oz. silver.

Is a prospect. Company probably dead.

OLD HICKORY COPPER CO. ARIZONA.

Address: 17½ Howe St., Passaic, N. J.

Officers: Jas. V. Parber, Passaic, N. J., pres.; J. G. Wigg, v. p.; John Post, v. p.; P. Wannemacher, sec-treas. John Parber, supt.

Inc. in Arizona. **Cap.** $5,000,000; $1 par; fully paid; issued 1,650,000 shares.

Property: 41 claims, 600 acres, 35 miles S. of Tucson, Pima county, and 8 miles from the S. P. R. R.

Development: 3,000′ of tunnels, shafts and open cuts. The main shaft, the Jackson, was 190′ deep in Nov., 1918. Prospectus states the vein widened from 1″ at the 110′ level to nearly 1′ at 160′ depth. On 150′ level claimed to have 2′ of copper sulphide in east drift and 1′ in west drift.

Equipment: includes an air-compressor, drill, sinking pump, hoist and an auto truck.

Shipements made in 1919. While the mine is still a prospect awaiting development to prove its value, the management seems to be sincere in its beliefs and aspirations for making a mine.

OLD PUEBLO MINING & MILLING CO. ARIZONA.

Address: J. M. McBride, sec., Tucson, Ariz.

Property: 5 patented claims, Pima county, 5 miles W. of Tucson developed by the 517′ Quien Sabe shaft and a tunnel. A 70′ shaft cut, at depth of 30′, a 15 ton pocket of chalcocite, assaying 33% copper, 16 oz. silver and $2.50 gold per ton.

Idle for years, but company still in existence. Mine was formerly operated by Tucson Cons. C. Co., fully described in Vol. XIV.

OLD VESUVIUS MINE ARIZONA.

Address: C. H. McMahan and brothers, owners, Kirkland, Yavapai county, Ariz.

Property: the City Group, known as the Old Vesuvius, 9 claims, unpatented, 9 miles S. E. of Kirkland. Shows 4 veins at contact of diorite and granite, and of diorite and quartz diorite. Developed by several shallow incline shafts. Small shipments made in 1916-1917 are reported to have carried from 4-7 oz. gold per ton. Assessment work only being done since 1917.

ORION MINING & MILLING CO. ARIZONA.
Succeeded by Gold Dust Mining Co., which see.

ORIZABA MINING CO. ARIZONA.
Dead. Described in Vol. XIII.

ORO BELLE DEVELOPMENT CO. ARIZONA.
Dissolved. See Vol. XIII, also **Oro Belle** and **Gray Eagle** group.

ORO BELLE & GRAY EAGLE GROUP. ARIZONA.
Idle. Address: Mrs. Hattie Barnes, owner, care Theron Davis, 170 Broadway, New York. Mine formerly owned by Tiger Gold Mng. Co.

Property: 10 patented claims, 172 acres, 5 miles S. E. of Crown King, Yavapai county, shows pyrite and chalcopyrite in fissure veins, 2-15′ wide. Veins strike N., dip 60° W. Ore is said to assay $20 gold. 2 oz. silver and 1% copper per ton.

Development: by 8 tunnels, longest 1,000′, and a 600′ shaft.

Equipment: includes a 50 h. p. steam hoist, compressor and 20-stamp mill.

Production: 19,010 lb. of copper, 9,937 oz. silver and 4,313 oz. gold in 1907; 3,639 oz. silver and 1,23 oz .gold in 1908; 4,820 lb. fine copper, 2,725 oz. silver and 1,226 oz. gold in 1909. Mine credited with total production to date of $700,000. Property was idle until Oct. 1915, when leased to Oro Belle Dev. C. Again idle in 1917. Some work done in 1918; now idle.

ORO COBRA MINING CO. ARIZONA.
Address: Mrs. Thos. Wilkinson, pres. and gen. mgr., 715 High St., Burlington, Iowa. Mine near Wenden, Yuma county, Ariz.

Inc. Oct., 1901, in Arizona. **Cap.** $1,500,000; $1 par; fully issued. Annual meeting, second Tuesday, in February.

Property: 14 claims, 280 acres, in the Tank Pass section of the Harcuvar mountains, Ellsworth district, 12 miles west of Wenden, Yuma county. The claims show diorite, schist, granite and porphyry, with several fissure veins, from a few inches to 20′ in estimated average width, carrying oxidized ores near surface, said to assay 12 to 15% copper, and $1.50 to $80 per ton in combined silver and gold values, with chalcopyrite, at shallow depth. Mine is opened by shafts of 250′, 150′ and 40′, and a tunnel of 110′, with 700′ of total workings. Only assessment work done in recent years.

ORO GRANDE MINES CO. ARIZONA.
Idle. Office: Clinton, Ia. Mine near Wickenburg, Maricopa county, Arizona.

Officers: at last account, G. E. Lamb, pres. and treas.; Geo. B. Upton, v. p. and gen. mgr.; F. W. Ellis. sec.; and T. G. Norris, Prescott, Ariz., directors.

Inc. 1901, in Arizona. **Cap.** $3,000,000; $10 par; issued $2,500,000. Is a close corporation, controlled by 6 shareholders. Annual meeting, second Tuesday in January.

Property: 9 claims, patented, 161 acres, in the Black Rock district, Yavapai county. shows contact deposits between diorite and hornblende schist. The vein estimated by management as 170′ wide, traceable 4,400′, and carries oxidized ores, bornite and chalcocite, with gold values.

Development: by shafts of 320′, 100′ and 100′, with about 8,000′ of workings, reported to have blocked out 980,000 tons of ore.

Equipment: includes a 55 h. p. gasoline plant at the mine, with a 15 h. p. hoist and 5-drill Sullivan air-compressor. The 50-ton mill has ten 1,050-lb. stamps with a 40 h. p. gasoline engine.

ORO MINE. ARIZONA.
Address: G. B. Williams, owner, 316 Meigs St., Rochester, N. Y.

Property: the Oro mine, 10 claims, 6 patented, at Old Glory, in the Oro Blanco district, 30 miles west of Nogales, Santa Cruz county. Mine

shows 3 parallel fissure veins from 6 to 30′ wide. Vein on which most of the work has been done is 16′ wide, with a 5′ paystreak of silicious sulphide ore carrying copper, lead and gold.

Development: carried on since 1911, consist of a 350′ shaft with 2 levels and ground opened for stoping. In 1916, a drift on vein at 350′ said to have followed a paystreak assaying 3% copper, 5% lead and $20 gold.

Equipment: includes pumps, tramway, mill and dam. Mine has produced about $50,000 worth of ore to 1916.

Owner plans sinking winze and continuing drift on vein on 350′ level.

ORO-PLATA MINE — **ARIZONA.**

Now a part of holdings of **Golconda Ext. Mng. Co.**, which see.

OVERLAND MINING CO. — **ARIZONA.**

Mine near Winkelman, Ariz., adjoins the London Range mine of the London Arizona Copper Co. and "79" mine on the south and west. Claims said to carry an extension of the main dike system of the London range, showing metamorphic contact orebodies. Hayden Junction is the nearest railway point. Mine reported under lease to M. H. Murphy and W. E. Dunlap, of Kingman, at last account.

OWL HEAD COPPER CO. — **ARIZONA.**

Office: Cameron Michel & Co., 8 West 40th St., New York. Mine near Red Rock, Pinal county, Ariz.

Officers: Wm. P. Michel, pres.:

Officers: Wm. P. Michel, pres: J. E. Michel, v. p.-treas.; T. M. Simonton, sec., with J. B. Wright and Ralph Cameron, directors.

Inc. 1910. in Arizona. **Cap.** $10,000,000; shares $1 par; 3,160,000 issued. Registrar & Transfer Co., transfer agent.

Property: 24 claims, the Apache Princess group, in the Tortillita mountains, Owl Head mining district, 16 miles N. E. of Red Rock.

Development: by 150′ shaft. Presumably idle several years.

Promoted by Cameron, Michel. & Co.

OXIDE COPPER CO. — **ARIZONA**

Office: A. C. Burrage, owner, 85 Ames Bldg., Boston, Mass. Mine at Silver Bell, near Red Rock, Pinal county, Ariz. Albert C. Burrage, pres.; Chas. D. Burrage ,sec.-treas.

Property: 46 claims, patented, known as the Copper Prince group, in the Silver Bell district, 7 miles south of the Imperial mine, shows contact metamorphic deposits carrying argentiferous copper sulphides in limestone gangue.

Development: by a 500′ shaft and a 350′ tunnel, with about one-half mile of workings.

Equipment: includes gasoline power and an air compressor.

Production was 49,676 lb. copper and 103 oz. silver in 1918, and less than $3,750 worth of ore in 1910; none reported since. Idle.

PACIFIC COPPER MINING CO. — **ARIZONA.**

Mortgage foreclosed by bondholders and company defunct. Fully described in Vol. XIV.

PALO VERDE COPPER CO. — **ARIZONA.**

Office: Akron, Ohio, C. H. Howland, Cuyahoga Falls, Ohio, mgr.

Officers: J. P. Loomis, v. p.; I. M. Shively, sec., with Chas. Currie. E. E. Quirk and C. H. Howland, directors.

Inc. in Arizona. **Cap.** $2,000,000; shares $1 par; issued $1,000,000.

Property: 8 claims, is a copper prospect about 60 miles N. of Phoenix, in the Saddleback Mtns., between White Tanks and Eagle Tail districts. Maricopa county.

Mine is opened by shafts of 50, 112 and 210′ depth and a 130′ tunnel. Surface ores said to contain 2 to 15% copper. Plans to resume work.

PAN-AMERICAN MINING CO. — **ARIZONA.**

Is a close corporation. C. P. Collins, pres., Tulsa, Okla.

Cap. $600,000; shares $1 par.

Property: 8 patented claims, near Prescott, Yavapai county, developed by several thousand feet of underground workings. Ore contains gold, silver, lead values, mostly of milling grade. Mine idle for several years.

PARADISE GOLD MINING CO. **ARIZONA.**

Idle.

Address: Box 1095, Phoenix, Ariz. F. Obermuller, v. p.-mgr.; Jos. L. Obermuller, cons. engr.

Property: 6 claims and 3 mill sites in Paradise Valley district, Maricopa county, 23 miles from Phoenix, said to have 2 parallel veins about 300′ apart, traceable at surface for 3,000′, 45′ wide at depth of 100′ and averaging about $5 in gold. Stock offered to the public at 25c., Feb., 1917. No later information

PARADISE MINING CO. **ARIZONA.**

Paradise, Cochise Co., Ariz., was controlled through ownership of 60% of stock, by Bisbee-Sonora Development Co., fully described in Vol. XII.

PATAGONIA MINES & DEVELOPMENT CO. **ARIZONA.**

Office: formerly at Patagonia, Santa Cruz county, Ariz.

No information since 1914; probably dead; described in Vol. XIII.

PATAGONIA-SUPERIOR COPPER CO. **ARIZONA.**

Subsidiary of **Magma Copper Co.**, 14 Wall Street, New York. Organized October, 1919, to exploit the **Three R. mine.** W. C. Browning, pres. mgr., Superior, Arizona.

Property: the Three R. mine, 55 claims, about 1,000 acres, on the westerly slope of the Patagonia mountains, 9 miles S. of Patagonia, Santa Cruz county, at an elevation of 5,000′.

Geology: Claims show alaskite with small, irregular areas of trachyte and rhyolite porphyries. Ore occurs mainly along several lodes in a N. S. shear zone as chalcocite in high-grade shoots and also disseminated low-grade values. The first orebody opened had stopes 70 to 80′ long and 40′ wide, extending from the 50′ to the 400′ level, and a second parallel ore-shoot, 100′ from the first, was 23′ wide and carried 8% ore.

Development: the Colossus tunnel, Evening Star tunnel, and the 260′ Colossus shaft ,with total underground workings of 10,000′. Practically all the high-grade ore has been mined. Considerable diamond drilling was done during 1920. Results were not encouraging and all in November.

Equipment: includes a 50 h. p. oil-type hoist at the Colossus shaft, 40 h. p. and 60 h. p. oil-type engines operating individual belt driven air-compressors, dwellings, etc.

Production: to end of 1919, 109, 714 tons averaging 5.07% copper.

PAYMASTER SILVER-LEAD CO. **ARIZONA.**

Address: Charles Blemman, pres., Tucson, Ariz.

Property: at Olive Camp, 25 miles S. of Tuscon, developed to depth of 330′. Ore is a lead- copper sulphide, with some zinc blende. Shipments made to El Paso.

PAYROLL MINE CO. **ARIZONA.**

Address: Chloride, Ariz.

Inc. 1920 in Delaware. **Cap.** $1,000,000; 50c. par.

Property: 1½ miles E. of Chloride, Mohave county.

Development: by 400′ vertical shaft. On the bottom level over 290′ has been driven in ore, the shoot being from 1 to 8′ wide. At 200′ the vein was 12′ wide for 290′. Minerals are mostly zinc, with a little gold and silver.

Equipment: electric hoist, compressor, etc.

Production: totaled $50,000 to end of 1916. Shipments were made to the mill at Needles. Operations reported resumed in 1920 and shaft being sunk to 600′ level.

P. D. EXTENSION COPPER CO. ARIZONA.

Mail returned from Morenci, Ariz., marked "out of business". Described in Vol. XIII.

PEABODY CONSOLIDATED COPPER CO. ARIZONA.

Office: 111 Broadway, New York. **Mine office:** Johnson, Cochise Co., Ariz.

Officers: at last accounts: Leo. Schlesinger, pres.; Alex. T. Wells, v. p.; I. Niner, sec.; J. Born, treas., at last account, with Jos. B. Mayer, Morgan J. O'Brien, Jr., Herbert R. Limburg, G. M. Minzesheimer and Jas. Muir, directors. John H. Banks, cons. engr.

Inc. in Ariz. **Cap.** $1,500,000. $5 par. Empire Trust Co., New York, transfer agent. U. S. Corporation Co. ,registrar.

Property: 12 claims, 5 patented, 230 acres, covering 2,000′ along the ore belt at Johnson camp, bought of the Bonanza Belt Copper Co., includes the Peabody mine, located 1879. Mine has a contact deposit between diabase and limestone and replacement veins, all within a 100′ belt. Mine is credited with a production of about $411,970. Ore is a mixture of zinc blende and chalcopyrite in a garnetized lime gangue and is oxidized to a depth of 200′. The ore shipped claimed to run 4-6% copper, with 5% iron, 15-20% lime and 55% insoluble; silver averages ½ oz. to each percent copper.

Development: by a 350′ shaft, with crosscuts on the 200 and 300′ levels. No ore reserves reported.

Equipment: includes 90 h. p. power plant, compressor and hoist.

Shipments: in 1917 were 300 tons per month to the El Paso smelter under a 3-year contract. Shipping in 1919.

Prospectus issued by company was regarded as rather unduly optimistic. Property is an old one, having been operated intermittently for 20 years.

PEAK SILVER MINING CO. ARIZONA.

Address: J. E. Pierson, gen. mgr. Prescott, Ariz.

Inc. 1920, in Arizona.

Officers: H. H. Keays, pres.; Chas. A. Weidler, sec.-treas.

Property: 62 claims, 1,220 acres on the Hassayampa river in Yavapai county, 10 miles S. of Prescott. The Black Horse mine developed by a 130′ shaft, is said to show a 3′ vein of high grade silver ore. Extensive development planned, but no recent report received, except that company was in legal difficulties, October, 1921.

PECK CONSOLIDATED SILVER MINES. ARIZONA.

Fully described in Volume XIV. The Peck mine has recently been acquired by the Bishop-Edwards company. Reported operating in a small way, early 1921.

PHILADELPHIA MINING CO. ARIZONA.

Mine address: Geo. P. Harrington, mgr., Crown King, Yavapai county.

Property: a lease on the Gladiator and War Eagle mines, formerly owned by the Nelson Mining Co. between town of Crown King and mine of that name. Has fissure vein 3′ wide, developed by 2 tunnels, 225′ apart vertically, the upper 1,000′ long, and 300′ incline shaft on vein. Drove a lower tunnel, 4,165′ long, to cut ore zone 800′ below old mine workings exposing 5′ of gold-bearing ore, and developing a large flow of water, that is a desirable asset.

Numerous assays show gold and silver in commercial quantities; also some lead, zinc and copper. Ore was sent to the flotation mill of the Bradshaw Reduction Co. at Crown King, adjoining the Philadelphia mine. The zinc-content, a detriment in the past, is valuable, forming by flotation a concentrate desired by smelters.

Equipment: includes 25 h. p. gasoline hoist and air compressor. Company employs an average force of 15 men.

PHOENIX GOLD MINING CO. ARIZONA

Address: Cave Creek, Maricopa county.

Property: consists of vanadium bearing claims.

PINAL DEVELOPMENT CO. **ARIZONA.**

Address: 1401 No. 3rd St., Phoenix, Ariz.

Officers: J. C. Devine, pres.-treas., and mgr.; E. A. Tovrea, v. p.; C. T. Carpenter, sec.; E. M. Blake, J. H. Robinson, E. P. Palmer and Arthur Luhrs, directors.

Inc. Dec., 1915, in Arizona. **Cap.** $1,500,000; $1 par; 700,000 shares issued.

Property: the Renfro group, 47 claims, 940 acres, near Hayden, adjoins the Troy-Manhattan at Troy, nearly due E. of Ray, Pinal county.

Geology: ore occurs on contact between limestone and shale, as irregular replacements on bedding plane. Ore horizon is 15′ thick, and ore carries oxidized copper minerals, no sulphides being found. Ore runs 10 to 20% copper with low gold-silver values.

Development: by several tunnels, main one 1,600′ long, with about 2,500′ of workings to depth of 600′. In June, 1917, a 3′ streak of high-grade copper ore was struck, and a raise and winze were driven on it. Production started September, 1917.

Property regarded as a legitimate mining venture. No recent returns available.

PIONEER MINING & SMELTING CO. **ARIZONA.**

Offices: 1178 Broadway New York.

Officers: Garret B. Kip. pres., Tarrytown, N. Y.; W. C. Moore, sec.-treas., with G. H. Corwin and Edward Benedict, directors.

Inc. Aug. 19, 1913, in Arizona, as a reorganization of the Pioneer Smelting Co., which went into bankruptcy in 1913. **Cap.** $1,000,000; $1 par; $690,647 issued.

Property: formerly held by the Pioneer Smelting Co., 14 claims, 260 acres, included the Plumed Knight mine, sold to Mr. Barnsdall of Pittsburgh in 1917, and the Gould mine, also sold, 1917. Mines fully described in Vol. XII.

Company owned a 150-ton custom smelter, 1½ miles west of Sahuarita, and 20 miles south of Tucson, on the Twin Buttes railroad, which was reported sold, 1919.

PITTSBURGH-JEROME COPPER CO. **ARIZONA**

Mine office: Chas. Arata, supt., Jerome, Yavapai county, Ariz.

Officers: Wm. M. McJunkin, pres.; C. A. Cooper, v. p.; E. F. Thompson, sec.; F. J. Toufel, treas., with D. M. Clemson, W. H. Nimich, W. L. Rodgers, John McLeod, Chas. J. Graham, Geo. A. Magoon and E. W. Gwinner, directors.

Inc. 1904 in Arizona. **Cap.** increased, March 9, 1906, to $3,000,000; $1 par; all issued. Union Trust Co., Pittsburg, registrar. 1,000 shares sold for $51 the lot at auction in New York, Oct. 15, 1921.

Property: 21 claims, 387 acres, lying 2 to 3 miles S. of Jerome, Yavapai county, nearly N. W. of the Black Hills property, and about midway between the United Verde and Equator mines.

Development: by main, or 500′, and the lower, or 900′, tunnels and the 900′ Pittsburgh shaft, said to show argentiferous and auriferous sulphide ore of about 4% copper tenor at 358′ depth.

The 500′ or main tunnel, 1,279′ long, connects with the shaft. An east drift on this level shows copper carbonate; the west drift is in diorite. Several veins were cut, said to show leached ore average 2%; selected sulphide ore carried from 6 to 30% copper, $2.50 gold and 75c silver per ton, leading the management to hope for increased values below water level.

Equipment: includes a 150 h. p. Fairbanks & Morse hoist, 650 cu. ft. compressor and electric power.

Holdings sold at sheriff's sale May 19, 1921 to Harry B. Wassell, who acquired title on judgement for $173,445. This will, it is reported, be followed by a reorganization of the company.

PITTSBURG MINING & MILLING CO. ARIZONA

Oatman, Ariz. **Officers** P. L. Hughes, pres.-treas.; L. G. Rose, sec.

Inc. Jan. 31, 1912, in Arizona. **Cap.** $1,500,000; outstanding April 1 1916, $723,300; shares $1 par, assessable. Security Transfer & Registra Co., New York, transfer agent and registrar. Listed on New York Curl as a prospect, but stricken off on Dec. 26, 1919.

Property: 11 claims, 220 acres, in Yavapai county, 1 mile W. from Gol Road and 1½ miles N. W. from Oatman, is said to show 3 distinct veins

Development: 300′ double compartment vertical shaft, sunk on E. en of Pittsburgh claim between main and hanging-wall veins; water preventec sinking deeper; at this level 125′ of work has been done, but to date th ledge where opened has been low-grade. Total workings, about 1,000′.

Equipment: includes a 20 h. p. gasoline hoist.

PLOMO KING MINES CO. ARIZON

E. S. Rhodes, pres., New Philadelphia, Ohio.

Property: in Vulture district, Maricopa county, about 20 miles S. W of Wickenburg. Ore is silver-lead.

Development: by two-compartment shaft. Shipments to be made to E Paso.

PLUMED KNIGHT MINE ARIZON

Sold in 1917 to Mr. Barnsdall of Pittsburgh, Pa.

Mine, formerly owned by Pioneer Mng. & Smelting Co., is 18 mil from Tucson, Pima county, in the San Xavier district.

Development: by shafts to about 350′ depth shows ore rich in iro lime and silica at and above 100′ level, succeeded by bornite at depth. O said to average 4% copper with small gold-silver values.

Small shipments made in 1919.

POCAHONTAS COPPER QUEEN MINING CO. ARIZON

Mine office: Mayer. Yavapai county, Ariz.

Officers: W. H. Skinner, pres. and gen. mgr.; T. J. Burns, v. p.; D. Chapin, sec.; Benj. A Brown, treas.; D. M. Rock, eng.

Inc. 1906, as successor of Big Bug Gold & Copper Mining Co. Ca $1,000,000.

Property: 14 claims, 3 miles S. E. of Mayer, in 2 groups, about 1.0 apart. The smaller group of 4 patented claims carries gold-copper o The Spar group of 10 claims has a vein up to 14′ in width, carrying main gold, silver and lead, and the mine is said to have shipped 23 carloads high-grade ore, under former ownership, that gave sufficient returns to p the purchase price and the cost of development.

Development: by 200′ two-compartment shaft and a 120′ shaft. level at this depth was extended to develop 2½′ of ore, said to assay $49 gold, silver, lead.

Equipment: 50-ton mill was installed in 1920 and reported produci a concentrate running 44 oz. silver, $10 gold, 6% copper, and 11% lead.

Property has been worked in a desultory fashion for years.

POLAND MINING CO. ARIZO

Was a subsidiary of the Dev. Co. of America, now dead. Fully scribed in Volume XIV. Property sold and company out of existen

POLARIS MINING CO. ARIZO

Idle. **Office:** 520 Lyceum Bldg., Duluth Minn.

Officers: W. A. Eaton, pres.; J. O. Davis, v. p.; G. L. Maycroft, se treas.; above with A. E. Fritz, G. A. Eaton, O. E. Dahly, B. P. Wheeler a G. D. Tulian, directors.

Inc. 1916, in Minn. **Cap.** $1,000,000; shares $1 par; 294,281 issu Company is successor of the Summit Gold Mng. Co., which in turn succe ed Summit Copper Co. Stockholders of Summit Gold Mng. Co. were ered stock in Polaris, share for share with payment of 25c a share.

Property: the Klondyke mine, 21 claims, 5 patented, about 400 ac and a mill site, in the Virginia district, Mohave county, about 22 miles W. of Chloride, the nearest railway station.

Ore: is a gold-bearing quartz occuring in a vein up to 50′ in width. In 1897, a 10-stamp amalgamation mill was erected near the property, and mine is credited with production of 3,000-4,000 tons of ore running from $8. to $37 per ton. Gold is finely disseminated and, as only a 32% extraction could be made, operations were suspended.

Development: by 300′ tunnel.

Transportation, water, etc., are some of the difficult problems confronting the company.

POMEROY-PRUDENTIAL COPPER CO. **ARIZONA**

Offices: Hornell, N. Y., and Superior, Ariz.

Officers: K. Pomeroy, pres.; J. T. Rurey, v. p.; E. Pomeroy, sec.; E. N. Brill, treas.

Inc. 1917, in Arizona. **Cap** $1,500,000; 750,000 in treasury; 50,000 shares sold at 25c each.

Property: 9 claims, Pioneer district, Pinal county, 3 miles W. of Silver King, and known as the Silver Bell and Sulphide group, in the Pioneer district, 3½ miles N. W. of the Magma mine.

Development: 130′ adit on Silver Bell group shows some copper glance ore with silver values. A 120′ adit on a 4′ vein on the Sulphide group shows 2% copper ore, and a 110′ shaft will cut this vein at 200′. Several prospect shafts 10-20′ deep show low grade copper ore.

Properly shut down during 1921, but assessment work done and taxes paid. Operations to be resumed 1922.

PORPHYRY CONSOLIDATED COPPER CO. **ARIZONA**

A consolidation of Porphyry Copper Co. and Barney Copper Co.

Address: Box 1419, Globe, Arizona.

Officers: J. D. Coplen, pres.; J. B. Coplen, v. p.-gen. mgr.; K. W. Holbert, sec.-asst. treas.; E. T. Wilder, treas.-asst. sec., with Thomas Wight, directors.

Inc. 1919, in Arizona. **Cap.** $5,000,000; $1 par; offered at 40c per share, October,, 1919. On June 2, 1919, Barney shareholders decided to re-organize under the new name. Each share issued by the Barney was exchanged for 3½ shares in the Porphyry Consolidated, and each share of Porphyry Copper was exchanged for 1⅝ shares of Porphyry Consolidated.

Property: 35 claims, 454 acres in the Barney and 113 acres in the Porphyry, 3½ miles N. W. of Miami, Gila county, main shaft being 400′ from Inspiration Consolidated ground.

Development: on the Porphyry—a 775′ shaft is said to have passed through 60′ of carbonate and 85′ of chalcocite. Workings total 2,000′ A winze sunk 225′ below the 650′ level is said to be in ore all the way The Van Dyke shaft is 300′ deep.

Equipment: pipe-line, telephone-line, and dwellings; 50 h. p. engine, hoist and compressor, etc.

Holdings reported sold to Inspiration Cons. Copper Co. in 1921 for 1,000,000.

PORPHYRY COPPER CO. **ARIZONA**

Absorbed by **Porphyry Consolidated Copper Co.**, which see

PORTAGE LAKE & BISBEE MNG. CO. **ARIZONA**

Office: care John Funkey, Hancock, Mich. **Mine address:** Bisbee, Ariz. Chas. Lewis, treas.

Inc. April, 1903, in Arizona succeeding Portage Lake & Calumet Development Co. **Cap.** $1,000,000; $1 par.

Property: 12 claims, 3 fractional, 191 acres, several patented, 3 miles S. E. of Bisbee, S. E. of Warren Dev. Co., in Cochise county, showing limestone, with a porphyry contact. The mine has a 2-compartment 302′ shaft, with a small compressor, pump, 75 h. p. hoist, etc. Inactive many years.

POTTS CANYON MINING CO. **ARIZONA**

From our files it appears that an attempt to sell some of the worthless shares of this concern resulted in F. D. Ryan of 1482 Broadway, New

York, and two others, being indicted by the Grand Jury at Baltimore, Md. Supposed to have owned a property in Pinal county.

POWERS GULCH DEVELOPMENT CO. ARIZONA

Idle. John Matson, supt., at last accounts.

Property: 23 claims in Powers gulch near Globe, Gila county, is said to show a vein carrying bornite and chalcopyrite ore associated with pyrite. Mine idle for a long time, was reopened in 1915 and a strike of tungsten ore reported in April, 1916.

Development: by 2 shallow shafts and 2 short tunnels.

PRINCE ALBERT MINING & MILLING CO. ARIZONA

Property disposed of. Described in Vol. XIII.

PRINCE OF ARIZONA MINING CO. ARIZONA

Owned by Chas. C. McGinnis and Wm. E. Thomas. Company has stock selling permit from Arizona Corporation Commission.

Property: 20 claims in Maricopa county in foothills of the Bradshaw mountains, 31 miles N. W. of Phoenix and 8 miles N. of Beardsley, the nearest rail point, shows a series of parallel quartz veins in Yavapai schist opened (April, 1920) by shallow workings. A shipment of sorted ore averaged 52.7% lead, 39.7 oz. silver and $5 gold; vanadium is said to be present.

PRUDENTIAL COPPER MINING CO. ARIZONA

Office: 322 Federal St., Chicago, Ill. **Mine office:** 9 Bashford Bldg., Prescott, Ariz. H. H. Linney, agt.

Officers: Shea Smith, pres.; F. B. Gibbs, sec.; G. H. Jenkins, v. p.-treas.; with W. H. Newhall, M. N. Murphy, Mrs. Emma S. Jennings and Mrs. E. A. Ewing, directors.

Cap. is 500,000 shares, and company is controlled, through the ownership of 422,778 shares, by the Estate of Maj. Shea Smith.

Property: 12 claims, patented.

Idle for years.

QUAKER GOLD MINES CO. ARIZONA

Address: care Thos. J. Brodnax, Board of Trade Bldg., Kansas City, Mo.

Property: 10 claims, patented, the Gold Note and Richinbar mines, 12 miles from railway, in Harper district, Bradshaw Mts., Yavapai county, Ariz., shows quartz vein carrying gold ores, reported to average $8 per ton.

Development: 5,000' of work, in shafts, levels and tunnels.

Equipment: includes 20-stamp mill, hoist, etc., with electric power. Is a big low-grade proposition.

QUEEN BEE MINE ARIZONA

Address: M. B. Dudley, owner, Mineral Park, via Kingman, Ariz.

Property: an old silver-gold mine sold in August, 1919, by James Uncapher. Surface outcrops were rich, and lessees in recent years have extracted considerable shipping ore.

QUEEN CALUMET COPPER EXTENSION CO. ARIZONA

Address: 121 So. Central Ave., Phoenix, Ariz., or Bisbee, Ariz.

Officers: Jas. Wood, pres., P. L. Woodman, v. p.-gen. mgr.; J. F. Cleveland, sec.; Chas. A. McDonald, treas., with A. K. Stacy, W. W. Perkins and W. W. Searles, directors.

Inc. Dec. 12, 1916, in Ariz. **Cap.** $1,500,000; shares $1 par.

Property: the Don Luis group of patented claims, about 421 acres and the Gold Knob group of 253 acres in the Warren mining district, Cochise county. Structural geological conditions said to warrant drilling.

QUEEN COPPER MINING CO. ARIZONA

Property sold to **Magma Copper Co.**, and company liquidated.

QUEEN CREEK COPPER CO. ARIZONA

Address: Phoenix, Ariz.

Officers: A. Mackay, pres.; W. C. Foster and F. S. Stephen, v. p.'s; Arthur J. Smith, sec.-treas.-mng. director, with C. A. Stauffer, J. W. Cree

law and C. M. Shannon, directors; C. H. Smith, supt., Superior, Ariz. E. Defty, cons. engr.

Inc. May 3, 1916, in Arizona. **Cap.** $1,000,000; shares $1 par; 564,965 hares outstanding. Listed on New York Curb as a prospect. Equitable rust Co., New York, transfer agents; U. S. Corporation Co., New York, gistrar. Annual meeting, first Monday in May.

Balance sheet dated March 31, 1921, shows cash and sundry accounts, ,857; accounts payable, $299; loans and interest accrued, $113,868.

Property: 17 claims, 9 patented, on Queen Creek, 1 mile from Superior, inal county said to have a contact fissure carrying gold-silver-copper values.

Development: 800′ shaft, with 1,200′ of drifting on contact vein at rious levels. On 600′ level a South drift was driven 307′ . All work was spended in 1920, awaiting more favorable market conditions.

ADIUM MINES CO. ARIZONA

Address: W. H. Mercer, mgr., Globe Ariz.

Property: 60 claims, 4 miles north of the Old Dominion mine, Globe, ila county, said to show vanadium ore in a vein or mineralized fault zone diabase. The ore shows galena associated with iron oxide and man- nese; vanadanite occurs as crystalline incrustations around other min- als, but has not yet been found in commercial quantities.

No recent information.

AINBOW MOUNTAIN MINING CO. ARIZONA

Described in Vol. XIII.

Company liquidated and property conveyed to a new company, the **ontoro Mining Co.**

ANDOLPH-GEMMILL DEVELOPMENT CO. ARIZONA

Fully described in Vol. XIV. Company was organized to mill the ils of an old mill and the ore of an old mine dump, which was exhausted 1917, and company is now practically defunct.

ANIER DEVELOPMENT CO. ARIZONA

See Ranier Mines Corporation.

Office: 216-27 School St., Boston, Mass.

Officers and directors: S. J. Gnash, pres.; W. W. Gnash, v. p.; W. A. an, sec.-treas.; S. J. Gnash, mgr.; W. T. Gnash, supt. Wenden, Arizona.

Inc. July 1, 1914, in Arizona. **Cap.** $3,000,000; $1 par; 1,878,496 shares tstanding of which 1,777,238 shares are pooled. Annual meeting, February h.

Property: 44 claims including the Big Four, about 860 acres, in Ells- rth district 12 miles N. of Wenden, Yuma county. Ore occurs in exposed ins carrying gold-silver-copper-iron. The main vein is reported exposed surface for 80-250′ in width. Country rock is granite-schist, shale, rphyry and limestone. Two small shipments averaged $59 per ton.

Development: totals 2,000′ of workings, including several shafts, deep- 500′,and a 130′ tunnel.

Reported on by J. H. Shockley.

ANIER MINES CORPORATION ARIZONA

Address: 216-27 School St., Boston, Mass.

Officers: S. J. Gnash, v. p.-mgr.; W. A. Dean, sec.-treas., with Angus acEachern and W. W. Gnash, directors. W. T. Gnash, supt.; J. H. ockley, cons. engr.

Inc. Oct., 1917, in Arizona. **Cap.** $5,000,000; $1 par; outstanding 00,000 shares, Jan. 1, 1921. Bonded debt, $500,000 ten-year 8% Gold nds, dated Dec. 1, 1920. Listed on Boston Curb. Transfer office, Met- olitan Trust Co., Boston. Registrar, Equitable Trust Co., Boston. nual meeting, second Tuesday in January.

Company is a holding company owning 98% of stock of Ranier Dev. (which see), and 90% of stock of Harqua Hala Ridge M. & M. Co. roperty near Wenden, Yuma county.) The Critic mine in Cunningham ss district, Yuma county, was acquired in 1920.

In a 45-page prospectus, the president of the company says, "The Corporation's vast holdings of 1,630 acres, comprising 90 mining claims in the very heart of the copper-gold producing district, with 2,500 outcroppings of copper ore, and 250 veins already exposed—one of them 290' in width at one place, warrant the prediction that Ranier will soon rank as one of the biggest and richest copper-gold mines in the State of Arizona." The original promoters received 2,000,000 shares for their holdings.

Promoters issue a house organ "Ranier Mining News", containing many optimistic statements, presumably intended for the stockholders.

RAY-ARIZONA COPPER CO. **ARIZONA**

Address: Fritz Bock, Jr., mgr., Kelvin, Arizona.

Officers: Fritz Bock, pres.; M. A. McCabe, sec.

Property: 42 claims, on the south side of the Gila river, opposite Kelvin, Gila county, shows monzonite porphyry in mineralized granite with impregnations and veins carrying copper ore.

Development: by tunnel, shaft and churn-drilling.

Lessees shipped several cars of copper ore in 1916 to Hayden smelter. Idle.

RAY BOSTON COPPER CO. **ARIZONA**

A reorganization of the **Kelvin-Sultana Copper Co.**

Address: Suite 400, 372 Boylston St., Boston, Mass. C. E. Hart, mgr., Box 995, Miami, Ariz.

Officers: A. H. Westfall, pres.; O. M. Gale, v. p.; G. O. Swarts, sec.; G. P. Baldwin, treas, 732 Monadnock Block, Chicago, Ill. C. E. Hart, gen.-mgr.; E. P. Worthington, supt.

Cap. $5,000,000.

Property: 21 claims and 3 fractions, 530 acres, all patented but 2 claims and fraction, in Ray-Kelvin district, Pinal county.

Company also owns 30 acres of gold and silver lands in Ures district of Mexico.

The Arizona mines were formerly known as the Riverside and Bryan groups, and are across the Gila river from and 1½ miles S. E. of Kelvin. Management reports 21 contact deposits, between granite and diorite, of which 5 veins have been developed; reported as 18" to 6' wide, and estimated to average 5' in width, with a generally N. W. trend. The property also was said, formerly, to show a 6' vein carrying chalcoyprite in the lower workings, from which shipments to the Humboldt smelter returned 8.7 to 10.6% copper. Average tenor of ore in all veins is estimated by the company at 6% copper and 3 to 4 oz. silver per ton. From published reports the deposits appear to be gash veins, pinching out at shallow depth.

Development: by 6 shafts, deepest 590' and the Hunter and Agnes tunnels, with about 10,000' of underground work. Crosscuts on the 540' level, driven 2,000' and 1,267' are reported to have intersected 3 veins. Old workings are described in Vol. XIII of this book.

Equipment: includes a 575 h. p. oil-burning electric plant, a 1-mile aerial tram across the Gila river to the railway station of Kelvin and a concentrator of 200 to 300 tons daily capacity.

Production: of old company, to end of 1909, was 422 tons of ore, yielding $12,450. Production in 1907 was 45,838lb. fine copper and 653 oz. silver. Daily shipments of 20 tons to the Hayden smelter were made in summer of 1911. The mill has been closed down until sufficiently large reserves have been blocked out to insure profitable operation.

To March, 1921, the new owners did 1,417' of diamond drilling in one hole at an angle of 68° to meet No. 2 vein.

RAY BROKEN HILL MINING CO. **ARIZONA**

Address: Ray, Ariz.

Officers: Frank Schilling, pres.; H. H. McDonald, sec.-treas., with E. J. Ferguson, W. F. Gordon and Dr. Crawford, directors. Scott Lintner, mgr.

Property: 8 claims, unpatented, adjoins Ray Cons. on the east; also 10 claims in the Alma group. The ore is gold and copper.

Development: by a 1,200′ tunnel.

Work was suspended on original holdings after an unfavorable report by C. P. Berkey, and L. D. Huntoon, late in 1919, and equipment acquired by Dripping Springs Copper Co. in 1920.

Company intends to acquire other holdings and has made application for patent on the claims adjacent to and covering the tunnel. A lease on the Little Bobbie claim was allowed to lapse.

RAY CENTRAL COPPER CO. **ARIZONA**

Idle. Formerly the Finney Copper Co.

Address: Box 488, Phoenix, Ariz.

Officers: E. O. Petro, pres.; A. G. Dulmage, v. p.; H. T. Weldon, sec.-treas.-mgr., with W. O. Temple, directors.

Inc. May 20, 1916. **Cap.** $150,000; 10¢ par; 700,000 outstanding. Annual meeting first Tuesday in May.

Property: 13 claims, 260 acres in Banner district, Gila county, said to show gold-silver-copper ore in a contact deposit in diabase and lime.

Development: by 165′ shaft; and drifts on that level. A prospect.

RAY CENTRAL COPPER MINING CO. **ARIZONA**

Company conveyed by direct deed all assets to Ray Consolidated Copper Co. in June, 1912.

RAY CONSOLIDATED COPPER CO. **ARIZONA**

Office: 25 Broad St., New York. **Mine office:** W. S. Boyd, mgr. Ray, Pinal county, Ariz. **Mill office:** Hayden, Gila county, Ariz.

Officers: Sherwood Aldrich, pres.; D. C. Jackling, v. p. and managing director; Chas. Hayden, second v. p.; preceding, with Chas. M. MacNeill and W. Hinckle Smith, executive committee; Eugene P. Shove, sec.-treas.; L. S. Cates, gen. mgr.; preceding with Spencer Penrose and Seeley W. Mudd directors. R. C. Gemmel, asst. mng. dir.; W. S. Boyd, mgr.; C. A. Smith, supt of mines; H. C. Smith, mill supt.; D. D. Moffatt, cons. engr. mills.

Inc., May 11, 1907 in Maine. **Cap.** $16,000,000; shares $10 par; $15,711.-790 issued. Original capital, $6,000,000, increased to $8,000,000 in 1908; increased 1909 to $10,000,000; increased May, 1910, to $14,000,000. The increase to $16,000,000, March, 1912, was to provide shares for absorption of the Ray Central C. M. Co., giving 1 share of Ray Cons. for 8 of Ray Central. Company absorbed the Gila Copper Co., through exchange of stock, giving 1 share for 3. Company owns entire capital stock of the Ray & Gila Valley Railroad Co., $1,785,100. Bankers' Trust Co., New York, and Boston Safe Deposit & Trust Co., Boston, registrars; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents. Fiscal year, formerly ending June 30, now ends with the calendar year. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, formerly held, 4th Tuesday in September, is the 3rd Friday in April.

Range of shares during 1920 was $22¾ and $10½ low; total sales in New York were 349,695 shares. Range in 1921, to Oct., 15, was $15 to $11⅛.

In Feb., 1921, company took a 4% interest, $1,600,000 total amount, in the Copper Export Association's $40,000,000 8% note issue.

Comparative Gen'l Balance Sheet, including Ray & Gila Valley R. R. Co.

Assets:

	Property	Const. & Equip.	Devel.	Metals in Transit	Other Current	Total
1920.....	$8,656,440	$7,429,485	$6,057,503	$5,325,015	$5,067,848	$32,536,291
1919.....	8,657,620	7,907,291	6,137,522	5,972,741	5,338,183	34,013,357
1918.....	8,657,620	8,141,719	6,218,529	4,067,781	8,791,496	36,426,070
1917.....	8,719,313	7,927,277	6,044,968	6,101,606	6,944,158	36,047,652
1916.....	8,715,888	9,252,188	4,655,381	8,084,998	2,941,300	33,649,755
1915.....	8,917,573	7,373,768	4,076,250	3,823,834	1,253,492	25,444,917
1914.....	8,917,407	6,961,660	4,024,120	1,753,695	912,892	22,569,774

Liabilities:

	Capital Stock	Bond	Current	Reserves, Ins. Bond Redemp. and Deprec.	Total Surplus	Total
1920	$15,771,790	.....	$446,287	$540,184	$15,778,030	$32,536,291
1919	15,771,790	.....	624,133	1,177,851	16,439,583	34,013,357
1918	15,771,790	.....	1,109,298	1,573,483	17,971,500	36,426,070
1917	15,771,790	.....	833,007	1,045,540	18,397,315	36,047,652
1916	15,771,790	.....	1,037,962	1,519,700	15,320,303	33,649,755
1915	15,712,790	$160,500	709,132	974,078	7,888,417	25,444,917
1914	14,549,290	2,708,000	316,911	905,217	4,090,356	22,569,774

Comparative Income Account, Ray Cons. Copper Co.

	Operating Revenue	Operating Expenses	Net Optg. Profit	Total Income	Total Deduct	Balance Dec. 31
1920	$8,254,022	$7,597,567	$656,455	$911,675	$1,577,179	$14,264,229
1919	8,252,505	7,185,986	1,066,519	1,366,643	3,154,358	14,929,732
1918	19,209,311	14,795,200	4,414,112	4,803,455	5,275,832	16,417,819
1917	21,278,071	11,299,415	9,978,656	10,416,303	7,339,284	16,890,195
1916	20,060,783	8,200,633	11,860,150	12,264,265	4,885,792	13,813,177
1915	10,498,962	6,125,590	4,373,371	5,004,133	2,345,798	6,434,704
1914	7,597,724	5,281,484	2,316,240	2,655,163	2,655,163	3,776,368

Earnings and Dividends on stock per share:

	1920	1919	1918	1917	1916	1915	1914	1913	1912
Earned	$0.58	$1.06	$3.05	$6.15	$7.66	$2.73	$1.29	$1.49	$1.33
Paid	1.00	2.00	3.25	4.20	2.75	1.25	0.75	1.125	nil

The total to Dec. 31, 1920 was $25,412,621.

A sinking fund of 10c. per ton of dry ore treated to extinguish cost of development was in effect from 1914 to 1916, increased to 12½c. a ton each year after 1916, except in 1919 when it was 15c. It seems improbable it will ever be needed.

Property: 1,971 acres of patented mineral land at Ray, 127 acres at Ray Junction for railroad purposes, and a tract of 4,164 acres in Gila and Pinal counties, at Hayden and 21 miles from the mines, for milling and power-plant and tailing disposal; 536.5 acres of this are leased to the A. S. & R. Co. for its smelter.

About 580 acres of the Ray property have been proven to be mineralized, and about 183 acres have been developed, with a certainty that more or less of the additional mineral ground will be found to carry workable deposits.

Geology: The ore deposit is almost identical with that of Miami, and genetically similar to those at Bingham, Ely, and Morenci. It is a flat orebody 150 to 500' thick, 1,000 to 3,000' wide and about 9,000' long, through the property. This zone consists essentially of a highly metamorphosed iron-stained schist, intruded by a granite mass, whose borders and tongues are also mineralized and cut by diabase dikes. A fault east of the orebody brings the orebody against quartzite and limestone, while unaltered schist is found to the west. The silicified and whitened rock is leached to a considerable depth, the oxidized zone being succeeded by impregnations and seams o chalcocite and pyrite. Oxidized copper ores are found near surface, though in much of the ground the top of the belt is leached to depths varying from 30 to 400' and averaging 225', this leached zone being succeeded by ore carrying copper sulphides, greatly enriched by the secondary redeposition of chalcocite, latter constituting the main ore value. At the bottom of the orebody the transition from the ore to rock mineralized with primary sulphides takes place in a few feet. This primary mineralization averages about one-half of 1% copper, whereas an average sample of ore on the 50' level gave 2.4% copper, 3.4% iron, 2.6% sulphur and 90.3% insoluble matter.

See also Professional Paper 115 of U. S. Geological Survey, 1919, by F. L. Ransome.

The many drill-holes bored have shown an average capping of 240′ depth, succeeded by an average of 118′ thickness of ore, on the Ray proper, with 315′ of capping and 171′ thickness of ore on the Gila ground. The Ray mine has been developed by both underground workings and extensive churn-drill borings. Six churn-drills have been employed, averaging about 50′ each daily, boring several hundred holes to an average depth of nearly 400′ each, with a total of 140,000′ of drilling, holes being bored checkerboard fashion, in 200′ squares.

Development: by shafts Nos. 1 and 2 about 4,000′ apart, and No. 3, the Ray Central shaft, near No. 1. No. 4 Man shaft, 547′ deep, sunk in the western portion of the mine and capable of handling 37 men per trip, went into commission in 1918. There are many less important workings. The ore supply now comes almost equally from the No. 1 and the No. 2 mines. The No. 3 mine furnishes a smaller tonnage of high-grade ore. No. 1 shaft is 400′ deep and has 4 levels at 171′ and each succeeding 100′ in depth. The shafts are connected by a drift, on the second level, which is run for more than 1 mile, practically through commercial ore. By the side of each shaft is an incline shaft, with a series of stairs used by the men and a haulage way used for the hauling of material, the main shafts, being used solely for ore-extraction. The greatest depth from which ore is to be hoisted will be about 300′ for years to come, and the greater part of the tonnage will be taken from the 170′ level and above for some years.

During 1919 and 1920, development was largely of routine nature, but at No. 2 mine preliminary work was done to open more ground on the 3rd level and to open the 4th level. No exploratory work was performed in this period.

The Ray mine, of which the Ray Central or Globe-Isabella mine is now an integral part, has been developed for a maximum width of 3,500′ and length of 8,000′. Progress in development may be shown as follows:

Year	Year's Work	Total Devel.	Total Exhaust.	Total
	feet	miles	miles	Rem. miles
1920.....	38,600	148	80	68
1919.....	31,079	140.5	75.5	65
1918.....	61,711	134	69	65
1917.....	84,915	123	63	60
1916.....	66,863	107	54	53
1915.....	45,292	94	..	..

Ore Reserves: Jan. 1, 1921, total ore reserves to date were 83,004,043 tons, averaging 2.068% copper and underlying an area of 205.2 acres. The higher grade orebody developed by No. 3 shaft, contained Jan. 1, 1914, approximately 540,000 tons of ore averaging slightly over 5% copper. The total reserve tonnage ensures a life of about 23 years on basis of normal production, averaging 10,000 tons per day. There is a large area tributary to No. 2 shaft where there are good reasons to expect additional tonnages.

Equipment: the mine is operated electrically throughout, taking current over a transmission line from Hayden to Ray. There is a crushing plant at the mine, reducing ore to about 1″ size before shipping to the mill.

The Ray & Gila Valley R. R. delivers the ore from mines at Ray to Ray Junction from where it is transported by the Arizona Eastern R. R. to the mills at Hayden. The R. & G. is standard gauge, equipped with 80 lb. rails, Mogul locomotives and 60-ton steel ore cars, and is operated as a common carrier. Late in 1920, Ray Cons. purchased a large part of ore hauling equipment and will operate its ore haulage service under a trackage license.

Concentrator: at Hayden, is in its essential features, a duplicate of the Garfield mill of the Utah Copper Co.

The mill, of 10,000 tons daily capacity, has eight units, and is so designed that it may be enlarged, on the unit plan. The crushing department

has 16 sets of 42x16" rolls, and 24 six-foot Garfield Chilean mills. Sizing is done by 48 impact screens, and Janney classifiers, and concentration is effected by Garfield roughing tables, Harz single compartment jigs, Wilfley tables, and Isbell vanners. Water, derived from the Gila river, is sent to a 4,000,000 gal. reservoir at the mill site through a 30" pipe, by pumps having a capacity of 7,500 gals. per minute.

The mill started in March, 1911, treating an average of 850 tons of ore daily. The concentrates are well adapted to smelting, as regards sulphur and iron content, only a small amount of limestone being required for fluxing. Concentrates are treated in the Hayden smelter, owned by the American Smelting & Refining Co.

The power-plant at the mill-site, of 10,000 h. p. capacity, supplies electric current for the operation of the entire property. The plant has water-tube boilers, and four 2,500 h. p. triple-expansion engines, direct-connected to four 1,750 k. w. electric generators; recently added, one 7,500 k. w. Parsons turbine direct-connected to a 6,600 volt generator. Oil and coal were formerly used for fuel, but a sure and steady supply of fuel oil for the future being uncertain, the company jointly with the Chino Copper Co. and the A. S. & R. Co., took over July 1, 1917, the coal fields formerly owned by the Victor American Fuel Co., in the Gallup district, N. Mexico. The Gallup-American Coal Co., with capital of $4,000,000, was organized to handle this property.

Production:

	Tons Treated	Cost per Ton. Mine Cts.	Mill Cts.	Total	% Cu.	% Rec.	%Cu. in Cncts.	Lbs. Rec.per T.Ore	Net Prod. Lbs. Cu.	Cost Cts. per Lb.	Sell. Price Cts.
1921†	347,778	132.00	117.00	....	1.641	77.09	....	.....	8,563,596	*15.650	.....
1920	1,706,928	179.00	124.00	$4.452	1.720	81.98	18.84	28.20	47,062,030	16.144	17.502
1919	1,621,600	168.00	129.00	4.431	1.814	79.45	20.18	28.83	46,011,371	*15.620	17.905
1918	3,411,000	176.00	101.00	4.337	1.613	74.92	18.198	24.17	83.599,160	17.695	22.941
1917	3,560,900	109.00	82.86	3.173	1.635	74.53	18.935	24.37	88,582,649	12.649	23.986
1916	3,332,340	80.073	55.35	2.46	1.607	72.20	19.91	22.56	74,983,540	10.134	26.724
1915	2,848,969	62.68	50.86	2.115	1.673	64.11	19.29	21.45	60.388,936	9.497	17.352
1914	2,427,700	62.42	49.88	2.174	1.760	67.88	19.25	23.89	57,004,281	8.839	13.267
1913	2,365,296	73.23	51.93	2.284	1.719	66.09	18.55	22.72	52,341,029	9,874	15.201
1912	1,565,875	77.55	46.88	2.334	1.677	68.28	18.94	22.9	35,861,496	9.828	15.762
1911	681,519	81.60	59.45	2.65	1.83	63.01	22.04	22.0	14,935,047	10.765	13.08

*Does not include Federal income and profit taxes. †First quarter.

Copper is sold through the new agency of Guggenheim Bros.

Mine cost includes coarse crushing and loading on cars at mine, 5.8¢ per ton in 1920. Total cost calculated from income statement includes all operating charges. Cost per pound does not include credits for gold and silver, nor for miscel. income, equal to 0.579¢ per lb. in 1920. Low recovery in 1915 due to construction work in mill improvements at a time when the price of copper made it more profitable to overload such sections as were not undergoing repairs.

In 1920 production of silver was 4,365 oz., sold at 100.45¢ per oz., and 643 oz. gold at $20 per oz.

With the signing of the Armistice, Nov. 1918, the demand for copper ceased abruptly, and to avoid a large surplus of unsold metal, production and operations were reduced approximately 50%, beginning the year 1919. Operating costs have decreased slightly. Production during the last few years has surpassed that of Chino and Nevada Cons., both older mines. The company has more constructive possibilities than any of the four porphyries. Equipment in every department is now practically complete and construction expenditures hereafter will be relatively small.

The tonnage already developed places the Ray Consolidated among the great copper mines of the world, standing sixth in point of ore reserves, with a certainty that the present enormous ore tonnage will be increased, and a possibility that it may be doubled. The management is practically the same as that of the Utah Copper Co., the pioneer among the so-called

porphyry mines of the world, and is thoroughly experienced, strong and capable.

Operations during 1919 were about 50% of normal and by the end of 1920 they were further reduced to 40% and entirely suspended in April, 1921. For the 1st quarter of 1921, there was an operating deficit of $181,296 and for the 2nd quarter, $370,210, which included $289,994 for shutdown expense.

RAY HERCULES COPPER COMPANY — ARIZONA

Succeeded by Ray Hercules Mines, Inc.

The Ray Hercules Copper Company was formed in 1915. The intervention of the war delayed construction and development and, at the same time, the company lost the sale of a year's production at the high metal prices then prevailing.

In this situation certain directors and creditors of the Company evidenced their confidence in the property and their good will toward stockholders by personally procuring from time to time the funds necessary for additional costs, development and operation.

In this way, over the period ending July 1921, $2,287,562 had been advanced by the directors and creditors on the Company's notes, for which advances they took as security the $3,000,000 7% First Mortgage Bonds of the Arizona Hercules Copper Company which, under the plan proposed to the shareholders under date of March 7, 1921, was deposited as collateral for a proposed issue of the same amount of bonds of the Ray Hercules Copper Co. bearing 8%. This plan of March 7, 1921 was approved by the stockholders but on account of the unfavorable conditions then existing, sufficient subscriptions were not received to permit the plan to be carried out, and the proposed Ray Hercules Copper Co. bonds were, therefore, never issued.

Ray Hercules Copper Company had 1,500,000 shares outstanding. The shareholders were given the privilege upon surrender and cancellation of their old stock, to subscribe to one share of the new stock for every two shares of the old stock held by them, upon payment of $1 per share for the new stock. The money so paid went into the treasury of the new company. The creditors of the old company foreclosed the mortgage on the properties through the Empire Trust Company as Trustee under the Deed of Trust, and the Trustee transferred the entire assets to the Ray Hercules Mines, Inc. for $1,000,000 bonds and 250,000 shares of its stock. The properties represent a cash expenditure of over $4,000,000 aside from what was paid for the mineral claims and mine.

RAY HERCULES MINES, INC. — ARIZONA

Office: 24 Broad St., New York. Mine at Ray, Arizona.

Officers: J. G. Hopkins, Pres., E. P. Earle, V. P., L. G. Doane, Treas., Wm. P. Maloney, Sec. Directors: J. G. Hopkins, E. P. Earle, Frank C. Armstrong, Geo. A. Huhn, W. F. Bartholomew, August Heckscher, Jos. B. McCall, Robert Linton, Managing Director, T. A. Wilson, Gen. Mgr.

Inc. Feb. 1922, in Delaware. Capital, 1,200,000 shares, $5 par. 650,000 shares outstanding. $1,000,000 First Mortgage 10-year convertible 8% bonds dated November 1, 1922. In Treasury: 200,000 shares capital stock for conversion of bonds at $5 per share, $300,000 cash and 350,000 shares of treasury stock.

Property: Formerly owned by Arizona Hercules Copper Co. includes 207 acres in the heart of the Ray district, Pinal county, Arizona, surrounded by the holdings of the Ray Consolidated Copper Co. 1,500 acre mill site at Ray Junction, 6 miles S. E. of mine. Mineral land shows Pinal schist, in part capped by dacite, conglomerate and wash, and invaded by diabase. Ore developed is an extension and part of the Ray Consolidated ore body.

Ore Reserves: In 1915 Henry Krumb made a report, after drilling 27 drill holes, estimating that by connecting up 17 of these holes there were 3,428,774 tons of developed and partially developed ore assaying 2.36% copper. "There is no doubt that further drilling will increase the present ore reserves as the above ore is all developed on 13.37 acres out of a total acreage of 207.24 acres. Unquestionably the area to the east and southeast of that already developed is very promising and on the whole I consider the property of great merit."

In June, 1921, Robert Linton reported 3,916,000 tons averaging 2.42% copper, as wholly or partly developed by churn drill and underground work. From this, 172,000 tons of 2.2% copper ore has been mined, leaving 3,744,000 tons of 2.43% copper.

Development: by a vertical main hoisting shaft 862' deep at N. W. corner of property and a second shaft 543' deep. Both connect with the main haulage level 472' below collar of main shaft. Also by churn drilling with holes 200' apart, and by over 22,000' of underground work.

Equipment: at the mine includes a double-drum, electrically-driven Nordberg hoist, capacity 300 tons per hour and an electrically-driven compressor plant.

The coarse crushing plant has a No. 8 Gates gyratory crusher and rolls, product going to the sampling mill and main ore bin, capacity 5,000 tons. The crushing plant can handle 3,500 tons per day. Mine and mill are served by the Ray & Gila Valley R. R., the Ray Hercules owning connecting standard-gauge railroads at either end, a total length of 3 miles, bridge and railroads, heavy main line S. P. construction. Mine is equipped with electric haulage system.

Concentrating Mill: At Ray Junction. Comprises 3 units with daily capacity of 600 tons each. First section went into commission August 12, 1918, the third about the middle of September. Equipment includes 3 No. 86 Marcy Mills, 3 six-foot Hardinge mills, 15 Diester-Overstrom tabes, 42 flotation cells, 9 Dorr classifiers, 3 Oliver filters and 2 Connersville blowers for the flotation machines. Jigs have been recently added increasing the recovery of native copper of which the ore carries considerable quantities. The mill recovery was 85.8% in August 1919, treating 1.81% ore and making a 26.8% concentrate. Ample water supply is obtained from the Company's main pumping plant on the Gila River at Ray Junction.

Production: begun August, 1918, was 4,994,355 lbs. copper in 12 months of irregular operations. Up to May 1, 1920 when, by reason of the copper market, operations were suspended, total output was about 8,000,000 lbs. copper.

Old Company started production too late to enjoy the war prosperity of other copper producers. It therefore had to contend with depressed copper marke of 1919-20 and did not have the opportunity to get on a satisfactory earning basis.

New Company has on hand as of April 5, 1922, $300,000 cash and 350,000 shares of treasury stock, so that it is in good position to resume operations when the copper metal market warrants.

The Company can easily produce 1,000,000 pounds of copper per month. It is managed by experienced copper men and has good prospects.

For description of property and smelter, see Ray Hercules Copper Co., on preceding pages.

RAY-KELVIN MINING CO. — ARIZONA

Address: 418 National Bank of Arizona Bldg., Phoenix, Ariz.

Inc., March, 1918, in Arizona, by Wm. E. Cogdell, A. L. Kelly and John L. Pascale, for the purpose of operating a lead-silver property of 24 unpat-

ented claims, 6 miles N. of Kelvin. In Nov., 1918, H. E. Easterday asked that a receiver be appointed for the company. No later information.

RAY SILVER LEAD MINING CO. **ARIZONA**

Address: 215 Noll Bldg., Phoenix, Ariz.

Officers: William McDermott, pres.; J. E. Rowlands, v. p.; J. H. Page, treas.; H. H. Smith, sec.-asst. treas., with A. W. Lautz, directors.

Inc. Dec., 1916, in Arizona. **Cap.** $1,500,000; $1 par; 723,805 shares outstanding; $94,950 8% convertible mortgage bonds outstanding.

Property: 48 claims, 960 acres, 2 miles E. of Ray, Pinal county, on top of high limestone mountains. Shows replacement deposits of high-grade lead carbonate ore in fissures and along porphyry dikes intrusive in limestone, the ore occurring just above quartzite series. There are three or four mines on the property, all showing ore. Survey for patent being made for 9 claims.

Production: began in June, 1917, and totaled 2,005 tons shipped to Jan. 31, 1919, contained 4,145,327 lbs. lead, 544 oz. gold, and 20,422 oz. silver with gross value of $270,784. Shipments, June 1 to Dec. 31, 1918, averaged 27.5% lead, and in 1919 and 1920, averaged 33% lead. Shipments made to El Paso smelter.

Property leased to O. B. Stanton, el al, to December, 1923. Development work reported to show high grade ore.

RAY VERDE COPPER CO. **ARIZONA**

Office: 26 W. 44th St., New York. W. B. Duvall, mgr., Jefferson Hotel, Phoenix, Ariz.; Geo. Pruitt, supt., Kelvin, Ariz.

Officers: Edw. A. McSweeney, pres.; L. H. Bradshaw, sec.; F. W. Nye, treas., with L. F. Van Zelm, K. D. McAlpin and J. M. Thornton, directors.

Inc. Oct., 1919, in Arizona. **Cap.** $500,000; increased to $1,000,000 in 1920; par $1; 450,000 shares outstanding. U. S. Corp. Co., New York, registrar and transfer agent. Stock listed on N. Y. Curb.

Property: 72 claims, 1,440 acres, 12 miles S. of Ray, said to show disseminated chalcopyrite in a large porphyry dike, also fissure veins carrying copper, gold, silver, lead and molybdenum.

Development: by 300′ tunnel, shafts and open cuts. Churn drilling planned for 1921. Management estimates ore reserves at 500,000 tons.

RECORD LODE MINING CO. **ARIZONA**

Address: J. J. McCarthy, supt., Oatman, Mohave county, Ariz.

Officers. Chas. A. L. Gehrmann, pres.; Lee R. Myers, v. p.; L. L. Wallace, sec.-treas., with J. J. McCarthy, directors.

Inc. Jan., 1916, in Arizona. **Cap.** $250,000; shares 25¢ par.

Property: 10 claims, located on Hardy vein.

An incline shaft was sunk on the vein to 250′ level where vein left the shaft. At last accounts shaft was 500′ deep.

Equipment: hoist, compressor, etc.

RED CHIEF MINING CO. **ARIZONA**

Address: Casa Grande, Pinal county, Ariz. T. P. Copening, mgr. Shipped some lead ore in 1919.

RED CLOUD CONS. MINES CO. **ARIZONA**

Defunct. See Red Cloud mine in this book and Vol. XIV.

RED CLOUD MINE **ARIZONA**

Formerly property of Red Cloud Cons. Mines Co. (q. v. in Vol. XIV). now controlled by syndicate of 6, headed by L. B. Johnson, Mesa, Ariz.

Lessee: Paul Kimball, Yuma, Ariz.

Property: 40 miles N. of Yuma, in Yuma county, developed by a 500′ shaft. Is an "antigua" said to have produced $3,000,000 in shipping ore in the 80's. All high grade exhausted to bottom of shaft, or water level, but

estimates show 60,000 tons of ore in dumps and pillars, averaging 5% lead and 10oz. silver per ton. Is leased to Salt Lake interests who have erected a small mill.

REDEMPTION COPPER MINING & MILLING CO. **ARIZONA**

Dead. Lost its property, 1914.

The mine near Chloride, Mohave county, Ariz., was sold to Dr. M. Taylor Uhler, Philadelphia, in 1917. See Vol. XII.

RED GAP GOLD MINES CO. **ARIZONA**

Officers: C. C. Ward, pres.; C.W. Hernden, v. p.; C. M. Pedley, sec.-treas. at last account.

Inc. 1917, in Arizona. **Cap.** $1,500,000; shares $1 par.

Property: a group of claims in the Weaver district, Mohave county, 25 miles N. W. of Chloride, developed by tunnels and drifts said to expose veins from 10-12' wide, showing gold-silver values. A prospect.

RED LION MINING CO. **ARIZONA**

Address: John Smeddle, mgr., Oatman, Mohave county, Ariz.

Officers: W. L. Stowers, pres.; C. D. Hendrickson, sec.

Property: lies between the Ben Harrison and Gray Eagle claims, supposedly on the Tom Reed vein.

Development: by 500' shaft and crosscuts on 225' and 320' levels. Extensive crosscutting planned on 220' level N. E. and on the 500' level S. E. and S. W.

RED METAL COPPER CO. **ARIZONA**

Address: Parker, Ariz.

Officers: Dr. A. H. Littlefield, pres.; Lee Pritt, v. p.; Fred M. Hall, sec.; John Pritt, treas.-supt., with J. F. Raney, directors.

Property: 12 miles N. E. of Parker, in Yuma county, adjoins the Western Arizona Copper Co. holdings on the S., and is said to show a contact deposit of porphyry, with an iron gossan, carrying gold and copper.

Development: by 225' shaft. Company offered stock at 25¢ per share, in 1917, to procure funds for further development. Idle and presumably dead.

RED MT. CONS. COPPER MINES CO., INC. **ARIZONA**

Probably idle. **Address:** C. W. Caulkins, sec., 99 Grand St., Brooklyn, New York.

Officers: C. E. Meyers, pres.-mgr., Jas. H. Sullivan, v.-p.; F. Brose, treas., with E. J. Widness, J. S. Smith, W. A. Anderson, J. L. Anderson and G. M. Barklay, directors.

Inc. April, 1917, in Ariz. **Cap.** $5,000,000; $1 par; issued 1,194,500 shares. Manager reports $25,000 spent in 1918 on development and machinery.

Property: 21 claims in Dixie district, Maricopa county, about 35 miles N. W. of Phoenix, said to show gold, silver and copper ore. **Development:** shallow shaft, less than 100', and 2 tunnels, total length about 400'.

Equipment: includes a 50 h. p. hoist, and a compressor.

RED MOUNTAIN COPPER MINING CO. **ARIZONA**

Property: 60 claims, 1,200 acres, includes the Four Metals mine at Mowry, Santa Cruz county, Ariz. Was worked unsuccessfully by Oscar A. Turner, 1914-15.

Development: by several tunnels, longest 1,300', said to show pyrite and chalcopyrite ore, assaying from 1-3% copper for over 300'. No recent report.

Idle for years and probably defunct.

RED MOUNTAIN DEVELOPMENT CO. **ARIZONA**

Office: P. O. Box 3007, Lowell, Cochise county, Ariz.

Officers: Frank Briggs, pres., treas.-gen. mgr.; Wm. Hawley, v. p.; E. J. Briggs, sec.

Inc Oct. 5, 1908, in Arizona. **Cap.** $1,000,000, $1 par.

Property: 17 claims, 340 acres, crossed by the Southern Pacific Railway, shows schist, porphyry and limestone, with a vein claimed to be 130'

wide and traceable 2 miles, carrying copper and lead ores, including copper oxides and chalcopyrite.

Development: consists of a 100′ shaft. Idle owing to a lack of funds since 1917.

RED ROVER COPPER CO. **ARIZONA**

Reorganized, 1917, as **Red Rover Mining Co.**, which see.

RED ROVER MINING CO. **ARIZONA**

Address: care of B. A. Gillespie, owner, Phoenix, Maricopa Co., Ariz. Is a reorganization of the Red Rover Copper Co.

Property: 12 claims, known as the Red Rover Group, 12 miles north of Camp Creek and 50 miles N. E. of Phoenix, the nearest rail point.

Development: by 10,000′ of workings, including a 200′ tunnel and a 500′ incline shaft, showing a 10 to 16′ orebody between limestone and porphyry, carrying a 3′ paystreak estimated to average 10% copper, 6 to 60 oz. silver.

The Red Rover mine, discovered 1882, has shipped from shallow workings about $200,000 worth of high-grade ore, running about 15 to 25% copper, but value mainly in silver chloride, 1 carload of 20 tons netting $41,000, with no allowance made for copper content.

Is a meritorious development proposition. No recent returns.

REINIGER FREEMAN MINING CO. **ARIZONA**

Address: 57 N. Church St., Tucson, Ariz.

Officers: Chas. P. Reiniger, pres.-gen. mgr.; Chas. W. Freeman, v.-p. L. E. Jettinghoff, sec.-treas., with Chas. E. Walker and J. E. Jones, directors. A. B. Richmond, mgr.

Inc. Jan., 1918, in Arizona . **Cap.** $5,000,000; $5 par. 1,000,000 shares listed on New York Curb Security Transfer & Registrar Co., transfer agent.

The General Balance Sheet, Dec., 1918, shows total assests of $5,169,400, which includes mining properties and options $3,894,572; cash, $76,450; bills receivable, $100,126; development expenditures, $71,892; machinery and equipment, $20,846; warehouses and supplies, $5,515; treasury stock, $1,000,000. Liabilities show; capital stock, $5,000,000; balance due on purchase price of properties, $16,000 on Oct. 9, 1919; $22,000 on Oct. 9, 1920; $131,400 on Oct. 9, 1921. Statements of receipts and disbursements show receipts of $174,703 from sale of stock, deduct disbursements, $98,253; cash on hand, $76,450. Company has been involved in litigation and no later report issued.

Property: the Wakefield group at Mineral Hill, also option on the Virginia group of claims, 20 miles W. of Silverbell; Belmer group of 5 claims, 20 miles S. of Tucson; Copper Prince group of claims 1 mile N. of Twin Buttes, Pima county. Virginia group is said to show contact veins, between granite and sedimentaries, that produced some copper ore from shaft 50′ deep in 1917. Copper Prince is said to have contact veins between limestone and granite with development shafts, 40′ and 70′ deep, showing copper ore.

The Wakefield or Belmer group of 21 claims, 347.97 acres, adjoins the San Xavier, Mineral Hill and other well known mines in the San Xavier district, 20 miles south of Tucson.

This tract covers a limestone-diabase contact in an area of sedimentary rocks, surrounded by granite and altered by contact metamorphism. Mineralization occurs in contact deposits and in veins. Ore in the neighboring properties in base, consisting of lead, zinc and copper sulphides and carrying variable value in silver.

Development: work in 1918, embraced sinking the Belmer shaft to a depth of 330′ and the San Carlos shaft, 80′, a few hundred feet south of it. The Belmer shaft is reported to have cut the San Carlos veins.

The property is well equipped, has ample houses, offices, buildings, etc., and it is evident considerable money has been spent on this tract, but development appears to have been suspended before ore was found.

The amount of work done on the property does not warrant the character of the advertising matter put out by the company. Presumably idle since 1919.

RICHARDS COPPER CO. **ARIZONA**

Out of business. Formerly owned the Black Hills Copper Co. whose property was near the Equator mine, Jerome. Property sold in 1917.

RICO CONSOLIDATED MINING CO. **ARIZONA**

Superseded by Rico Exploration Co.

RICO EXPLORATION CO. **ARIZONA**

Address: 1101 Citizens Bank Bldg., Cleveland, Ohio.

Officers: M. A. Monaghan, pres.; C. J. Weideman, sec.-treas.; M. C. Cleveland, v. p.-mgr., Kingman, Ariz.

Inc. in Arizona. **Cap.** $500,000, increased from $100,000 in August, 1919. Company succeeded the Rico Cons. Mining Co.

Property: a lease on the Rico and C. O. D. mines, 20 miles N. of Kingman, Mohave county, which has expired. The Rico mine has since been reported under option to I. C. Bateman, and the C. O. D. mine is now owned by C. O. D. Mines, Inc.

RIO TONTO COPPER MINING CO. **ARIZONA**

Mail returned from former address, 137 No. Central Ave., Phoenix, Arizona.

Inc. Nov., 1917, in Arizona.

Property: the Patton Copper mine, 4 miles east of Mayer, Yavapai county, said to have high-grade ore exposed in several openings. Idle several years.

RIPSEY COPPER CO. **ARIZONA.**

Address: R. P. Sharpe, mgr., 1216 State Life Bldg., Indianapolis, Ind.

Officers: M. P. Woody, pres.; J. W. Sharpe, v. p.; M. W. Hopkins, sec.; Henry Severin, treas., with Dr. L. M. Green and W. H. Adams, directors.

Inc. 1914, in Arizona, to succeed Arizona Pacific Copper Co. **Cap.** $6,000,000; $1 par; all issued and owned by four directors. Securities Trust Co., Indianapolis, registrar. Stock transferred at company office. A $400,000 bond issue was authorized in 1920 to provide funds for further development.

Property: 12 claims, 240 acres, in Pinal county, 5 miles S. of Kelvin, said to show a disseminated deposit, 1,650′ x 600′; in granite diorite, with N. E.-S. W. course. The ore is mainly chalcocite with copper oxides and carbonates, averaging 1.78% copper and $1.50 in gold and silver.

Development: by 500′ vertical shaft and tunnels.

Equipment: includes hoist, compressor and pump.

Property shut down since 1907, but resumption of operations planned for 1921.

RIVER RANGE MINING CO. **ARIZONA.**

Address: c/o R. S. Billings, Kingman, Ariz.

Inc. 1921, in Ariz. **Cap.** $150,000; 10c. par.

Property: in Union Pass section, San Francisco district, Mohave county.

ROADSIDE MINE **ARIZONA.**

Property: 58 claims, 1,240 acres, in Pima county, about 40 miles S. W. of Tucson. Ore said to average 3% copper and 6 oz. silver per ton.

Development: by shafts, 400′, 200′ and 120′ deep. Developing 1920-21.

ROOSEVELT LAKE COPPER CO. **ARIZONA**

Mail returned from former address at 17 E. Adams Street, Phoenix, Ariz.

Officers: R. H. Williams, pres.; A. J. Matthews, v. p.; W. E. Laird, sec.; C. F. Ashley, treas., with C. H. Prather and J. R. Murdock, directors.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par; 400,000 issued.

Property: the Humdinger and Orocobre claims in the Mazatzal Mtns., Maricopa county, 20 miles from the Roosevelt dam, and the Virginia

claims, 9 miles from Phoenix. One claim said to have ore worth $1,000,000 on hand.

Development: by tunnels; churn-drilling contemplated.

Extravagant statements were published about this company's possibilities, a full-page advertisement including this gem: "In this vast treasurehouse—in vaults of porphyry and quartz, with walls of adamant—what wealth awaits the drill and blast, only the most active imagination can conceive." At last report company had sold its Roosevelt Lake property and was to use the cash to develop the claims near Phoenix. Presumably defunct.

ROSALIE COPPER CO. **ARIZONA.**

Letters returned from last address. Haddock & Shackelford, 424 Dwight Bldg., Kansas City, Mo. and from Los Angeles, Cal.

Inc. in Arizona. **Cap.** $3,000,000; shares $1 par.

Property: 9 claims, patented, 180 acres, in the Copper Creek district, Yavapai county, 25 miles S. E. of Mayer and 18 miles from Cordes siding, the nearest rail point.

The mine has numerous pits and shafts, and a 1,000′ tunnel, developing a 2 to 7′ vein carrying native copper, in the oxidized zone, followed by bornite, chalcopyrite and occassional chalcocite ores, said to assay 4.15 to 7% copper, with small gold and silver values.

Equipment: includes a 50 h. p. gasoline engine and air compressor. Presumably idle.

ROSEMONT DEVELOPMENT CO. **ARIZONA**

Office: 11 Broadway, New York. Is controlled by Adolph Lewisohn and Lewisohn Bros. E. B. Corbet, mgr., 1st Natl. Bank Bldg., San Francisco, Calif.

Property: 45 patented claims and 7 patented mill sites, at Rosemont Pima Co., Ariz., 20 miles from railroad.

In 1919 a part of the property was under lease to the Daylight Mining Co., a Tucson company. Shipments were made regularly until the copper market became unsettled.

Geology: numerous orebodies in limestone, occuring under geological conditions surficially similar to those at Bisbee. Company has a small smelter, long idle. Property regarded as promising.

ROWLEY COPPER MINES CO. **ARIZONA.**

Office: Kansas City, Mo.

Walter X. Osborn, mgr., Gila Bend, Maricopa county, Ariz.

Officers: E. D. Lysle., pres., Leavenworth, Kan.; C. D. French, v. p.-treas., Kansas City, Mo.; J. T. McRuer, sec., with Jas. O. Goodwin, and D. Rowley, directors.

Inc. June, 1909, in Arizona. **Cap.** $10,000,000; $1 par; fully paid.

Property: 6 claims, patents pending, 124 acres, about 28 miles No. W. of Gila Bend, and 65 miles S. W. of Phoenix, Ariz., acquired in 1909 for $20,000 cash and 1,000,000 shares.

Development: by two incline shafts to depth of 350′ with about 700′ of crosscuts and drifts and 234′ vertical shaft. Said to have exposed 3 strong veins of copper-gold-and silver-lead ore. Reported in 1918, that wulfenite had been found and a small mill had been built to treat it.

Equipment: includes 2 steam boilers, 200 h. p. oil engine, 2 compressors, one 300′ and one 1,000′ hoist; also five storage oil tanks, ore trailers, etc. Transportation is by 30-ton caterpillar 75 h. p. tractor owned by the company.

Prospectus states Mr. C. J. Price of Topeka, Kansas, a mining engineer of wide experience in both the U. S. and South Africa reports: "Your property has all the ingredients and requisites for the making of a big copper mine. Stock being offered in 1921 at 13c. cash or 14c. on the installment plan.

Legal notice of resumption of operations was given, October, 1921.

ROYAL BLUE SILVER & COPPER MINING CO. **ARIZONA.**

Inc. 1920, in Arizona.

Property: Royal Blue mine, in Santa Rita Mountains, Tyndall district, near Patagonia, Santa Cruz county, formerly owned by Apache Mining Co. Ore contains copper and silver.

Equipment: includes 15-ton Gibson mill, gasoline engine and hoist.

RUBY COPPER CO. **ARIZONA.**

Office: 317 Ridge Bldg., Kansas City, Mo. **Mine office:** Patagonia, Santa Cruz county, Ariz.

Officers: F. D. Reasor, pres,; E. Theilman, v. p.; C. E. Sweet, sec.; C. L. Cookson, treas., with H. J. Richards, F. P. Greenwood, A. E. White and R. W. Pierce, directors. C. A. Pierce, gen. mgr.

Inc. 1912, in Arizona. **Cap.** $2,000,000; shares $1 par; issued 1,735,659. Debentures, $200,000 at 6%; issued, $119,760. Annual meeting, third Monday in January.

Property: the Lee group of 9 claims, 6 patented, about 13 miles N. W. of Patagonia, on Benson Branch of S. P. R. R.

Geology: claims show remnants of Tertiary lavas capping a series of limestones and other sedimentary rocks, altered by metamorphism and underlain by a dense black crystalline rock that carries ore. This rock, though seemingly devoid of crushed zones or fissures, contains disseminated particles of chalcopyrite with occasional bunches and patches of high-grade ore assaying as high as 27% copper and 100 oz. silver per ton. This rock also holds kidneys, or globular masses of primary copper, glance and bornite. Ores are estimated to average 6% copper, 12 oz. silver and 11 cts. gold per ton.

Development: by 460′ shaft and a drift tunnel, with about 5,000′ of workings. The shaft is dry, unlike that of the Hosey mine to the N., and the Happy Jack to the S., both in higher ground.

Equipment: includes 30 h. p. gasoline hoist, and Leyner compressor.

Company has prospected its disseminated deposits by a number of churn-drill holes and plans to sink a shaft upon the strength of drill results.

RUBY GOLD AND COPPER CO. **ARIZONA.**

Dead. Property near Parker, Yuma county, Ariz., was acquired by the **Billie Mack Mining Co.**, and later by the Illinois Arizona Copper Co., which see.

RUBY SILVER CO. **ARIZONA.**

Address: Prescott, Ariz.

Officers: A. C. Gilmore, pres.-mgr. R. E. Morrison, v. p.; J. E. Russell, sec.; Wm. R. Uber, treas. all of Prescott.

Cap. $500,000; $1 par. 100,000 shares offered at 25c., March, 1921, and permit to sell an additional 100,000 at 25c. given in September.

Property: 5 claims in Hassayampa district, Yavapai county, said to show 3,000′ of the Zero vein, 6 to 25′ wide with lead-silver ore. Work was resumed in April, 1919, and the tunnel driven 420′ on vein, with 70′ raise, to be continued to surface. Further work contemplated, fall of 1921.

RURAL MINES CO., INC. **ARIZONA**

Address: M. B. Dudley, Kingman, Ariz. W. W. Widdowson, mgr.; T. D. Walsh, supt.

Property: Rural and Buckeye gold-silver mines, in Mineral Park district, Mohave county, near Kingman, controlled by M. B. Dudley and associates. The Rural has a 200′ shaft, the Buckeye a 700′ tunnel. Estimated to have 22,000 tons good milling ore in mine and 8,000 tons milling ore on the dumps. Ore occurs in a fissure vein in granite, carrying gold and silver.

Equipment: includes electrically-driven hoist, compressor, pump; also machine-shop, dwellings, water supply, etc. A 100-ton mill is planned.

Company also has a lease on the holdings of the Lodi Mines., near Luning, Nevada.

SADDLE MOUNTAIN MINING CO. **ARIZONA.**

Office: 902 Chapel St., New Haven, Conn.

Officers: Frank M. Travis, prs.; C. M. Robinson, sec.-treas.

Inc. 1902, in Arizona. **Cap.** $2,500,000, increased from $1,000,000; shares $1 par; outstanding, 1,306,585 shares, 3,000 shares sold for $10 the lot at public auction in New York on Dec.3 1, 1920.

Property: consists only of $300,000 par value of the capital stock of the Gila C. Sulphide Co., which, in October, 1909, acquired the property of the Saddle Mountain Mining Co., subject to the latter's authorized outstanding first mortgage bond issue of $1,000,000. These bonds were exchanged for an equal issue, $1,000,000 first mortgage 6% bonds of the Gila Copper Sulphide Co., at the option of the bondholders. Interest payable April 1 and Oct. 1. Of this issue, prior to December 1, 1917, $248,600 par value were retired out of earnings, leaving outstanding, December, 1, 1917, $751,400, due, principal and interest, April 1, 1918.

For description of the property, see **Gila Copper Sulphide Co.**

SAHUARO COPPER CO. **ARIZONA**

Address: Mineral Hill, via Tucson, Ariz. F. Buckout, pres.; T. R. Shacklett, v. p.; W. D. Uphaw, sec.-treas.

Property: 4 claims adjoining the Vulcan copper mine in the Mineral Hill-San Xavier district, Pima county, under development in 1920.

SAINT ANTHONY MNG. & DEV. CO. **ARIZONA**

Address: R. C. Gillis, Chapman Bldg., Los Angeles, Cal. **Mine office:** Schultz, Pinal county, Ariz.

Officers: R. C. Gillis, pres.; A. H. Fleming, v. p.; Epes Randolph, treas.; C. L. Bundy, sec.; Horace Pomeroy, gen. mgr.

Cap. $1,000,000; $1 par; 300,000 issued.

Property: the Mammoth and Collins groups, at Schultz, near Mammoth, and south of Ray, developed by 833′ shaft. A strong vein shows gold, lead and wulfenite ore. An 1,800′ drift on the 700′ level connects both groups.

Equipment: 200-ton concentrator and flotation plant. Mine and mill closed down.

SAN CARLOS MINING CO. **ARIZONA**

Address: D. Rowley, Gila Bend, Ariz.

Officers: Dora Rowley, pres.; J. C. Rowley, v. p.; Daisy Rowley, sec.-treas.; also directors.

Inc. Oct., 1914, in Arizona. **Cap.** $1,500,000; $1 par; 500,000 issued. Stock offered for sale by Southwest Securities Co., New York, in 1920.

Property: 11 claims, 220 acres, 18 miles W. and 7 miles N. of Gila Bend, Maricopa county, said to show contact fissures in rhyolite. Orebody is 8 to 12′ thick. Shoots are from 2 to 36″ wide and ore carries copper, gold and silver. Ground is considered to contain extensions of the Rowley veins.

Development: incline shaft to 238′ depth. No record of operations for many years.

Edwin Walters, J. F. Price, and others have examined the property.

SAN SIMON COPPER CO. **ARIZONA**

Office: Marquette, Mich. **Mine office:** Paradise, Cochise County, Ariz.

Officers: Nathan M. Kaufman, pres.; Hon. Norman W. Haire, v. p.; S. R. Kaufman, sec.-treas., with Thos. F. Cole, John A. Duncan, Wm. G. Rice and Thos. H. Collins, directors.

Inc. 1907, in Arizona. as a reconstruction of the Chiricahua Development Co. **Cap.** $2,500,000; $10 par.

Property: 40 claims, 7 patented, about 750 acres in Cochise county, 16 miles from nearest railway, at Rodeo, N. Mex. previously operated by Capt. Thos. Burns as a silver mine.

Development: a 750' crosscut tunnel with a 100' winze 700' from the portal, cutting 50' of leached ore, apparently the apex of a sulphide orebody. Also the 400' Mars shaft, bottomed in chalcopyrite ore of 2 to 4% copper tenor. The 400' Planet shaft has drifts on the 4th level.

Equipment: includes two 150 h. p. boilers, two 2,000' double drum hoists, and a 16-drill air compressor. Idle; only assessment work done in recent years.

SANTA RITA COPPER MINING & SMELTING CO. ARIZONA

Mail returned, address to P. O. Box 592, El Paso, Tex. **Mine office:** Arivaca, Pima county, Ariz.

Inc. June, 1901, in Arizona. **Cap.** 3,000,000; shares $1 par; issued, $2,750,000.

Property: 12 claims, 220 acres, in the Tyndall district of the Santa Rita mountains, 13 miles from Arivaca, shows granite, porphyry and diorite, carrying several veins of sulphide ore, usually at the contact of the diorite and granite. Veins range from 4 to 12' in width.

Development: 2 shafts and several tunnels, with a total of about 2,000' of workings, mostly in low-grade ore. A new tunnel, planned to give a back of 110', was 200' long, at last accounts. The mine is without power equipment. Company is a promotion of A. A. Post. Presumably moribund.

SAN VICENTE MINING & MILLING CO. ARIZONA

A. Sween, agent, Phoenix, Arizona.

Directors: J. A. Ritzler, R. O. Johnson, J. B. Burke, R. E. Houren, A. P. Schuster, J. E. Creighton and A. Sween.

Inc. 1921, in Arizona. **Cap.** $500,000; $1 par.

SAN XAVIER EXTENSION COPPER CO. ARIZONA

Address: Tucson, Ariz.

Officers: E. G. Bush, pres.-gen. mgr., with Nathan Kendall and R. K. Shelton, directors. E. A. Pike, supt.

Cap. $750,000; 50c par.

Property: 6 claims, 4 surveyed for patent, 100 acres, in San Xavier district, Pima county, developed by 440' vertical shaft, has lead-silver, copper, zinc ore.

Reported to have shipped 900 tons of ore assaying 20 oz. silver, and 4% copper from the 200' level. Idle temporarily, but company plans sinking to 500' level.

SAN XAVIER MINE ARIZONA

Owned by **Empire Zinc Co.** of Colorado and described thereunder.

SARATOGA MINING CO. ARIZONA

Crown King, Yavapai county, Ariz. J. L. Deming, mgr. According to report the company was reorganized in 1915, and in Dec., 1915, completed a 75-ton mill to treat Saratoga ore and also the dump ore of the adjoining Crown King mine, belonging to the Yavapai Consolidated Gold-Silver-Copper Co. No recent returns.

SASCO SMELTER ARIZONA

Acquired by the A. S. & R. Co. from the bankrupt Southern Arizona Sm. Co. Operations ceased in 1918; was dismantled in 1920. See Vol XI, Copper Handbook for description.

SCHUYKILL MINING CO. ARIZONA

Fully described in Volume XIV. Geo. N. MacBean, receiver, Holbrook, Arizona. Litigation settled and entire holdings acquired by **Cole-Tennessee Mining Co.**, which see.

SECRET PASS GOLD TOP MINING CO. ARIZONA

Addresses: J. P. Loftus, 1615 Martel Ave., Hollywood, Cal., and Kingman, Arizona.

Officers: J. P. Loftus, pres.; C. S. Sprague, v. p.; G. P. Loftus, sec.-treas., with F. Kemp, J. K. Turner and S. L. Carpenter, directors.

Inc. May 30, 1916, in Arizona. **Cap.** $100,000; 10c par; 587,000 issued.

Property: 5 claims, 100 acres in Oatman district, Mohave county. Open cuts and other shallow workings said to show 5,000 tons of $6 to $15 gold ore developed.

Equipment: 30-ton plant including 3' Hardinge ball mill. Presumably idle.

SENATE SILVER MINING CO. **ARIZONA**

Officers: C. C. Spicer, pres.; A. G. Keating, v. p.; J. N. Harper, treas.; S. M. Warmbath, treas.; with P. C. Thorne, directors.

Inc. in Arizona. **Cap.** $150,000; 10c par; 50,000 shares issued.

Property: 4 claims, 3 miles from Hackberry, and 30 miles from Kingman. Reported that development would be carried through vertical shaft of Hackberry Cons. until company sinks its own shaft, which was 200' deep, September, 1919, and still sinking on vein with 30" of 48 oz. silver ore.

Equipment: includes 25 h. p. hoist and a compressor. Is a prospect.

SESAME COPPER CO. **ARIZONA**

Dead. Described in Volume XIV.

SHAMROCK MINING CO. **ARIZONA**

Address: Bernard McEntee, gen. mgr. ,via Vicksburg, Yuma Co., Ariz.

Property: in the Plomosa district. Ore is said to carry 5% copper and 20 oz. silver per ton. Shipments amount to $12,000 to date.

SHANNON COPPER CO. **ARIZONA**

Office: 67 Milk St., Boston, Mass.

Officers: Nathan L. Amster, pres.; H. N. Stonemetz, v. p.; Chas. R. Jeffers, sec.-treas., with Wm. A. Paine, M. W. Cole, C. J. McGilravy, J. B. Beaty and Jonas Brooks, directors. J. W. Bennie, gen. mgr.

Inc. Nov. 13, 1899, in Delaware. **Cap.** $3,000,000; $10 par; increased July, 1909, to $3,300,000; issued, $3,000,000; 300,000 treasury shares. Shares are listed on the Boston Exchange. National Shawmut Bank, Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, third Wednesday in March.

In 1920, the directors were authorized to invest in business outside of metal mining, more especially in oil, but neither mineral nor oil properties of sufficient merit have as yet been found.

Financial statement, years ending Dec. 31:

Year	Sales	Profit	Dividends	Year's Surplus	Current assets	Current liabilities
1920.....	.....	.....	.....	.....	$395,263	$5,664
1919.....	.....	.....	.....	.....	466,890	12,266
1918.....	$2,254,774	$277,583*	.....	$277,583†	234,732**	250,262
1917.....	1,824,947	161,219	$525,000	380,032†	.....	.....
1916.....	2,620,950	783,216	150,000	671,055	.....	.....
1915.....	1,102,275	205,606	.....	209,678	.....	.....

* Loss. † Deficit. ** Exclusive of $540,710 investments.

Of the 1920 current assets, $145,000 is deposited with the Cosmopolitan Trust Co., which was (Jan. 1, 1921) in hands of the Bank Commissioner. Company is expending $5,000 per month in exploration work and in keeping mines unwatered.

The Arizona Copper Co., in 1919, took over the Clifton-Metcalf properties of the Shannon, including mines, reduction works, railroads, together with a 53% stock interest in the Coronado Mng. Co. The price was $600,000. With this money company paid off $200,000 outstanding bonds of Shannon-Ariz. Ry. Co. and paid off its floating debt. The Metcalf mines had been idle for some time, the ore having declined in grade until it could not be profitably treated.

Property: the company retains the Copper Belle mine at Gleeson, Cochise county, and the Yaeger Canyon properties, 8 miles S. W. of Jerome, Yavapai county. The Yaeger mine was closed down in March, 1919, to wait for a better demand for copper; in 1920, a little development work was done.

The mine is opened to the 1,300' level and is said to have cost $75,000; an additional $125,000 was spent on development. It is doubted whether this sum can be recovered from the ore developed. The Copper Belle mine is described under Leonard Copper Co., which is the subsidiary company holding title to the mine.

Production: in 1918 amounted to 9,627,987 lb. copper, 2,466 oz. gold and 77,314 oz. silver. Of the copper production, 7,164,918 lbs. were sold at 22.10c per lb.

Reported, fall of 1921, that both properties were being developed at a cost of about $3,500 per month, and that good ore was being uncovered.

SHATTUCK ARIZONA COPPER CO. — ARIZONA

Office: 120 Broadway, New York. **Mine office:** Bisbee, Cochise county, Arizona.

Officers: Thos. Bardon, pres.; H. L. Mundy, v. p.; N. E. LaMond, v. p.-sec.; A. M. Chisholm, treas., and L. C. Shattuck, gen. mgr., directors. Arthur Houle, supt.

Inc. March 22, 1904, in Minnesota. **Cap.** $3,500,000; $10 par, fully issued. Company is closely connected, in ownership and management with the Denn-Arizona Copper Co. The National Shawmut Bank, Boston, and Bankers' Trust Co., New York, registrars; Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, transfer agents. Shares listed on the Boston and New York Stock Exchanges. Annual meeting, third Wednesday in April.

Financial statement, years ending Dec. 31:

Year	Revenue	Net profit	Dividends	Current assets	Current liabilities
1920.....	$1,582,924	$239,115*	$87,500	$1,686,537	$72,381
1919.....	1,069,697	21,894*	875,000	2,164,483	451,876
1918.....	2,668,083	784,659	1,662,500	2,505,213	411,996
1917.....	3,652,156	1,477,500	787,500	7,307,161	329,536
1916.....	5,160,924	3,074,013	437,500	3,000,797	219,750
1915.....	2,368,548	1,174,028	262,500	1,543,417	168,230

* Loss.

A further deficit of $150,165 is shown for first 6 months of 1921, due to the fact that production is at a minimum while development continues.

Dividends: $2 in 1910; $1 in 1911; $1.50 in 1913; $1.50 in 1914; $2.50 in 1915; $4.75 in 1916; $5 in 1917; $2 in 1918; $1.25 in 1919 and 25c., Jan., 1920 making a total of $21.75 per share.

Property: 8 claims, patented, 109 acres, lying in the northeastern portion of the Bisbee camp, Cochise county, about one-half mile south of the original workings of the Copper Queen, and to the north of the Calumet & Arizona. The property shows carboniferous limestone, with intrusive porphyry dikes, and a big fault covered with a silicious gossan of 30 to 50' width. The orebodies occur as irregular replacements along bedding planes and along dike contacts. Ores carry copper and lead with gold, silver and vanadium values, and are oxidized down to 800', with low-grade sulphides at depth.

Lead ore treated by mill in 1918 averaged 6.6% lead, 8.1 oz. silver and 0.07 oz. gold, and the average for copper ore is apparently 5-7% copper and about 5 oz. of silver.

Option on the Con Virginia mine (q v.) in Sonora, was dropped Jan. 1, 1921, as development had not shown continuity of ore.

Development: the mine is opened by a 1,139' three-compartment shaft 15x4' 6" in size, connected with the Uncle Sam shaft of the Copper Queen on the 800' level, with the Powell shaft of the Calumet & Arizona on the 600' level, and with the workings of the Wolverine & Arizona on the 200' level. Mining work was begun Aug., 1904, and ore shipments started Sept., 1906.

During 1919, extensions were 4,244′; in 1920, 8,250′; and 6,092′ in first half of 1921, making 30.5 miles in all from the 100′ to 1,100′ level inclusive.

On the 100 and 200′ levels a new orebody was developed by 3,270′ of workings, with 18,000 tons of ore blocked out assaying 7½% copper and 6 oz. silver per ton. Further development is being carried on at 600′ and 1,100′.

Some of the orebodies are only partly developed, and there is still a fairly large unexplored area of limestone geologically favorable to ore deposition.

Ore reserves: on Nov. 1, 1921, developed and partly developed, were estimated to be about 620,000 tons, of which 330,000 tons were copper and the remainder lead ores.

Equipment: includes a 400-ton mill employing gravity concentration and flotation to treat low-grade silver lead-carbonate ore; operations on limited scale began July, 1918. Total expense for construction and equipment of mill was $294,902. For details, see article by Glenn L. Allen in Eng. & Mng. Jour. for Oct. 16, 1920.

The 750 h. p. steam plant has five 150 h. p. boilers. The main hoist is an 18x48″ duplex double-drum engine, capable of handling continuously a 15,000-lb. unbalanced load at a vertical hoisting speed of 2,000′ per minute from a depth of 1,500′. The air plant includes a 40-drill cross-compound air compressor. Fuel is petroleum, with a normal yearly consumption of about 20,000 bbl.

A 3,300′ aerial tram of 500 tons daily capacity, with average grade of 18%, supported by 14 towers of 12 to 40′ height, leads from a 1,000-ton ore bin near the shaft to the El Paso & Southwestern Railway, the buckets discharging loads direct into 50-ton ore cars. Copper ore is smelted by the Calumet & Arizona Mng. Co., at Douglas, Ariz., under contract in effect to July 1, 1923 and concentrate by lead furnaces at El Paso, Texas.

Also 12 mine buildings, including machine shop, carpenter shop, smithy, boiler house, engine house, warehouse, sawmill, and a change house with accommodations for 300 men.

Recent production:

	Copper Lb.	Lead Lb.	Silver Oz.	Gold Oz.	Copper Cost	Per Lb. Sold
1920.....	2,374,148	8,279,678	401,626	4,971	23.52¢.	18.25¢.
1919.....	2,111,841	4,432,655	89,724	300	22.40	24.37
1918.....	9,081,959	2,420,690	233,925	2,061	14.635	25.66
1917.....	11.935,317	2,010,145	154,344	1,542	13.242	28.317
1916.....	18,161,763	3,413,445	314,718	4,721	8.71	23.18
1915.....	11,154,211	2,345,342	201,869	3,151	(b)8.44	18.5
1914.....	10,846,918		198,419	2,444	(b)8.47	14.13
1913.....	13,219,756		236,000	2,033	7.22	

(b) Under curtailed production from Aug. 14 to Oct. 23 when shipments were discontinued, resumed in April, 1915.

The 1919 production was obtained from 22,256 tons of copper ore and 49,363 tons of lead ore; in 1920, from 19,175 tons of copper and 93,061 tons of lead ore.

All production was discontinued, November, 1920, owing to high costs and low metal prices. Development with 45 men was continued until July 31, 1921, when it also ceased. Good ore was found on the 600′ level.

SHEA COPPER CO. — ARIZONA

Address: O. G. Engelder, mgr., Jerome, Arizona.

Officers: D. J. Shea, pres.; E. G. Bush, v. p.; J. M. Goodwin, treas.; O. G. Engelder, sec. and mgr., together with R. E. Moore, directors.

Inc. 1916 in Arizona. **Cap.** $750,000; 50c par; permitted to sell 161,458 shares at 10¢ each in Dec., 1920.

Property: 5 patented claims, south of Copper Chief group, carrying 8 or 9 outcrops with gold, silver and copper.

Development: to depth of 825' by incline shaft following the vein, with levels at 225', 325, 425' and 525'. An 1,800' tunnel was being driven on 525' level and the main shaft deepened to 1,000', in 1921. Total workings March, 1921, 4,720'.

Shipments in 1920 reported made to United Verde Extension smelter.

SHELDON MINING CO. **ARIZONA**

Address: care Stukey Bros., Walker, Ariz. John F. Pell, pres., Newark, N. J.; A. R. Ackerman, treas., Walker, Ariz. Operated as a close corporation.

Inc. Aug. 1916, in Arizona, as a merger of the Sheldon group, the H. T. Andrews holdings and those of the Empire Mining Co., Metals Mining Co. and the Majors Mining & Milling Co. These holdings include nine attractive copper-gold properties, several of them pioneer mines of the Walker district, Yavapai county. The tract is about 14 miles from Prescott.

Development: work in 1921 reported to have opened up 16' of shipping ore on the 400' level.

SHERWOOD COPPER CO. **ARIZONA**

Address: Y. Cavillo, mgr., Tucson, Arizona.

Property: in Comobabi district, Pima county, 60 miles S. W. of Tucson.

Development: by 145' shaft and drifting, said to have opened high grade silver ore.

SHILL GOLD MINING CO. **ARIZONA**

Name changed 1917, **Humboldt Cons. Copper Co.**, which see.

SIGNAL POINT MINING CO. **ARIZONA**

Office: 40 First National Bank Bldg., Douglas, Ariz.

Officers: G. E. Hemphill, pres.-gen. mgr.; E. G. Richards, v. p.; Z. T. Phillips, sec.-treas., with E. A. Hemphill and Charles Stephens, directors.

Inc. July 10, 1915, in Arizona. **Cap.** $600,000; 50c par; 800,000 issued.

Property: 19 claims, 12 miles E of Douglas, Cochise county, near International Boundary.

Development: by 2 shafts, 120 and 150' deep, equipped with gasoline hoists. No. 1 shaft was sunk on an iron dike, showing traces of copper and silver, and up to $3 gold per ton; No. 2 passed through 40' of gold, silver, copper, lead ore into a leached zone. Evidently idle, no recent returns.

SILVER BELL CONSOLIDATED MINING CO. **ARIZONA**

Office: Fithian Bldg., Santa Barbara, Calif. **Eastern office:** Paul Alexander in charge, 31 Union Sq., New York City. **Mine address:** Price, Ariz.

Officers: Joel Remington Fithian, pres.; Geo. J. Stoneman, v. p.; Geo. C. Baker, sec.-treas.; W. Perry Howle, gen. mgr.; with Geo. W. Brown, directors.

Inc. Feb. 24, 1920, in Arizona. **Cap.** $2,000,000; $1 par; 1,200,000 treasury shares; 800,000 escrowed. Transfers and registration at company's office. Annual meeting, 1st Tues. in January.

Property: 25 claims, 3 patented, 480 acres, in Pioneer district, Pinal county, includes the newly discovered Martinez and the old and famous Silver Bell and Columbia mines, operated 1879 to 1882, by Pinal Cons. Mng. Co. and later by leasers. The Bell vein in rhyolite traced for 5,000' and up to 75' wide, shows silver-lead ore said to run about 13oz. silver and 5% lead; high grade ore of pay-shoots ranges from 100 to 200 oz. silver and 25 to 60% lead. Martinez vein is reported to be 45' wide. There are 7 veins on property.

Development: by tunnels and 300′ incline; longest tunnel is 1,000′. Total workings, mainly by former owners, are 4,300′. Reserves, said to be based on samples cut at 10′ intervals, reported to be 257,097 tons, of which 80,000 are blocked out, and 13,266 tons on dump, all of a reported gross value of $3,257,871.

Production: in last year (1882) of early operations said to have been $225,481 net smelter return, in part as bullion from an old smelter on Gila river.

Because of water scarcity, company contemplates reducing ore by chloridization-roast, volatilization and Cottrell precipitation. Examined by H. B. Starbird, M. H. McLean and G. W. Tibbits.

Regarded as a worthy promotion, needing financing and conservative management.

SILVER BELT CONS. MINING CO. **ARIZONA**

Addresses: 212 Ideal Bldg., Denver, Colo.; Prescott, Ariz.; and Humboldt, Ariz.

Officers: John J. Mahony Jr., pres.; R. H. Burmister, v. p. H. J. Mahony, sec.-treas.; B. Rybon, mgr., with J. G. Harney, John Faubel, and J. B. Dudley, directors.

Inc. Aug. 1916, in Arizona. **Cap.** $250,000; 10c par; 160,000 issued.

Property: 8 claims, 2 patented, 200 acres, in Big Bug district, Yavapai county, 2 miles from Humboldt, said to show a contact vein between diorite and Yavapai schist.

Development: by 295′ shaft at S. end of property, with workings exposing a 4′ vein of silver-lead ore on the 114′ and 230′ levels. There is also a 125′ shaft at N. end of property and a third shaft 1,000′ N. of the 295′ shaft, was 265′ deep in Sept., 1919. On the 250′ level there was 20″ of rich silver-lead ore.

Equipment: includes a 50 h. p. oil engine, 15 h. p. hoist, compressor, pump, blower, house, etc. A 50-ton mill planned for 1921.

Management claims to have 30,000 tons of $11 ore on the dump.

SILVER BUTTES MINING CO. **ARIZONA**

Address: C. P. Crawford, 121 South Central Ave., Phoenix, Ariz.

Inc. in Arizona. **Cap.** $1,200,000; shares $1 par; 503,839 issued.

Property: 10 claims, in Mazatzal mountains, Gila county. Geological conditions are said to be similar to those of Jerome. According to a report by A. F. Muter, there are two vein systems in diorite, really fault fissures containing ore, especially at junctions of the two. All ore near the surface shows intense leaching. An incline shaft was recommended on the N.-S. vein, which can be traced on surface for 3,000′. The Butte vein, 2 to 7′ wide, is said to contain from 25 to 200 oz. silver per ton, $2 to $15 gold, and 2 to 12% copper. Some rich ore has been shipped.

Development: by 3,000′ of workings to depth of 350′. This is an old property reported to have been worked since 1895.

SILVER CROSS MINING CO. **ARIZONA.**

Address: Natl. Bank of Arizona Bldg., Phoenix, Ariz. Controlled by **Lawton Mines Finance Co.**, 1265 Broadway, New York.

Property: in the Turkey Creek section of the Black Canyon district, Yavapai county, developed by 150′ shaft and 130′ of drifting on a 2′ vein, said to average 14-25 oz. in silver-lead.

Equipment: includes 3-drill compressor and engine. The L. T. S. 50-ton flotation mill is owned by the same interests.

SILVER CROWN MINING CO. **ARIZONA**

Address: Crown King, Ariz.

Officers: L. V. Swiggert, pres.-treas.-mgr.; T. M. Anderson, v. p.-supt.; F. F. Swiggert, sec.; above are directors.

Inc. July, 1917, in Arizona. **Cap.** $1,000,000; $1 par; 600,000 issued.

Property: 3 claims, 60 acres, surveyed for patent, at Crown King, Yavapai county, said to show a contact vein between schist and granite, with copper-silver ore.

Development: by tunnels, lower tunnel in 950', said to cut an orebody, 22' wide, assaying $11 across 20'.

SILVER CYCLE MINING CO. ARIZONA

Address: O. O. Smith, supt., Prescott, Ariz.

Property: the Davis Dunkirk and Poverty groups on Slate creek, Senator district, Yavapai county, acquired late in 1919. Ten mines are included. Ores carry silver, gold, and copper. Developing at last account.

SILVER HILL MINING & MILLING CO. ARIZONA

Mail marked "out of business," returned from former address, Chloride, Ariz. in July, 1919. Described in Vol. XIII.

SILVER KEYSTONE CO. ARIZONA

Consolidated 1917 with **Keystone Consolidated Mining Co.** which see.

SILVER KING OF ARIZONA MINING CO. ARIZONA

John Fowle, receiver. **Office:** 1 Broadway, New York. **Mine office:** Superior, Ariz.

Officers: A. W. Hillebrand, pres.; John Fowle, v. p.-mgr.; W. F. Ainsworth, sec.-treas., with E. J. Stern, E. S. Booth, G. D. Christy and W. W. Lawhon, directors.

Inc. May, 1916, in Arizona. **Cap.** $2,500,000; $1 par; changed to $5 par in 1920; and $500,000 7% 10-year bond issue authorized. Security Transfer & Registrar Co., New York, transfer office. Annual meeting, second Tuesday in January. Listed on New York Curb.

Financial statement, December 31, 1919, showed: Total assets, $2,365,017; current assets, $78,328. Liabilities: capital stock, $2,014,290; bonds, $213,400; accounts and notes payable, $18,405; surplus, $99,632.

Operating account showed expenditures, $311,403; income and receipts, $326,006; cash balance, $27,704.

Property: the Silver King mine, 11 claims, over 170 acres, 3 miles from Superior, Pinal county, on the Stoneman grade. It is an old silver mine, popularly credited with a production of $10,000,000, and known to have paid $1,950,000 in dividends up to July, 1887. Opened to a depth of 1,000', the mine was originally worked for gold and silver, copper ore in the form of tetrahedrite coming in at a depth of about 310' and continuing to depth of 510'.

Geology: the conditions are described in Bull, 540, U. S. Geol. Survey. Though currently spoken of as a vein, the ore-body is a stockwork, in which the extraordinary rich ores, carrying various silver arsenical and antimonial sulphides of silver, with argentite and stromeyerite, apparently gave out at the bottom levels. Below this level, lower grade but payable concentrating ore, amenable to flotation may be expected and lateral development is also expected to develop more ore. Old records show that copper ore was mined on the 800' level.

Company was to sink a 3-compartment 1,000' shaft and upon its completion planned erecting a 500-ton mill. The shaft was down 635' at end of June, 1920.

Equipment: includes gasoline hoist, compressor, pump, 5-ton auto-truck and a 25-ton plant using a Marcy mill and flotation apparatus. The mill started operating in November, 1918. Shipments during 1919 totaled $97,606, and in 1918 netted the company, $46,983.

In July, 1920, John Fowle, v. p. and gen. mgr., was appointed receiver at an annual salary of $4,000 a year. Judgments against the company for $361,731, resulted in foreclosure sale, July, 1921, to Walter F. Ainsworth, New York for $250,000.

SILVER REEF MINE ARIZONA

Address: Frank M. Leonard, 3543 Third St., San Diego, Calif. Owned by John Hays Hammond, Jas. W. Gerard, Chas. R. Leonard, Frank M. Leonard and Frank W. Royer.

Property: 12 claims, surveyed for patent, including the Silver Reef mines, at Vekol, 12 miles S. of Casa Grande, in Pinal county, formerly owned by Silver Reef M. & S. Co., now dead. Vein 35′ wide, between granite and rhyolite, carries 12 to 20 oz, silver ore, also some lead and copper.

Development: by a 375′ shaft and 425′ tunnel.

Equipment: includes a gasoline hoist, air-compressor, and 20-stamp all slime cyanide plant.

SILVER TRAIL MINES CO. **ARIZONA**

Address: E. C. Bradshaw, Kingman, Arizona.

Inc. 1920, in Arizona. **Cap.** $250,0000; 25c. par; 100,000 shares treasury stock offered at 20c., May, 1921.

Property: Diamond Joe mine, in Hualpai Mtns., Mohave county, 26 miles from Yucca, the nearest rail point. Ore occurs in quartz veins, averaging 12-16 oz. silver and 20-25% lead.

Development: by 420′ shaft and about 2,000′ of lateral workings. Several thousand tons of ore on dumps being treated in 50-ton mill early in 1921.

SILVER VIRGIN MINING CO. **ARIZONA**

Officers: A. B. Murchison, pres.; J. F. Deitrich, v. p.; S. W. White, sec.; F. E. Caldwell, treas., with J. E. Shaw and H. D. Maynard, directors.

Inc. 1919. in Arizona. **Cap.** $150,000.

Property: in the Quijotoa Mtns., Pima county, 85 miles from Tucson, reached by good road through the Papago Indian Reservation.

Development: by shaft. Reserves are reported as 10,000 tons of $56 silver ore.

SILVER ZONE MNG. & MLG. CO. **ARIZONA**

Address: A. W. Davis, gen. mgr., Prescott, Arizona.

Officers: H. D. Ross, pres.; H. C. Storey, v. p.-gen. mgr.; J. P. Dillon, sec.-treas., with A. W. Davis, directors.

Inc. in Arizona. **Cap.** $2,000,000; par $1; 1,350,000 treasury shares.

Property: the Boxer group of 4 claims, 80 acres, in the Black Canyon district, Yavapai county, 3⅛ miles S. E. of Turkey on P. and E. R. R., adjoins the Black Canyon Mng. Co. A 5-foot vein with a flat dip cuts across the Yavapai schists; the value of ore is chiefly silver, with some lead and zinc.

Development: by 150′ incline. By agreement, the portal main tunnel of Black Canyon Mng. Co. is situated on the Boxer group; vein is followed for 960′.

It is a prospect.

SLOCUM COPPER CO. **ARIZONA**

Succeeded by the **Arizona Cactilone Copper Co.**, which see.

SOLSTICE MINING & MILLING CO. **ARIZONA**

Address: Tombstone, Arizona.

Officers: W. T. Boyd, pres.; M. M. Bludworth, v. p.-mgr.; H. Houston Hughart, sec.-treas., with A. Wentwort and O. Gibson, directors. H. E. Macea, supt.

Inc. July 19, 1919, in Arizona. **Cap.** $250,000; $1 par. Stock transferred at company office. Annual meeting first Monday in September.

Property: 4 claims in Tombstone district, Cochise county, developed by 150′ shaft and 700′ of workings. Ore occurs in fissure vein in syenite; reported to average 23 oz. silver, 6% lead, 0.5 oz. gold. Management estimates total reserves of 1,000,000 tons, with 100,000 tons blocked out.

Equipment: includes 10 h. p. steam hoist and compressor. Plan installing concentrator and cyanide mill.

SOMBRERO DEVELOPMENT CO. **ARIZONA**

Office: Houghton National Bang Bldg., Houghton, Mich. **Mine office:** Globe, Gila Co., Ariz. Dr. Lucius L. Hubbard, gen. mgr. Company is a syndicate, not incorporated.

Property: on Cherry creek, west of Sombrero Butte, and about 50 miles north of Globe, is prospected by adits. The mine has a small water driven plant. Inactive.

SOUTHERN ARIZONA MINING CO. **ARIZONA**

Now **Consolidated Southern Arizona Mining Co.**, which see.

SOUTHERN ARIZONA SMELTING CO. **ARIZONA**

Bankrupt. Property, the Sasco smelter, bought in by preferred creditors at public auction, March, 1915, was leased and finally acquired by the A. S. & R. Co. Sasco smelter fully described in Vol. XI, Copper Handbook.

SOUTH RAY COPPER MINING CO. **ARIZONA**

Office: 26 W. 44th St., New York. **Mine office:** Kelvin, Ariz.

Officers: A. N. Rice, pres.; E. A. McSweeney, v. p.; L. H. Bradshaw, sec.-treas. with C. A. Schoen and F. W. Nye, directors.

Inc. 1917, in Maine. **Cap.** $3,000,000; par $10; $2,700,000 outstanding. Authorized $300,000, three-year 7% notes. Corporation Trust Co., New York, registrar and transfer agent.

Property: 600 acres, in Pinal county, 9 miles S. of Ray, formerly worked under name of "Ripsey" and subsequently as the "Norman". Ore is gold, silver, copper.

Development: by 523' shaft.

SOUTHWESTERN COPPER CO. **ARIZONA**

See **Arizona-Southwestern Copper Co.**

SOUTHWESTERN LEASING & DEVELOPMENT CO. **ARIZONA**

Care of Henry Snell, Globe, Ariz. Company inactive.

SOUTHWESTERN MIAMI DEVELOPMENT CO. **ARIZONA**

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Globe, Arizona.

Officers: Geo. F. Ruez, pres.; L. A. Thulin, sec; W. S. Rooney, treas., with R. H. Gross, T. S. Dee, D. T. Kennedy, Morris La Croix, and A. H. Moir, directors. F. W. Hoar, gen. mgr.

Inc. June 24, 1911, in Arizona. **Cap.** $500,000, increased Feb., 1912, from $250,000; $5 par; issued 23,000 fully paid shares and 95,000 assessable shares. Assessment of $1 called Oct., 1920; previous assessments were $1, July, 1919 and 25c. payable Jan. 12, 1914. The first annual report, dated Dec. 31, 1912, gave receipts since organization as $276,084 and disbursements as $197,162 of which $65,944 was payments on options, leaving a balance of $78,922. Shares are listed on the Boston Curb. Boston Safe Deposit & Trust Co., transfer agent.

Property: 17 claims, 4 patented, adjoining the Inspiration Consolidated holdings, in the Miami district, 8 miles west of Globe, shows silicified schist, mineralized at and near, the contact with granite-porphyry, the orebody being an extension of the porphyry deposit opened in the Inspiration and Miami properties. Ore occurs as chalcocite disseminated in schist.

Development: by churn drilling, along the same lines followed by its big neighbors, Miami and Inspiration. Eighteen holes have been drilled, averaging about 1,200' deep and the total footage amounting to about 20,000'. Ore developed is estimated at 3,000,000 tons of 1.25% copper. The company has been inactive for two years, being tied up in litigation to oust trespassers. In April, 1919, the company was given authority by the court to clear its property of all trespassers.

In addition to its mining property it acquired leases in 1919 on 800 acres of oil lands in northern Texas. Assessments were called to provide funds for drilling; by October, 1920, a depth of 4,000' had been reached, with a daily production of 250 barrels of oil and 5,000,000 cu. ft. of gas.

SOUTHWEST INSPIRATION COPPER CO. **ARIZONA**

Mail returned from former office, 8 W. Adams St., Phoenix, Ariz.

Officers at last account: H. H. Temple, pres.; J. J. Sweeney, v. p.-treas.; F. W. Crenshaw, sec.; C. J. Price, gen mgr.; also directors, with Louis Huss.

Inc. 1917, in Arizona. **Cap.** $5,000,000; $1 par; 2,500,000 issued.

Property: 69 claims, 1,200 acres, adjoining Calumet & Arizona and Copper State companies' holdings on E., in Bunker Hill district, 12 miles E. of Mammoth, Pinal county. Examined by C. J. Price, N. R. Logue and Louis Huber.

Claims are said to show 5 chimney deposits in diorite, also disseminated porphyry. Ore carries copper, gold, and silver.

Development: by 1,500′ tunnel and 400′ shaft.

Idle and probably defunct.

SOUTHWEST METALS CO. **ARIZONA**

Office: 43 Exchange Pl., New York.

Officers: Jas. A. Heitzmann, pres., Seth B. French, v. p. Percy H. Kittle, sec.-treas.

Inc. 1920 in Delaware. **Cap.** 100,000 shares without par value, of which 6,000 were issued at $20 each, and 6,000 were reserved to be issued at the same price. As of April 4, 1921, 60,669 unissued shares were available for covering the then outstanding obligations of Cons. Arizona. The New York Trust Co. is depositary.

Company was organized to finance the **Consolidated Arizona Smelting Co.**, (q.v.) and on Sept. 16, 1920, offered to exchange its capital stock for income convertible bonds and capital stock of the Cons. Ariz. Sm. Co. For each 20 shares of Southwest Metals, Cons. Ariz. bondholders pay one $1,000 bond plus $50 in cash or income bonds scrip, and 1/40 share of Southwest Metals for 1 share of Cons. Ariz. plus 40 cents in cash, payable in installments to June 1, 1921. This offer was extended to Nov. 5, 1920. To Oct. 20, $681,500 bonds and 415,679 shares of Cons. Ariz. had accepted the offer. When the deal is completed the 2 companies could be consolidated. This would result in a company owning the mine and smelters, with an authorized capital of 100,000 shares, of which 71,275 would be issued, and with no bonded or floating indebtedness. If the exchange is not completed, instead of only 40 cents per share, it would require at least $1.25 per share to redeem the property and provide sufficient working capital.

On Dec. 24, 1920, a receiver was appointed for Cons. Arizona, but a further extension of the offer to May 2, 1921, was made on April 4, at which time 515,395 shares of Cons. Arizona had been deposited and the Southwest company owned or controlled $1,203,152 of Cons Ariz. obligations, slightly more than 50% of its total liabilities, including cost of receivership to August 1st. The money value of assets is not shown, but assessed valuation of Cons. Arizona was $3,501,438 for 1920.

As the largest creditor of Cons. Arizona, the Southwest Metals Co. on April 4, 1921, proposed, (a) to exchange its stock at $20 per share for C. A. refunding bonds at cost to holder (this offer is in addition to that made to income bond and stockholders), (b) to obtain participation of other creditors in general plan, (c) to arrange for settlement of chattel mortgage, and (d) to sell to subscribers unissued stock of the Southwest company.

Late in 1921, reported that most of the claims vs. Cons. Arizona had been taken over.

SQUAW PEAK COPPER MINING CO. **ARIZONA**

Address: Edison Thacker, Jerome, Ariz.

Officers: J. J. Cain, pres.; H. E. Thacker, v. p.; Edison Thacker, sec.-treas., with R. Thacker and A. W. Whitaker, directors.

Inc. in Arizona. **Cap.** $2,000,000; shares $1 par; 100,000 issued.

Property: 21 claims, 420 acres, in Squaw Peak district, Yavapai county, 2 miles W. of Verde river and 28 miles S. E. of Jerome. Examined in November, 1916, by W. E. Defty, whose conclusions were not favorable. Claims said to show copper ore with chalcopyrite and oxide minerals in quartz, occurring in fracture planes and veinlets in granite, capped to the W. by Cambrian rocks.

Development: 400' main tunnel and several shorter ones; also a 75' shaft.

Equipment: steam boiler and compressor. Presumably idle.

STANDARD METALS CO. **ARIZONA**

Mail returned from former address: Security Bond Co., 530 Title Insurance Bldg., Los Angeles, California.

Officers: O. B. Bachman, pres.; A. G. Kohnhorst, sec.; W. J. Mitchell, supt.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: over 1,000 acres, including the Denver, Standard, Tres de Mayo, Bob Lee, Mowry and North Mowry mines, in Santa Cruz county. Ore carries silver and lead.

Development: workings said to aggregate 12,000' to 15,000'. In the Denver, G. R. Hay estimated an output of $400,000 for 10 years. The Mowry has a large past production, and is said to have 100,000 tons on dumps worth $5 per ton net. E. W. Brooks considers the Bob Lee "one of the most promising undertakings of its kind."

It is to be hoped that those interested are not banking too much on past production of the mines. Presumably idle.

STANDARD MINERALS CO. **ARIZONA**

Address: 116 W. Center St., Anaheim, Cal.

Officers. G. M. Simpson, pres., Box 727, Kingman, Ariz.; L. C. Deming, v. p.; C. C. Randall, sec.-treas.; with H. L. Seares, directors, all of Anaheim.

Inc. Nov., 1917, in Arizona. **Cap.** $2,000,000; $1 par; outstanding 1,500,000. The company acquired the property of the Telluride Chief Mining Co. See Vol. XIII.

Property: 25 claims, 450 acres, in Hualpai range, Mohave county, 20 miles S. E. of Kingman, has molybdenite and silver in quartz vein in granite. Reported that 50,000 tons of ore are blocked out.

Development: 355' vertical shaft, with 2,000' of workings. On 200 and 300' levels a large tonnage of 1% molybdenite ore has been opened.

Equipment: includes 100-ton flotation mill which started operating in March, 1919; a 40 h. p. hoist and 500 cu. ft. compressor, with 25, 80, and 120-h. p. oil engines. Production not reported.

STARGO MINES, INC. **ARIZONA**

Office and mine address: M. J. Hannon, supt., Morenci, Ariz.

Officers: Geo. J. Stoneman, pres.; P. A. Tharaldson, v. p.; J. C. Callaghan, sec., with Chas. Beach, Hugh Campbell, E. A. Sawyer, W. A. Harmony, W. J. Graham and M. J. Hannon, directors.

Inc. 1920 in Ariz. **Cap.** $500,000; par $1. 350,000 issued.

Property: a compact tract of 26 claims, 400 acres, on the southern border of Morenci, Greenlee county, and about ¼ mile from the railway spur.

Geology: the claims cover a tilted block of limestone and limey shales resting on the basal quartzite of the district, underlain in turn by granite. This block is similar to but thicker than the block immediately north, which contains the great copper deposits of the camp. On the Stargo limestone beds dip gently westward, the block being bounded by the Copper Mountain fault in Morenci gulch and by the Apache gulch fault, both major displacements of the region. Geologically the Stargo ground lies close to the main monzonite area and the intrusive masses observed in the tract indicate that igneous rock extends under the entire area. The western claims, beyond Apache gulch, show the basal quartzite, with limestone overlying it, the rocks forming a block cut by five short cross faults.

There are eight (8) known veins on the property, three of which have been productive, notably the Stargo, Capote and Craig veins, but work on each one of the others has also shown payable ore.

Ore contains hornsilver and native silver, in a siliceous gangue; occasional spots of rich sulphides are said to occur. The ore occurs as normal fissure vein filling with lateral expansions on congenial bedding planes, forming the so-called mantas. The veins are all similar in character and content, and cut through the underlying quartzite as well as the limestone series.

Development: by 3 working shafts on the Stargo vein, one 200′ deep. The main workings are on the first level 1,200′ long, whose face is about 300′ below the surface. The ore as mined runs between $16 and $40 per ton and varies from 3′ to 8′ thick. The workings on the Triangle vein show 4′ to 6′ of $14 to $18 milling ore for a length of 1,500′, mostly in open cut work, but also 2 tunnels. The Craig vein, which averages 9′ thick and is traceable 3,000′, carries ore that varies from $8 to $30 per ton. The workings clearly indicate persistence of ore and that the tonnage of prospective ore is quite large.

Equipment: includes two hoists, an air line to the Phelps Dodge power plant, compressor and fairly complete equipment for further development.

Shipments of ore taken out by Mexican leasers during past six years aggregate over $100,000, the ore averaging better than $20 per ton in silver.

STARGO SILVER BELT MNG. CO. **ARIZONA**

Dead. Company owned the Stargo silver mine, near Morenci, sold to M. J. Hannon and associates, in 1920, who organized the **Stargo Mines, Inc., q. v.**

STENE CONS. COPPER CO. **ARIZONA**

(Successors to **R. M. Stene Mines, Ltd.**)

Exec. office: 40 Wall St., New York. **Mine address:** Stene's Camp, via Congress Junction, Arizona.

Officers: R. M. Stene, pres.-mgr.; C. U. Leonori, v. p.; C. B. Christy, sec.; Fred M. Dunn, treas., with L. W. Coggins, C. T. Washburn, C. W. Clawson, directors. A. P. Dittmar, gen. supt..

Inc. Dec. 3rd, 1917, in Arizona. **Cap.** $3,000,000; $1 par; changed to $500,000 of 7% cumulative convertible, pfd. stock and $2,500,000 common stock; both $1 par. Security Tr. & Reg. Co., transfer agt. and registrar.

Balance sheet of August, 1918, shows: 333,334 shares paid for Riverside group and 650,000 shares (in 1918) for Oregonian group, besides $5,900 cash. Smelter returns from test shipment $1,358, cash received from sale of stock R. M. Stene Mines Co., $24,374.

Promotion stock to directors, attorneys, etc., 135,387 shares; to R. M. Stene for stock due by Stene Mines Co., 28,680 shares; shares sold, old company, 166,666; new company, 67,166. New stock issued for leaching plant, etc., 606,267 shares. A Globe syndicate underwrote this stock in July, 1919.

Property: 785 acres; the Oregonian group, 6 claims, and the Riverside group, 34 claims, in Mohave and Yuma counties, 12 miles N. E. of Swansea. This tract on the north side of the Bill Williams river has a flat orebody in part covered by gravel. The orebody is reported to be 1,400′ long, to average 250′ wide and from 6′ to 30′ thick. Fifty-one samples are reported to average 8.1% copper. Mr. Donohue estimated 275,000 tons of 2.5% ore.

The Riverside group covers a canyon cut by the river through upturned schists with flat fault fracture showing copper ore in rather sporadic occurrence. The development work thus far done on the group is disappointing, but the waterpower right may prove quite valuable.

Company reports August 3, 1919, arrangements made to install 300-ton crushing and sampling plant, bins and power unit, with 150-ton leaching plant, also compressor, quarry track and power equipment, etc. A track drill No. 5 and a steam shovel were to be ordered and a bridge built across the river at the dam-site.

The acquisition of the Oregonian group as recommended by the examining engineer gives the company a producing property, while Riverside claims will be developed later.

The **Stene Development Corporation,** 801 Madison Ave., New York, is fiscal agent for the Stene Cons. Copper Co.

STERLING COPPER CO. **ARIZONA**

Idle. **Officers at last account:** J. W. Thomas, pres.; L. C. Elliott, sec.; D. E. Nelson, treas.; with E. A. Congdon and J. A. Elliott, directors. C. H. Bean, supt.

Inc. 1906, in Arizona. **Cap.** $1,000,000, $1 par; 482,600 shares issued.

Property: in the vicinity of Dos Cabezos, Cochise county, is developed by short tunnels and a 125' shaft, following a limestone porphyry contact, showing copper and lead ore which is said to average 5% copper. There has been about 1,000' of work done and $3,000 spent in development. Property is a prospect.

STEVENS COPPER MINING CO. **ARIZONA**

Company dissolved and assets distributed. Fully described in Vol. XIV.

STODDARD MILLING CO. **ARIZONA**

Described in Vol. XIII. Property now owned by **Arizona Binghamton Copper Co.**

STODDARD MINES CO **ARIZONA**

Succeeded by Arizona Binghamton Copper Co., which see.

STORM CLOUD MINE **ARIZONA**

Property: near Senator, Hassayampa district, Yavapai county, operated by M. J. O'Brien, Ltd., of Cobalt, Ontario.

STRATTON CONS. COPPER CO. **ARIZONA**

(Successor to Stratton Copper Co. and Old Hat Copper Co.)

Address: Box 1116, Tucson Arizona.

Officers: C. N. Wilson, pres.; S. H. Keeney, v. p.; J. R. Dunseath, sec.-treas.; above are directors.

Inc. April, 1919. **Cap.** $1,500,000; $1 par; all issued.

Property: 14 claims, in process of patenting, in Catalina Mts., 54 miles N. E. of Tucson, said to show a contact deposit of copper ore in limestone with assays from 2 to 8% copper.

Development: shallow shafts and tunnels, with a total of 1,800' of workings. **Equipment:** includes compressor, 60 h. p. boiler, water system and 10 buildings. A $40,000 highway to the mine has been completed.

Management expected to start operations in 1921.

STRATTON COPPER CO. **ARIZONA**

Succeeded by **Stratton Cons. Copper Co.**, which see.

STURDY GOLD MINING CO. **ARIZONA**

Address: 317 Frick Bldg., Pittsburgh, Pa. **Mine address:** Cactus, Ariz.

Officers: John Sturdy, pres.; H. Q. Turner, v. p.; N. Sturdy, sec.-treas.; F. L. Smith, cons. engr.; Judge Wm. H. Stilwell, counsel, with F. E. Miller, Geo. B. Burd and Willis Plunket, directors.

Inc. June 16, 1915, in Arizona. **Cap.** $750,000; $1 par; outstanding, $500,000. Annual meeting, second Thursday in January.

Property: 7 claims, 117 acres, in the Winifred district, Maricopa county, 16 miles N. of Phoenix, formerly owned by Fortuna Gold & Copper Co., described in Copper Handbook, Vol. XI. Was acquired by present management at sheriff's sale. Claims are said to show 7 quartz veins in granite, from 2-25' in width showing gold and silver ore, that averages $30 per ton.

Development: by two 125' vertical shafts, with 1,200' of workings.

Equipment: 25-ton amalgamating- concentrating mill, to be enlarged to 100 tons daily capacity, and cyanide unit added.

SULLIVAN COPPER DEVELOPMENT CO. **ARIZONA**

Address: care F. H. Nelson, pres., 610 Lonsdale Bldg., Duluth, Minn. Mine office: Paradise, Cochise Co., Ariz. Geo. H. Crosby, sec.-treas.

Property: 14 claims, 6 patented, 4 miles west of San Simon, Chiricahua Mts., has opencuts, showing leached copper ore and a little very rich ore, and has a 60′ tunnel showing lead ore. Management considered good and property promising. Idle, except for annual assessment work, since 1917.

SULTANA-ARIZONA COPPER CO. **ARIZONA**

See **Kelvin-Sultana Copper Co.**, and **Ray Boston Copper Co.**

SUN DIAL GOLD MINING CO. **ARIZONA**

Was one of the big crop of wildcats born in Oatman since the strike in the United Eastern.

SUNNYSIDE MINING CO. **ARIZONA**

Office: Oatman, Mohave county, Arizona.

Officers: C. H. Palmer, Jr., pres.; F. A. Keith, v. p.; R. I. Rogers, sec.-treas., with S. W. Mudd, Philip Wiseman, P. L. Mullen and M. R. Sullivan, directors.

Inc. in Arizona. **Cap.** $1,500,000; $1 par.

Property: Sunnyside group of 3 claims, 2 miles S. E. of Oatman, said to have a vein with assay values of from $2 to $8 gold per ton. Development on vein at 400′ level, considered promising. Property is in the development stage. Idle since 1917.

SUNSET COPPER MINES CO. **ARIZONA**

Address: Hayden, Arizona

Officers: Geo. H. Parsons, pres.; J. E. Steele, v. p.; Chester Bertolette, v. p.; F. W. McQuiston, sec.; T. A. Bell, treas., with F. M. Pool and E. C. Hight, directors.

Inc. in Delaware. **Cap.** $3,000,000; shares $1 par; issued 1,570,000 shares, 50,000 treasury shares offered in 1920-21 at 25c. per share.

Property: 14 claims, in Bunker Hill district, Pinal county, 14 miles E. of Mammoth and 34 miles from Hayden. Company also has 12 claims in Riverside district, same county, said to have gold-silver-copper ore, developed by two shafts, 140′ and 190′ deep and tunnels, 75′ and 290′ long.

Geology: ore-bearing rock is a quartz diorite that cuts the sedimentaries and volcanic breccias. Ore shoots are found as chimneys, or pipes, from 25′ to several hundred feet in diameter. Ore usually occurs as a filling between fragments of breccia.

Development: by 175′ shaft and 590′ tunnel, said to show a body of 3½% to 5% copper carbonate ore.

SUPERIOR AND BOSTON COPPER CO. **ARIZONA**

Offices: 50 Congress St., Boston, Mass; and Copper Hill, Arizona.

Officers: T. R. Drummond, pres.; John F. Barry, sec.-treas., Garrett Mott, chairman, with J. B. Hardon, W. F. Fitzgerald and B. F. Stenz, directors. E. G. Deane, mgr.; C. W. Botsford, geologist.

Inc. Nov. 23, 1906, in Arizona. **Cap.** $6,500,000; was originally $1,500,000, increased Sept. 5, 1908, to $2,000,000; April 22, 1909, to $2,500,000; July 25, 1911, to $3,000,000; Sept. 30, 1911, to present amount; shares $10 par; $9.00 paid in; issued 297,827. Company has levied 10 assessments, last one of 50c. Jan. 1921. Listed on Boston Stock Exchange. State Street Trust Co., Boston, registrar: Boston Safe Deposit & Trust Co., transfer agent. Annual meeting first Monday in December.

Comparative Financial Statement: fiscal year ending Sept. 30—

	Ore Sales	Calls & Sundries	Balance Oct. 1	Prev.	Total	Total Expend.	Balance Oct. 1
1921....	$103,501	$140,521	$ 31,031	$275,053	$280,087	$ 5,034	
1920....	213,244	98,360	114,512	426,116	395,085	31,031	
1919....	8,446	15,882	129,374	153,702	39,190	114,512	
1918....	246,158	106,342	141,577	494,077	364,703	129,374	
1917....	340,198	43,344	176,107	559,649	418,071	141,577	
1916....	40,501(a)	243,030	29,529	313,060	136,953	176,107	
1915....	54,530(b)	19,108	59,285	132,923	103,394	29,527	
1914....	291,515	1,720	75,268	368,503	309,218	59,285	
1913....	153,436	268,503	81,382	503,321	428,052	75,269	

(a) Lessees produced $167,212 additional. (b) Lessees produced $42,-164 additional.

Property: 51 claims, 698 acres, of which 35 claims, 475 acres, are patented in Globe district, Gila county. The Globe & Arizona tract of 22 claims was bought for $320,000, an adjoining group of 21 claims was bought for $46,000, and the Collins-Doyle group of 5 claims was bought for $150,416, giving a total cost of $516,416 for lands. The Collins-Doyle group, added 1909, adjoins the former holdings on the north, carrying the extension of the Old Dominion fault, and is well located with respect to the Great Eastern vein. The property is a compact tract next east of the Arizona Commerical, and east of the Old Dominion. The property carries both limestone and iron ore for fluxes. It is reached by the Arizona Commercial and Arizona Eastern railways, both connecting with the main line at Globe.

In addition, the Telfair group of 12 claims, 200 acres, adjoining the Superior & Boston, was acquired in 1917 for $7,000 cash and 14,000 shares The ground is believed to have the extension of the Old Dominion vein.

Geology: the property shows diabase cutting through about 600′ of quartzite with interbedded shale and Globe limestone. Copper ore occurs in veins filling fault fissure. There are 2 dominant fault-belts, one series including from north to south, the Old Dominion, Great Eastern or Black Hawk, Limestone, Black Oxide and Iron King fault veins, intersected at nearly right angles by other faults of later age, apparently but slightly mineralized. Three of the veins—Great Eastern, Limestone and Black Oxide have all produced considerable ore in the past. The upper portion of the Old Dominion vein has been faulted 200′ to 700′ to the N. and wherever opened, is barren of copper. The supposition is it has never been mineralized. The average strike of the faults is N. 70° E., with average dip of 60° N.

Development: by 4 shafts, the McGaw, Great Eastern, Limestone and Gardner, and 1 tunnel. Workings total about 57,700′. New work during year ending Sept. 30, 1919, amounted to 4,589′; for same period in 1920, 8,397 and 4,408′ of drilling, and in 1921, 5,835, plus 1,036′ of drilling.

At end of 1918, reserves of ore workable at the then copper prices were practically exhausted, and every effort has since been made to find new ore bodies in Great Eastern, Old Dominion and 3 other veins.

The McGaw shaft is 1,400′ deep, with 3 compartments. The 10th level opened at 970′ corresponds with the 10th level of the Arizona Commerical mine, next west. This shaft lies 900′ north of the old shaft and is sunk between the Old Dominion fault on the north and the Great Eastern vein on the south, and is planned to intersect the Great Eastern vein at depth. This is the main working shaft of the mine and does the ore hoisting for the entire property.

One of the main hindrances to mining in the past has been water, also the largest item of expense.

The Great Eastern vein on the 6th level in the McGaw shaft, showed an ore shoot 25′ to 30′ wide, proven for a distance of over 800′. The 8th level exposed this vein for over 400′ and also showed the zone of oxidation to continue to this depth The 10th level discloses the first sulphide ore encountered in the McGaw workings of the mine but the 12th level shows little or no copper in this vein, as far as developed. The vein matter is heavily stained with iron, highly silicious and, when commercial, carries about 7% copper.

The Old Dominion (or North) vein has been tapped by crosscuts from the McGaw shaft, on the 4th, 6th, 10th, 12th, and 14th levels. Assay returns were in most cases disappointing. Some encouraging silver values were found on the 1,200′ level, and further work is being done, in the hope of opening up a silver-bearing orebody. Drilling, chiefly in 1920, in an

effort to locate the extension of the Old Dominion vein below the Great Eastern vein, has thus far not met with success. Further drill work is planned. In 1921, a 300′ crosscut on 8th level failed to find commercial ore in the O. D. vein.

The 318′ Limestone shaft showed a 4′ footwall paystreak of commercial ore on the 300′ level; has not been operated for several years.

The Gardner 3-compartment vertical shaft at the southern end of the property, on the Black Oxide vein, is 435′ deep; mine is now idle. The Black Oxide vein apparently is a continuation of the Buckeye fault, on which the Old Dominion has opened mines on the Buckeye, Carrie and True Blue claims.

The 1,054′ Black Oxide tunnel has its portal about 1,000′ S. W. of the Limestone shaft, and cut the Black Oxide vein at 670′, giving a 400′ back. Drifts on this level show a vein carrying micaceous hematite, with small quantities of copper, and a little shoot of smelting ore. Indications are favorable to the existence of good bodies of high-grade sulphide ore at greater depth. The Black Oxide is 280′ east of the True Blue mine of the Old Dominion, from which lessees shipped small quantities of high-grade ore for several years. The Black Oxide vein was opened also on the 800′ level by a long crosscut from the McGaw shaft; some copper glance was found but not in paying quantities. Further development is being done.

The Iron King vein, parallel with the other 4 faults of the property, shows a good gossan, and has an old 70′ shaft, in leached vein material similar to that in the other faults, at similar depth.

The Footwall vein, discovered in October, 1919, had produced, up to October 1, 1920, about $290,000. About 2,000 tons of similar grade is left in the mine, although it is known that ore of shipping grade does not extend to the 600′ level. A small vein, known as the "Rigby", from 1-2′ wide, was discovered on the 400′ level in 1920, ore assays about 10% copper and 30 oz. silver. Work on this vein in 1921 was encouraging.

Equipment: includes a hoist at each shaft, aggregating 1,260-h. p. The main plant, at the McGaw shaft, has four 250 h. p. water tube boilers, a 5-ton hoist good for 1,600′, and a 1,200 cu. ft. cross-compound air compressor, with an auxiliary compressor at another shaft. The mine has three 1,000-gal. pumps.

The company owns numerous buildings, including well-equipped machine shop, smithy, carpenter shop, office, change house, and warehouse with a number of dwellings for employees. Buildings are lighted by electricity. Fuel is mainly petroleum, with 5,000-gal. and 12,000-gal. storage tanks.

Production: was begun Feb., 1908, and to end of 1910 amounted to 27,126 tons ore, yielding 3,846,402 lb. copper and 94,698 oz. silver practically all from the Great Eastern vein above the 6th level. Known ore reserves being exhausted, production was suspended Aug., 1910, to March, 1913, when shipments were again resumed, curtailed in 1914 and resumed March 15, 1915.

Output in the year ended Sept. 30, 1918, was 22,751 tons of ore assaying 3.88% copper and 4 oz. silver per ton, compared with 17,146 tons (assay not given) the previous year. Copper production totalled 1,676,446 lb. Cost of copper sold and delivered was 22.81c per lb., with average price received of 22.42c. During the fiscal year ending Sept. 30, 1920, production amounted to 9,104 tons of ore assaying 14.3 oz. silver and 5.84% copper, yielding 1,062,379 lb. of copper 130,323 oz. silver, as compared with 59,694 lb. copper and 133 oz. silver in 1919, from 773 tons of ore. Shipments from Oct. 1, 1920, to April 18, 1921, amounted to 11,108 tons of ore, averaging 4.38% copper and 5.88 oz. silver, having a net smelter value of $95,233. Except for one shipment of silver ore, no production was made, April to Oct 1.

The company has made courageous efforts to make a mine and it is hoped that the new development work undertaken will open up the reserves of sulphide ore which have been sought for so long, for it is upon finding

3 compartments, is 600' deep, with a hoist. No. 5 shaft, 373' deep, has a 75 h. p. steam hoist, and No. 6 shaft, 250' deep, has a 25 h. p. steam hoist.

The main or footwall orebody is 30x600' and has (in 1920) been opened on the 600' level by the new (No. 7) shaft.

Equipment: the power plant has two 250 h. p. boilers, a 300 k. w. d. c. motor, and a 150 k. w. belt driven motor operating pumps at the Bill Williams Fork river, supplying water to the mine and works through 3" and 6" pipe-lines. A reverberatory furnace was partly completed when the mine closed down in 1913. The smelter has a water-jacket blast-furnace of 750 tons rated daily capacity, a 15,000 cu. ft. air compressor, and a blower direct-connected to a compound engine. Buildings include a machine-shop, sawmill and other structures. Slags are handled by a Jeffrey electric locomotive. The smelter building is of structural steel. The converter department has 2 stands and 9 shells, rotated electrically, with a 40-ton electric crane, having 2 auxiliary hoists, and a silica mill, with electric motor, for linings.

The mines and works are connected with the Santa Fé, Prescott & Phoenix Railway by a 21-mile line, known as the Arizona & Swansea Railroad, operated, but not owned (controlled by George Mitchell of Los Angeles) by the company.

Mine has been an extensive producer since 1909. See **Swansea Lease, Inc.**, for recent production, etc.

The company is an example of enthusiasm run wild, coupled with reckless stock selling and the foolish construction of surface works before the development of enough ore to keep them busy.

SWANSEA LEASE, INC. **ARIZONA**

Mine address: E. S. Smith, supt., Swansea, Ariz.

Office: 523 Pacific Electric Bldg., Los Angeles, Calif.

Officers: G. M. Colvocoresses, pres.; F. R. Corwin, v. p.; O. F. Janssen, sec.-treas.

Cap. $500,000; $1 par; 375,000 shares owned by Cons. Arizona Smelter Co., which in 1920 also took over all obligations except current.

In May, 1917, company obtained a 10-year lease on property of **Swansea Cons. G. & C. Mining Co.**, Swansea, Ariz., and in 1918 erected a 200-ton concentrator, and sank a 500' working shaft. In 1919, a flotation section was added and capacity of mill was increased to 300 tons. Both mill and mine equipment are the property of leasing company. Operations in 1920 were conducted between 500 and 600' levels through the new (No. 7) shaft.

A small amount of shipping ore is extracted, but largest part of production is in form of concentrate averaging 0.45 oz. silver and 23% copper, all shipped to Cons. Arizona smelter at Humboldt. Heads average 3.9% copper and recovery is 97%. Considerable production is reported for 1919, and beginning with Feb. 1, 1920, it was 5,000-7,500 tons per month until Dec. 24, 1920, when the Cons. Arizona S. Co. went into hands of receiver. See **Swansea Cons. G. & C. Mng. Co.**

SWASTIKA DEVELOPMENT CO. **ARIZONA**

Property: in the Bradshaw mountains, Yavapai county, sold in May, 1919, to the **Swastika Silver & Copper Co.**, which see.

SWASTIKA SILVER AND COPPER CO. **ARIZONA**

Mine address: F. W. Giroux, mgr., Mayer, Ariz. Freight and express office, Peck's Siding, Ariz.

Officers: L. M. Frantz, pres.; Wm. Brown, care Red Camel Coal Co., Fort Braul, W. Va., 1st v. p.; Namon Jackson, v. p., Pres. First Natl. Bank, Logan, W. Va.; F. W. Giroux, gen. mgr.-asst. treas.; John Faulkner, sec.-treas.

Inc. May 9, 1919, in Ariz. **Cap.** $1,000,000; $1 par. Company is not successor of Swastika Dev. Co., which is still alive though it sold its property to the Swastika S. & C. Co.

Property: the old Black Warrior, Silver Prince, Isis, and Hard-scrabble claims, near Crown King, Peck district, Yavapai county. During 1915-1919 the property produced about $100,000. From 1910 to 1915 the Swastika Dev. Co. shipped ore with a value of $116,000. From 1874 to 1910 the Black Warrior and Silver Prince are said to have produced about half a million dollars.

Development: by 4 shafts, 70′, 225′, 250′ and 447′ in depth with several thousand feet of drifting. Company estimates ore reserves of 100,000 tons milling ore, assaying 12 to 16 oz. silver per ton. High-grade ore occurs in pockets. The Prince vein has three known ore-shoots. On the property are five veins, only two of which have been worked to any extent.

Equipment: includes 12 h. p. gasoline hoist, one 9 h. p. and one 6 h. p. gas engine. Swastika camp has accommodations for 30 men. Management has a 50-ton Dorr process continuous decantation cyanide plant about half completed, July, 1921. Shipped ore intermittently to the Humboldt smelter during 1920.

SWISSHELM GOLD-SILVER CO. **ARIZONA**

Address: 32 South Stone Ave., or P. O. Box 188, Tucson, Ariz., or Robt. Randell, supt., Webb, Cochise Co., Arizona.

Officers: F. J. Heney, pres.; Ben Heney, v. p.-gen. mgr.; G. H. Smalley, sec.; Byrd Brooks, treas.

Inc. 1907, in Arizona. **Cap.** $300,000, 50c par; 300,000 shares escrowed; 300,000 in treasury.

Property: over 313 acres in the Swisshelm range, Cochise county, 12 miles by road to railroad, 30 miles N. of Douglas; said to have a contact metamorphic deposit between limestone and andesite, with gold-silver-lead ore.

Development: by 300′ incline shaft, 250 and 300′ tunnels, with total workings of 1,750′. Reported to have 5,000 tons of ore blocked out, averaging $25 per ton.

Management states that lead content of ore has hindered satisfactory smelter contracts, but in 1918 $6,265 was realized from ore sales. Gross earnings are given as $9,247. A new smelting contract was arranged in Nov. 1919, whereby the C. & A. works at Douglas will take the ore provided it contains over 70% silica. As the El Paso smelter had too much silicious ore, it penalized the excess silica. A saving of $1.50 per ton on freight will be made by shipping to Douglas. First shipment of 50 tons made January, 1920.

Property has been examined by W. R. Ramsdell and others.

TABLE MOUNTAIN COPPER CO. **ARIZONA**

Near Mammoth, Ariz. Was controlled by Arimex Consolidated Copper Co., now defunct; a Thomas W. Lawson promotion. Fully described, Vol. XI., Copper Handbook.

TANK PASS CONSOLIDATED MINING CO. **ARIZONA**

Idle. **Address:** A. Tennyson Pryor, pres.-gen. mgr., Rockwood, Mich. Ward Smith, v. p.

Inc. Nov., 1909. **Cap.** $3,000,000; $10 par. Company controls the Alvin Development Co. through stock ownership, and took over the property of the Cobralla Copper Co., March, 1910.

Property: the Ultimatum or Cobralla group, adjoins the Alvin, near Tank Pass in the Harcuvar mountains, Ellsworth district, Yuma county, about 10 miles from Wenden. The mine carries about 4,500′ of the strike of various fractures in a contact zone following granite intrusive in quartzite, amphibolite and limestone, the ores carrying bornite and chalcopyrite, and estimated to average 3 to 5% copper, 5 to 6 oz. silver and $1 to $8 gold per ton, with occasional paystreaks and masses of high-grade ore.

Development: by the 150′ Carbonate Hill shaft and a 200′ tunnel.

Equipment: includes gasoline hoist. Is a prospect of merit.

TEJON MINING CO. **ARIZONA**

Address at last account: L. I. Thiers, supt., Gleeson, Cochise Co., Ariz.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: 8 patented claims, 150 acres, at Gleeson, in the Turquoise or Courtland district, adjoining the Copper Belle mine of the Leonard Copper Co., shows heavy bedded limestone dipping steeply eastward into the mountain ridge and cut by intrusive bodies of monzonite and later quartz porphyry. Ore occurs as a contact deposit. Average assays reported as 5% copper, 6 oz. silver, 0.07 oz. gold per ton.

Development: by the 500′ Tejon shaft, and by several old tunnels with extensive drifts and stopes in oxidized ore.

Equipment: modern and complete, includes electric and steam power, compressor, etc. Railway is close at hand. Property appears meritorious and management good. Reported closed down, February, 1919.

TELLURIDE & CHLORIDE LEASING M. & M. CO. **ARIZONA**

Property: the Schenectady mine, 3 claims and a millsite, in Chloride district, Mohave county, only 585′ north of Tennessee mine, has 5′ fissure vein, crossed by Genevieve vein.

Development: by a 400′ shaft, with good silver ore reported at 225′.

Production: totaled $10,000 to end of 1916. Idle and company probably defunct.

TELLURIDE CHIEF MINING CO. **ARIZONA**

Described in Vol. XIII. Property acquired by **Standard Minerals Co.**, which see.

TELLURIDE M., M. & DEV. CO. **ARIZONA**

Office: Oatman, Ariz.

Officers: J. L. McIver, pres.; Geo. G. M. Mackay, v. p.; Byron Campbell, sec.-treas., with W. Matthie and J. B. Dowd, directors.

Inc. 1915, in Ariz. **Cap.** $220,000; increased May, 1919, to $300,000; shares 20c par; treasury shares, May 1, 1917, 175,516.

Property: 14 claims, 177 acres, at Oatman, Mohave county.

Development: by 580′ shaft with crosscutting and drifting, said to show gold ore of milling grade.

Equipment: includes 40 h. p. engine, double-friction hoist, compressors, mine buildings, etc.

Mine examined in Jan., 1917, by Etienne A. Ritter, who suggested diamond-drilling, and considers that the property is well situated, also that some important bodies of commercial ore should be uncovered. Exploration work under way since 1919.

TENNESSEE MINE **ARIZONA**

Chloride, Ariz. See **Schuykill Mining Co.**

TETER-STONE AZURITE MINING CO. **ARIZONA**

Dr. D. W. Teter, pres.

Property: 3 miles south of Dragoon, Cochise county, has a 4 to 10′ contact deposit, between limestone and granite, showing outcrops of azurite and malachite, with some sulphide ore in a tunnel. Operations suspended, 1913, owing to a heavy inflow of water. No later information.

TEXAS-ARIZONA COPPER CO. **ARIZONA**

Address: First Nat'l Bank Bldg., Houston, Texas. M. M. Carpenter, supt., Tucson, Ariz.

Officers: T. H. Bass, pres.; J. H. Kirby, v. p.; J. M. Baird, sec.-treas.; with J. G. Bass and M. M. Carpenter, directors.

Inc. 1917, in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: 38 claims, 700 acres, in Pima county, 10 miles N. E. of Tucson, said to show copper ore in schist and gneiss.

Management states that $25,000 was spent in 1918 in diamond and churn drilling, and a 2-compartment shaft sunk to depth of 120′. Plan deepening shaft and additional development work.

Production: 1,000 tons in 1907, and 3,518 tons in 1917.

TEXAS-ARIZONA MINING CO. **ARIZONA**

Operated by J. H. Smith & Co., lessees, Dragoon, Ariz.

Property: near Dragoon, Cochise county, developed by 350′ shaft and drifts. A strike of high-grade lead-silver ore was reported in 1920. Developing.

THREE R MINE **ARIZONA**

Formerly operated by Three R Mining & Milling Co.

Acquired in Oct., 1919, by the **Patagonia-Superior Copper Co.**, a subsidiary of the Magma Copper Co.

THUMB BUTTE CONS. MINES CO. **ARIZONA**

Address: C. P. Crawford, mgr., Prescott, Ariz.

Property: the old Anderson silver group of claims, in Thumb Butte district, Yavapai county, 8 miles W. of Prescott.

Development: to depth of 125′ by 2 shafts with total workings of 500′. Ore contains silver, lead, copper and gold.

THUMB BUTTE GOLD MINING CO. **ARIZONA**

C. B. Manville, pres.; Johns Manville Co., Madison Ave. and 41st St., New York; Robt. Malcolm, mgr., Kingman, Ariz.

Property: 40 claims, 800 acres, near Union Pass, San Francisco district, Mohave county.

Development: by 540′ double-compartment shaft, and tunnels. Company reported to have spent $200,000 to March, 1921, on development and to plan the expenditure of $1,500,000 on a model townsite, including 500 houses.

Equipment: includes 320 cu. ft. compressor, 30 h. p. engine and pumping plant.

THUMB BUTTE MINING CO. **ARIZONA**

Address: care Henry Johnson, Kingman, Ariz.

Property: in the Union Pass section, San Francisco district, Mohave county, developed by two-compartment shaft and equipped with necessary machinery.

TIGER GOLD MINING CO. **ARIZONA**

Formerly owned the **Oro Belle & Gray Eagle** mine, Crown King, Ariz., which see.

TILLIE STARBUCK MINES CO. **ARIZONA**

Address: A. J. Pickrell, Prescott, Ariz.

Officers: A. J. Pickrell, pres. and treas.; Alan Gardner, v. p.; G. H. Stack, sec.; also directors.

Inc. July 17, 1916, in Arizona. **Cap.** $250,000; $1 par; 125,000 issued. Authorized (Sept., 1921) to sell 14,808 shares at $1.50 each.

Property: 12 claims, 242 acres, on Slate creek, Hassayampa district, Yavapai county, 15 miles S. of Prescott, has a quartz fissure vein in porphyry and schist, dipping nearly vertical with N.-S. course. Three shoots, up to 100′ long and 3-14′ in width, have been proven to depth of 800′, with ore reported to assay $5 to $8 per ton in gold and silver.

Development: by tunnels, 2,000, 800, 150 and 600′ long. Workings total 4,000′ to depth of 800′. Raises have been driven between tunnels. Management estimates 100,000 tons of ore blocked out above the 800′ level, averaging $5 silver, $10 gold, ½% zinc and ½% lead. This ore mills well.

Plan erection of 50-ton mill and flotation plant. Is a decidedly meritorious proposition being slowly financed by a few people, and developed under safe and sane supervision.

TIMES MINING CO. **ARIZONA**

Presumably dead. Described in Vol. XIII.

TIPPERARY MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Property: the McKesson mines, 6 miles W. of Wallapai Station, Mohave county, reported held by the **Kingman Silver-Gold Mines Co.**, in 1920.

TIP TOP CONS. MINING CO. **ARIZONA**

Defunct. Described in Vol. XIV. Succeeded by **Arizona Tip Top Mines Co.**, which see.

TIP TOP COPPER CO. **ARIZONA**

Office: Commonwealth Bldg., Philadelphia, Pa. **Mine office:** Helvetia, Pima county, Ariz.

Officers: Geo. A. Aman, pres.; S. Charles Pratt, v. p. and gen. mgr., at last accounts.

Inc. 1902, in Arizona. **Cap.** $1,150,000; shares $1 par.

Property: the Little Helvetia mine, 24 claims, 400 acres, including the Tip Top and Copper Duke claims, also a 100-acre mill site, about 2 miles from Helvetia, shows 3 veins, averaging 14′ width. These veins have extensive bodies of soft black sulphide ore in altered clayey limestone and porphyry, reported to give average assays of 5% copper and 1 oz. silver per ton, with a trace of gold.

Development: mainly by tunnel with about 4,000′ of workings.

Equipment: includes gasoline power. Was bonded 1907, to Guggenheim interests, for $250,000, with cash payment of $75,000, but both parties to bargain were dissatisfied, and property reverted to owners.

Idle many years.

TOMBOY MINES **ARIZONA**

Address: Bruce Hobbs, sec., 29 Otis St., Boston, Mass.

Idle. Described in Vol. XIII.

TOMBSTONE CO-OPERATIVE MINING CO. **ARIZONA**

Address: J. L. Melgren & Son, Tombstone, Ariz. J. W. Storkman, mill supt.

Property: a 120-ton concentrating mill and cyanide plant, at Tombstone, Cochise county, treating custom ore.

TOMBSTONE SILVER FIELDS CO. **ARIZONA**

F. W. Clark, pres. Frank Cavanaugh, supt.

Inc. 1920, in Delaware. **Cap.** $1,500,000; in 250,000 8% cumulative, convertible pfd. shares and 1,250,000 common shares; $1 par.

Property: included a bond on the Mellgren group of 55 claims, also the Merrimac and Old Guard groups, in the Tombstone district, Cochise county.

No work has been done since the initial payment was made and the ground has probably reverted to the original owners.

TOM REED APEX MINING CO. **ARIZONA**

Probably dead. See Vol. XIV.

TOM REED GOLD MINES CO. **ARIZONA**

Mine office: C. R. Waters, supt., Oatman, Ariz. **Office:** 604 Chamber of Commerce Bldg., Pasadena, Calif.

Officers: S. S. Wold, pres.; Chas. Mushrush, v. p.-asst. treas.; W. J. Lawrence, sec.; J. W. Roach, treas.; E. S. Harwood, asst. sec.; with O. Kock and C. N. Post, directors. W. B. Phelps, gen. supt.; W. A. Linfesty, mill supt.; J. C. McBride, res. agt.

Inc. Dec. 17, 1906, in Arizona. **Cap.** $1,000,000; $1 par; outstanding, 700,555. No bond issues, mortgages or indebtedness. Listed on Los Angeles Stock Exchange.

For year ending April 1, 1921, gross earnings were $710,515, and other income was $28,202. Contra, mining, milling and transportation expense was $498,284; mine overhead, $39,887; administration, etc., $65,435; total expense, $603,606. Net income was $135,111, which after depreciation and depletion left $31,278 deficit, carried to surplus, as compared with a gain of $17,922 for 1920. Current assets were $108,926, and liabilities, $68,049, with additional commitments of $10,831; surplus was $1,733,758.

Company's investments include stock interest in Crown City Gold Mines Co., Gold Reef Cons. Mines Co. and Clipper Mtn. Gold Mines Co., the latter two in California.

Dividends: aggregate over $2,900,000. The first dividend of 6% was paid in 1908, and a second dividend of 3% was paid in 1910. Since then dividends averaged 4½% per month for five years. In 1916, 10½% per share was paid. Dividends were resumed in 1918, at rate of 2% per month and reduced in 1920 and 1921. In fiscal year 1920-1921, 15% was paid, with last on March 20, 1921.

History: the mine was discovered in 1900, 20 years after the discovery of the Gold Roads mine nearby. Early development proved unsuccessful and in 1904 the mine was sold for $75,000, one-tenth cash. The purchasers failed to meet payments and the property passed to the Title Insurance & Trust Co. of Los Angeles, representing creditors, for $45,000. The present company was formed and deeper developments undertaken. The Ben Harrison shaft was then 150′ deep and the Tom Reed 90′. The first shoot of commercial ore was encountered on the 150′ level.

Property: 29 claims, 12 patented, in three district groups, 431 acres, in the San Francisco district, Mohave county. Also owns water rights and mill sites in Cottonwood Canyon.

Geology: the claims cover the outcrop of the big Tom Reed lode, one of the typical quartz-adularia veins of the district, which has been reopened and crushed by strike faulting with enrichment of the primary ore. The ore-shoots persist to the deepest level developed (1,400′), with no change in size or value. Ore is gold-bearing; for 5 years prior to 1921, average value of ore mined and treated was $8.75.

In April, 1919, suit was begun against the United Eastern company concerning orebodies in the Big Jim claim, owned by the latter. Due to the fault system revealed in Tom Reed, confusion has arisen as to the dislocation of the Big Jim orebody and its obscured northwestern prolongation. The case is complex. Final argument was heard in Nov., 1920, and in March, 1921, the decision rendered was adverse to Tom Reed; an appeal has been taken.

Development: by Aztec, Red Cloud (725′) and other shafts, to a total depth of 1,400′, with total workings of about 6 miles. New work totaled 5,315′ in 1920-1921.

At 400′ depth in the Aztec claim there was opened 1,000′ of milling ore, but results on 500′ level were disappointing, although late in 1919 some high-grade ore had been opened showing good width. Further work in 1920 on 400′ level uncovered 2 new orebodies with little promise above but unexplored below. Work on 700′ level has begun. Reported in June, 1919, that a 6′ vein of $15 ore had been opened on 400′ level of the Bald Eagle claim. The vein was cut at 600′ in 1920, but larger part of ore came from the Grey Eagle orebodies.

Ore reserves: April 1, 1919, estimated to be 65,800 tons. With the vein exposed on one side only and ore occurring in small faulted blocks, reserves for 1921 are not given.

Equipment: working shaft has a 150 h. p. electric hoist. Power is supplied by the Desert Light & Power Co., Kingman. There are 3 compressors with capacity of 4,000 cu. ft.

The mill, re-built in 1917, of 300 tons capacity, has ball-mills, classifiers and counter-current decantation system of cyanidation. Mine has machine-shops, supply store, hospital, recreation hall, etc. Present equipment cost more than $300,000.

Production: from April 1, 1908 to Jan. 1, 1920, totaled $8,186,074, and to the end of 1920, about $9,100,000.

For year ending March 31, 1918, 81,114 tons ore treated, average assay $7.595; tails averaged $0.446. Mining and milling costs were $5.25 per ton, including all overhead, taxes and depreciation. During the year ending March 31, 1919, there were treated 88,525 tons of ore, average value, $9.05 per ton; tails averaged $0.37. Mining and milling costs were $4.63 per ton, of which $2.03 was for milling and $2.60 for mining. Total costs were $5.87 per ton. Production was 36,524 oz. gold, and 17,229 oz. silver. In

1919-20, the output was 89,557 tons of ore averaging $7.94 and tails $0.34 per ton. Total cost was $6.68. In 1920-21, 93,970 tons averaging $7.81 per ton were treated; tails averaged $0.25. Mining cost was $3.41 and milling, $1.85, with a total of $6.72. Net bullion production was $705,657 in year ended March 31, 1921, as against $675,403 in previous year.

Property is a good one, and equipment complete. During the past several years there have been many changes in the Tom Reed management, the last being in Sept., 1917. The new mill is working well and has been profitably treating lower-grade ore, but, despite many economies, the margin has become close.

TOM REED, JR., MINING CO. **ARIZONA**

Probably dead. Described in Vol. XIII.

TORTILLITA COPPER CO. **ARIZONA**

Office: care Cameron, Michel & Co., 8 W. 40th St., New York. **Western office:** care Hon. J. B. Wright, 32 N. Stone Ave., Tucson, Ariz.

Officers: Wm. P. Michel, chairman; Robinson V. Thompson, pres.; Thos. Rowland, v. p.; Leon N. Salmon, sec.; J. W. Edward Michel, treas., with Geo. P. Jeffrey, directors.

Inc. March, 1912, in Arizona. **Cap.** $1,000,000; $1 par; 600,000 issued. Registrar & Transfer Co., Jersey City, N. J., transfer agent. Annual meeting in January, at the Tucson office.

Property: 37 claims, 750 acres, about 15 miles N. E. of Redrock, Pinal county, includes the Cloudburst and Yankee Girl mines, purchased under foreclosure in May, 1912. Property is an old-time silver producer.

Development: by "Yankee Girl" 2-compartment shaft, 500' deep.

Equipment: includes an oil-driven air compressor, drills and a gasoline hoist.

Whether the property has a large ore deposit or not has not yet been proven. Idle for several years.

The Tortillita was promoted by Cameron, Michel & Co., a company that refuses to publish reports or furnish information, except to prospective "investors."

TOWNE MINING CO. **ARIZONA**

Officers at last account : S S. Jones, pres.; T. J. Murphy, v. p.; J. E. Shank, sec.-treas; with Dan Murphy and J. M. Francis, directors.

Property: the Towne mine, 1½ miles S. of Chloride, Mohave county, developed by 225' vertical shaft.

Production: totaled $1,125,000 to 1916, mostly silver ore. Smelter returns show carloads of selected ore assaying 7 oz. gold and 600 oz. silver per ton.

Idle.

TRENCH CONSOLIDATED MINES CO. **ARIZONA**

Property: the Farrel mine, near Patagonia and Harshaw, Santa Cruz county. Was acquired in 1913 by Chas. W. Clark. Double compartment shaft sunk 600', reported to have opened good grade ore on the 500' level.

Holdings changed hands in 1920.

TROY ARIZONA COPPER CO. **ARIZONA**

Address: A. K. Sloan, sec.-treas., 15 Maiden Lane, New York.

Mine office: Kelvin, Pinal county, Ariz.

Officers: John F. Galvin, pres.; Calvin Page, v. p.; Brackley Shaw and Henry Rudolph, directors. John C. Devine, mgr.

Cap. $3,000,000; $10 par. Company is a reconstruction of the old Troy Copper Co., succeeded by Troy-Manhattan C. Co., which in turn was succeeded by the Troy Consolidated Mining Co., fully described in Vol. IX, Copper Handbook. Operations of all these "Troy" companies proved disappointing.

Property: 85 claims, 1,600 acres, in Pinal county, 3½ miles N. E. of Ellman, on the Arizona Eastern R. R., known as Troy, Climax and Man-

hattan groups. The Troy group said to have 12 and Manhattan group 6 veins.

Development: reported to aggregate over 5 miles, including several shafts, deepest 500′, and tunnels. Company's engineer stated that while a large tonnage of ore is not blocked out, yet with a moderate amount of work several hundred thousand tons could readily be made available. Examined and repor ed on by L. Von Rosenberg, but inspection proved the work very superficial and conclusions, in our opinion, unwarranted.

Present management considered good and property promising. Presumably idle.

TUCKAHOE MINING CO. **ARIZONA**

Mine address: E. J. Carter, mgr., Chloride, Arizona.

Treasurer's Office: 185 Devonshire St., Boston Mass.

Officers: Fred J. Bein, pres.; A. M. McDuffee, v. p.; Geo. E. Mills, sec.; Chas. Matlack, treas., with E. J. Carter, directors.

Inc. in Ariz. **Cap.** $1,000,000; $1 par; 500,000 shares issued. Authorized $250,000 five-year 7% convertible debenture bonds; none issued. Commonwealth Trust Co., Boston, registrar; Beacon Trust Co., Boston, transfer agent.

Property: 5 claims, 1 patented, 90 acres in Wallapai district, 1 mile from Chloride. Ore occurs in a fissure vein in porphyritic granite, carrying gold and silver, with some lead and zinc. The main orebody, opened to depth of 550′, is reported to be 2-7′ wide and 410′ in length, assaying 26-40 oz. silver and 0.20 oz gold, with an average value of $30 per ton. Reserves estimated at 33,000 tons of $32 ore.

Development: by 600′ shaft with levels at 150, 250, 350, and 550′, and a total of 3,000′ of workings.

Equipment: includes 30 h. p. gas hoist, engine and pump, electric power, compressor, air-drills, and necessary buildings. Management plans additional development on the 550′ level and erection of a 50-ton mill combining gravity and flotation concentration.

Production: to date about 2,300 tons valued at $175,000.

TUCSON ARIZONA COPPER CO. **ARIZONA**

Address: John F. Cowan, D. F. Walker Bldg., Salt Lake City, Utah.

Officers: John F. Cowan, pres.; E. A. Culbertson, v. p.; B. G. Hite, sec.-treas., with S. H. Douglas, W. H. King and L. A. Cummings, directors.

Inc. Nov. 28, 1916, in Arizona. **Cap.** $1,000,000; $1 par; 724,493 issued.

Property: 23 claims, in Pima county, 6 miles from Tucson, shows contacts and fissures in limestone and andesite. Orebody is said to be from 4 to 30′ wide, dips 45 to 75°, and has an E.-W. course. Shoot is 400′ long, 6 to 10′ thick, and reported to assay 6% copper, 3 oz. silver and $1 gold per ton.

Development: by 135′ shaft and 500′ of workings.

Equipment: 25 h. p. gasoline hoist and 250 cu. ft. compressor.

Company is reported to have acquired a new property in Plumas county, California, and to contemplate a reorganization.

TUCSON CONSOLIDATED COPPER CO. **ARIZONA**

Dead. Fully described in Volume XIV. See **Old Pueblo M. & M. Co.**

TUNGSTEN REEF MINES CO. **ARIZONA**

Officers: A. J. Clark, pres.-treas., H. W. Hellman Bldg., Los Angeles Calif.., L. E. Porter, v. p.-sec.; G. D. Kislingbury, supt.

Property: group of claims in Huachuca Mountains, Cochise county, 40 miles S. W. of Bisbee, and 16 miles S. of Hereford, formerly owned by Exposed Reef Tungsten Co. Ore occurs in quartz vein carrying a high percentage of tungsten with some gold.

Equipment: 100-ton mill, making a recovery of 10lb WO_3 per ton of ore (1918).

Idle since the signing of the Armistice.

TURKEY SILVER MINING CO. **ARIZONA**

Address: E. G. Weaver, Prescott, Ariz. **Inc.** 1920, in Arizona.

Property: the Cutter, Iron Dike and Pavo mines in the Black Canyon district, Yavapai county, said to contain gold-silver bearing ore, Machinery being installed and development work reported under way, March, 1921.

TUSCUMBIA MINING & MILLING CO. **ARIZONA**

Dissolved. Described in Vol. XIV.

TWIN BUTTES MINING & SMELTING CO. **ARIZONA**

Office: 77 Michigan St., Milwaukee, Wis. **Mine office:** Twin Buttes, Pima county, Ariz.

Officers: W. A. Barber, pres.; Julius O. Frank and J. H. Tweedy, Jr., v. p's. John Mets, sec.; Stephen Hoff, treas., with Ralph M. Friend, G. P. Mayer, Fred Wilmanns, R. E. Hackett and Henry Nunnemacher, directors.

Inc. Sept. 8, 1903, in Arizona. **Cap.** $2,000,000; increased, 1905, from $1,000,000 to $1,250,000, and again increased, January, 1910, to $3,000,000; shares $1 par; 2,000,000 shares outstanding. Capital reduced to $1,880,000 in July, 1918. Controls the Twin Buttes Railroad Co. Wisconsin Trust Co., transfer agent and registrar. Annual meeting, third Monday in February.

Property: the Glance mine, operated under bond and lease on a royalty basis by the Glance Mining Co. The Morgan mine is idle. The Twin Buttes Co., also owns many other claims, partly patented, in the Twin Buttes district, in the foothills of the Sierrita Mountains, 27 miles south of Tucson. Lands carry fissure veins in limestone and contact deposits having a limestone foot and granite-porphyry hanging wall.

The Twin Buttes Railway, 10 miles in length, running from Twin Buttes to the S. P. (Nogales line), has 1 locomotive and 3 flat cars.

See **Glance Mining Co.** The Queen mine has been sold to the Midland Copper Co.

TWO PEAKS MINING CO. **ARIZONA**

Address: Turner, Arizona.

Officers: W. G. Gilmore, pres.; J. C. Akard, v. p.; E. P. A. Larrieu, sec.-treas., with J. S. Trowbridge and T. D. M. Larrieu, directors.

Inc. Jan. 4, 1916, in Arizona. **Cap.** $2,500,000, $2.50 par; 432,054 issued.

Property: 45 claims, 1,012 acres, at S. end of Whetstone Mts., Cochise county, said to show a contact with a mineralized shear-zone striking S. 48° W., through the overlying monzonite porphyry, below which is limestone. Ore occurs as lenses in sheeting planes and through the porphyry mass, and according to company carries 3.16% copper, 0.034 oz. gold and 2 oz. silver per ton in shear zone. Minerals are chalcopyrite in shear zone, and bornite and chalcopyrite in contact deposit. Carload in 1916 averaged 4.03% copper.

Development: by shafts 36, 55, 60, and 100′ deep, and by 270 to 280′ tunnels. Workings to depth of 150′; total, 1,500′. No recent information.

TYRO MINES CO. **ARIZONA**

Address: c/o I. M. George, Kingman, Arizona.

Property: in Union Pass or San Francisco district, Mohave county, developed by 300′ shaft, exposing an orebody 30′ wide of milling grade.

UNION BASIN MINING CO. **ARIZONA**

Plant was burned down in 1917; insurance collected; funds invested. Company in process of dissolution. Described in Vol. XIII. Property sold for $35,000 to C. B. Bell, who organized the **Highland Mining Co.**

UNION METALS CORPORATION **ARIZONA**

Address: Frank F. Peard, pres.-gen. mgr., Bradbury Bldg., Los Angeles, Calif. Security Transfer & Registrar Co., New York, transfer agent.

Property: Fredonia and Fredonia No. 2 claims, N. of Kingman, in the Wallapai district, Mohave county, formerly owned by the Golconda Consolidated, said to have developed a strong lead-zinc vein carrying gold and silver.

The Union Metals Corp. is in process of consolidation with the United Tungsten-Copper Mines and Kaibab Sm. Co., the new corporation to be the Kaibab Cons. M. Co.

UNION PASS MINING CO. **ARIZONA**

Address: c/o A. G. Cushman, Kingman, Ariz. Thos Kilker, supt.

Property: 120 acres, in one block, in Union Pass section of the San Francisco district, Mohave county; and also fractions in same district adjoining Gold Chain.

UNITED AMERICAN MINING CO. **ARIZONA**

Address: Oatman Ariz. **Mine address:** A. L. Nielson, supt., Oatman, Arizona.

Officers: W. K. Ridenour, pres.-treas.-gen. mgr.; John F. Withers, v. p.; J. A. George, sec., with R. H. Carr, E. A. Shaw and C. W. Herndon, of Kingman, directors.

Inc. April 7, 1919, in Ariz. **Cap.** $375,000; par 25c.; 300,000 shares in treasury. Annual meeting 1st Tuesday in March. Company authorized, October, 1921, to sell 223,925 shares at 20c. each.

Property: the Rebel and Kicker patented claims, 40 acres, said to contain east extensions of the Tom Reed veins. Also the Helen mine adjoining the Moss mine, an old and rich producer.

Development: prosecuted continuously since 1920, includes 700′ shaft, with winze to 925′ level, and 4,200′ of workings. Drifts show vein to be 10 to 30′ wide with pay streak, 2-4′ wide, and with length of 225′ to 250′, averaging $20 per ton, on 850′ level.

Equipment: electric hoist, Sullivan compressor, etc.

Reserves: perhaps 5,000 tons, including 18″ of $50 ore, but no accurate estimate made. Arrangement being made (1922) to treat ore in Tom Reed mill.

Stock sold at 20c. in Nov., 1921 by E. A. Shaw, fiscal agent, Kingman. Property belonged to and was operated by the Amalgamated Copper Co. in the eighties. The Helen claim is undeveloped.

UNITED ARIZONA COPPER MINING & SM. CO. **ARIZONA**

Office: 123 Liberty St., New York. **Mine address:** A. Syverson, supt., Mayer, Arizona.

Officers: C. H. Dunlap, pres., Phoenix, Ariz.; Frank O. Longcor, v. p.-gen. mgr.; Claudius A. Hand, sec.-treas.; with Geo. M. Buckingham, Warren P. Eaton, Percy W. Brough, and Geo. Davidson, all of New York City, Lucien Little of West Orange, N. J. and R. C. Baker of Phoenix, Arizona., directors.

Inc. March, 1916, in Arizona. **Cap.** $2,000,000; $1 par; 1,500,000 issued. Listed on New York Curb. Securlty Transfer & Registrar Co., 66 Broadway, N. Y., transfer agent.

Property: 22 claims, 440 acres, on Copper creek, Yavapai county, 26½ miles E. of Mayer, by a good road and 16 miles E. of Horseshoe ranch on Agua Fria river. The group is in a belt of sheared granite 1½ miles long, showing quartz veins containing masses and bands of copper ore; these quartz veins grade into wider zones of sheared and schistose granite, characterized by uralite and chlorite. Surface showings are attractive and recent work, at a depth of 980′ disclosed high grade bornite-chalcopyrite ore. During 1920-21 about 3,500′ of diamond drilling, which was done on the tract, proved the continuity of the veins, and the downward continuance of mineralization, though the cores do not show high grade ore like that cut by the shaft. The Arizona Copper Queen Co. owns the group to the north, the Rosalie Copper Co., the group to the south, with the Brooklyn mine beyond.

Development: by 1,020′ shaft with levels at 150′, 300′, 400′, 600′, 800′, 900 and 1,000′.

Equipment: includes 25 h. p. Foss gasoline hoist, also 3,000 cu. ft. compressor and 60 gallon pump. Examined by G. W. Miller and A. G. Marsh.

TURKEY SILVER MINING CO. **ARIZONA**

Address: E. G. Weaver, Prescott, Ariz. **Inc.** 1920, in Arizona.

Property: the Cutter, Iron Dike and Pavo mines in the Black Canyon district, Yavapai county, said to contain gold-silver bearing ore, Machinery being installed and development work reported under way, March, 1921.

TUSCUMBIA MINING & MILLING CO. **ARIZONA**

Dissolved. Described in Vol. XIV.

TWIN BUTTES MINING & SMELTING CO. **ARIZONA**

Office: 77 Michigan St., Milwaukee, Wis. **Mine office:** Twin Buttes, Pima county, Ariz.

Officers: W. A. Barber, pres.; Julius O. Frank and J. H. Tweedy, Jr., v. p.'s. John Mets, sec.; Stephen Hoff, treas., with Ralph M. Friend, G. P. Mayer, Fred Wilmanns, R. E. Hackett and Henry Nunnemacher, directors.

Inc. Sept. 8, 1903, in Arizona. **Cap.** $2,000,000; increased, 1905, from $1,000,000 to $1,250,000, and again increased, January, 1910, to $3,000,000; shares $1 par; 2,000,000 shares outstanding. Capital reduced to $1,880,000 in July, 1918. Controls the Twin Buttes Railroad Co. Wisconsin Trust Co., transfer agent and registrar. Annual meeting, third Monday in February.

Property: the Glance mine, operated under bond and lease on a royalty basis by the Glance Mining Co. The Morgan mine is idle. The Twin Buttes Co., also owns many other claims, partly patented, in the Twin Buttes district, in the foothills of the Sierrita Mountains, 27 miles south of Tucson. Lands carry fissure veins in limestone and contact deposits having a limestone foot and granite-porphyry hanging wall.

The Twin Buttes Railway, 10 miles in length, running from Twin Buttes to the S. P. (Nogales line), has 1 locomotive and 3 flat cars.

See **Glance Mining Co.** The Queen mine has been sold to the Midland Copper Co.

TWO PEAKS MINING CO. **ARIZONA**

Address: Turner, Arizona.

Officers: W. G. Gilmore, pres.; J. C. Akard, v. p.; E. P. A. Larrieu, sec.-treas., with J. S. Trowbridge and T. D. M. Larrieu, directors.

Inc. Jan. 4, 1916, in Arizona. **Cap.** $2,500,000, $2.50 par; 432,054 issued.

Property: 45 claims, 1,012 acres, at S. end of Whetstone Mts., Cochise county, said to show a contact with a mineralized shear-zone striking S. 48° W., through the overlying monzonite porphyry, below which is limestone. Ore occurs as lenses in sheeting planes and through the porphyry mass, and according to company carries 3.16% copper, 0.034 oz. gold and 2 oz. silver per ton in shear zone. Minerals are chalcopyrite in shear zone, and bornite and chalcopyrite in contact deposit. Carload in 1916 averaged 4.03% copper.

Development: by shafts 36, 55, 60, and 100′ deep, and by 270 to 280′ tunnels. Workings to depth of 150′; total, 1,500′. No recent information.

TYRO MINES CO. **ARIZONA**

Address: c/o I. M. George, Kingman, Arizona.

Property: in Union Pass or San Francisco district, Mohave county, developed by 300′ shaft, exposing an orebody 30′ wide of milling grade.

UNION BASIN MINING CO. **ARIZONA**

Plant was burned down in 1917; insurance collected; funds invested. Company in process of dissolution. Described in Vol. XIII. Property sold for $35,000 to C. B. Bell, who organized the **Highland Mining Co.**

UNION METALS CORPORATION **ARIZONA**

Address: Frank F. Peard, pres.-gen. mgr., Bradbury Bldg., Los Angeles, Calif. Security Transfer & Registrar Co., New York, transfer agent.

Property: Fredonia and Fredonia No. 2 claims, N. of Kingman, in the Wallapai district, Mohave county, formerly owned by the Golconda Consolidated, said to have developed a strong lead-zinc vein carrying gold and silver.

The Union Metals Corp. is in process of consolidation with the United Tungsten-Copper Mines and Kaibab Sm. Co., the new corporation to be the Kaibab Cons. M. Co.

UNION PASS MINING CO. **ARIZONA**

Address: c/o A. G. Cushman, Kingman, Ariz. Thos Kilker, supt.

Property: 120 acres, in one block, in Union Pass section of the San Francisco district, Mohave county; and also fractions in same district adjoining Gold Chain.

UNITED AMERICAN MINING CO. **ARIZONA**

Address: Oatman Ariz. **Mine address:** A. L. Nielson, supt., Oatman, Arizona.

Officers: W. K. Ridenour, pres.-treas.-gen. mgr.; John F. Withers, v. p.; J. A. George, sec., with R. H. Carr, E. A. Shaw and C. W. Herndon, of Kingman, directors.

Inc. April 7, 1919, in Ariz. **Cap.** $375,000; par 25c.; 300,000 shares in treasury. Annual meeting 1st Tuesday in March. Company authorized, October, 1921, to sell 223,925 shares at 20c. each.

Property: the Rebel and Kicker patented claims, 40 acres, said to contain east extensions of the Tom Reed veins. Also the Helen mine adjoining the Moss mine, an old and rich producer.

Development: prosecuted continuously since 1920, includes 700′ shaft, with winze to 925′ level, and 4,200′ of workings. Drifts show vein to be 10 to 30′ wide with pay streak, 2-4′ wide, and with length of 225′ to 250′, averaging $20 per ton, on 850′ level.

Equipment: electric hoist, Sullivan compressor, etc.

Reserves: perhaps 5,000 tons, including 18″ of $50 ore, but no accurate estimate made. Arrangement being made (1922) to treat ore in Tom Reed mill.

Stock sold at 20c. in Nov., 1921 by E. A. Shaw, fiscal agent, Kingman. Property belonged to and was operated by the Amalgamated Copper Co. in the eighties. The Helen claim is undeveloped.

UNITED ARIZONA COPPER MINING & SM. CO. **ARIZONA**

Office: 123 Liberty St., New York. **Mine address:** A. Syverson, supt., Mayer, Arizona.

Officers: C. H. Dunlap, pres., Phoenix, Ariz.; Frank O. Longcor, v. p.-gen. mgr.; Claudius A. Hand, sec.-treas.; with Geo. M. Buckingham, Warren P. Eaton, Percy W. Brough, and Geo. Davidson, all of New York City, Lucien Little of West Orange, N. J. and R. C. Baker of Phoenix, Arizona., directors.

Inc. March, 1916, in Arizona. **Cap.** $2,000,000; $1 par; 1,500,000 issued. Listed on New York Curb. Securlty Transfer & Registrar Co., 66 Broadway, N. Y., transfer agent.

Property: 22 claims, 440 acres, on Copper creek, Yavapai county, 26½ miles E. of Mayer, by a good road and 16 miles E. of Horseshoe ranch on Agua Fria river. The group is in a belt of sheared granite 1½ miles long, showing quartz veins containing masses and bands of copper ore; these quartz veins grade into wider zones of sheared and schistose granite, characterized by uralite and chlorite. Surface showings are attractive and recent work, at a depth of 980′ disclosed high grade bornite-chalcopyrite ore. During 1920-21 about 3,500′ of diamond drilling, which was done on the tract, proved the continuity of the veins, and the downward continuance of mineralization, though the cores do not show high grade ore like that cut by the shaft. The Arizona Copper Queen Co. owns the group to the north, the Rosalie Copper Co., the group to the south, with the Brooklyn mine beyond.

Development: by 1,020′ shaft with levels at 150′, 300′, 400′, 600′, 800′, 900 and 1,000′.

Equipment: includes 25 h. p. Foss gasoline hoist, also 3,000 cu. ft. compressor and 60 gallon pump. Examined by G. W. Miller and A. G. Marsh.

Austin G. Marsh, acting cons. engr. of the company, estimates that water level is 200' below the bottom of the shaft, now1,020' deep and that "the fact that ore has been discovered at the present depth, the high grade of this ore and the occurrence in a fissure vein is very promising indicating continuation to great depths as well as widespread occurrence throughout the extensive quartz vein system".

UNITED ARIZONA EXTENSION MINING CORP. ARIZONA

Merged April 1, 1921 with **United Arizona C. M. & S. Co.**, which see.

UNITED EASTERN MINING CO. ARIZONA

Office: Oatman, Arizona.

Officers: Philip Wiseman, pres.; Geo. W. Long and C. H. Palmer, Jr., v. ps.; R. I. Rogers, treas., with S. W. Mudd, J. L. McIver, W. K. Ridenour, Geo. D. Nordenholt, D. C. Jackling, J. E. Fishburn, and R. C. Nowland, directors. Wallace Keith, sec. and purchasing agent; Roy W. Moore, gen.-supt.; Earle M. Bagley, mill supt.

Inc. Nov. 22, 1913, in Ariz. **Cap.** $1,500,000; $1 par; outstanding 1,363,000. Equitable Trust Co., of New York and Cecurity Trust & Savings Bank of Los Angeles, transfer agts.; Central-Union Trust Co., New York and Security Trust & Savings Bank, Los Angeles, registrars. There are over 2,100 shareholders. Listed on Los Angeles Stock Exchange and on New York and Boston curbs. Annual meeting first Tuesday in March.

Financial Statement, years ending Dec. 31:

Year	Property plant etc	Prepaid develop.	Supplies	Cash and current	Total
1920	$1,379,005	$ 52,730	$ 91,492	$945,866	$2,469,093
1919	2,093,355	105,459	102,823	731,655	3,033,292
1918	3,940,553	.....	130,241	748,651	4,980,074

Liabilities

Year	Capital	Cap. Sur.	Profit,Loss	Reserve	Current	Total
1920	$1,363,000	$ 987,530	$.....	$36,635	$ 81,829	$2,469,093
1919	1,363,000	1,576,271	....	14,809	79,212	3,033,292
1918	1,363,000	2,480,567	852,927	2,076	281,505	4,980,074

Income Account

Year	Total revenue	*Operat. charge	Arizona Taxes	Profit
1920	$2,192,634	$998,231	$96,308	$1,098,096
1919	1,997,189	932,934	97,613	966,642
			Cost per ton	

*Does not include Federal taxes.

For first 10 months of 1921, profit was $916,185, after deducting operating charges, but not depreciation, income taxes, and the like.

Dividends: initial in July, 1917, and 30¢ per share for that year; 62¢ in 1918; 66c. in 1919; 72c. in 1920; 60c. in 1921; 15c., Jan. 28, 1922. Distributions are made quarterly. Total, $4,157,150.

Property 17 claims, 224 acres, patented, at Oatman, Mohave county, adjoining the Tom Reed mine on the N., and covering the N. W. extension of Tom Reed vein; 21 miles S. W. of Kingman, the nearest rail point.

In April, 1917, the Big Jim mine, 1 mile from the producing section of the United Eastern was purchased for 160,000 United Eastern shares, or over $800,000.

In April, 1919, the Tom Reed Gold Mines Co. started suit against the United Eastern concerning orebodies in the Big Jim claim. The dispute arose through confusion due to the fault system revealed in the Tom Reed mine, whereby the Big Jim orebody has been dislocated and its N. W. prolongation obscured. Final arguments were heard on Nov. 15, 1920; in March following, decision was rendered in favor of defendant. Plaintiff has appealed.

Geology: deposit consists of a vein, irregularly banded with quartz, in andesite. Geology of the district is complex, composed of andesite flows with rhyolite intrusions, and has been studied by many engineers. Veins outcrop either as prominent silicified ribs or as shallow depressions in the andesites, all showing more or less brecciated rock fragments cemented by calcite or quartz. Ore occurs as a series of lenses pinching vertically and horizontally within the vein-filling. Gold is seldom found near the surface in commercial quantities. The gold is extremely fine, making fine grinding necessary. None of the mines are wet.

Development: by the main or No. 2 shaft, 1,343′ deep, and several miles of openings. The original orebody on Tom Reed Extension claim will have been exhausted above the 665′ level in about 6 months. Mill ore has been coming from the 665′, 815′ and 965′ levels. On the 815′ level there is a shoot 920′ long and 7′ wide. A limited amount of work is being performed at the Big Jim mine.

New work in 1919 covered 4,850′, including 350′ at the Big Jim; in 1920, total was 3,162′. During 1920, 3,150′ of diamond-drilling was done on the 8th and 10th levels to quickly determine possibilities at greater depth; results were not encouraging.

Ore reserves: on Jan. 1, 1921 were 222,086 tons with gross value of $4,100,738, assuring a 3 year mill supply; this is a reduction from 1919 of 47,000 tons and about $2,000,000 in value.

Equipment: includes double-drum 150 h. p. electric hoist, two 150 h. p. compressors of 888 cu. ft. each, 200-ton coarse ore bin, No. 6 gyratory crusher driven by 50 h .p. motor, 400-ton mill ore bin, 2 No. 6½ Marcy mills driven by 50 h. p. motors, Dorr classifiers, three 5 x 6′ Ball pebble mills driven by 75 h. p. motors, Callow tanks, 6 Dorr 40 x 12′ thickeners, 7 Dorr 24 x 14′ agitators, 16 diaphragm pumps, Krogh centrifugal pumps, Merrill classifying and zinc dust precipitating presses, refinery and the necessary cyaniding accessories, with a daily capacity of 325 tons. The whole surface equipment including water system, houses, roads, etc., cost over $260,000.

The United Eastern mine and mill are described by Otto Wartenweiler in the November, 1917, Bull. of the A. I. M. E.; and the mill operations during 1917 and 1918, by W. O. North, in Bull. 152 of the A. I. M. & M. E., Aug., 1919.

Production: in 1921 was 88,043 tons ore milled yielding $1,775,772 at a cost of $703,162, or an operating income of $11,539 per ton, or total of $1,015,953.

Year	Ton ore milled	Value per ton	Rec. %	Gold oz.	Silver oz.	Min.	Mill	Total cost
1921.....	88,043	$20.69	96.78	.....	.....	....	....	$11.509
1920.....	102,926	21.76	96.80	100,886	75,526	5.19	2.02	9.15
1919.....	97,325	20.87	96.99	91,263	55,973	5.09	2.02	9.21
1918.....	92,339	23.16	96.95	97,827	52,485	4.73	2.22	8.50
1917.....	84,548	22.42	96.41	85,918	43,989	4.18	2.16	7.28

Reserves have not kept step with production, and the drilling campaign of 1920 did not show commercial values in the undeveloped ground of the main vein. The future of this mine apparently therefore depends on developments in the Big Jim mine, and on a reduction of mining costs, through cheaper wages and economies elsewhere, so as to prolong the life of the mine by making the formerly worthless lower grade material, a source of profit. The management is conservative and very efficient.

UNITED GLOBE MINES **ARIZONA**

See **Old Dominion Co.**

UNITED JEROME COPPER CO. **ARIZONA**

Probably dead.

One of the companies that employed full-page advertisements during the boom at Jerome, trying to sell shares. Cannot locate promoters and letters sent to company are returned by postoffice.

UNITED MAGMA MINES CO. ARIZONA

Out of existence, and Harry Lefkovits (name changed in Sept., 1918, to Lefko), with his first aide, R. V. Stuart, were finally convicted in Dec., 1919 of using the mails to defraud the public. A swindle from beginning to end. See Vol. XIII.

UNITED MINES COMPANY OF ARIZONA ARIZONA

Address: care L. M. Hart, 120 Broadway, New York City.

Officers at last account: George Christie, v. p.; S. H. Stewart, treas.; E A. Goodrich, sec., with H. E. Woods and A. G. Halm, directors.

Inc. May, 1916, in Arizona. **Cap.** $1,750,000; $1 par; 900,000 in treasury. On Dec. 10, 1919, at public auction, 1,000 shares were sold at $75 the lot. Stock stricken from listing on New York Curb, December, 1920.

Property: 30 claims, 600 acres near Bouse, Yuma county, including former holdings of Little Butte Cons. Mines Co., the Arizona Pride and Bullion groups.

Mine shut down 1916, as funds for development were nearly exhausted before reaching the point where engineers expected to find the orebody.

Development: by a 700′ incline shaft with 1,000′ of levels at depths of 75, 120, 210 and 310′. Water was encountered at 200′, but the lowest limit of oxidation has not yet been reached. The 120′ level shows ore bunches for 600′ along the drift. The 210′ level shows mainly leached vein matter with occasional bunches of copper ore, but the leached material is said to average $7 per ton for 200′ along the drift. Similar conditions obtain at 300′.

The **Arizona Pride Group** claims cover part of the granite area in which gold-bearing quartz veins occur. Development includes 50′ and 60′ shafts, both showing ore.

The **Bullion Group** covers a sedimentary area, cut by intrusions of diorite and andesite, with veins following the intrusive contacts. A 205′ shaft on one vein has not reached water level, the filling being leached.

Production: under former owners the Little Butte mine shipments produced 73,400 lb. copper, the ore averaging $7.60 per ton gold, 9.4% copper, 20% iron and 32.4% silica.

In April, 1917, property was examined by Henry C. Carr, who considered the gold-bearing vein of secondary consideration without a treatment plant. Copper ore will probably be found in commercial quantities at greater depth—predicted at 750′.

The property has attractive possibilities which are said to warrant carefully planned development.

UNITED NORTH MINES CO. ARIZONA

Mail returned from former address, 434 I. W. Hellman Bldg., Los Angeles.

Officers: C. T. Howland, pres.; W. H. Thomas, sec. and treas.

Inc. 1915, in Ariz. **Cap.** $100,000; par 10c.; in treasury, 500,000.

Property: the Lion, Kennedy Fraction, and Poorman claims, 40 acres, in the San Francisco district, Mohave county, between United Eastern and Gold Road mines, N. of west end of Fessenden claims.

Equipment: 25 h. p. gasoline hoist, compressors, etc. Probably idle.

UNITED STATES CONTINENTAL MINES CO. ARIZONA

Address: Room 916, 30 Broad St., New York. An I. K. Farrington & Co. promotion.

Officers: I. K. Farrington, pres.; O. O. Abbe, v. p.; R. B. Cross, treas.

Cap. $1,000,000; $1 par, changed to $5 par; 200,000 shares issued. Stock listed on N. Y. Curb. High, 10½; low .06 in 1921 (July). Stock offered at 4½ per share, October, 1921. Registrar and Transfer Co., New York, registrar and transfer agent.

Company controls the **Arizona Victory Mng. Co.** and **Consolidated Homestead Mines, Inc., of Arizona,** and the **Honduras American Syn.** of Honduras, which are separately described. A merger of the U. S. Continental and Honduras American is under way on a basis of 20 shares of United States Continental for 1 Honduras American. The promoters are extensively advertising the U. S. Continental and the subsidiary companies, advising stockholders "to look at their company as their opportunity to engage in mining on an actual, fortune making mine basis".

In November, 1921, it was officially reported that nine-tenths of Honduras American shares have been exchanged, or were about to be.

As yet none of the properties are near the producing stage, nor are they developed or equipped.

UNITED STATES PLATINUM CO. **ARIZONA**

A "war-baby," born in 1918, presumably died the same year. See Philadelphia North American, for August 22, 1918.

Officers at last account: Ralph H. Cameron, pres, 1006 Land Title Bldg., Philadelphia, Pa. H. N. Williams, sec.-treas.

Property: in the Grand Canyon of Arizona. The U. S. Geological Survey in a Press Bulletin, issued in Jan., 1919, says:

"From time to time the supposed presence of platinum ore in the Grand Canyon has received new advertisement, and recently stock in a company organized to exploit the alleged deposits was offered for sale in an alluring prospectus wherein were published assays of the so-called ore that showed as much as 2.4 oz. of platinum to the ton. . . . The supposed platinum bearing deposits are beds of green and red ferruginous sandstone that constitute a subordinate part of the geologic formation known as the Bright Angel shale, of Cambrian age."

In 1911, F. L. Ransome of the U. S. Geological Survey, and, in 1915, H. G. Ferguson, of the Survey, examined claims near Indian Garden that were being held as platinum-bearing ground. In 1918, Mr. Ransome again examined the supposed platinum deposits. The Press Bulletin says, "As a result of these investigations it may be safely stated that the supposed platinum deposits in the Grand Canyon do not contain platinum—certainly not enough to be of any value."

The ground was also examined by John M. Boutwell, who stated that he made a geologic study and took 275 samples. As the result of careful duplicate and triplicate assays, special chemical work, and duplicate concentration tests, "platinum ore has not been found in the ground examined in form and grade of commercial value."

In a suit brought by the United States against Cameron et al, the Supreme Court, in August, 1920, affirmed judgment of the lower courts, enjoining the defendants from occupying or using the property Cameron claimed as a lode mining claim, located by him in 1902, on the southern rim of the Grand Canyon at the head of the Bright Angel Trail.

UNITED STATES VANADIUM DEVELOPMENT CO. **ARIZONA**

Address: 306 Goodrich Bldg., Phoenix, Ariz. **Mine office: Kelvin, Ariz.**

Officers: E. P. Palmer, pres.; H. B. Holloway, v. p.; A. L. Flagg, sec; W. J. Horspool, treas., with B. E. Marks, directors.

Inc. Dec. 31, 1915, in Arizona. **Cap.** $1,500,000; $1 par; issued 1,350,000 shares.

Property: 40 claims, 800 acres, in Pinal county, 3 miles E. of Kelvin. Development by 250′ and 400′ tunnels said to have opened considerable ore, averaging 1.3% vanadium. 1% molybdenum and $3 gold and silver Since May, 1920, only a small force is working on the property.

UNITED VERDE CONSOLIDATED CO. **ARIZONA**

Presumably out of existence. See Volume XIV.

UNITED VERDE COPPER CO. **ARIZONA**

Office: 20 Exchange Place, New York. **Mine Office:** Jerome, Yavapai county, Ariz. **Smelter office:** Clarkdale, Ariz.

Officers: Wm. A. Clark, pres.; Jas. A Macdonald, v. p.; J. H. Anderson, sec.; H. H. St. Clair, treas.; Chas. W. Clark, gen. mgr.; officers are the directors; Root, E. Tally, asst. gen. mgr.; H. DeWitt Smith, supt. of mines; Dave Hopkins, purch. agent.

Inc. 1883, in New York and reorganized Sept. 2, 1899, West Virginia. Again reorganized in Delaware, May 9, 1917. **Cap.** 500,000 shares of no par value fully issued and fully paid. Is practically a close corporation, having 20 shareholders, and is controlled, through stock ownership, by W. A. Clark. Five hundred shares were sold at auction, March 1910, for $70 per share.

Gross sales of copper, silver and gold were $5,368,672 in 1909, $5,605,488 in 1910, $4,736,834 in 1911, $5,899,457 in 1912, $6,171,116 in 1913, $5,186,999 in 1914, $9,519,419 in 1915, $17,185,881 in 1916, $15,276,954 in 1917 $19,275,567 in 1918; $6,563,427 in 1919; $10,823,856 in 1920.

In Feb., 1921 company took a 5% interest, $2,000,000 total amount, in the Copper Export Association's $40,000,000 8% note issue.

Dividends: were begun, 1892, by old company on the basis of 25c per share monthly. Recent dividends have been: $2,005,000 in 1905, $2,700,000 in 1906, $2,700,000 in 1907 $2,025,000 in 1908, $2,700,000 in 1909, $2,700,000 in 1910, $2,250,000 in 1911, $1,800,000 in 1912, $1,575,000 in 1913, $1,125,000 in 1914, $1,800,000 in 1915, $4,050,000 in 1916, $5,175,000 in 1917, $5,550,000 in 1918, $1,800,000 in 1919, $1,800,000 in 1920, $450,000 in March, 1921.

Property: 45 patented claims, 659 acres, with sundry adjoining property, including the North Venture and South Venture claims, which have produced a little high-grade ore, in the Verde district, Yavapai county at Jerome.

As a result of a compromise of a suit, Chas. W. Clark as trustee holds 5,181,173 shares of the Hull Copper Co.

Geology: the property shows an area of metamorphosed volcanic flows overlain by clearly bedded sedimentaries. These beds were greatly sheared and folded and then intruded by acidic porphyry. The later intrusion of a diorite was followed by ore-deposition along the concave margin of this diorite.

The ore-bodies are steep dipping lenses, varying in section from a few feet in width and length up to 200' wide by 500' long. The oxidized zone above 160' level carries auriferous and argentiferous copper ores. Secondary enrichment is of little importance. The primary zone carries pyrite and chalcopyrite, with a little bornite and sphalerite. All ore is smelted direct without concentration; its average copper content is approximately 5.25%.

Development: to the depth of 2,500'. Production is chiefly from the 1,500' and lower levels, and is in large part obtained by horizontal cut-and-fill methods. The oxidized zone is being mined by mill-holes and shrinkage is used where the ground will permit. Square-set stopes are required where the rock is shattered.

No. 5 ore-shaft has been concreted to the 2,500' level and No. 6 supply-shaft to the 1,950' level; and there are two other working shafts, Nos. 3 and 4. Level intervals are 150'.

The ore is easily oxidizable owing to its high sulphur tenor, and is therefore liable to spontaneous combustion, while, owing to the more or less shattered condition of the orebody, it is difficult to prevent entirely the access of air, very little of which will keep a sulphur fire burning incessantly. The fire on the 400' level has been burning since 1897, and the mine is on fire in various places, from No. 9 level to surface, fire in stopes not worked being walled off by cement bulkheads. Mining until early in 1917 has been in process for several years in the fire zone under the Plenum system, introduced by J. J. Shaw. By this method, air under pressure is blown against the face of the stopes by electric fans. The large volume of cold air has a cooling effect on the burning ore, reducing temperatures, and extinguishing the fire in the immediate vicinity of the working face, at the same time driving back

the deadly fumes into the shattered rock mass and permitting extraction of the ore. The fire, while dangerous and annoying, does not destroy the copper, all of which will be recovered eventually, by mining or leaching.

In order to reach the burning sulphide stopes, steam shovels began 1919-20 to remove 14,000,000 cu. yd. of over burden which will permit the mining down to the 500′ level of some 5,000,000 tons of ore said to carry 4% copper. This has necessitated the abandonment of certain old workings and the replacing of a part of the old surface plant by new.

The mine has one of the most perfect systems of mechanical ventilation known to copper mining. It was developed through the necessity of fire control, and cooling off of the heated parts of the mine, together with a plentiful supply of fresh air to the working faces.

For the convenience of smelter operation, ores as mined are divided into 4 classes. All underground work is planned to maintain a daily output of 3,000 tons, with a possible increase to 4,500 tons; this necessitates 25,000′ of workings and a vertical development of 100′ per year.

Equipment: includes a new compressed air plant of 3 units of electrically driven 2-stage compressors of 1,500, 3,000, and 6,800 cu. ft. capacity respectively, driven by 300 h. p., 600 h. p. and 1,250 h. p. motors respectively.

The No. 5 shaft has a mechanical double-drum hoist with electrical equipment, speed of 1,000′ per-minute, good for 3,000′ depth; skips of 7-ton capacity, operated in balance, are used. This installation is on the 1,000′ level, which is the collar of No. 5 shaft. No. 6 shaft has a single drum and reel hoist, driven by a 350 h. p. induction motor and liquid control. The service cage is 7′x12′, double decked, and operates in balance with a counterweight running by flat cable over the hoist reel. The main drum runs the service cage for men and supplies, and 1¾″ cable is supplied for 2,500′ depth. This hoist station is also underground, the collar of the shaft being at the 500′ level.

Underground haulage equipment includes seven 4-ton, nineteen 6-ton, two 10-ton, and three 25-ton trolley-type, and four 3½-ton storage battery, locomotives.

The new surface plant includes a change house for 1,500 men, and a full complement of shops, heating plant, warehouse, etc. These are equipped with the most modern equipment obtainable. The buildings are of modern fireproof construction, well lighted and ventilated.

Crushing plant. is located at Hopewell, at mouth of the 1,000′ tunnel, and consists in brief of a No. 9 gyratory crusher, four sets of 54″x24″ Anaconda rolls, 2 Symons 48″ vertical fine reduction crushers and storage bins for 15,000 tons. This plant has proven unsatisfactory, and will be replaced by a new plant at Clarkdale.

Smelter: the new 3,000-ton smelter designed by Repath and McGregor has been operating since June, 1915. Additions and improvements have since been made, bringing its capacity up to 5,000 tons per day; it consists of a crushing and sampling plant, calcining plant, blast-furnace, converter and reverberatory departments, powdered-coal plant, and a power house, together with coke and ore-storage yards and bins with a total capacity of 26,000 tons. Buildings are built of steel and concrete.

The crushing and sampling plant has a 30x18″ jaw-crusher, driven by a 50 h. p. motor; product passes up an incline belt conveyor, capacity 2,400 tons daily, to sampling mill. This mill has three 20x10″ Blake crushers, 3 sets of crushing rolls, 54x24″, 36x12″ and 24x12″; two 4x14′ Gates trommels and 4 Snyder samplers with final sample of 1 to 250. Crusher product goes over conveyor belts to storage bins for fines or to the calcining plant.

No. 1 calcining plant has twelve 21½′ Wedge furnaces, total capacity, 1,150 tons; the 6 hearths, 5 roasting and 1 drying, are brick-lined. The plant is built so that it can be enlarged when required. Cooling blast is furnished by 1 or 2 No. 6 Sirocco 3-oz. blowers each having a capacity of 25,000 cu. ft. of free air per minute, driven by a 30 h. p. motor. Fumes pass to the dust chamber building, sides of brick and steel, roof of brick, and then to the

400' stack. Calcines, as well as dust, are drawn into 15-ton cars, hauled by 10-ton electric locomotives. No. 2 calcining plant, recently completed, has 12 brick-lined 22½' Wedge roasters, each with 7 hearths; total daily capacity, 1,400 tons. The collecting flue connects with dust chamber of No. 1 plant, and exit gases of both plants are mixed before going to Cottrell smoke-treating plant, began summer of 1920. This plant will treat 1,200,000 cu. ft. of gases per minute in pipe and straight-line treaters, treated gases being taken off by a 420'x30' stock.

The reverberatory plant has three 19'x100' furnaces, and three 25'x100' furnaces, added 1919-20. Four of these furnaces, including the 3 last built burn powdered coal; although oil-firing equipment is ready for use at any time. Calcines and fetling ores are fed to these furnaces. Slag is skimmed off into Treadwell motor-tilted pots, drawn by 18-ton electric locomotives, of which there are three.

The powdered coal plant, completed in 1919, prepares coal for reverberatory use; it consists of a 14,000-ton storage bunker, (12,000 tons under water), crusher, dryer plant, disintegrators, pulverizing plant, and low pressure blowing plant. Screw conveyors convey the coal to the furnace burners; 15 oz. pressure-air blows the dust into the furnaces. The capacity of this plant is 600 tons per day pulverized to 200 mesh. This plant is described by J. B. Johnson in the "Eng. and Mng. Jour." for Aug. 21, 1920.

The blast-furnace plant has four 48x320" furnaces. Feed consists of rich oxidized and sulphide ores, with some calcite. Gases go to a second dust chamber, similar to the other, but with steel plate sides, before going to the 400' stack. Ore and flux for the furnaces is brought by 4 to 6 ton side-discharge cars.

The converter plant has seven stands with eight 12' shells of the Great Falls type. Converters are basic, lined with Harbison-Walker magnesite. Feed consists of mattes from reverberatories and blast-furnaces, together with silica converter ore fed raw. Tilting is done by 50 h. p. direct-current motors. Copper is poured into two copper casting machines, each operated by a 20 h. p. direct-current motor. Slag is drawn into Treadwell pots and charged hot into the reverberatories.

Three blowing engines supply converter air, 1 vertical and 2 horizontal, with capacities of 20,000, 24,000 and 20,000 cu ft., respectively; air is made at 16 lb. pressure. Air for blast-furnaces is supplied by 6 Roots blowers at 32 to 40 oz. pressure, with a total capacity of 230,000 cu. ft. per minute. Four blowers are motor driven, 1 by a steam and 1 by a Diesel engine.

The power plant will generate only part of the electric current used, remainder being purchased from the Arizona Power Co. Current is received at 44,000 volts and stepped down to 2,200 volts. Waste heat from the reverberatories is utilized for 12 Stirling M boilers, 713 h. p. each, 2 to each furnace. Two similar boilers, using fuel oil are held in reserve. The electric generating system consists of 3 units of 500, 1,500 and 2,000 k. w. capacity, respectively, the first is connected to a Parsons turbine, and generates at 440 volts and is for emergency in case of accident to the transformers; the other two units generate 2,300 volts, 60 cycle, 3 phase current. The 230 volt direct current for cranes, railway motors, etc., is supplied by two 200 k. w. motor-generator sets synchronous motor driven; also by a 400 k. w. induction motor-driven D. C. generator, owned by the Arizona Power Company. The total transformer capacity is 1,750 k. w. from 2,200 to 440 volts.

Water is supplied by gravity from springs about 3 miles from smelter; an auxiliary pumping plant on the Verde river below the smelter is used in case of water shortage.

The cooling system of the furnaces, compressors, and the condensing system of the steam units are taken care of by a central cooling plant and pumping station. There are 3 condensers, and 5 centrifugal pumps, driven by motors.

Compressed air is supplied by a Corliss cross compound steam driven compressor of 2,500 cu. ft. capacity, compressed to 100 lb. pressure; also by a 2-stage electric driven compressor of 2,470 cu. ft. capacity.

L. A. Parsons describes the smelter and new surface plant in the "Mng. & Sci. Press" for Oct. 16, 1920 and June 25, 1921, respec ively.

A standard-gauge railway, built 1912, by the Atchison, Topeka & Santa Fe R. R. Co., connects the new smelter at Clarkdale with its main line at Drake. The standard-gauge Verde Tunnel & Smelter R. R. owned by stockholders of United Verde C. Co., connects Clarkdale with Jerome; it handles all traffic to and from Jerome since the narrow-gauge United Verde and Pacific Ry. was dismantled early in 1920.

Recent Production:

Year	Lbs. Copper	Oz. Silver	Oz. Gold
1917.....	71,753,111	1,222,607	29,497
1918.....	77,560,204	1,298,414	29,145
1919.....	42,927,666	665,328	16,838
1920.....	64,952,270	906,055	18,760

Approximately 8,200,000 tons was extracted up to 1918, 40% of which was produced in the last 5 years.

In early years the United Verde made copper for 5¢ or less a pound, if one deducts gold and silver values from the cost. The reported cost per pound of finished copper, after deducting gold and silver values, was 9.17¢ per lb. in 1904; 9.27¢ per lb. in 1905; 8.69¢ in 1906, and 10.54¢ in 1907. Under average circumstances the cost may be figured as 9 to 10¢ per lb.

UNITED VERDE EXTENSION MINING CO. ARIZONA

Office: 233 Broadway, New York. **Mine office;** Jerome Arizona. **Smelter:** Clemenceau, Ariz.

Officers: James S. Douglas, pres.; George E. Tener, v. p.; Louis E. Whicher, v. p.; Chas. P. Sands, sec.-treas.; with Paul Armitage, R. M. Raymond, George Kingdon, gen. mgr.; Archibald Douglas and Andrew J. Pickrell, directors. E. E. Campbell, gen. supt.; G. W. Prince, smelter supt.

Inc. 1902, in Maine, as a reconstruction of the United Verde Extension Gold Silver & Copper Mng. Co. **Cap.** $3,000,000; shares $10 par. Reorganized in Delaware, **cap.** $4,000,000; shares $10 par. and again reorganized 1912, and **cap.** reduced to $750,000; shares 50¢ par; issued $525,000. In this reorganization, approximately 360,000 shares were set aside for exchange, on a share for share basis for old shares outstanding; about 40,000 shares were issued in liquidation of debts; 150,000 shares were issued to Jas. S. Douglas for services; 50,000 shares were sold to Mr. Douglas for $25,000 cash; 400,000 shares were optioned to Mr. Douglas and his associates with the right to purchase all or a part of this block at par value at any time prior to June 15, 1915, and 500,000 shares were reserved for treasury purposes. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, tranfer agt. Shares are listed on the Boston Curb, traded on New York Curb. Annual meeting, 3rd Tuesday in February.

Comparative Balance Sheet shows, for years ended Dec. 31:

ASSETS

	Mining Claims	Equip.& Smelter	Inv'nt.& Land Acq'd	Accts.Rec. & Inv.	Cash & Lib.Bonds	Due—Ore & Bul. S.	O.&B.in Transit	Total
1921	$26,836,843	$3,600,247	$2,357,884	$1,809,025	$4,211,246	.....	$1,882,284	$40,697 529
1920	*27,836,685	**4,069,506	2.135.480	999.619	†4.073 911	.....	4,498,046	43,613,247
1919	40,604.915	5,538,016	1.840.613	963,893	3.939.192	99,664	4.424,100	$57 410.393
1918	40,354.914	5,126.285	1,836 859	1,089.514	5,224.646	852,445	3.477,407	57.962.070
1917	40.351.598	2,033,015	1,366,921	362.992	7,515,023	1,167,847	2,668,698	55,466,093

*After depletion. **After depreciation; † bonds at par.

	LIABILITIES					
	Capital Stock	Accounts Payable	Reserves— Depletion Deprec. etc.	Developed Orebody	Surplus Account	Total
1921	$[illegible]	$1,247,542	$93,670	$38,425,000	$406,317	$40,697,529
[illegible]	525,000	1,553,249	125,139	38,425,000	2,984,859	43,613,247
[illegible]	525,000	2,610,996	9,945,330	38,425,000	5,904,067	57,410,393
1918	$25,000	2,942,843	7,567,863	38,425,000	8,501,724	57,962,070
1917	$25,000	477,306	4,019,257	40,000,000	10,444,529	55,466,093

Comparative Statement of Operations:

	1920	1919	1918
Gross income	$7,591,815	$5,058,668	$14,919,072
Other income	202,843	406,256	237,644
Total income	$7,794,658	$5,464,924	$15,156,716
Expenses, taxes, etc.	3,978,638	3,340,900	8,257,729
Depl. and Deprec.	4,635,229	2,359,180	3,567,933
Net earnings	*$819,209	*$235,156	$3,331,054
Dividends	2,100,000	2,362,500	1,575,000
Surplus for year	*$2,919,209	*$2,597,656	$1,756,054

*Loss.

Report for 1921 showed: gross income, $2,043,519; other income, $275,740 ;total income, $2,319,259; expenses ,taxes, etc., $2,282,262; deple. & deprec., $1,565,538; deficit, $1,528,541; dividends, $1, 050,000; loss, $2,578,541.

Company has taken a $1,080,000 interest in the $40,000,000 8% gold note issue of the Copper Export Association, disposing of 10,800,000 lb. of copper in return. On Nov. 1, 1921, metal on hand had been reduced to $9,796,000 lb.

Dividends: $1 in 1916; $2.85 in 1917; $4.50 in 1918; $2.25 in 1919; $2.00 in 1920; $1.00 in 1921; 25¢ on Feb. 1, 1922. The to al is $13.85, equal to $14,542,500.

Property: 1,200 acres, known as the Little Daisy group, a two-thirds interest in the adjoining Florencia claim, and an option on 19 claims, 300 acres adjacent to the company's property on the S. and S.-E.; $130,000 was paid for this tract.

In November, 1919, the 8 patented claims, 160 acres, of the West United Verde Copper Co. were acquired. Several small deposits have been opened, the deepest workings being 1,200'. The price was $250,000, and some West United shareholders tried to secure an injunction against the sale, considering the price too low. Also, in same year, company purchased the Vulcan group. In May, 1921, reported that option had been taken on 628,078 shares of Jerome Verde Dev. Co. (q. v.) for $464,039, and that U. V. X. would manage development of Jerome Verde property. In November, it was stated that deeds of conveyance had been filed, calling for a $420,000 payment.

History: original development was by an 800' vertical shaft, the Edith on the Little Daisy claim, about 1,700' from the main shaft of the United Verde mine, with collar 450' lower. This shaft, after passing through 50' of iron stains, encountered copper carbonates, continuing for depth of about 150', succeeded by conglomerate, and from a depth of 425' to 578' passed through schist carrying copper sulphides and manganese. These old workings total about 5,000' but develop only a little ore of about 2% copper, 1 oz. silver and $3 gold, on the 800' level. A 130' winze below this level was bottomed in decomposed schist, showing considerable copper.

The early exploration work of the company was unsuccessful, and an option was taken in 1913 on the Jerome Verde group, but development was disappointing and option was relinquished in 1915. Then, in the company's own ground a large body of very rich chalcocite ore was encountered on the 1,200' level, Dec., 1914. This orebody was developed and worked during 1915, and the shaft was sunk to the 1,400' level; in Feb., 1916, a drift on this level cut the downward extension of the bonanza orebody found above.

The ore thus far developed lies on the northerly downthrown side of a big fault, with a drop of 650′ or thereabouts, as shown by the limestone strata on each side of it.

Development: when fully opened, the orebody covered an area of 60,000 sq. ft. on the 1,400′, and raises proved its extension to the 1,300′ level. In 1920, indications were that body would be about ⅓ less in area on the 1,500′ and still somewhat smaller on the 1,600′ level. Average copper content of ore on 1,500′ is 5.9%.

The new 3-compartment Audrey shaft has been sunk to the 1,700′ level and concreted; this permits of drifting on the 1,500′, 1,600′ and 1,700′ levels. There are 2 other shafts, the Little Daisy, used only for ventilation, and the Edith, used for supplies; in addition there are 2 raises to surface, one used for ventilation, the other for waste. In 1919, the Audrey and Edith shafts were connected by crosscuts on 1,500, 1,600 and 1,700′ levels; and in 1919-20, the Edith shaft was being sunk to the lowest level. At end of 1919, the 12,395′ standard gauge track haulage-tunnel with 332′ of connections, was completed; this connects with the mine on the 1,300′ level, enabling all ore to be shipped direct from the mine to the smelter and eliminating the use of the aerial tram. Overhead square-set stoping is used for very heavy ground, about 50%, and the Mitchell stoping method wherever weight of ground will permit, about 50%. In 1918 new work amounted to 10,919′; in 1919, 5,578′; in 1920, 7,534′; in 1921, 2,838′.

Oxidized ore was encountered 60′ above 1,300′ level, and, though no considerable quantity of ore is expected above this point, a notable tonnage of oxidized siliceous ore was partially developed in 1920.

Ore Reserves: in 1919 were 571,400 tons above the 1,400′ level, averaging 15% copper, 3 oz. silver and 50¢ gold; in 1920, 1,148,000 tons above the 1,000 level, averaging 11.81% copper, 2.22 oz. silver and 46¢ gold; in 1921, 1,102,000 tons above the 1,500′ level, averaging 11.75% copper, 2.22oz. silver and 46¢ gold.

Smelter: designed by A. G. McGregor and staff, Warren, Ariz., and described by F. E. Nichols in "E. & M. J." of Oct. 19, 1918. Started operating in July, 1918. The plant includes one 48″x26′-8″ blast-furnace, two 25′x120′ reverberatories; six 21′ 6″ 6-hearth Wedge roasters, and three 12′ converters of the Great Falls type. Mine ore goes to steel receiving bins, 1,500 tons capacity, and by belt conveyors to crushing and sampling plant; from here the coarse material goes to the coarse bedding 5,300-ton bin, the fine material to the fine bedding 5,000-ton bin. The coarse ore goes by conveyor to the blast furnace building to bins to charge cars. Blast furnace has a daily capacity of 600 tons of ore. Slag is handled by 225 cu. ft. electrically tilted cars, drawn by 24-ton electric locomotives. The fines go by belt conveyor to the roasting plant, after calcining they are taken in 15-ton cars to the reverberatories, each with a daily capacity of 500 to 600 tons. Reverberatories are coal-dust fired, the first time this has been tried in Arizona. The coal-crushing and pulverizing equipment consists of a 24″ Jeffrey single-roll crusher, a Fuller-Lehigh indirect fired rotating drier, and a battery of four 42″ F-L ball pulverizing mills. The converting plant has a 40-ton electric traveling crane.

Reverberatory waste heat is used in generating steam in 3 Stirling waste-heat boilers, 713 rated h. p. each; in addition there are 2 Stirling direct-fired boilers, 439 rated h. p. each, fired with pulverized coal.

The power plant contains three 2,200-volt turbo-generators; two 200 k. w. motor-generator sets for direct current for the plant; two units, each consisting of a Roots 400 cu. ft. blower, direct connected to a tandem compound engine, for blast furnace air; two 18,000 cu. ft. blowing engines for the converter air. A new 4,500 cu. ft. compressor was installed in 1919. Water is obtained from wells on the site at 100′ depth. Ore trains consist of 25-ton electric locomotive and 30-ton cars.

Danger from fire has been minimized—the Edith shaft has a spraying system, the Audrey shaft has been concreted, and the Little Daisy shaft is naturally wet. The Mitchell stoping method leaves barriers of waste which

will serve as fire-breaks in that part of the Bonanza orebody where this system is used. A suction fan, capacity 40,000 cu. ft. per minute, is located at the top of the Little Daisy shaft, and another, capacity 135,000 cu. ft. per minute, will be placed at the top of the air-raise. With this equipment and the completion of the necessary underground work the mine will be one of the best ventilated in the southwest.

Production:

Year	Ore tons	Copper %	Gold oz.	Silver oz.	Cost per ton of ore	*Net cost per lb.,cents	Selling price per lb.,cents
1921 (4 mos.)	53,643	.....	....	....	....	13.46	.....
1920.....	164,307	12.84	.023	2.22	....	8.53	.....
1919 (8 mos.)..	96,546	15.5	.029	3.23	....	9.8	17.136
1918.....	133,535	20.35	.024	4.18	....	....	24.145
1917.....	115,064	27.5	.014	2.89	$32.88	5.8¢	27.033¢
1916.....	80,159	22.7	.032	1.60	29.91	6.6	24.145

	Lbs. Copper	Oz. Gold	Oz. Silver
1921 (4 mos.).....	12,498,005	2,328	112,864
1920.....	41,942,700	5,530	359,370
1919 (8½ mos.).....	28,860,615	3,169	272,855
1918.....	55,491,077	3,046	503,739
1917.....	63,242,784	1,656	332,536
1916.....	36,402,972	2,570	128,467

*Does not include depreciation, depletion or taxes.

Reported that company has acquired mining rights to 200 acres of coal lands near Gallup, N. Mexico.

Copper on hand Dec. 31, 1921 amounted to 6,955,942 lb.

The company is one of the lowest cost copper producers in the United States. Although the grade of ore now being smelted is lower, large profits should continue with the operation of its own smelter.

Except for development work, operations were suspended in May, 1921, to await better copper prices.

UNITED VERDE JR., CO. **ARIZONA**

Property, the Ballard group, reverted to owners. See United Verde Cons. Co., in Volume XIV.

UNITED WESTERN MINING CO. **ARIZONA**

Address. Oatman, Ariz.

Officers: W. K. Ridenour, pres. and treas.: H. E. Woods, v. p., with J. A. George and R. H. Carr, directors.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par; in treasury, 600,000. Listed on San Francisco and Los Angeles stock exchanges. Was listed as a prospect on New York Curb, but was stricken from the list in Aug., 1918. Permission to sell stock was given September, 1921.

Property: 4 claims, 65 acres, one mile S. W. of Oatman, Mohave County, crossed by main road connecting Gold Road and Oatman, and adjoining property of the United Eastern Company along what appears to be a continuation of the main ore zone of that property. Also owns the Oofty Goofty group and water rights 4 miles N. W. of Oatman, total, 125 acres. Ore is free-milling gold, containing little silver. Pay ore occurs in shoots of undetermined extension. Development shows strong vein on the upper levels but below milling grade. On 505' level the vein is large, wet, and reported to show milling value.

Development: comprises a shaft 500' deep with crosscuts at 200' and 500'. At the latter depth a heavy flow of water from the vein stopped work, 1918.

Equipment: includes 50 h. p. hoist, compressor, buildings, etc.

Property a good prospect, but drifting alone can determine its value.

UNIVERSAL MINES CO. **ARIZONA**

Amalgamated October, 1920, with Dripping Springs Copper Co., and described under new title, **Dripping Springs Mines Corp.**, which see.

UTAH-ARIZONA GOLD & COPPER MINING CO. **ARIZONA**

Mail returned from former address: 626 Dooly Bldg., Salt Lake City, Utah.

Officers: Heber S. Cutler, pres.; J. F. Shelley, v. p.-gen. mgr., Shelley, Idaho; John W. Geiger, sec.-treas.: with W. J. Burton, Geo. F. Shelley and M. Thomas, directors.

Inc. Nov. 11, 1907 in Arizona. **Cap.** $1,000,000; $1 par; issued 961,023 Annual meeting, second Tuesday in September.

Property: 60 claims, about 1,200 acres, and a 20-acre mill site, in the Weaver district, Mohave county, 18 miles N. W. of Chloride, the nearest rail point. Claims show quartz veins traversing granite and mica-schist, carrying gold-copper ore. Property includes the Golden Gate mine, developed by two incline shafts of 125′ and 135′, on parallel veins, and several short tunnels, with total of about 2,000′ of workings.

Equipment: includes a 5-stamp mill. Idle since 1914.

VAN DYKE COPPER CO. **ARIZONA**

Address: E. R. Rice, mgr., Miami, Ariz.

Officers: C. W. Van Dyke, pres.; with H. A. Smith, v. p.; C. B. Loomis, sec.; Wm. E. Brooks, treas., with L. D. Van Dyke and W. E. Loomis, all of Miami, directors.

Inc. Aug. 1916, in Arizona. **Cap.** $5,000,000; 50c. par.

Property: 1687 acres, 417 patented, in Globe district, Gila county, adjoins Miami and Inspiration on S. E.

Development: by 1,692′ shaft with main lateral workings on the 1,215′ and 1,550′ levels.

Equipment: includes 3-churn-drilling outfits, 25 h. p. hoist, and 10 by 10 air-compressor.

VEKOL MINES CO. **ARIZONA**

Address: care E. B. Holt, Phoenix, Ariz.

Incorporators: F. M. Pool, Geo. W. Elias and E. B. Holt, all of Phoenix. P. P. Daggs, owner, Claremont, Calif.

Inc. 1918, in Arizona.

Property: the old Vekol silver mine, in the Casa Grande district, Pinal county, under lease and option. Is reputed to have been a big shipper of hand sorted ore, averaging 300 oz. silver per ton, for 15 years after discovery in 1879. Beginning with 1884, 32 oz. silver ore was treated in a 10-stamp pan-amalgamation mill. Old workings, consisting of 4 inclines on the strike, aggregate 40,000′, developing a block 400′ x 2,600′ with a 200′ back. Ore containing hornsilver and argentite, occurs in replacement deposits in dolomitic limestone.

Treatment process has been determined and company proposes to erect a 100-ton plant. Ore reserves estimated to be 70,000 tons, averaging 20 oz. Lessees are now operating on a small scale.

VENTURE HILL MINING CO., THE **ARIZONA**

Address: C. H. Riebelong, sec.-treas., Prescott, Ariz. **Mine address:** C. T. Jolly, pres., Jerome, Ariz. Ed. Kiehl, v. p.

Inc. 1900, in Arizona. **Cap.** 3,000,000 shares; $1 par. In Sept., 1917, $25,000 was borrowed, for development, on 10% notes, secured by mortgage.

Property: 6 patented claims, 110 acres, 2 miles S. of Jerome, Yavapai county, near the Verde Combination and others. Examined by W. H. Weed in 1916. Was regarded as a good prospect.

Mine sold under foreclosure proceedings Nov. 18, 1920, to Edw. Shumate of Prescott and Boaz Duncan of Los Angeles, and has not yet been redeemed by company. Fully described Vol. XIV.

VERDE APEX COPPER MINING CO. — ARIZONA

Address: J. H. Robinson, sec., Prescott, Ariz.

Cap. $3,000,000; shares $1 par; 750,000 in treasury; 450,000 issued; 1,800,000 in pool.

Property: 8 claims, 85 acres, in central part of the Verde district, Yavapai county, one mile from Jerome, and some distance S. of the open cut of the United Verde mine. The claims are well located. As underground work is limited, the prospective value of the ground is largely a matter of geologic deduction and estimate, based on finding both oxide and sulphide ores in the tunnels, and with full knowledge of the 3 producers in the district.

Development: three veins are exposed in tunnels. The Black Horse is 6' wide, carrying good ore; the Socrates is narrow, but has promise, and No. 3 vein in the upper tunnel shows oxide ore of commercial value. With the Venture Hill Mining Co., a joint shaft was sunk on the boundary of the two properties to depth of 330'.

Was a promising venture. Company is in financial difficulties, creditors having brought suit in January, 1921, for $24,000. In September, property was acquired by C. M. Raible, of Jerome, through a sheriff's deed, on a judgement of $28,909.

VERDE CENTRAL MINES, INC. — ARIZONA

Address: C. T. Joslin, sec., Prescott, Ariz. E. L. Bartholomew, supt.

Officers: W. F. Staunton, pres.; C. T. Joslin, sec.--treas., with J. A. Hope, C. C. Miller, Jr., and L. Spence, directors.

Inc. Aug. 16, 1916, in Arizona. **Cap.** $2,500,000; $1 par; 500,000 issued.

Property: 20 patented claims, 308 acres, at Jerome, Yavapai county, in the center of the Verde district. Claims considered well located, and merit development of the known veins and prospecting along shear planes and beneath the limestone cap. Contains extension of the Venture vein, of claims owned by U. V. Extension.

Development: by a 650' shaft. On the 600' level a crosscut run early 1922 exposed ore assaying 10-15% copper and 5-6 oz. silver per ton. Deeper development to 1,000' depth is to be done by shaft and hoisting plant on 600' level. There are also 4 tunnels. Exploration work financed by C. & A. Co.

Property promising and management able.

VERDE COMBINATION COPPER CO. — ARIZONA

Address: David Morgan, v. p.-mgr., Box O, Jerome, Ariz.

Officers: J. L. Dyer, pres.; L. J. Gilchrist, sec.; Jas. F. Primm, treas.; with J. M. Layman, J. S. Eberman and W. N. Richards, directors. W. B. Kennedy, asst. sec. asst. treas.

Inc. in Arizona. Cap. $1,000,000; 50c. par; 1,600,000 issued. Union Bank & Trust Co., El Paso, Texas, transfer agent. Annual meeting in December. 1,000 shares sold for $82 the lot in New York on Dec. 8, 1920.

Property: 33 claims, 550 acres, 15 patented, in Verde District, Yavapai county. Company's engineers consider it is on the main fissure of the district, and essential to possess all the favorable attributes for ore deposition.

Development: principally at the north end of the property, by a 1,300' shaft which connects with extensive workings in the Mescal tunnel. This tunnel shows the great Verde fault, the master, and post mineral, fault that traverses the Jerome district for 20 miles; also discloses 2' of 5% copper ore in a fissure vein, on which but little development save a raise has been done; also two promising contacts between diorite with stringers of copper. The old workings at the south end of the tract include 640' and 300' shafts, showing diorite with stringers of copper; and a 75' tunnel crossing a 3' quartz vein.

Diamond drill exploratory work under way at last account.

VERDE GRANDE COPPER CO. ARIZONA

Reorganized in July, 1917, as the **Jerome Grande Copper Co.**, which see. Described in Vol. XII.

VERDE HUB COPPER CO. ARIZONA

Address: S. Morthland, 715 Millikin Bldg., Decatur, Ill. W. S. Owens, supt., Jerome, Arizona.

Officers: Wm. C. Field, pres.; F. P. Wells, v. p.; E. Linxweiler, treas.; Samuel Morthland .sec.; with S. F. Lowry, C. C. McFann and N. M. Gillies, directors.

Inc. Nov., 1916. **Cap.** $1,000,000; 50c. par. A reorganization of the Decatur Copper M. Co.

Property: the Decatur, 1 mile S. of Jerome, Yavapai county.

Development: by 284′ shaft. Diamond drilling, in charge of Samuel Morthland, was started in Sept., 1917, but later was stopped on account of the war; drilling done is said to have been encouraging and it is planned to resume this work.

VERDE INSPIRATION MINING CO. ARIZONA

Officers: E. H. Meek, pres. mgr., Prescott, Ariz.; A. L. Hammond, sec.; with M. Lynch, J. H. James and S. S. Allen, directors.

Inc. Jan., 1917, in Arizona. **Cap.** $1,000,000; $1 par; 125,000 shares went to owners and promoters, 125,000 for outstanding obligations, with 750,000 in treasury and offered to the public.

Company was organized to take over the Hillside Mining Co., 9 claims 170 acres, 1½ miles from Cherry, Yavapai county, and 12 miles S. of Jerome, said to show gold ore $7 to $17 per ton with 20,000 tons ore blocked out.

Development: by several shafts to depth of 400′. Equipped with a 20-stamp mill, pumps, assay office and other necessary buildings. A cyanide plant was being installed at last account.

VERDE MINES & MILLING CO. ARIZONA

W. F. Burns, pres.-mgr., Prescott, Ariz.

Property: Monarch group in the Verde district, Yavapai county, 7 miles S. of Jerome, developed to depth of 218′ and said to carry free milling ore averaging $20 per ton in gold and silver. Reported that 40,000 tons of ore are available.

Equipment: includes a 10-stamp mill and cyanide plant connected to 3 tunnels by gravity tram.

The mill was to be enlarged to 50-ton daily capacity and the shaft sunk to 600′ (1921).

VERDE MONSTER COPPER CO. ARIZONA

Officers: T. F. Shea, pres., Jerome, Ariz.; C. M. Pedley, v. p.; and A. M. McLellan, sec.-treas.

Inc. in Arizona. **Cap.** $2,000,000; shares 25c par.

Property: 600 acres, in Yavapai county, 8 miles N. of Jerome. Ore containing 4% copper was reported near the surface. Not operating.

VERDE QUEEN COPPER CO. ARIZONA

Reported in Smythe's Obsolete American Securities, Vol. XI, 1911, "New Jersey charter void 1906, for non-payment of taxes."

At a stockholders' meeting held in Jersey City, N. J., May 6, 1916, dissolution of the company was approved. It was decided to make a distribution of part of its assets, consisting of 1,000,000 shares of Jerome Verde Copper Co.'s stock; holders of Verde Queens stock to receive in part liquidation 200 shares Jerome Verde stock for each share of Verde Queen stock.

Property of the company was taken over in 1906 by the **Jerome Verde Copper Co.**

VERDE QUEEN MINING CO. ARIZONA

Address: Pantano, Pima Co., Ariz. P. M. Hilton, supt.

Property: in central part of Empire district, about 12 miles from Pantano, and 15 miles W. of Benson. Shows silver-lead and copper ores, developed by a 280' two-compartment shaft. Shipments of lead ore made to the El Paso smelter in 1919.

Equipment: includes gasoline hoist.

VERDE SQUAW COPPER MINING CO. — **ARIZONA**

Address: T. H. Gray, sec., Box 682, Jerome, Ariz.

Officers: J. B. MacDonald, pres.; D. W. Barter, v. p.; T. H. Gray, sec. and gen. mgr.; C. F. Benjamin, treas.; with C. C. and G. Reid, directors.

Inc. Jan. 8, 1917, in Arizona. **Cap.** $1,500.000; $1 par; 915,000 issued. Annual meeting, second Monday in January.

Property: 15 claims, 275 acres, in Verde Valley, 4½ miles S. of Camp Verde, 25 miles S. E. of Jerome, Yavapai county. Examined in 1917 by William Winkelman.

Development: prospected for 17 years by D. W. Barter, and 3 to 40% ore has been exposed in numerous places. The Barter tunnel now in 1,000' is said to have cut a 30' vein at depth of 500'; this vein is reported to have some bornite and also 8' of lower grade sulphide assaying 1% to 7% copper. A 2-compartment shaft has been sunk on the Boulder claim, a 40 h. p. hoist and a compressor added. Underground work here totals 270'.

Is a meritorious mining venture. Inactive.

VICEROY MINING CO. — **ARIZONA**

Office: Janesville, Wis. Mine near Patagonia, Santa Cruz county, Ariz.

Officers: Frank H. Baack, pres.; M. G. Jeffris, v. p.; M. O. Mouat, sec.-treas., Janesville, Wis.

Inc. Oct., 1912. **Cap.** $1,000,000; $1 par; issued, 600,000.

Property: 8 claims, 164 acres, in the Tyndall district, 20 miles N. N. W. of Patagonia, shows a number of fissure veins, traversing porphyry or following contacts between diorite and porphyry and dipping 45°. The vein is said to range from 6 to 75' in width. Ores are principally silver-bearing, but show occasional bornite and a little lead ore above the water level, reported to carry from 16 to 199 oz. silver per ton.

Development: by shafts of 40' and 100' with about 400' of tunnel workings in leached ore.

Idle owing to lack of funds.

VICTOR & BELLE CROWN MINING CO. — **ARIZONA**

Address: Wenden, Yuma Co., Arizona.

Officers: J. E. Matteson, pres.; F. C. Piper, v. p.; J. H. Matteson, sec.-treas.; Geo. M. White, mgr., at last accounts.

Property: 10 claims, 180 acres, in the Harcuvar Mtns., Yuma county, 8 miles N. of Salome, the nearest rail point, said to show a vein of 5 to 7' width, with a 30 to 36" paystreak, giving assays of 15 to 20% copper and $15 to $20 gold per ton.

Development: includes shafts of 80', 35' and 450', and tunnels of 755' 165' and 230', aggregating about 1,200' of workings. A tunnel was planned to intersect the veins at 600' depth.

Shipping in 1919.

VICTOR COPPER CO. — **ARIZONA**

Reorganized as **New York Verde Copper Co.**, which see.

VINDICATOR MINING CO. — **ARIZONA**

Address: care Otis E. Young, Phoenix, Ariz.

Property: located in Cunningham Pass district, Yuma county, said to show copper-gold ore. Developed by shaft.

VIVIAN MINING CO. — **ARIZONA**

Idle. **Office:** 415 Bradbury Bldg., Los Angeles, Calif. **Mine** office: Oatman, Ariz.

Officers: E. M. Ross, pres.; G. A. Hancock, v. p.-gen. mgr.; A. Reuter, sec.; with F. P. Thom, C. Leonhardt, and R. Deving, directors. Farmers' & Merchants' National Bank, treas.

Inc. 1905, in Cal. **Cap.** $500,000; $1 par; assessable; all outstanding. Annual meeting, first Saturday in July.

Property: 11 claims, 183 acres, 2½ miles W. of Oatman, Mohave county.

Development: 450′ shaft; workings, 5,400′.

Equipment: two 40 h. p. oil engines, steam compressor, 8 h. p. hoist, electric light plant, buildings, etc.

VULCAN CONSOLIDATED MINING CO. **ARIZONA**

Address: W. R. Ramsdell, 30 S. Stone Ave., Tucson, Ariz.

Officers: W. R. Ramsdell, pres.; C. E. Walker, v. p.; J. S. Kelso, sec.-treas.

Inc. March 16, 1916, in Arizona. **Cap.** $100,000; $1 par.

Property: 9 claims, 4 patented, 20 miles S. of Tucson, Pima county. Examined by F. R. Weekes.

Development: 175′ vertical shaft and 560′ incline shaft. Flow of water was struck and mine shut down early in 1918 on account of caving of lower part of incline shaft. Company planned sinking new shaft, pumping out mine and mining the 6 to 7% ore, large bodies of which are said to have been undergoing development when water was struck.

Equipment: 15 and 25 h. p. hoists,, and 50 h. p. compressor.

Production:

	Lb. Copper	Oz. Silver	Net Smelter Returns	% Copper	Oz. Silver
1917	476,690	4,718	$84,238	7.52	1.55
1916	716,458	6,614	128.753	6.43	1.17

VULTURE MINES CO. **ARIZONA**

Officers: at last account: Robt. Mackay, pres.; F. W. Rockwell, v. p.; R. T. Sewall, sec., Boston; A. McLean, treas., with F. M. Kimbark, E. I. Marvell, and J. B. Sullivan, Jr., directors; Spencer Hutchinson, cons. engr.

Cap. 600,000 shares; par $5; all issued. No bonded indebtedness. 35 Congress St., Boston, Mass., transfer office. R. T. Sewall, registrar. Annual meeting, June 1.

Property: 31 claims, 11 patented, 618 acres, 15 miles S. W. of Wickenburg, Maricopa county. The Vulture mine is one of the oldest and at one time was one of the best gold producers in Arizona.

Geology: quartz vein in schist contains gold, with some galena and pyrite, dips 37° and strikes N. 85° E. Pay ore occurs in shoots, the main orebody being 35′ by 300′.

Development: of mine is by back stoping and waste filling through two inclined shafts 765′ and 595′ deep. Greatest depth of workings, 1,239′; linear extent, 25,000′.

Production: treated in 1912 was 19,689 tons; in 1913, 33,174; in 1914, 36,348; in 1915, 29,968 tons. Idle several years and equipment sold in 1921.

WALDRON MINING CO. **ARIZONA**

Mail returned from former office: 535 Chamber of Commerce Bldg., Pasadena, Cal. **Mine address:** Venture Camp, Kingman, Mohave county, Ariz. Geo. H. Hill, mgr.; W. Van Doren, sec.

A reorganization, 1918, of the Arizona Venture Corp'n, which owned 5 groups, 12 claims, about 240 acres, near the Old Diamond Joe mine, developed by tunnel, and by 600′ shaft.

Equipment: includes hoist, air compressor, electric power plant and a mill. Probably defunct.

WALLAPAI CHIEF MINING CO. **ARIZONA**

Address: S. C. Hall, 648 S. Olive St., Los Angeles, Cal., or Kingman, Arizona.

Officers: C. F. Eyton, pres.; J. W. Squires, v. p.; S. C. Hall, sec.-treas.; with H. T. Rudisill and E. A. Gord, directors.

Inc. April, 1916, in Arizona. **Cap.** $2,000,000; $1 par; 1,000,000 outstanding.

Property: 5 claims in Maynard district, Mohave county, near Kingman. Presumably idle.

WALNUT CREEK MINING & MILLING CO. **ARIZONA**

Address: 1371 E. 17th St., Los Angeles, Calif., or Kingman, Mohave Co., Ariz., Jack Zwinge, supt.

Officers: Frank Sohn, pres.; Chas. E. Kent, sec.

Inc. 1909, in Calif. **Cap.** $1,000,000; $1 par; 525,675 shares issued.

Property: 9 miles S. of Kingman, developed by a tunnel 800′ long, said to have crosscut 20′ of vein material showing some copper ore. A shaft being sunk to 360′ depth at last account.

WANDERING JEW MINE **ARIZONA**

Comprises a group of four claims in the Tyndall district on the W. slope of Santa Rita mountains, near Alto, Santa Cruz county, owned by M. & L. Lulley and R. R. Richardson.

Development: to 100′ depth by 2 shafts, 300′ apart, drifts and crosscuts aggregating about 2,000′ of workings. Country rock is gray diorite. Vein varies from 6″ to 4′ in width and contains argentiferous galena. About half the deposit is said to be shipping ore, the rest, concentrating grade. Ore is galena from the surface down, but in places, contains a little copper carbonate and chalcopyrite. Property has a 75-ton flotation mill.

WARDWELL & OSBORNE COPPER MINES CO. **ARIZONA**

Dead. Property lost by failure to do assessment work, and subsequently relocated and now held by **Mammon Copper Co.**, which see. Described in Vol. XII.

WAR EAGLE & GLADIATOR GROUP **ARIZONA**

Leased to **Philadelphia Mining Co.**, which see.

WAR HORSE COPPER MINING CO. **ARIZONA**

Mail returned from former address: % Bacher & Stelsel, 412 Mills Bldg., El Paso, Texas.

Cap. $1,000,000; shares $1 par.

Property: 15 claims in the Tombstone district, Cochise county, 23 miles N. W. of Bisbee.

Development: 508′ shaft and other openings. At 265′ there was said to be 70′ of ore assaying 8% copper, 16 oz. silver and $1 gold per ton. At 400′ the vein was reported to be 27′ wide and believed to run through 6 claims, a distance of 9,000′.

No recent returns and company probably out of business.

WARREN REALTY & DEVELOPMENT CO. **ARIZONA**

Property sold in 1917 to Phelps, Dodge & Co., and company liquidated. For description, see Vol. XII.

WARRIOR COPPER CO. **ARIZONA**

Office: Brown Bldg., Philadelphia, Pa. **Mine office:** Globe, Gila Co., Arizona.

Officers: Spencer D. Wright, pres.; Philip Godlev, v. p.; Geo. H. Barbaman, treas.; D. H. Paris, sec., with Ernest L. Tustin, H. B. Hopper, I. E. Kane, W. W. Doughten, T. A. Blythe, C. Gallagher, G. B. Walker and Thos. D. Martindale, directors.

Inc. March 10, 1905, in Delaware, as successor of Black Warrior Copper Co. Amalgamated, which had come to grief. **Cap.** $1,225,000; in $375,000 cumulative 7% preferred stock, par $5, and $850,000 common stock, par $10.

Property: the Lost Gulch group, near the Inspiration mine, about 550 acres, Globe district, Gila county, now being explored by diamond drilling.

The claims show a highly altered monzonite-porphyry covering the larger part of the area, with extensive outcrops of dacite and limestone and smaller ones of diabase, general geological conditions being much the same as at the Black Warrior.

The Mongomery group was sold in the early part of 1920 to the Inspiration Cons. Copper Co.

WASHINGTON-ARIZONA COPPER CO. ARIZONA

E. D. Reese, mgr, at last account.

Property: the George Washington claims in Mineral Park district, Mohave county, said to have a large tonnage of copper-silver ore.

Development: by 3 tunnels and a shaft to a depth of several hundred feet. **Equipment:** includes a 300-ton mill, using the Fields flotation process. Shipping in 1919.

WAYNE DEVELOPMENT CO. ARIZONA

Long inactive and company probably defunct. Fully described in Vol. XIV.

WESTERN ARIZONA COPPER CO. ARIZONA

Mail returned, 1918, from former address, Miami, Ariz.

Presumably dead. See Vol. XIV.

WESTERN COPPER CO. ARIZONA

Address: W. W. Lawhon, pres., Hotel Commercial Block, Phoenix, Arizona.

Property: the old Patton property, in Yavapai county, 4 miles from Mayer, adjoins the Copper Queen holdings on the N. Company never was active and mine is closed down.

WESTERN MINES CORPORATION ARIZONA

Address: Frank A. Keith, pres., 1202 Hollingsworth Bldg., Los Angeles Calif.

Inc. 1920 to take over holdings of the **Arizona Rex Mining Co.** and the **Arizona Midway Co.**, at Oatman.

WESTERN ORE CONCENTRATION CO. ARIZONA

F. E. Steffy, gen. mgr., Chloride, Ariz, at last account. Company operated a 250-ton custom plant including a 9x15" Blake crusher, two 14x30" Reliance rolls, Marcy ball mill, Hancock jig, 10 Wilfley tables and K. & K. flotation unit. Probably defunct.

WEST GOLD ROAD MINING CO. ARIZONA

Fully described in Vol. XIV.

WEST UNITED VERDE COPPER CO. ARIZONA

Property, including that absorbed from Jerome-Victor Extension Copper Co., taken over by **United Verde Extension Mng. Co.** in 1919. Fully described in Volume XIV.

WHITCOMB MINING & MILLING CO. ARIZONA

Office: 154 W. Randolph St., Chicago, Ill. **Mine office:** Tucson, Ariz.

Officers: H. Whitcomb, pres.-gen. mgr.; J. F. Johantgen, v. p.; I. A. Snow, treas.; A. McCallum, sec., with J. C. Freeman, directors.

Inc. March, 1914, in Arizona. **Cap.** $100,000; increased to $200,000; shares $1 par; all issued. No bonded indebtedness.

Property: 3 claims in the Pima district, 20 miles from Tucson. The increase of capitalization was for the purpose of acquiring 6 additional claims known as the Prosperity group.

Development: by inclined shaft about 500' deep and stopes on 3 levels. Ore is a silver-lead-bearing quartz of milling grade.

Equipment: includes a concentrating mill.

WHITE HILLS MINING CO. ARIZONA

Address: Chas. D. Wagner, sec., Kingman, Ariz.

Officers: John H. Ware, pres.; Anson H. Smith, v. p.; Kent Keller, gen. mgr.

Offered 100,000 shares treasury stock at $1 per share, June, 1921.

Property: 47 patented claims, in White Hills district, N. of Chloride, Mohave county, operated 1892-96 by White Hills Mng. Co. and later by White Hills M. & M. Co., and credited with a past production of over 6,000,000 oz. silver.

The old workings have been unwatered and main shaft is to be deepened. Lessees are reported mining highgrade silver ore.

WHITE METAL MINING CO. ..ARIZONA

Address: J. C. Devine, mgr., Kelvin, Ariz.

Officers: John C. Devine, pres.; T. H. Crowe, v. p.; C. T. Carpenter, sec.; J. L. Gust, treas., with Chas. H. Barney, directors.

Inc. 1917, in Ariz. **Cap.** $7,500,000; $5 par; $5,384,600 outstanding. Commonwealth Trust Co., Boston, transfer agent; State St. Trust Co., Boston, registrar.

Property: consists of 15 claims, 1 patented, 300 acres, on the S. side of the Pinal range, Gila county, south of Globe. Ore occurs in veins, said to average 20 oz. silver, with gold and lead. Reserves estimated at 100,000 tons.

Development: by 480′ shaft, and tunnels, 580′ and 600′ long, with 3,000′ of total workings.

Equipment: includes 50-ton mill with flotation unit, 40 h. p. hoist, 2 compressors and pump.

WHITE-VICTOR COPPER MINING CO. ARIZONA

Out of business. See Vol. XIV.

WICKENBURG COPPER M. & R. CO. ARIZONA

Idle many years. See Vol. XIV for description.

WILD HORSE MINE ARIZONA

Owned by Wm. D. & H. J. Gray, Patagonia, Ariz.

Property: adjoins the Three R mine, about 7 miles from Patagonia, Santa Cruz county. Ore contains silver, copper, and gold.

WILLIE ROSE COPPER MINING CO. ARIZONA

Mail returned from former address, J. W. Sterling, mgr., Bowie, Ariz.

Property: the Willie Rose mine, near Triangle Springs, 13 miles S. of San Simon, Cochise county, was operated under 10-year lease from 1914. Developed by 188′ shaft said to be bottomed in a 12′ vein carrying slightly argentiferous chalcocite, of about 2% copper tenor. Ore occurs in lime-porphyry contact, veins running E.-W., showing copper glance at slight depth. Made several shipments of $12 per ton ore to the El Paso smelter.

Equipment: includes hoist, oil engine, compressor and air-drills.

Presumably defunct.

WINCHESTER GOLD MINING CO. ARIZONA

Officers: L. E. Hesla, pres.-treas., Prescott, Ariz.; A. W. Bark, v. p.; C. F. Paul, sec., with C. J. Dalken and O. H. Hesla, directors.

Inc. July, 1915, in Arizona. **Cap.** $1,500,000; $1 par; 535,000 outstanding. Annual meeting, first Monday in July.

Property: 6 claims and 2 fractions, 140 acres, in Mohave county, 2 miles W. of Oatman. Company does not reply to requests for information.

WOLF ARIZONA COPPER CO. ARIZONA

Officers: Carl H. Wolf, pres.; H. C. Wolf, sec., and W. J. Woestendick, treas. Above are directors.

Inc. in Delaware. **Cap.** $1,000,000; shares $1 par.

Property: lease and bond on 7 claims, 6 patented, 85 acres, in Big Bug district, Yavapai county, includes the McCabe and Gladstone mines. Examined by O. Longacre and W. C. Thomas. Claims said to show a vein in quartz diorite, dipping 75° and pitching E.-W. Ore-shoots are from 10″ to 5′ wide. Ore carries zinc, lead, gold, silver and copper; first class averaging $35 and second class $15 per ton.

Development: by 800 and 1,100′ incline shafts, workings, totaling about 5 miles. Reserves blocked out are given as 4,000 tons first class and 40,000 tons second class ore.

Equipment: includes steam hoist, compressor, pumps, 10-stamp mill and 100-ton Callow flotation plant.

Company is said to have a dump containing 20,000 tons of $6 tailing available for treatment.

WOLF CREEK MINING CO. ARIZONA

Officers: Jas. F. Keating, pres.; A. J. McEwen, v. p.; H. W. Armstrong sec.; John Rodden, treas., all of Clarkdale, Ariz.

Inc. 1919 in Arizona. **Cap.** $500,000; par $1.

Property: 7 claims, 140 acres, in Yavapai county, 8 miles W. of Mayer, said to show gold-silver-copper ore.

Development: by 300′ tunnel. Property is a prospect.

WOLVERINE & ARIZONA MINING CO. ARIZONA

Office: Calumet, Mich. Marc Bailey, mine supt., Bisbee, Ariz.

Officers: John Daniell, pres.; Paul P. Roehm, v. p.; Edw. Ulseth, 2nd v. p.; Chas. Chynoweth, sec.-treas., with Jos. Bosch, W. H. Brophy, W. Frank James and Fred C. Smith, directors.

Inc. March, 1905, in Arizona, as successor of Wolverine & Arizona Development Co. **Cap.** $3,000,000; $15 par; issued 97,156 shares subject to assessment, and 21,792 shares of fullpaid stock. Levied 25-cent assessments March 19, 1906; Sept. 17, 1906; June 17, 1907; Nov. 18, 1907. State Savings Bank Bldg., Laurium, Mich., registrar; secretary of company, transfer agent. Annual meeting in April.

Report for year ending Dec. 31, 1920, shows: receipts, $18,330; expenditures, $40,699; cash on hand, $119,082.

Dividends: 10cts. per share, in Dec. 1914; 25 cts. per share, in Dec., 1915; 25cts. in 1918.

Property: 9 claims, 152 acres, known as the Cairo, Memphis, Kentucky Georgia, Louisiana, Chicago, Warren, George and Broken Promise, in the Warren district, Cochise county. The Georgia claim lies 600′ from lands of the Calumet & Arizona, and is about 3,000′ from the Irish Mag shaft of that company, and from the Spray and Holbrook shafts of the Copper Queen. The Uncle Sam and White Tail Deer claims of the Copper Queen are adjacent to the Wolverine & Arizona.

Development: claims lie along the high limestone ridge W. of Bisbee, extending westward to the open valley, and the first development was begun on the farthermost side of the group. The Broken Promise shaft, 700′ deep, with 3 compartments, cut mineralized limestone showing considerable iron but no ore in commercial quantity. A drift on the 500′ level running 850′ toward the Pittsburg & Duluth group (Cal. & Ariz.) cut leached ore and ledge matter, carrying traces of copper. Drifts running in other directions showed leached ore, but not in encouraging quantities, and work in this area was suspended, 1909.

Exploratory work on the western claims proving disappointing, the easternmost claims were prospected in 1906 by diamond drill and a hole 410′ deep passed into 50′ of 4 to 10% oxidized copper ore near the Shattuck mine. This orebody being inaccessible from the Broken Promise shaft, the use of the Higgins tunnel was acquired and the ore opened up from the Bisbee side of the mountain. The tunnel was extended 310′ to the Wolverine boundary and then southerly to intersect the orebody on the Wolverine ground. Orebody proved to be a replacement deposit of rich oxidized ore, lying within the limits of the Warren claim, about 2,700′ from the tunnel portal. After working out the oxidized ore down to the Shattuck boundary, exploration upward was begun and a fine body of sulphide ore was developed in the footwall limestone above the oxidized zone. This was exhausted in 1918.

A tunnel to explore the Shattuck fault, which crosses the property, has been driven. In year ending Sept. 30, 1918, work on Broken Promise claim amounted to 1,769′, including sinking of No. 2 shaft to 4th level, a depth of 386′. Ore from this claim came from an orebody on southeast end line of claim; developments here look promising.

During 1920, the shaft (No. 1) on Broken Promise was reopened to the 500′ level and drifts explored. No new orebodies were discovered, but

several thousand tons of high grade ore are in reserve at No. 2 shaft. New work amounted to 1,354'.

The mine has been a small but steady shipper of high-grade ore to the Douglas smelter, this ore paying all working expenses and building up a small surplus. It formerly averaged about 10%, but the sulphide ore is of lower grade. The mine has about 6,000' of workings and its ore-bodies connect downward with great stopes in the Shattuck mine, the deposit being the top of one of the ore-shoots of that property. The mine is connected underground with the Uncle Sam mine of the Copper Queen, as well as with the workings of the Shattuck mine.

Equipment: includes a 250 h. p. steam plant, 2 single-drum hoists and a 6-drill air compressor, all at the Broken Promise shaft and all unused for several years.

Production: 2,524 tons, netting $37,962 in 1910; 984 tons, netting $11,873 in 1911; 762 tons, netting $12,861 in 1912. The output for fiscal year ending Sept. 30, 1915, yielded $130,370, or $17.13 per ton. In 1915-16 the output was 1,193 tons, averaging $23.96 per ton, equal to $28,588, and in 1917-18, 10,597 tons, yielding $162,004. In 1920, 837 tons of 9% copper ore were shipped.

A geological report made by J. B. Tenney late in 1920 concludes that possibilities of finding new ore are good. The property is excellently handled.

WOODBURY COPPER CO. — **ARIZONA**

Probably dead. See Vol. XIII and XIV.

WORLD'S FAIR EXTENSION MINING CO. — **ARIZONA**

Inc. 1920, in Arizona.

Property: 8 claims, near Patagonia, in Santa Cruz county, between the World's Fair and Flux mines, said to contain lead-silver-copper bearing ore. No record of operations obtainable.

WORLD'S FAIR MINE — **ARIZONA**

Patagonia, Santa Cruz county, Arizona.

Owned by Frank & Josephine Powers, operated under lease by **Bachman-Merritt Metals Co.**, which see.

A suit is pending against the owners for delinquent taxes.

WRIGLEY EXPLORATION CO. — **ARIZONA**

Company liquidated. Described in Vol. XIII.

YABA COPPER CO. — **ARIZONA**

Address: A. J. Carroll, v. p., Prescott, Arizona.

Officers: John Erickson, pres.; J. B. Dudley, sec.-treas., with F. S. Olsen, Edw. Hannvig, A. J. Carroll, Ed. F. Bowers and M. Carroll, directors.

Inc. 1919, in Arizona.

Property: Carroll group, Yavapai county, near Prescott, slightly developed and equipped with a hoist and compressor.

YAVAPAI CONS. GOLD-SILVER-COPPER CO. — **ARIZONA**

Office: Prescott, Ariz. **Mine Office:** Crown King, Ariz.

Officers: T. G. Norris, pres.; A. W. Edwards, v. p.; G. D. Morris, sec.-treas.; L. H. Mulhearn, asst. sec.-treas.

Property: 18 claims, partly patented including the Old Reliable mine, 3 miles from Crown King; the Wildflower and Tiger groups in Pine Grove district; and the Crown King mines; all in the Bradshaw Mtns., Yavapai county. The last named group, 18 claims, bought from B. A. Turner, receiver of the old corporation, for $75,000, half cash and half in shares, has been a considerable producer, mainly of gold.

Property was operated from 1916-19 by Bradshaw Reduction Co., described in Vol. XIV.

Development: by several thousand feet of old workings on a contact vein between porphyry and syenite, carrying slightly auriferous and highly argentiferous copper ores.

Equipment. includes steam power, compressors, 10-stamp mill and 200-ton concentrator.

YOUNG MINES CO., LTD. **ARIZONA**

Office: 413 Fleming Bldg., Phoenix, Ariz.

Officers: Geo. U. Young, pres.-gen. mgr.; H. Clay Parker, sec., with A. W. Sevringhaus, E. A. Sevringhaus, E. C. Moore, directors. H. A. Sevringhaus, fiscal agent. Willis Laurence, supt.

Inc. 1910, in Arizona. **Cap.** $1,500,000; $1 par; outstanding, 20,000. Annual meeting in May.

Property: 80 claims, about 1600 acres, 20 miles E. of Mesa, Maricopa county, contains a large disseminated low-grade orebody, said to carry sufficient free milling gold for mining on a large scale by steam shovel or caving.

Development: includes 3 shafts, 150′, 800′ and 445′ deep and about 10,000′ of laterals.

Equipment: includes 100 h. p. hoist, pump, small compressor, buildings for accommodation of 100 men.

The president reported that: "Property may be worked on a 350-ton basis on high-grade ore on a 6 to 8-year supply now developed in addition to 20 years' operation on 1,000 tons per day basis according to engineers' estimates on hand." What was done about it is not known.

Y. P. MINING CO. **ARIZONA**

Address: Noble H. Getchell, mgr., Battle Mountain, Nevada.

Dividends: paid under former management said to amount to $15,000.

Property: the Cash mine of 12 claims (7 patented), 240 acres, in Hassayampa district, Yavapai county, 12 miles S. of Prescott, shows 13 parallel veins, one of which, the Conglomerate, is reported to be 2 to 5′ wide, the ore at the surface assaying 7 to $22 in gold per ton. Only one vein was worked by former management and is said to have yielded $500,000. Examined by Leonard D. Sivyer.

Development: to depth of 750′. One estimate gives "a reasonable $734,000 worth of ore in sight" with silver at 60¢.

Equipment: includes hoist, compressor, electric-light plant and 30-ton mill employing Wilfley tables and Monell slimer.

Property under lease and bond (51%) of stock to the **Betty O'Neal Mines** (q. v.) operating property of that name in Lander county, Nev.

YUCCA-ARIZONA COPPER CO. **ARIZONA**

Property sold by court order several years ago and company dead. Described in Vol. XIII.

YUCCA TUNGSTEN MINING CO. **ARIZONA**

Subsidiary of York Metal & Alloys Co. of York, Pa.

Address: Harvey Klotsch, mgr., Yucca, Mohave Co., Ariz.

Property: 26 claims, 17 miles N. E. of Yucca, on the Santa Fe Railway, in Cedar Valley district, shows a 5′ vein of ore, carrying 5% tungstic acid and 1% to 3% copper.

Development comprises a 250′ shaft and 1,300′ of drift tunnels, 200′ apart vertically. **Equipment:** includes a 50-ton mill with two flotation units. Shipping in 1918 and 1919; shipments in 1919 included copper ore.

YUMA CONSOLIDATED MINING CO. **ARIZONA**

Described in Vol. XIV. Property sold to King Placer Co., in 1916.

YUMA MINE **ARIZONA**

Owned by Mrs. W. H. Barnes, Tucson, Ariz.

Property: in Pima county, 14 miles N. W. of Tucson. Mine is described in Bull. 111, U. S. Bureau of Mines, 1916. The molybdenum occurs as wulfenite in an acid eruptive rock so highly altered that it is difficult to classify. The wulfenite is associated with cerussite, or well-crystallized vanadinite, or both. The average mine ore assays 5% molybdenum, $2.50 gold and 5% lead.

YUMA WARRIOR MINING CO. **ARIZONA**

Office: 41 Bank of Arizona Bldg., Prescott, Ariz.

Officers: H. W. Stevens, pres.; E. J. F. Horne, v. p.; C. T. Joslin, sec.-treas., with W. A. Drake, R. W. Hunt, O. W. Johnson and H. K. Chapin, directors. John B. Martin, supt.

Inc. in Arizona. **Cap.** $3,500,000; $1 par; about one-half is outstanding.

Property: 365 acres in the Ellsworth district, 6½ miles from Salome, Yuma county, known as the Harqua Hala-Bonanza and Golden Eagle groups, formerly owned by Harqua Hala. Originally located in 1888, the mine is reported to have yielded gold worth $4,000,000 above the 200′ level. Examined by L. W. Getchell.

Geology: ore shoots occur in shear-zones in schists with intercalated limestone, extending down into the basal granite. Basic dikes are found and many veinlets of quartz and calcite occur. Geology is described in U. S. G. S. Bull. 451, 1911, p. 106.

Development: by incline shaft to 365′ vertical depth.

Equipment: complete mining plant, ⅞ mile aerial tram from Golden Eagle mine to Bonanza, 40-stamp mill, shops, and buildings.

Production: is irregular; since Feb., 1917, the mill yielded gold worth $25,000.

No recent news, and mine presumably idle.

ZONIA COPPER CO. **ARIZONA**

Secretary's office: 25 Broadway, New York City. P. G. Spilsbury, mgr., P. O. Box 1123, Phoenix, Ariz. J. K. Hooper, supt., Kirkland, Ariz.

Officers: L. D. Ricketts, pres.; W. D. Thornton, v. p.; J. W. Allen, sec.-treas., with C. F. Kelley and J. D. Ryan, directors. W. S. Harper, asst. sec.-asst. treas.

Inc. January 3, 1921, in Delaware. **Cap.** $1,000,000; $10 par.

Property: options on 75 claims, 37 patented, including the Zonia and McMahon groups, at Zonia, in Walnut Grove district, Yavapai county, 12 miles S. E. of Kirkland. Prospecting with two shafts. Both groups were shippers in 1919.

Reported, October, 1921, that dispute with Kirkland Arizona has arisen as to title to portion of the mineral holdings.

ARKANSAS

The zinc-lead region of northern Arkansas is in Boone, Baxter, Marion, Newton and Searcy counties. Carbonate and silicate ores are the principal products, though drilling has exposed sphalerite, but galena has not yet been found in large quantities. Open-cut mining is the general rule. Ore-dressing follows Joplin, Missouri, practice.*

Production statistics are given by the State Bureau of Mines. Most of the mines were idle during 1918, though several new mills were erected in Boone and Marion counties. Yearly production, in short tons, is as follows.

	Zinc concentrates				Lead concentrates	
Year	Sphalerite	Value	Carbonates	Value	Tons	Value
1919	24	.....	141	.....	56	.....
1918	310	$16,430	2,156	$68,333	155	$13,954
1917	916	57,824	17,053	650,585	474	47,593
1916	1,670	112,726	16,609	940,224	339	28,097
1915	686	41,341	7,925	408,079	79	4,961
1914	743	19,406	1,143	25,187	52	2,408
1913	594	16,916	680	15,050	23	1,179

The ouput of the State for 1917 and 1918 is as follows:

	1917	1918
Crude ore, tons	203,600	37,000
Zinc, per cent	3.70	2.86
Lead, per cent	0.19	0.32

Concentrates:	1917	1918
Sphalerite, per cent	58.40	59.00
Carbonates, per cent	40.50	40.60
Galena, per cent	80.50	77.40

*The field was described in the "Engineering and Mining Journal" of August 26, 1911, by Otto Ruhl, and on February 16, 1918, by Tom Shiras.

The total value in 1919 was $8,340.

The manganese region is tributary to Batesville.

The mines are arranged alphabetically.

The total production of manganese ore from 1849-1918 inclusive was 75,985 tons. Very little manganese ore has since been mined.

AMERICAN BAUXITE CO. **ARKANSAS**

Office: 1111 Harrison Bldg., Philadelphia, Pa. **Mine address.** Bauxite, Saline county, Ark. J. T. Fuller, supt.

Operated as a close corporation.

Property: the largest producer of bauxite (hydrated oxide of alumina) in the State. The output is sold mostly to the Aluminum Ore Co. of East St. Louis. Employees number from 600-1,000, varying with demand for product. The bauxite occurs as blanket formation in clay and is mined by open-cut methods. The ore, which is of high grade, is crushed to 2" size and dried, ready for market. Shipments amount to 10 cars of dried bauxite per day. The mine is described by Tom Shiras in the "Eng. & Mng. Journal" of June 21, 1919.

AMERICAN STAR ANTIMONY CORPORATION **ARKANSAS**

Office and mine: Gilham, Ark.

Officers: Gordon Battele, pres.; Huntington Natl. Bank Bldg., Columbus, O. F. M. Fenton, v. p.-sec.-treas., with Harry S. Miller and G. B. Fenton, directors.

Inc. Dec. 10, 1916, in Missouri. **Cap.** $24,000; $100 par; all issued. Conqueror Trust Co., Joplin, Mo., registrar and transfer agent. Annual meeting, second Monday in December.

Property: 3 groups, 440 acres, near Gilham, Sevier county, and a smelter in the town of Sevier. **Ore:** stibnite occurs in fissure veins, 6" to 3' wide, said to give average assays of 30% antimony, 33% sulphur, 6% silica, 3% iron, and 24% alumina.

Development: by 3 shafts, deepest 175'.

Equipment: includes 3 compressors, hoist and steam power. Management reported ore reserves of 2,000 tons in 1917. Developing.

ARKANSAS MINING & MERCANTILE CO. **ARKANSAS**

Address: F. A. Handlen, mgr., Fort Smith, Ark.

Property: zinc-lead mine on boundary between Boone and Marion counties. A 200-ton mill was to be built at last account.

ARKANSAS ZINC CO. **ARKANSAS**

Con Medley, mgr., Rush, Ark.

Property: the Beulah mine, near Rush, operated during 1920, and a 100-ton mill erected.

ARKANSAS ZINC & SMELTING CORP. **ARKANSAS**

Subsidiary of **American Metal Co.** (q. v.) property acquired by purchase in 1920. See Vol. XIV for description of Arkansas company.

Works address. Van Buren, Ark.

Operates a 3,200 retort zinc smelter.

ATHLETIC MINING & SMELTING CO. **ARKANSAS**

See same title in Missouri.

B. & A. MINING CO. **ARKANSAS**

(Boston & Arkansas Mng. Co.)

Address: J. W. Hammond, Okmulgee, Okla. C. L. Larson, mgr.; E. W. Ellis, supt. Okmulgee, Okla.

Directors: J. W. Hammond, O. F. Dickenson, F. P. Snider, Charles Popkin, W. W. Jenkins, Robt. M. Isham, Wm. Foley, I. H. Cox, Richard Bottle, Milo Brown and N. Lambertson.

Property: the old Davis mine, 15 miles N. of de Queen and 6 miles N. W. of Gilham, Sevier county. Claims were acquired in 1918, and $250,000 has been spent on development and machinery. The ore-zone is up to 40' wide, and carries sphalerite, chalcopyrite and galena. The first named min-

coal follows the footwall, while the others are disseminated. A 250' shaft has been sunk. Mill employs rolls, jigs, and tables.

Company has recently acquired a lease on 2,600 acres of coal land in Okmulgee county, Okla.

BIG HURRICANE MINE — **ARKANSAS**

Address: J. C. Shepherd, Pindall, Searcy county, Ark.

Property: 480 acres, near Pindall, on the M. & N. A. R. R. The mine is in an ore-bearing fault running N. 82° W. Carbonates have been the principal output, but sphalerite has been found under them.

Development: by large open-cut 60' deep, exposing a thin ore-bearing vein included in the fault. Ore is removed by cars drawn up an incline track.

Equipment: 3 mills of 125, 200 and 100-ton capacity, respectively. In No. 1, ore is crushed to ½" mesh, and jigged. Tailing passes to No. 2, where a Hardinge mill grinds it to 1½ mm. size, concentration being on tables. No. 3 has 4 tables, which handle pulp from No. 2 mill without finer grinding. Losses of metallic zinc were reduced by the three plants from 5% to 3% and later to 1½%.

Reported that of 340 tons of zinc carbonate concentrate shipped from the county, the larger part came from the Hurricane.

BOO-GRA-LOO MINING CO. (THE) — **ARKANSAS**

Address: Pawhuska, Okla.

Officers: W. E. Graham, pres.-mgr.; H. M. Loomer, sec.; R. B. Boone, treas., also directors.

Inc. Jan. 26, 1918, in Oklahoma. **Cap.** $10,000; $1 par; all issued. Annual meeting, January 25.

Property: lease on 390 acres of patented land, at Zinc, Boone county, Ark. Ore body is a chamber deposit of calamine in limestone.

Development: by 300' tunnel. **Equipment:** includes a 50-ton mill, using concentrators. No production reported.

BOSTON & ARKANSAS MNG. CO. — **ARKANSAS**

See B. & A. Mng. Co.

CENTRAL STATES LEAD & ZINC CO. — **ARKANSAS**

Property: the Monkey Hill zinc mine in Marion county. A 100-ton mill was erected in 1918.

CHARLEY BOY MINING CO. — **ARKANSAS**

Officers: A. K. Richards, pres.; W. T. Hines, v. p.; Chas. Gilstrop, sec.-treas.

Company had a lease on land in the Zinc district, Boone county.

CONFEDERATE MINE — **ARKANSAS**

A zinc-lead mine in Newton county, said to have been worked in 1860. A 300-ton mill, the largest in the State, was erected late in 1917. Water is brought 9,800' in a 6" pipe-line. Concentrates consist of 66% zinc carbonate and 33% lead.

CONSOLIDATED ZINC MINES CO. — **ARKANSAS**

Property: the Howard, Churchill, and Wallace zinc mines. A 400-ton mill was to be built at last report.

CONTINENTAL ZINC CO. — **ARKANSAS**

Liquidated. See Vol. XIV.

CUSHMAN MANGANESE CO. — **ARKANSAS**

Address: Walter H. Denison, Cushman, Ark.

DIXIE GIRL MINING CO. — **ARKANSAS**

Offices: 600 Wheat Bldg., Fort Worth, Texas; and Buffalo, Ark.

Officers: O. H. Haley, pres.; I. W. Haley, v. p.; H. Lederman, sec.-treas., with A. C. Barnhart and J. H. Hand, directors. L. E. Myles, mgr.; C. T. Jobes, cons. eng.

Inc. 1917, in Arkansas. **Cap.** $300,000; $1 par; 50,000 issued.

Property: 160 acres of patented land 5 miles S. W. of Buffalo, and 5 miles N. E. of Rush.

Development: by tunnels and open-cuts. Ore is zinc carbonate, said to average 40% zinc. New machinery was installed in 1918.

Property reported under lease to R. P. Templin of Alton, Ill.

DIXIE QUEEN MINING CO. ARKANSAS

Property: the Can Spring mine, on Warner creek, near Buffalo, Marion county.

EDITH MINING CO. ARKANSAS

Address: Charles Le Vasseur, Rush, Ark.

Property: acquired in Jan., 1919, by J. de Costa and associates of Kansas City, Mo. Ore is a carbonate of zinc, and is hauled to Yellville.

EUREKA MANGANESE & MINING CO. ARKANSAS

Listed in Volume XIV. Company consolidated 1921 with Southern Hill Manganese Co., as **United States Manganese Co.**, which see.

EVERTON MINING & DEVELOPMENT CO. ARKANSAS

Address: Everton, Ark.

Property: manganese deposit in Pugh Hollow, Lafferty Creek district, Boone county. Ore said to carry from 25 to 29% Mn. Concentration raises this grade to above 34%.

FORT SMITH SPELTER CO. ARKANSAS

Address: C. W. Martin, pres., Fort Smith, Ark.

Works: zinc smelter with 2,560 retorts at Fort Smith and rolling mills for sheet zinc at Greencastle, Indiana. Ore is purchased from mines in Arkansas and the Tri-State region.

Through the sale, July, 1919, of his interests in the American Zinc Products Co., D. W. Kerr, former president, transferred control of the above works to the Valley Iron Co. of Youngstown, Ohio. New York office: 50 Church St., with M. L. Filley as Eastern sales manager.

FOX DEN MINING CO. ARKANSAS

Property: the Dry Bone zinc mine and mill, near Buffalo.

GLOBE BAUXITE CO. ARKANSAS

Operates a bauxite deposit in Little Rock district, Arkansas.

GLORIA MINING CO. ARKANSAS

Office: Zinc, Ark. Geo. C. Miller, mgr.-supt. Not incorporated. Reported gross earnings, 1918, $30,000, costs, $20,000.

Dividends: $10,000.

Property: 31 acres, 1 mile N. of Zinc, carries a blanket deposit of zinc ore in limestone, worked by 560′ tunnel.

Equipment: oil engine, 600′ tramway, 50-ton concentrator, consisting of jigs and tables. Concentrate shipped in 1918 averaged 44% zinc and valued at $30,000.

HARRISON MINING & MILLING CO. ARKANSAS

Lease sold to **Krueger-Mills Mining Co.**, which see.

INDEPENDENCE MINING CO. ARKANSAS

Address: E. C. McComb, mgr., Batesville, Ark. Walter H. Denison, sales agent, Cushman, Ark.

Company operates the Polk-Southard mine and washing plant near Cushman.

KRUEGER-MILLS MINING CO. ARKANSAS

Address: W. O. Krueger, Harrison, or E. H. Mills, Springfield, Mo.

Property: lease acquired from Harrison M. & M. Co., Harrison, Ark. Zinc ore was developed, and a 75-ton mill operated in 1918, but was burned down in that year.

LIBERTY LEAD & ZINC CO. ARKANSAS

Address: Yellville, Ark.

Officers: C. G. Rogers, pres.; G. W. Caldwell, v. p.; R. R. Stone, sec.-treas.

Inc. June 17, 1917, in Arizona. **Cap.** $100,000; $1 par.

Gross earnings in 1918 were $2,000, and expenses, $3,000.

Property: 220 acres in Marion county, 3 miles S. E. of Yellville, contains a blanket deposit in flint rock and sand. Ore carries zinc only. Development by 200′ tunnel.

Equipment: geared hoist, 850 cu. ft. compressor, 75 h. p. oil engine, and 150-ton mill, including 2 jigs.

Production: in 1917, 100 tons of ore; in 1918, 50 tons of concentrate.

MAGNOLIA LEAD & ZINC CO. **ARKANSAS**

Address: G. C. Millar, Zinc, Ark.

Property: 4,000 acres in Marion county, contains chamber deposits of zinc carbonate in limestone and flint.

Development: by 200′ tunnel, to depth of 200′.

Equipment: steam power, 600 cu. ft. compressor, 300′ tramway, with 150-ton mill employing jigs.

The ore assays 12% and the concentrate 42% zinc. The finished product costs $15 per ton.

MATTIE MAY MINING CO. **ARKANSAS**

Property: at Rush, Ark.

A 100- on mill to concentrate the developed zinc carbonate ore was completed in 1919.

McCURRY MINING & MILLING CO. **ARKANSAS**

Address: W. A. McCurry, Zinc, Ark.

Property: the Coker Hollow and Rhodes-Manchester; the Haulk at Dodd City; and the Keyes Gap and Canton mines, near Ponca City. The former shows zinc silicate, the latter blende and galena. At Zinc the company has a 100-ton custom mill.

MORNING STAR MINING CO. **ARKANSAS**

Address: J. W. McDanield, Rush, Marion Co., Ark.

Company was reorganized in 1920 to acquire the Capps, Carney, Morning Star, Philadelphia and Red Cloud mines in the Rush district of Northern Arkansas. The Morning Star mine was a small producer in 1919.

NATIONAL MANGANESE CO. **ARKANSAS**

Address: Anderson, Ark.

Officers: C. A. Enoche, pres.; J. L. Elliott, v. p.

Inc. 1918. **Cap.** $100,000.

Property: 230 acres of manganese bearing ground, 4 miles from Penters Bluff, the nearest shipping point. A washing plant is to be installed.

NORTHERN MINNESOTA ORE CO. **ARKANSAS**

See same title in Minnesota.

NORTH STAR MINING CO. **ARKANSAS**

Address: F. C. Heywood, Yellville, Ark.

Property: the North Star and Lone Star mines in northern Arkansas, drilled in spring of 1918; the two mines were consolidated; a mill was erected with aerial tram, and in April, 1919, the daily output was 5 tons of high-grade zinc carbonate.

OKLAHOMA-KANSAS MINING CO. **ARKANSAS**

Address: Ross Blake, mgr., Batesville, Ark.

Officers: O. M. Bilharz, pres.; W. H. Gartung, sec.-treas.

Property: 585 acres in Independence county. Containing manganese ore in clay, which is worked by a steam-shovel. A 300-ton mill makes a 50% manganese product.

ONWATTA MINING CO. **ARKANSAS**

Address: C. G. Rogers, supt., Yellville, Ark.

Officers: C. G. Rogers, pres.; G. W. Caldwell, v. p.; R. R. Stone, sec.-treas.

Property: 40 acres in Marion county, 9 miles N. of Yellville, shows lead ore with calamine, smithsonite and some cadmium, occurring in fissures or fault breccias in limestone. The zinc ore averages better than 60% metal.

Development: by 150 and 300′ tunnels. Workings total 1,000′, blocking out 2,000 tons of ore.

Equipment: 35 h. p. oil engine, 140 cu. ft. compressor, and 50-ton mill, containing jigs.

Production: 1,000 tons of ore up to 1918.

OZARK MINING & MILLING CO. **ARKANSAS**

Address: A. O. Potoroff, lessee, Batesville, Ark.

Property: near Batesville, equipped with 100-ton mill and steam shovel One of the large producers in the region.

REPUBLIC MINING & MANUFACTURING CO. **ARKANSAS**

Company operates a bauxite deposit east of Little Rock, Arkansas.

SHEPHERD MINING CO., J. C. **ARKANSAS**

Address: Shepherd & Wilson, Batesville, Ark.

Property: a zinc mine in Rush district, Marion county and holdings in Searcy county.

SILVER KING LEAD & ZINC CO. **ARKANSAS**

Address: Yellville, Ark.

Property: Sure Pop No. 2 mine, on Water creek, Marion county. Ore is a zinc carbonate. Reopened in 1921.

SILVER KING MINING CO. **ARKANSAS**

Address: J. W. Kelly, Hot Springs, Ark.

Inc. 1921. **Cap.** $50,000.

Property: includes the Waterloo, Elnora, Silver City and Minnesota mines, about 1,300 acres, near the old camp of Silver, Montgomery county, 30 miles W. of Hot Springs. Ore occurs in veins in quartz and calcite as galena, sphalerite and tetrahedrite.

Development: by 185′ shaft that has been unwatered and is to be sunk to 500′ depth. Necessary machinery was reported installed May, 1921, and work under way.

SOUTHERN HILL MANGANESE CO. **ARKANSAS**

Consolidated 1921 with Eureka Manganese & Mng. Co., as United States Manganese Co., which see.

TEMPLE MINING CO. **ARKANSAS**

Address: A. Ludlow, supt., Buffalo, Ark.

A mill was reported producing zinc carbonate concentrate at last account.

UNITED STATES MANGANESE CO. **ARKANSAS**

Address: Cushman Ark.

Officers: Dr. Roe, pres.; Dr. McFatrich, v. p.; W. H. Beatty, sec.-mgr. Walter H. Dennison, sales agent, Cushman Ark.

Inc. 1921. **Cap.** $250,000. Is a consolidation of the Eureka Manganese & Mng. Co. and the Southern Hill Manganese Co.

Property: includes Eureka mine and mill near Cushman, the Southern Hill mine and 543 acres formerly owned by the Gregory estate.

YELLOW ROSE MINING CO. **ARKANSAS**

Address: Rush Ark.

Cap. $3,000,000

Property: the Yellow Rose, White Eagle and Big Find zinc mines in the Rush district Marion county; said to be one of the best properties in northern Arkansas, with an output of 1,820,000 lb. of ore in 1917.

Development: by shaft and tunnel. Equipped with 200-ton mill.

CALIFORNIA

As the mining districts of the State are widely scattered along the Sierra Nevada, the mining companies and mines are described alphabetically, instead of by districts or counties.

The gold output of California still constitutes he most important and valuable metallic product of the State The increase shown in the production was entirely due to better results in gold and silver mining operations, the

baser metals all showing big declines. Gold production for 1921 was $15,744,910, compared with $14,311,043 in 1920.

Year	Copper	Lead	Quicksilver, Flasks	Silver,	Zinc, lb.
1921	11,681,705	770,298	2,400	3,514,276	842,000
1920	12,020,272	4,813,510	10,278	1,706,327	1,165,509
1919	23,584,698	4,139,562	15,200	1,349,508	1,384,192
1918	47,793,046	13,464,869	22,621	1,427,861	5,565,561
1917	48,534,611	21,651,352	24,382	1,462,955	11,854,804

ABBOTT QUICKSILVER CO. **CALIFORNIA**

It had a lease on property of Alpha Quicksilver Co., which see.

AETNA QUICKSILVER MINE **CALIFORNIA**

Address: Lawley Bros., owners, Calistoga, Calif; E. de Golia mgr., and E. L. Frost, supt., Aetna Springs, Lake Co., Calif.

Property: 9 miles N. E. of Calistoga, and 18 miles from St. Helena, the shipping point. Cinnabar was first found there in 1854, and total production of quicksilver is over 46,000 flasks. Most of the ore is in serpentine, only a little in sandstone.

Development: by 9 tunnels (No. 7 being 7,226′ long and No. 9, 3,557′), attaining a depth of 900′, and the 800′ Star shaft. The last work reported was at a glory-hole on the Phoenix claim.

Equipment: storage bins, grizzly, one 60-ton Scott fine-ore furnace using fuel condensers, oil engines, and suitable buildings. No recent production figures.

AFTERTHOUGHT COPPER CO. **CALIFORNIA**

Office: 1321 Pierce Bldg., St. Louis, Mo. **Mine Office:** Ingot, Shasta county, Calif.

Officers: Geo. L. Porter, pres.; J. Taylor Stratton, v. p.; C. A. Crowl, sec.-treas., with S. F. Lumm, C. Cambern, C. P. Keller, F. P. Maid and John T. Milliken, directors. A. H. Heller, gen. supt.; Robt. Milliken, mine supt.

Inc. Jan. 1909, in Arizona. **Cap.** $16,000,000, $10 par; 1,544,898 shares issued. Is successor of Great Western Gold Co. A 20-year 1st. mtge. 6% gold coupon bond issue of $800,000 authorized; $350,000 issued, Sept., 1917.

Property: 19 patented claims, 380 acres, with mill and smelter sites and timber lands giving total holdings of 1,760 acres. Lands include the Afterthought, Liberty, Last Chance, Section 15 and Bull groups, mines more or less developed being Afterthought, Copper Hill and Copper Grand. Lands are on the east side belt, which extends from Ingot DeLamar, and is entirely distinct from the copper belt on the west side of the Sacramento river. Lands show porphyry, slates and shales, carrying contact deposits containing sulphide ores, there being 5 known ore-bodies, of which 2 are under development, one being reported by company to be 160′x500′x35′ in size.

Company also has 160 acres located 12 miles N. of Redding, in the Flat Creek district, adjoining Mountain Copper Co. property.

Development: The Afterthought mine in the Furnaceville district, 20 miles E. of Redding, has a main shaft 900′ deep, with 7 tunnels, main tunnel being about 2,500′ long, with a total of 10,000′ of workings. The 700′ level shows an entirely new ore-body, averaging 4½% copper, 3% zinc, 6 oz. silver, and 60¢ gold per ton. This was also cut on 9th level. Sampling of the mine and assays of 12,000 tons of ore milled during one year, show the ore to average 3.6% copper, 18% zinc, 6 oz. silver and 60c gold per ton. Ore of mine characterized by extremely fine sulphides, chalcopyrite and sphalerite with barite and pyrite.

Equipment: includes blast-furnaces, electric power, a 115 h. p. steam plant at the mine, with 20 h. p. and 30 h. p. hoists and a 5-drill air-compressor, also a flotation plant that is treating 300 tons daily. To separate the zinc from copper, the flotation product is put in a Wedge type furnace, lightly roasted at 400 to 500° heat, and retreated in flotation cells.

A 14-mile standard-gauge railway, known as the California, Shasta & Eastern Railway, connects Anderson, on the Southern Pacific Railway with Bella Vista. The ore is hauled 12 miles by truck from the mine to Bella Vista.

The smelter: 1 mile north of Cow creek and 1½ miles north of the mine, is connected therewith by a 30″ tramline. The smelter, blown in March 24, 1905 has water-jacket blast furnaces of 42″-96″, rated at 75 tons, and 42″x 150″, rated at 250 tons daily capacity. A new 300-ton reverberatory furnace, 19′ x 60′ went into operation in July, 1919. Employs 100 men when running full time.

The reverberatory furnace smelted 15,000 to 20,000 tons, up to Aug. 1921 when suit was brought against the company for infringement of patent, in using side feeding, but the verdict was for only $1.

The company has done considerable experimenting with its complex ore, which has been very difficult to treat satisfactorily. The Horwood process will apparently solve the difficulty. This is described on page 151, Min. & Sci. Press of August 2, 1919. See also same journal April 24, 1920, and May 29, 1920.

A 300-ton differential oil flotation plant was erected 1919. Ore is crushed to 2″ diameter, ground to 48-mesh, then subjected to flotation, which produces a collective concentrate and a final tailing. The concentrate is thickened, filtered, dried and roasted lightly. After cooling, it is again subjected to flotation producing a froth called zinc concentrate, and a tailing, that is copper-iron concentrate. Ratio of concentration is about 2 to 1, giving 150 tons of collective concentrate daily; this concentrat when treated gives 60 tons copper concentrate to 90 tons zinc concentrate. Janney flotation machines are used.

Operations were indefinitly suspended, February, 1920.

ALCADE GOLD MINES CO. **CALIFORNIA**

Address: 57 Post St., San Francisco, Calif. Lloyd Root, supt., Grass Valley, Calif.

Officers: E. E. Drake, pres.; L. A. Bailey, sec., 149 New Montgomery St., San Francisco. W. S. Tevis of San Francisco, acquired a large interest, June, 1921.

Inc. 1918, in Calif. **Cap.** $500,000.

Property: the Alcade gold mine, formerly the Kenosha, with 12 claims, 200 acres, 4 miles S. W. of Grass Valley, Nevada county, located in 1867.

Geology: the main vein, in amphibolite, is 18 to 24″ wide, the quartz averaging 6″. Ore is free milling, carrying coarse gold and up to 3% sulphides.

Development: by shallow shafts up to the year 1875; to depth of 180′ in 1900; and below 450′ late in 1919. Extensions in 1920 included shaft sinking and 1,400′ of drifts. The rich orebody uncovered on the 400′ level was opened by winzes.

The old Taylor or Kenosha shaft is to be sunk to 1,000′.

Equipment: steam boilers, pump, hoist, 6-drill compressor machine-drills, 20-stamp mill, purchased from Golden Gate Explor. Co., electric power, and suitable buildings.

Production: estimated to be $500,000. The mill was treating ore late in 1920.

ALLEGHANY MINING CO. **CALIFORNIA**

Address: R. M. Searls, 375 City Hall, San Francisco.

Inc. 1919. **Cap.** $500,000.

Has an option on and is working the Tightner mine at Alleghany, Sierra county; see **Tightner Mines Co.** in this volume. Company also holds bond on the Gold Canyon Group, below Moores Flat, in Nevada county, which it unwatered and worked in 1920.

ALLISON MINING CO. **CALIFORNIA**

Address: Melones, Calaveras county, Cal.

Inc. 1917, by A. W. Copps and John T. Murphy, at San Francisco, and Frank B. Pattee of Oakdale.

Property: quartz claims on Carson creek, adjoins the Jones, on both sides and ends and is W. of the Melones mines. Vein shows orebodies of $5 quartz and some high grade ore.

Two 5′ Huntington mills were to be installed at last account.

ALLISON RANCH MINE **CALIFORNIA**

Owned by **Grass Valley Cons. G. M. Co.**, which see.

ALPHA QUICKSILVER COMPANY **CALIFORNIA**

Mail returned from former address: Wilbur Springs, Colusa county, Cal.

Officers: R. A. Bogges, pres.; E. R. Dodge, sec.; W. H. Rablin, treas. Directors: R. A. Bogges, E. R. Dodge, T. K. Stewart, W. E. Pruett.

Inc. March 21, 1917, in Nevada. **Cap.** $250,000—7% pfd. and $500,000 common; $5 par; all issued.

Property: 555 acres, near Wilbur Springs, Colusa county. Leased to Abbott Quicksilver Co.

Development: 250′ shaft and 4,000′ workings. Ore is said to contain 15 lbs. mercury per ton and to occur in a 15′ serpentine vein in shale; course N. W.-S. E., dip 22° from perpendicular. Ore at bottom of mine said to be good. New shaft is 115′ deep.

Equipment: 50 h. p. steam hoist, compressor, 2,000′ tramway, concentrator and a 50-ton furnace.

Production: total to date said to be 30,000 flasks. From 1900 to 1904 reported to have netted $7,000 per month. Closed by litigation from 1904 to 1916.

ALTA COMBINATION CO. **CALIFORNIA**

Address: H. L. Ostrander, mgr., 1200 Main St., Grass Valley, Calif.

Inc. 1920, in Calif. **Cap.** $500,000.

Property: Alta-Combination placer, at Grass Valley, Nevada county, developed by 1,000′ adit.

Equipment: includes compressor, power plant, saw-mill and shops.

ALTOONA QUICKSILVER MNG. CO. **CALIFORNIA**

Address: Chas. Allenberg, sec., 333 Kearney St., San Francisco. J. Frowenfeld, pres.

Inc. 1875, in Calif. **Cap.** $10,000; 10c. par.

Property: 3 claims in Trinity county, 15 miles N. E. of Carrville and 16 miles N. W. of Castella. Four veins, of which 3 unite on 600′ level, occur in a serpentine-porphyry contact, forming a mineralized zone 4 to 50′ wide and 400′ long.

Development: by 450′ shaft with a 150′ winze reaching the 600′ level.

Equipment: includes a reduction plant.

First acquired by company in 1875, property has produced about 29,000 flasks of quicksilver. Is operated by lessees, a small production being reported for 1919.

AMADOR MINES CO. **CALIFORNIA**

Owners: J. W. Bullock, Seattle Wash., and W. B. Hubbard, Amador City, Amador county, Calif.

Property: formerly operated under name of Original Amador Cons. Mines Co., 6 claims, covering 4,400′ on the lode at Amador City, is said to show a system of parallel veins, from 12′ to 50′ wide, with diabase hanging and Mariposa slate foot-wall.

Development: by 1,238′ incline shaft, 16,742′ of crosscuts and drifts, and 27,465′ of raises.

Equipment: includes compressor driven by 100 h. p. motor, hoist, and 250-ton amalgamation-concentration mill, with cyanide plant of 250-ton monthly capacity.

Was operating in 1919, but pumping only in 1920.

AMERICAN EAGLE CONSOLIDATED MINES CO. **CALIFORNIA**

Address: c/o Pierce, Critchlow & Barrette, Hibernian Bldg., Los Angeles, California.

Inc. 1919, in Del. **Cap.** $2,500,000.

AMERICAN GOLD DREDGING CO. **CALIFORNIA**

Was, or is, in some way connected with the **Oro Water, Light & Power Co.**

Address: 418 Sharon Bldg., San Francisco. R. K. Estep, supt., Redding, Calif.; C. G. Leeson, mgr., Oroville, Calif.

Officers: Luther J. Holton, pres.; R. L. Van der Naillen, v. p.-gen. mgr.; R. C. Maclachlan, sec.

Inc. March 13, 1916, in Calif. **Cap.** $900,000; par $25; 36,000 issued. Dividends to date, 30c. per share each on Feb. 1, and May 1, 1920. Annual meeting 3rd Monday in January.

Property: Reid Ferry farm of 800 acres on Sacramento river, across the river from Redding, Shasta county, and placer holdings in Calaveras, Amador, Butte, and San Joaquin counties. On the Mokelumne river between Amador and Calaveras counties, the gravel carries about 10c. gold per yard, and annual production for 2 boats has been $200,000. Considerable platinum and iridium are recovered.

The dredges have buckets from 5 to 9 cu. ft., and some handle 225,000 yd. per month.

In 1920, 5 dredges were at work on 4 different areas, for part or all of year.

In 1921, company secured a 19-year exploitation concession from the Mexican government to extensive placer fields near Sinaloa, Mexico, on the Yaqui, Fuerte, Mayo and Sinaloa rivers.

AMERICAN MINING CO. **CALIFORNIA**

Idle **Address:** Redding, Shasta county, Cal.

Inc. and was controlled by Jas. Sallee.

In 1914 the company started to work the old American mine in the French Gulch district, consisting of 11 claims. Development work of the old mine includes 4 tunnels from 50′ to 1,400′ in length, and one stope 125′ long and 240′ in height. When mine shut down under former management ore is said to have assayed $20 in gold per ton. It occurs in a fissure vein, strike N. 70° W., dip S. 75° E., slate walls. Pay-shoot is 2′ wide. A 10-stamp mill is on the property.

ANDY FITZ MINING & MILLING CO **CALIFORNIA**

Address: First Savings Bank Bldg., San Francisco, Calif. H. R. Verrue, pres.; P. J. Walton, sec.

Inc. 1908, in Calif. **Cap.** $500,000; par $1.

Property: the Fruitvale mine in the Forest district, Sierra county, near Downieville.

ANGELS CAMP DEEP MINING CO. **CALIFORNIA**

Address John C. Benson, pres., 744 Call Bldg., San Francisco, or Angels Camp, Calaveras Co., Calif.

Inc. 1916, in Nevada. **Cap.** $1,500,000; $1 par; 1,081,000 shares issued.

Property: the Angels Camp Deep mine. The shaft is 500′ deep with levels at 200 and 500′. A high grade ledge, assaying up to $600 per ton, was reported opened on these two levels, in 1921.

Equipment: includes 20-stamp mill, 100-h. p. hoist, air-compressor and other equipment. During 1920, company was developing only. Crushing of $4.86 ore was started March 31, 1921.

ANITA COPPER CO. CALIFORNIA

Address: 933 Central Ave., Los Angeles, Calif.

Officers: W. T. Bill, pres.; F. E. Sanford, sec.

Inc. 1910. **Cap.** $1,000,000; $1 par.

ANITA GOLD MINING CO. CALIFORNIA

Address: 409 Montgomery St., San Francisco, Calif.

ARBUCKLE MINING CO. CALIFORNIA

See **Pacific Coast Gold Mines Corp.**

ARBUCKLE MINING CO. CALIFORNIA

Address: Frank Green, Ono, Shasta county, Cal.

Property: the Bell Cow gold mine on Arbuckle Mountain, near Redding. Estimated reserves were 50,000 tons in October, 1919, some of which assayed from $10 to $15 per ton.

Equipment: steam power, 10-stamp mill, 4½-mile road, and buildings.

ARCTIC MINING & POWER CO. CALIFORNIA

Address: J. T. Price, pres., 538 Consolidated Realty Bldg., Los Angeles.

Inc. 1910, in Calif. **Cap.** $1,000,000; $1 par.

Property: 228 acres, 7 miles N. E. of Washington, Nevada county, said to contain 8 parallel veins, 5′ wide, in granite. Quartz ore contains free gold and some sulphides.

Development: by 60′ shaft and 3 tunnels, a total of about 1,000′ of work.

Equipment: hydro-electric plant, constructed in 1914, compressor, and buildings.

Idle at last report.

ARGONAUT CONS. MINING CO. CALIFORNIA

Office: 224 West 57th St., New York. Controls Argonaut Mining Co., and is itself controlled by the **White Knob Copper & Development Co.**, owning a majority of its capital stock.

Officers: John T. Smith, pres.; A. H. Carlisle, v. p.; Arthur Kennedy, secretary; with F. A. Gaynor, and W. W. Cohen, directors.

Inc. Jan. 5, 1907, in Maine. **Cap.** $2,000,000; par $5; 371,000 shares issued, of which 240,000 are owned by White Knob Copper & Development Co. Annual meeting, first Tuesday after June 1. Security Transfer & Registrar Co., tran. agt. and registrar, New York.

Dividends: 30c. in 1914; 40c. in 1915; 40c. in 1916; 25c. in 1917; 20c. in 1918; 5c. in 1919; 15c. in 1920.

ARGONAUT MINING CO. CALIFORNIA

Address: 1404 Humboldt Sav. Bank Bldg., San Francisco. **Mine Office:** Jackson, Amador Co., Calif.

Officers: Jos. B. Smith, sec., with John Raggio, John T. Smith, E. A. Stent and Ambrose Gherini, directors. V. S. Garbarini, gen. mgr.; B. Sanguinnetti, mine foreman; H. Leam, mill foreman.

Inc. in 1893. **Cap.** $1,000,000, shares $5 par; all issued. Is the operating company of the Argonaut Cons. Mng. Co., control of which is held by the White Knob Copper & Dev. Co.

Property: one mile north of Jackson, on the Mother Lode, adjoins the Kennedy Extension Mng. Co. on the south.

Geology: ore is a soft shattered white gold quartz in a regular and continuous vein 8′ to 12′ wide, with strike N. 10° W. Vein outcrops in a meta-diabase; above the 290′ level it passes into the Mariposa slates, where, apparently the fissure was originally opened by a thrust fault with a throw of 150′. One wall is a soft black slate, the other is slate or a greenstone schist. Two oreshoots have been developed; the north shoot 325′ long, the south shoot 600′ long, each with average width of 10′. On the 1,240′ level there is a split in the vein, a branch running off into the schist hanging wall. Ore yields in the mill about $5.50 in free gold and $1.50 in concentrates.

Development: by 4,850′ shaft, sunk at an angle of 60°, with levels at 150′ intervals. At 290′ level shaft cuts the vein in diabase, from the 1,460′ level to present depth it is in the slate hanging-wall. Present work is being

done on the four lower levels. Ground is very heavy and the square-set mining method is used. Nearly half the force employed underground are timbermen. Ore is hoisted, in 4-ton skips, by a 500 h. p. double-drum electric hoist, automatically dumped into storage bins, then fed to a 10 by 16" Knight crusher and trammed in 2½-ton cars to the mill. This mine and the Kennedy were flooded in 1920, to extinguish the fire that ravaged both mines. The mine was pumped out and production resumed October, 1920.

Mill: sixty 1,000-lb. stamps, dropping 96 times per minute, with 7" drop, and crushing 5 tons per stamp per day through 20-mesh wire screen. From the amalgamating plates pulp flows to 36 Frue vanners, tailing goes to hydraulic classifiers, overflow being cencentrated on 20' Darrow rotary concentrators. A 90% extraction is made by amalgamation and concentration. Company employs 225 men.

Production: figures are not available, but the mine was the 11th on the list of American gold producers in 1918, and the 4th in California.

This mine has the highest average grade ore and is one of the best gold mines along the Mother Lode of California, and normally pays good dividends.

ARGUS STERLING MINING CO. **CALIFORNIA**

Address: 502 Security Bldg., Los Angeles.

Officers: A. C. Taylor, pres.; J. O. Butler, sec.

Inc. 1916, in Arizona. **Cap.** $100,000; par 10c.; all issued.

Property: 120 acres, at Darwin, Inyo county, Calif. Ore contains silver, lead, gold and copper. **Development:** 1,000' of tunnels, etc.

Shipped lead-silver ore in 1920.

ARPS COPPER COMPANY **CALIFORNIA**

Company out of business. See Volume XIV.

Property: Arps and Reno groups were deeded back to the original owners, and subsequently optioned to D. C. Jackling in connection with the Bully Hill development scheme.

ARROWHEAD RICO MINING CO. **CALIFORNIA**

Address: E. R. White, sec., Tonopah, Nevada.

Directors: E. E. Northup, pres.-mgr.; Sol Kamp, v. p.; E. B. White, Frank Abbott, and S. A. McDonald.

Property: 9 claims acquired from A. Farrington of Big Pine, Calif., in the Ubehebe district, Inyo county, 48 miles from Bonnie Claire on the T. & T. R. R. High grade copper and lead ores, with gold and silver values, occur in veins in limestone. Assay returns from car-load lots have shown 18 to 36% copper from copper ores, and 63% lead, with 25 oz. silver, from lead ores.

Development: by tunnels, one being driven 500' to open ore at a depth of 300'.

Equipment: oil engines, compressor and hoist, etc., erected 1920. Shipments are hauled to Bonnie Claire at a cost of $15 per ton, thence by rail to Utah smelters at $12 per ton. A little silver ore was produced in 1920.

ASSETS REALIZING MINES CORPORATION **CALIFORNIA**

Address: Stock Exchange Bldg., Los Angeles, Cal. (Is a subsidiary of the Dupont Copper Co. of Nevada, which holds a 51% interest.)

Officers: J. V. Priest, pres.-gen. mgr.; J. A. Brown, v. p.; F. W. Andrews, sec.-treas., with M. Brines and R. F. Howard, directors. C. L. Logue, supt.

Inc. 1914, in Calif. **Cap.** $1,000,000; $1 par; 999,883 issued.

Annual meeting, June 23.

General balance sheet, September 16, 1919, covering period since incorporation, shows: Net original purchase values mining properties, $596,252; total expenses applicable to development, $207,087, which includes development and equipment, $164,187; administrative and miscellaneous expenses, $42,900. Current assets and contracts in course of collection, $24,537; treasury stock. $177.

Liabilities: paid in capital, $576,994; notes payable, $3,025, and an item, capital surplus, $269,410.

Property: The Arica group of 28 claims, 560 acres, in the Ironwood district, Riverside county. **Ore:** gold-silver, in six veins between dolomite hanging and chlorite schist foot-walls: ore is found in porphyry intrusions between these walls.

Development: by 2 shafts, one 930′ deep, with 9 levels from the 80′ to 900′. The 138′ level said to be opened for 270′ in ore assaying $10 to $30 per ton in gold. The second shaft, 330′ deep, has levels at 165′, 230′, and 330′ depths, and ore is said to average $20 per ton.

Equipment: 150-ton plant, equipped with crusher and rolls, Hardinge mill, Dorr classifiers, thickeners, and agitators, air-compressor, pumps, assay office, boarding house and 10 buildings.

Ore reserves: reported, 50,000 tons ready for stoping.

Company said to own 51% of the stock of the Rito Seco Gold Mines, Colorado, and 60% of the Mammoth Gold, Silver and Platinum Mines, Colombia, South America.

ATASCADERO COPPER CO. — CALIFORNIA

Address: B. G. Lewis, 1113 Hobart Bldg., San Francisco. Alfred Hanford, supt.

Inc. 1919. **Cap.** $150,000.

Property: 12 claims, 360 acres, 160 acres patented, on Greenhorn Mt., in French Gulch district, Shasta county, includes the Greenhorn mine, 3 miles west of Tower House, acquired from the Greenhorn Mountain Copper Co. Said to show gold-silver-copper sulphide ore, occurring as a fissure in porphyry. Vein strikes N. 61° W., dips 40°, assays said to average 4.5% copper per ton.

Development: by over 3,000′ of tunnels, Greatest depth of workings is 480′. Management claims 250,000 tons of 3% ore blocked out.

Equipment: sufficient for development by tunneling, but is to include a treatment plant which will use a process devised at Oakland, Calif.

Final payment of $50,000 on mine made, 1921.

ATOLIA MINING CO. — CALIFORNIA

Address: 1404 Humbolt Sav. Bank Bldg., San Francisco. **Mine office:** at Atolia San Bernardino county, Cal.

Officers: E. C. Voorheis, pres.; E. A. Stent, sec.; Chas. S. Taylor, supt.; B. C. Clark, cons. engr.

Inc. 1906, in Californa. **Cap.** $100,000; $1 par; all issued.

Dividends: $180,000 in 1915; $2,705,000 in 1916; $1,300,000 in 1917; total $5,264,500 to Sept., 1918.

Property: a number of claims at Atolia on the Randsburg branch of the A. T. & Sante Fe R. R. are being worked for tungsten ores. The ore occurs as scheelite in both placer deposits and fissure veins. The Atolia is the largest tungsten mine in the world. Also owns Saint Anthony Mines Co., Nevada.

Development: by 1,100′ shaft with electric hoist and full equipment.

Equipment: 100-ton concentrator, equipped with Huntingtons, Deister roughers and tables, Dorr classifier and Callow cones.

Production: shipments of concentrate in 1917 were 1,938 tons, returning $2,155,505; the mill treated 21,913 tons of 6.187% ore, recovery 79%. Costs were $12.65 per ton. In 1918 output was 1,200 tons of concentrate.

Mine and mill closed down in April, 1919, until the tungsten market improves or a protective duty is enacted.

AVAWATZ CONSOLIDATED MINES — CALIFORNIA

Address: 510 W. 6th St. Los Angeles, Calif.

Officers: A. B. Carpenter, pres.; S. E. Meserve, sec.

Inc. May, 1919, in Calif. **Cap.** $1,000,000; par $1; 682,000 issued.

Annual meeting May 1st.

Property: the old Crown mine 206 acres, 124 patented, in the Silver Lake district, San Bernardino county, 11 miles from rail.

A brecciated zone carries argentiferous galena. Considerable work has been done and at present there is some rich ore exposed. Development was re-started in July, 1919, and a hoist, air-compressor, and other machinery erected.

Production: 300 tons silver-lead ore.

BAGDAD-CHASE GOLD MINING CO. CALIFORNIA

Address: J. N. Beckley, treas., Rochester, N. Y. Is a holding company owning all the stock of the Soulsby Consolidated Gold Mining Co., at Soulsbyville, and a substantial stock interest in the Pacific Mines Corporation at Camp Rochester.

BALAKLALA CENTRAL MG. & SMELTING CO. CALIFORNIA

Address: S. A. Holman, mgr. Coram, Shasta county, Cal. Inactive. **Inc.** in Wyoming. **Cap.** $5,000,000; shares $5 par; one-third of issue owned by Balaklala Consolidated Copper Co., the remainder by the Mammoth Copper Mining Co.

Owns 3 claims surrounded on all sides by Balaklala Consolidated Copper Co.'s holdings.

BALAKLALA CONSOLIDATED COPPER CO. CALIFORNIA

Office: 111 Broadway, New York. **Works office:** Coram, Shasta county, Calif.

Officers: Thomas W. Lawson, pres.; Wm. A. Kerr, v. p.-treas.-gen. mgr., Mackay, Ida., with H. W. Hoops, J. A. Young, and E. M. Buchanan, directors.

Inc. Feb. 24, 1906, in Nevada. **Cap** $10,000,000; reduced to $1,000,000, in 1917; shares $25 par; all owned by First National Copper Co. Bond issue of $1,500,000 has been retired. Annual meeting last Thursday in October.

Is a reorganization of the Balaklala Mining Co., control of which was sold simultaneously to two parties, making a snarl requiring reconstruction to untangle. Is controlled, through ownership of entire stock issue, by the First National Copper Co. Windsor Trust Co., New York, and Federal Trust Co., Boston, transfer agents; Trust Company of America, New York, and First National Bank, Boston, registrars.

Profit and loss account June 30, 1919 to Dec. 31, 1919., (latest available); Net ore sales $590,707; Cost of operations $412,355; Other income $13,396; Dividends $180,000; Surplus for period $11,748.

Property: 72 claims, patented, 1,149 acres, also 800 acres of miscellaneous lands, including a smelter site, the townsite of Coram and right-of-way for tram line.

The mines are at Kimberly, 3 miles from Coram on the Southern Pacific R. R., covering 3,040′ along the main mineral zone. The Clouds Rest and Gooseberry claims in the Flat Creek district were purchased in Dec., 1920.

Country rock is rhyolite, ore occurring in lenticular masses as replacement of country rock, in flat bodies, with slight dip to north, and greatest extension east and west, with a series of north and south step faults, causing displacement from a few feet to more than 100′. The main ore-bodies are developed for lengths of 900′ and 1,100′. Ore is cupriferous pyrite, copper values being mainly in chalcopyrite, with a little chalcocite and covellite, all carrying gold and silver values, estimated by management to average about 2.65% copper, 0.9 oz. silver and 50 to 60c. gold per ton. The large ore body developing about 1,000,000 tons, gives a typical analysis of 2.7% copper, 0.95 oz. silver, 0.03 oz. gold, 21.4% silica, 31.5% iron, 4.3% lime, 3.4% alumina, 2.2% zinc and 35.2% sulphur.

Developed by a large glory hole, and by tunnels, with upraises, providing for open-cast mining, giving cheap extraction. There are about 20 tunnels, including the Weil tunnel, nearly 6,000′ long.

Ore reserves: said to be about 3,000,000 tons of 2.83% copper ore with 1.32 oz. silver and 60c. gold per ton, a year's supply (100,000 tons) being ready for stoping.

Equipment: includes a steam plant installation of about 1,000 h. p. and electric power. Machinery includes a number of hoists, 5 compound air compressors and about 40 rock drills. Buildings include an office, store, school, hospital, sawmill and about 75 dwellings. The Coram property, townsite, smelter, etc, were sold to the Shasta Zinc & Copper Co., and moved to Winthrop.

See Vol. XIV for description.

Although the smelter is about 14 miles from the nearest cultivated lands, the Shasta County Farmers' Protective Association obtained an injunction shutting down the company smelter, in 1911. This led to the installation of the Cottrell electrolytic flue dust precipitator, which took out the dust, but not the acid fumes, and hence was not successful. The Young process used at Campo Seco (Penn Mining Co.) and the Hall process were also unsuccessful. The Heslewood method in 1915 was the last one to be tried out, but was not satisfactory.

The smelting record is given in Vol. XI. the Copper Handbook.

Production: June 30, 1918 to May 15, 1919; amounted to 82,271 tons of ore, the net recovered values being 2.81% copper and $1.54 gold and silver, or a total of $178,352; copper being sold at 19.59c. per pound. For year 1917-1918, mine produced 82,876 tons ore, assaying 2.29% copper, $1.57 in gold and silver, which compares with the previous years' production of 76,559 tons, netting $174,656. Shipments made to the Mammoth Smelter. All operations suspended in May, 1919.

BALAKLALA COPPER CO. **CALIFORNIA**

Reorganized as **First National Copper Co.** q. v.

BALD MOUNTAIN MINING CO. **CALIFORNIA**

Address: Mark N. Alling, Downieville, Calif.

Property: 441 acres, in the Forest district, 13 miles S. of Downieville, Sierra county. The mine covers two ancient gravel channels, lying on slate and schist and covered by lava. Several quartz veins were found in the mine, one carrying free gold.

Development: by 1,800' bedrock tunnel and raises into the gravel. From 1872 to 1887 the gold output was $3,100,000, and net profit $1,300,000. Shafts have been sunk to open the N. extension of the Bald Mountain channel.

BANK MINING & PROMOTING CO. **CALIFORNIA**

Address: 816 Prudential Bldg., Buffalo, N. Y.

Officers: W. H. Barnhart, pres.; Geo. R. Reed, sec.

Inc. 1900, in Arizona. **Cap.** $300,000; par 20c.

Property: a gold mine near Allegheny, Sierra county, Calif.

BANNER CONSOLIDATED MINES, INC. **CALIFORNIA**

Address: H. B. Walmsley, 200 Fifth Ave., New York City. **Mine address:** John M. Nicol, mgr., Grass Valley, Calif.

Officers: W. J. Webster, pres.; Theo. Roosevelt Pell, v. p.; H. B. Walmsley, v. p.-sec.; John M. Nicol, v. p.; Leland Lyon, treas., with W. H. Finley, Ernest Du Pont, Parmeley W. Herrick, John Errikson and A. De Wint Foote, directors.

Inc. 1921, in Delaware. **Cap.** $2,250,000; par $1. Transfer agent, Empire Trust Co., New York; registrar, New York Trust Co. The company is a consolidation of the Central Cons. Mines, Inc. and the Norambagua Cons. Inc. Shares were exchanged on basis of 2 old for 1 of new company. Controls the Cuje Gold Mines in Nicaragua, C. A.

Property: the Grass Valley tract of 1967 acres, in Nevada county, consists of the Banner, North Banner and Central mines, in the East or Banner belt of the district, and the Norambagua and Perrin and Gluyas mines in the Wolf Creek section, adjacent to the well known Empire mine.

The Banner tract of 1,000 acres, covers 2¼ miles of the vein system, with four developed orebodies and 12 promising, but slightly developed outcrops. The Norambagua-Perrin tract 937 acres is traversed by several known orebodies and includes the junction of two.

Development: by 4 adits and 4 shafts, with 12,000′ of workings, the deepest 800′ on the incline. At the Norambagua the deepest workings are 1,300′ with little ore mined below the 500′ level. Ore said to run $10 to $30 per ton, but company expects to treat 300 tons daily of $8 ore, at cost ot $4.50 per ton for all expenses.

Equipment: 200-ton mill remodelled and 100-ton flotation plant installed late in 1921.

Reserves: company's manager reports 55,000 tons between the 800 and 3,000′ levels, in the Central mine, of a net value of $247,000 with $180,000 more in probable ore. No figures are given for the North Banner reserves, but the 11 veins are estimated to contain 1,000,000 tons above the 3,000′ level. At the Norambagua and Perrin mines, reserves are estimated at $400,000.

Production: of all the mines now owned is $1,605,000.

The Cuje property covers 450 acres, contains 3 large veins, said to average $10-$12 per ton, with total yield to date of $200,000.

Company has good properties, high class directorate and gives promise of becoming a long lived and profitable enterprise.

BANNER MOUNTAIN SILVER MINING CO. **CALIFORNIA**

Address: H. L. Meyer, First Natl. Bank Bldg., Fresno, Calif.

Inc. 1920, in Calif. **Cap.** $100,000.

BARBAROSSA MINING CO. **CALIFORNIA**

Company probably defunct. See Vol. XIV.

BEAR VALLEY MINING CO. **CALIFORNIA**

Address: F. H. Turner, Emigrant Gap, Calif.

Property: the Zebright mine, 27 miles from Nevada City and 5 miles from Emigrant Gap, Nevada county, contains a 20′ vein in slate. The ore assays up to $3 per ton.

Development: by tunnels, the main being 900′ long. The principal ore shoot has been stoped on its dip for 400′.

Equipment: water-power, under 470′ head, hoist from lower tunnel to mill, jaw-crusher, 10 stamps, 4′ ball-mill, 5-drill compressor, etc.

BELGIUM-BOHEMIAN MINING CO. **CALIFORNIA**

A Belgian company, that in 1914, owned the Highland mine, Liberty district, 11 miles S. E. of Etna Mills in the Klamath Reserve.

Property: 100 acres in Siskiyou county.

Ore: carries free-milling gold in shoots 130′ long and 2′ wide; strike N. 40° E., dip 30° S. E. Footwall is a diorite schist and hanging-wall is quartz porphyry.

Development: by tunnels with several thousand feet of workings; main tunnel 600′ long. All work has been done near apex of mountain so that only a shallow depth has been obtained. Supplies are packed in over a 3-mile trail.

Equipment: includes a 10-stamp mill, run by gasoline. Mine is credited with a production of $350,000. No recent returns.

BELLEVUE MINING CO. **CALIFORNIA**

Address: R. H. Kingdon, La Porte, Calif. Sir James and Sir Henry Bell, London, England, in control.

Property: 2,000 acres, 4½ miles from La Porte, and 54 miles from Oroville, in Plumas county, at 4,784′ elevation, covers 3 miles of gravel channel, on slate bedrock overlain by andesite. The gravel is 150′ deep, with pay gravel 120′ wide and 4′ deep, including 6″ of bedrock. Faulting is common.

Development: by 5,400′ bedrock tunnel, 8 by 8′ in clear. About 4,000′ of exploration was done in gravel, including 1,900′ of breasting. Costs were

$4 to $10 per cu. yd.

BELMONT SHAWMUT MINING CO. **CALIFORNIA**

Subsidiary of **Tonopah Belmont Development Co.** of Nevada, which owns 750,000 of the 1,000,000 shares, and spent $743,850 on property up to the end of 1920. Property was acquired in February, 1917.

Offices: 500 Bullitt Bldg., Philadelphia; Hobart Bldg., San Francisco, and Shawmut, Cal.

Officers: C. A. Heller, pres.; W. M. Potts, v. p.; S. D. Sinkler, v. p.; C. B. Taylor, general counsel; with H. C. Brougher, M. B. Cutter, J. C. Fraley, R. G. Park and T. W. Synnott, directors. R. G. Wilson, sec.-treas. G. H. Garrey, cons. geologist.

Operating Staff: Frederick Bradshaw, gen. mgr.; O. McCraney, supt.; B. E. Rowe, mine supt.; Carl Wark, mill supt.

Inc. in Delaware. **Cap.** $1,000,000; $1 par.

In 1918, the revenue from gold was $128,500; new construction, development, etc., cost $161,042. During 1919 there was an operating loss of $111,904, plus $27,276 for improvements, etc. Operations were suspended, August, 1920, owing to high cost and scarcity of labor, but resumed in September, 1921.

Property: the Eagle Shawmut mine in Tuolumne county; it is the southernmost property of any of present importance on the Mother Lode.

Geology: an 18′ fissure vein between amphibolite schist and slate carries quartz with free gold and 7% of sulphides.

Development: during 15 years' operation a depth of 2,300′ was attained. The main entrance is now through a long crosscut adit, which meets the shaft at 1,800′ from the portal. The main ore-shoot is continuous from surface to lowest level. On No. 16 level this shoot consists of a series of closely-joined or overlapping lenses of sulphide ore, 490′ long, 10′ wide, worth $7.50 gold per ton. In 1917-1918, the main shaft was sunk from 1,834 to 2,243′, measured from the adit, which is 2,800′ long. In 1918, new openings totaled 2,133′, 85% being below level No. 16. In 1919, the footage was 2,425; and 1,000′ in 1920. Total workings are over 9 miles. On No. 18, the deepest level, the sulphide shoot is 400′ long, and is of better grade than above. **Ore reserves:** are estimated at 429,098 tons. The cost of mining in 1919 was $1.97 per ton.

Equipment: water and electric power, 400-h. p. hoist on the adit level, pumps, underground crushing station just above adit level, Sirocco fan of 30,000 cu. ft. capacity, 2,800-ton storage-bin, 70 stamps averaging 1,100 lb. each, Butchart tables, Dorr classifier, tube-mill, Jones-Belmont flotation cells, and 25-ton cyanide plant, capable of treating 400 tons daily.

Production: up to 1917 the total was $4,500,000. During the broken period of 1918, there was treated 29,336 tons of ore, averaging 0.237 oz. gold per ton. The 3,229 tons of concentrate assayed 1.987 oz., a total of 6,418 oz. The recovery was 92.18%.

This mine, operated under the present efficient management and with normal conditions, should add materially to the gold output of California, and prove profitable to the stockholders.

BENDIGO MINES CO. **CALIFORNIA**

Address: Vidal, Riverside county, Cal. Lester Scott, supt., at last accounts.

Property: company purchased in Jan., 1915, the Morgan and Bradley group of claims, 7 miles from Vidal. The ore is copper-gold and returns from shipment of several cars are said to be $50 per ton.

Development: by a 150 incline shaft, with a 60′ vertical winze from lower level which is claimed to have opened up a 3′ vein of ore. $75,000 said to have been taken from the small block of ground opened by the shaft. There is also a large deposit of gypsum on the property. No recent information.

BEN FRANKLIN CONSOLIDATED GOLD MNG. CO. **CALIFORNIA**

Idle. M. S. White, mgr., Grass Valley, Calif.

BEVERIDGE CONSOLIDATED MINES CO. **CALIFORNIA**

Officers: Albert J. Padian, pres.; Sydney R. Brough, sec., 518 S. Van Ness Ave., Los Angeles, Calif. **Inc.** in Arizona.

Property: 5 claims in Beveridge canyon, Inyo county, adjoins the old Keynote mine on the S.

Development: by 180′ tunnel at an elevation of 7,500′ on the War Eagle vein claimed to be 3′ wide and to give assays of $45 per ton. The orebody has a N. 70° E. course and dips slightly S.

No recent returns.

BIG BURSAR MINING CO. **CALIFORNIA**

Address: 58 Sutter St., San Francisco.

Officers: H. H. Young, v. p.; G. Gunzendorfer, sec.

Inc. 1918, in Calif. **Cap.** $1,000,000; par $1; issued 250,000 shares.

Property: 60 patented acres, in Ophir district, Placer county.

BIG CLIFF MINING CO. **CALIFORNIA**

Idle. Does not reply to letters. See Vol. XII. Mine in Salmon River district, 18 miles from Etna Mills, Siskiyou county.

BIG FIFTY MINE **CALIFORNIA**

Probably out of business, as it does not pay to mine antimony in America. Letters returned unclaimed in April, 1920. See Vol. XIV.

BIRCHVILLE MINING CO. **CALIFORNIA**

Idle. **Address:** 607 First National Bank Bldg., San Francisco.

Property: a group of patented claims, covering 320 acres, 1 mile S. E. of Graniteville, Nevada county.

BISHOP CREEK GOLD MINE **CALIFORNIA**

Now owned by the **Wilshire Cons. Mining Co.**, which see.

BLACK BEAR MINING CO. **CALIFORNIA**

Address: F. A. Gowing, Piedmont, Calf.

Property: the Black Bear mine, at Black Bear, Siskiyou county, and near Yreka, is being rehabilitated and the old tunnels retimbered, etc. A little ore was extracted in 1920.

BLACK CANYON QUARTZ MINING CO. OF CAL. **CALIFORNIA**

Address: 481 Mills Bldg., San Francisco, Calif.

Officers: E. C. Kavanaugh, pres.; S. M. Aitken, sec.

Inc. 1907, in Calif. **Cap.** $10,000; par $100.

Property: 4 claims, containing gold ore, in Canada Hill district, Placer county, 40 miles E. of Colfax on the S. P. R. R. Developed by tunnels, shafts, etc.

BLACK HAWK MINE **CALIFORNIA**

Owned by D. A. Blue, Randsburg, Calif.

Property: 7 claims, in the Stringer district, near Randsburg, Kern county. **Ore:** quartz in 6″ vein, assaying $20 per ton. Mill test of 50 tons of gravel from placer claims said to have assayed $6 gold and 3 oz. of 60% tungsten per yd. **Developed** by 125′ shaft. **Equipped** with 5-stamp mill and water power.

BLACK HAWK TUNGSTEN MINING CORP. **CALIFORNIA**

Office: Atolia, California.

Officers: J. F. Dodson, pres., 107½ Sixth St., Box 982, San Pedro, Calif., P. M. Gaffey, v. p.; A. G. Sepulveda, treas.; R. H. Beaton, sec., with C. E. Fulton, J. P. Treft, W. M. Phelps, F. D. Foote and Peter Lux, directors.

Inc. 1917, in California. **Cap.** $200,000; $1 par; issued 176,209. Claimed in November, 1918, to have $10,000 in cash and no debts. Stock is listed on Los Angeles Stock Exchange.

Property: 16 claims, 200 acres, 2 claims patented, adjoins property of Atolia Mining Co., San Bernardino county. $200,000 is said to have been spent in exploration, development and equipment.

Development: by 500′ shaft with 2,000′ of workings. Equipped with electric hoist and compressor. **Production:** 50 tons.

BLACK OAK MINES & MILL CO. **CALIFORNIA**

Office: First National Bank Bldg., San Francisco **Mine office:** Soulsbyville, Tuolumne county, Calif. **Officers:** Chas. E. Knox, pres.-gen. mgr., Tonopah, Nev.; C. W. Hopkins, sec.; R. C. Knox, supt.; F. N. Watts, mill supt.

Inc. 1913, in South Dakota. **Cap.** $1,000,000; $1 par; 823,009 issued. Annual meeting in April.

Property: several claims 1 mile west of Soulsbyville, Tuolumne county.

Geology: ore is quartz, containing pyrrhotite, sphalerite, marcasite, and galena, in a vein in granodiorite. Vein has strike of N. 15° E., with dip 60° to 70° W., varying in width from 1′ to 25′, and has several branches coming in from the hanging-wall side. The ore occurs in lenses at the intersections of diorite dike crossings and also near faults. Diorite dikes have a strike of N. 55° E., vertical dip, and 1 to 2′ in width.

Development: by a 70° incline shaft sunk in the foot-wall and levels at intervals of 100′. Lowest workings are on the 1,800′ level. Two ore-shoots have been developed, one north of the shaft, 500′ long, average width 4′, the other south of the shaft, 300′ long and average width of 20′. Ore milled averages $20 per ton. Diamond-drilling disclosed some ore on 700′ level, and new work in 1916 showed 4′ of high grade ore on 1,800′ level.

Equipment: 100 h. p. single-drum electric hoist, air-compressor, and pumps .also a mill consisting of 20-1,250lb stamps crushing 3.5 tons per stamp per day through 10-mesh screens. Ore is crushed in 1.85% cyanide solution. Remainder of equipment includes a Dorr classifier, a 5x18′ tube mill, treatment tanks, and filter. Lime is added to batteries and agitators, and 24 lb. lead oxide to the tube mill and agitators. Mill makes an extraction of 96%, consuming 1.5lb cyanide, and 3lb lime per ton of ore. Costs per ton are: Development, $1.63; mining, $2.22; treatment, $1.59; general and misc., $0.56; material in mill, $0.96; labor in mill, $0.62; total, $7.59. Employs 85 men. See Mineralogist's Report, Mines & Min. Res. of Tuolumne county, p. 138.

Production: to 1921, $1,564,000. Company, like several others, operating along the Mother Lode, is very secretive about operations, but in January, 1920, the 18th level had opened 30″ of rich ore on which mill tests were to be made; and at the end of 1920, 42″ of rich ore had been opened for 40′ on the 19th level.

BLUE LEDGE MINE **CALIFORNIA**

Office: 82 Beaver St., New York City. Mine near Hutton, Siskiyou county, Calif. Property is held by the Mexican S. & R. Company, a subsidiary of the Compania Metalurgica Mexicana. J. A. Hilbert, mgr.

Property: 27 claims, patented, about 440 acres, in the Elliott district on Upper Appelgate river, 4 miles south of the Oregon line, also a large smelter site at Seattle Bar. Property located 1889, but only slightly developed until 1909. Company has spent over $700,000 in work since that time.

Geology: the vein, with strike of N. 10° S., and almost vertical dip, slightly inclined west, traceable some 3,000′ by prominent outcrops of 50 to 250′ width, lies between a footwall of gray to black, slightly micaceous schist, and a hanging wall of soft white mica-schist, the wall not always being clearly defined, and with mineralization extending into the hanging-wall. Orebodies are lenticular deposits, with clay gouge, said, by several authorities, to be in huge laminations in the schist formation, but ore apparently is persistent to depth. Ore is mainly chalcopyrite, associated with a little sphalerite and occasional native copper, average value being 6% copper and $5 gold per ton.

Development: 9 tunnels, with upwards of 2 miles of workings and nearly 7,000′ of diamond-drilling

Vein averages 5′ in width and the mine workings block out 110,000 tons of 6% ore with 70,000 tons more probable. Main working tunnel is connected with others, by raises to surface 500′ above. A winze opens a 600′ drift on ore 300′ below the main tunnel. The mineralized wall-rock carries commercial value and contains lenses of high-grade ore, but above estimate refers to the quartz vein only.

Equipment: includes a hydro-electric power plant, taking water from Elliott creek under a head of about 150′ at pressure of 85 lb. Buildings include an office, assay office, boarding house, dwelling and sawmill. The company has improved the townsite with waterworks, sewers and a school house, and has built a good road between Hutton and Yreka. A 40-mile railway to connect with the Southern Pacific at Medford, Ore., has been projected.

Regular shipments to the Tacoma smelter were made in 1919 and in 1920, until October when it was closed down. Construction of a new $50,000 electric power plant postponed.

BLUE LIGHT SILVER MINES CO. **CALIFORNIA**

Address: W. W. Harritt, supt., Silverado Mines, Santiago Canyon, Orange Co., Calif.

Agents: Carnahan & Clark, 501 Inv. Bldg., Los Angeles. Calif.

Inc. 1920. **Cap.** $1,000,000.

Property: the Silverado mine, Santa Rosa district, known for 150 years. Base silver ore occurs in vein, 3′ to 8′ wide, between andesite and porphyry.

Development: 2,500′ of crosscuts and 1,000′ tunnel, with 1,500′ back, blocking out several thousand tons of $12 ore.

Equipment: 50-ton mill with K. & K. flotation, 300′ Clayton compressor, 100-h. p. engine, 1,300′ gravity tram, etc.

Was producing in 1920.

BLUE MONSTER MINES CO. **CALIFORNIA**

Address: J. E. Nelson, mgr., 828 Story Bldg., Los Angeles, Calif.

Officers: Jas. H. Blagge, pres.; Chas. A. Cole, v. p.; J. E. Nelson, sec.; treas., with M. M. Miles and Wm. E. Whittington, directors.

Inc. in Arizona. **Cap** $150,000; 10c. par; 850,000 shares outstanding .

Property: 14 claims, 280 acres in Big Pine district, Inyo county. **Geology:** contact deposit containing silver-lead values in galena and carbonate ore, occurring in shoots between granite and limestone. On another claim, 18′ ledge of red quartz contains $12 per ton in gold and silver.

Development: by tunnels, 200′ and 400′ long, with a back of 150′. Gold ledge is opened by 100′ tunnel and 20′ winze. Has a 25-ton concentrator.

Production: 750 tons of ore returning about $100,000. Property operated by leasers, 1921.

BLUE MOUNTAIN MINING CO. **CALIFORNIA**

Office: 431 Security Bldg., Los Angeles, Cal.

Officers: Chas. K. Barnes, pres., mgr., White River, Cal.; H. H. Koons, v. p.; R. B. Chapman, sec.; J. F. Kent, treas.; with S. E. Yount, directors.

Inc. 1910, in California. **Cap.** $30,000; $1 par; assessable, 29,038 issued. Annual meeting in July.

Gross earnings, 1916, $37,539; operating expenses, $15,233. Dividends paid to date, $14,519.

Property: 9 claims, 170 acres, 5 miles N. of Woody, in the White River district, Kern county, Calif. **Ore:** is quartz, carrying gold and silver, occurring in shoots in a fissure vein in granite. Ore shoot said to be 2′ wide and over 800′ long, carries 2% iron and some lead and zinc. Average assay $13.60.

Development: by 450′ incline shaft with 4,000′ of workings. Company claims ore reserves of 20,000 tons with 5,000 blocked out.

Equipment: includes gas hoist, compressor, pump, etc., and a 5-stamp mill to be enlarged to 20-stamps.

Was operated under bond and lease in 1919, but apparently idle during 1920.

BOBS FARM MINING CO. **CALIFORNIA**

No data for several years. Mail returned undelivered. See Vol. XIV.

BOREALIS CONSOLIDATED MINES CO. **CALIFORNIA**

Address: E. P. Stephenson, Freeman Hotel, Auburn, Calif. Controlled by J. C. Winters of New York.

Property: 69 acres, including the Eureka and Hathaway mines, in Ophir district, 4 miles W. of Auburn, Placer county, Calif. Two gold veins, 2' and 3' wide, occur in granodiorite. The Eureka ore is said to average $10 per ton.

Development: by 280' shaft, 837' tunnel and 4,500' of drifts. Company estimated reserves of the Eureka mine to be 17,000 tons of $12 ore in 1915.

Equipment: hoist, compressor, 2 roller quartz mills, tables, etc.

Concentrates were being sent to smelter in 1915. The Hathaway was unwatered early in 1917. No later information.

BRANDY CITY MINES CO. **CALIFORNIA**

Address: Chas. Allenberg, c/o E. L. Goldstein Co., owners, 333 Kearney St., San Francisco.

Property: 1,000 acres of placer locations, covering 2½ miles of gravel deposits, at Brandy City, 30 miles N. of Nevada City, Sierra county. From 1883 to 1890, mine was worked on a large scale; it was then idle for 17 years until reopened in 1907. The gravel is 200' deep and up to 800' wide, with 40' of lava capping.

Equipment: consists of a hydraulic plant capable of handling 2,000 cu. yd. daily.

BROOKLYN MINING CO. **CALIFORNIA**

Address: Box 2, Highland, Calif. Listed in Vol. XIII.

BROWN BEAR MINING CO. **CALIFORNIA**

Address: Redding, Shasta Co., or Deadwood, Trinity Co., Cal. Thos. McDonald, pres.; B. McDonald, supt.

Property: 586 acres of mineral land, 200 patented, and 671 acres of timber land, includes the Brown Bear mine, on north side of Deadwood Gulch at Deadwood, discovered in 1875, and worked ever since. The property is a consolidation of several mines and as a whole has been the largest producer in the Weaverville Quadrangle and most famous mine in Trinity county. It is credited with a production of $7,000,000 to $10,000,000.

Geology: 2 main veins, the Monte Cristo and the Last Chance 200' apart, lie in slate, but cut soda granite porphyry. Veins are parallel, and strike N. 80° E. The Monte Cristo dips steeply to the north; the Last Chance dips south 60° to 80°. Width is not over 2', more commonly about 6", but stopes have been mined to a width of 22'. Ore-shoots are several hundred feet in length; those of the Last Chance vein pitch at a flat angle to the East. Quartz contains pyrite, galena, sphalerite and arsenopyrite. Pyrite being the most common, rich ore is usually found, where galena and sphalerite are present. The ore runs between $20 and $50.

Development: 7 crosscut tunnels ranging in length from 100 to 2,400', the lowest being 1,080' below the outcrop. Workings total several miles.

Equipment: includes a 10-stamp mill, 2 Wilfley tables and water power obtained from Deadwood Creek through a 3-mile ditch.

Lessees have been working the mine.

BRUNSWICK CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Offices: 519 California St., San Francisco; Grass Valley, Nevada Co., Cal.; 74 Cortland St., New York.

Officers: P. C. Oscanyan, pres.; R. Chester Turner, v. p.-gen., mgr; I. C. Nilon, sec.-treas., with J. A. Beckwith, and C. H. Mallen, supt., directors. P. J. Burke, asst. sec.-asst. treas.

Inc: Jan. 11, 1890. **Cap.** $500,000; $1 par; 395,287 shares issued. P. J. Burke, 74 Cortland St., New York, transfer agent; Metropolitan Trust Co., New York, registrar. Listed on San Francisco Exchange.

Dividends: in 1906, 3c.; in 1913, 6c.; in 1914, 24c.; in 1915, 18c. per share; none since. Total dividends to date, 51c. or $203,314, total assessments, $1.22 per share.

Property: 27 acres, 2 miles E. of Grass Valley, has gold quartz veins in schist. Also, 320 acres of ranch land.

Development: by incline shaft to 1,100′ level, and by 1,347′ vertical shaft. Underground work in 1917 totaled 1,896′ against 2,185′ in 1916. **Ore reserves:** were estimated at 10,000 tons Jan. 24, 1918.

Equipment: includes electric power, hoist, compressor, crusher, 20 stamps, tables, and suitable buildings.

Production:

		Costs Per Ton			Value	Ore %	Bullion Prod.	
	Tons	Mng.	Mlg.	Total	p. t.	Ext.	Oz.Au.	Oz.Ag.
1917.....	30,805	$4.32	$0.91	$6.26	$6.55	90.5		
1916.....	34,091	3.87	0.83	5.90	6.44	89.5	7,998	1,856
1915.....	22,004	4.97	0.84	8.59	11.11	90.8	9,486	2,069
1914.....	16,237	6.05	.93	10.22	....	93.9	12,992	2,622

Mine was closed in June, 1918, on account of abnormal conditions.

BUCHINO MINING CO. CALIFORNIA

Address: 709 Balboa Bldg., San Francisco, Calif.

Officers: J. H. Dockweiler, pres.; C. A. Clinton, v. p.; Harold E. Haven, sec.; Val Franz, treas.

Inc. 1908, in Calif. **Cap.** $250,000; $1 par.

Property: a gold mine in Monterey county, Calif. Idle, 1919.

BUCKEYE MINING CO. OF CALIFORNIA CALIFORNIA

Office: E. S. Suffern, pres., 135 Broadway, New York.

Mine closed on account of market conditions. See Volume XIV. Negotiating for new properties, 1921.

BULLION HILL MINING CO. CALIFORNIA

Address: W. O. Crosby, or W. J. England, Washington mine, near Angels Camp, Calif.

Property: the Washington mine, near French Gulch, Shasta county. New owners remodelled 5-stamp mill in 1921, and planned deepening work-tion of $400,000.

Mine, operated 1920-21 by G. E. C. Rousseau, has a reported produc-ings below the 180′, or bottom level.

BULLY CAVE CO. CALIFORNIA

Address: c/o Hatch & Clute, 524 Fifth Ave., New York. Mine at Win-throp, Shasta Co., Cal.

Officers: E. S. Hatch, pres.; Vincent P. Donihee, v. p.; Frank M. Clute, treas. also, directors; Frank F. Gearn, sec.; E. J. McLaggan, supt. **Cap.** $5,000.

Property: the Phoenix group, a large low-grade mine. Claims show two mineralized shear zones 40 to 300′ wide, with clay gouge walls and "ore channels" of high-grade, 1½′ to 6′ wide. The ore carries iron pyrite with chalcopyrite and zinc sulphide.

Development: by Hawkeye tunnel, 1,050′ with 74 and 150′ drifts; Ydalpom II tunnel, 1,115′ and 3 drifts; North Star tunnel, 1,050′ and 2 drifts; Recorder 1,600′ drift and winze; Recorder II, 400′ tunnel; Ydalpom I, 150′ tunnel.

Equipment: includes all necessary machinery, houses, etc. Company also owns a gold mine at Cave Creek, Maricopa county, Ariz.

Nothing new is known of either property.

BULLY HILL COPPER MINING & SMELTING CO. CALIFORNIA

Fully described in Volume XIV. Property acquired by Bully Hill Mines, Inc., and transfered in 1920 to **Shasta Zinc & Copper Co.**, q. v.

BULLY HILL MINES INC. CALIFORNIA

Succeeded by **Shasta Zinc & Copper Co.**, which see.

BUNKER HILL CONS. MINING CO. **CALIFORNIA**

Office: Humboldt Sav. Bank Bldg., San Francisco. **Mine office:** Amador City, Amador county, Cal.

Directors: N. W. Hyler, O. D. Rohlfs, H. A. McQueen, T. G. Negrich, and John Endey. Robt. Christensen, supt.

Inc. 1907. **Cap.** $200,000; $1 par. The mine has paid dividends for several years; in first half of 1915 six monthly dividends were paid, totaling $30,000. Assessments were levied in 1920. Shares sold up to 78c., with normal of 20c. in stock flurry, April, 1921.

Property: the Bunker Hill mine, 3 claims on the Mother Lode, 1½ miles N. of Amador City.

Geology: gold ore occurs in the Bunker Hill vein, which strikes N. 25° W., dip 58° E., with average width of 6'. From surface to 200' level the vein occurs on the contact between Mariposa slate on the west and metadiabase on the east; from the 200' to the 1,400' level the vein is in slate; from the 1,500' to the 2,400' level the vein has a greenstone footwall and slate hanging-wall. Ore occurs in the form of lenses, the schist being cut by numerous stringers of quartz; the rock is highly impregnated with pyrite, as high as 4 to 5%. The gray orebody has been developed on the 1,400', 1,500', 1,750' and 1,950' levels. Three oreshoots have been developed on the property: the north and south shoots on the Bunker Hill vein have an average length of 500', average width of 6', while the gray orebody is 600' long, average width of 15'.

Development: by double-compartment 2,800' shaft, sunk on an incline of 58°. On the 2,400' level the distance from the shaft to the Bunker Hill vein is 280'. In 1920 a 500' winze was sunk at a point 1,040' N. of the shaft, but the ore developed averaged only $3 per ton. A raise opened ore early in 1920.

Equipment: includes a double-drum hoist, driven by a 300-h. p. motor, compressor, driven by 100-h. p. motor, pumps, a 40-stamp mill and a cyanide plant. Ore is hoisted in 2½-ton skips, and is crushed by a Knight crusher, before being trammed 550' to the mill. Stamps, weighing 1,150 lbs. each, drop 6½", 96 drops per min., crush 5 tons per stamp daily through No. 4 punched screen. Pulp flows over double-compartment amalgamating plates to 24 6' Frue vanners; tailings from the vanners go to the cyanide plant, owned by lessees, where sands are treated in eight 100-ton leaching vats, treatment taking 8 days. Concentrates are first agitated with lime in Pachuca tanks, 50 lbs. lime for 11 tons ore, then agitated 8 hours with strong cyanide solution; treatment lasting 3 to 4 days.

Mill tailing runs 99c. per ton; a 45% extraction is made. Tailing is treated on a royalty basis by W. E. Darrow, V. R. Fitzsimmons and others of Sutter Creek. The Bunker Hill company normally employed 155 men. See U. S. G. S. Folio 63.

In the first six months of 1915, 42,087 tons of ore were mined and milled, producing $151,591, an average value of $3.60 per ton; aggregate total expenses, $109,792. No profit has been made for several years as costs have been over $4 per ton.

On November 5, 1920 dissatisfied shareholders met at the mine to discuss the situation and elected the new board of directors, but the old one refused to relinquish the property. Operations in 1920 were much curtailed.

CACTUS CONSOLIDATED MINING CO. **CALIFORNIA**

Probably dead. No information for years. See Volume XIV.

CALAVADA COPPER CO. **CALIFORNIA**

See Calavada Copper Co., Nevada.

CALAVERAS CONSOLIDATED SYNDICATE **CALIFORNIA**

Absorbed by **Carson Hill Gold Mines, Inc.**, which see.

CALAVERAS COPPER CO. **CALIFORNIA**

Office: 94 Ames Bldg., Boston, Mass. **Mine address:** S. M. Levy, mgr., Box 18, Copperopolis, Calaveras Co., Cal.

Officers: Chas. M. Hayden, pres.; Herbert Goff, sec.-treas.; with Oliver Ames, F. Lothrop Ames, Samuel Carr, Gilmer Clapp, J. E. Manter, John S. Ames, and Ross F. Roberston, directors.

Inc. Aug. 31, 1909, in Del. **Cap.** reduced 1910 from $5,000,000 to $2,500,000 common shares; $5 par; issued $1,868,750; $300,000 preferred shares $5 par, none issued.

Bonds: (first mortgage, 6%) principal amount $450,000; interest accrued to Dec. 31, 1915, $147,510; under refinancing plan adopted January, 1916, this indebtness was extended so as to fall due in nine equal installments, beginning Jan. 1, 1920, viz., $50,000 of principal and $16,390 of said accrued interest each year; each of said payments bearing interest at 6% from Jan. 1, 1916. Under the same plan $99,000 face value of debenture notes were issued, payable at the rate of $5,000 per month, beginning March 1, 1918. Of these notes $55,000 have already been paid. All the bonds are held by the Ames Estate of Boston, which formerly owned the property. State Street Trust Co., of Boston, registrar; Federal Trust Co., Boston, transfer agent. Stock is listed on the Boston Curb. Annual meeting, 2nd Monday in February.

Property: 2,833 acres at Campo Seco, including the Union, Keystone and Empire mines, and also including ranch and water power lands, bought Aug. 31, 1909, of Union Copper Mining Co., 16 miles from Milton, the nearest rail point on the Southern Pacific. Mines opened 1861, were worked intermittently until 1907.

Geology: ore consists of fairly massive chalcopyrite in a gangue of dense slate, the ore running 1.6 to 2.5% copper. The rock is a schistose basic igneous rock whose general strike is N. 30° W. The dip is 65° northeasterly. This is traversed by a shear zone about 125′ wide. The claims cover approximately 19,000′ along the strike of this shear zone, in which the ore occurs as lenticular bodies.

Development: the strike of the vein is proven for about 8,000′ The principal development is at the Union and Keystone mines.

Equipment: includes a 400 to 500-ton concentrator, smelter with blast and reverberatory furnaces and electric power; a 1,000-h. p. steam plant at the Union mine, with 3 hoists, 15-drill and 5-drill air compressors The company owns about 60 buildings, including office buildings, boarding houses, bunk houses, 3 ware-houses, machine shop, smithy, 3 barns, and about 40 dwellings.

The 600-ton mill equipped with three ball-mills is operating with oil flotation, and is connected with the mines by a 4,000′ electric tram.

Smelter: fully described by E. H. Robie, E. & M. Journal, June 11, 1920, has 2 McDougall calciners, a 200-ton blast-furnace and a 150-ton reverberatory furnace. The converter has 2 Allis-Chalmers stands. Smelter fuel was petroleum and coke.

In 1920, the blast furnace and concentartor were in commission until Dec. 15,; ore production ceased on Sept, 30, when fire destroyed the mine plant of the Union shaft. Development continues.

CALAVERAS MINING & MILLING CO. CALIFORNIA

Address: Mitchell Mill, Calaveras county, Calif.

Property: Black Wonder mine, at Mitchell Mill, reopened in 1919 and equipped with air compressor, jaw crusher, Gibson mill, small concentrator hoist, boiler and pump.

In 1920, was mainly developing but made a small output.

CALIFORNIA CARIBOO GOLD DREDGING CO. CALIFORNIA

Address: Daly & Daly, 1st. Natl. Bank Bldg., Long Beach, Calif.

Inc. 1920. **Cap.** $1,000,000.

CALIFORNIA CHROME CO. CALIFORNIA

Office address: J. B. Hubbard, v. p.-mgr.; Kohl Bldg., San Francisco.

Officers: E. F. Price, pres. (30 E. 42nd St., New York); Geo. H. Lindsay, asst. sec.

Inc. 1915. **Cap.** $100,000.

Property: 14 claims in Glenn county and the Little Castle Creek (Brown) mine on the Shasta-Siskiyou county line, shows lenses of chromite. The latter is one of the most important chromite deposits discovered in the U. S. In 1918, company also operated in DelNorte county, California, and in Josephine county, Oregon. Not operating 1920-21.

CALIFORNIA EAGLE BIRD MINING CO **CALIFORNIA**

H. S. Mourning, pres.-mgr., at last account.

Property: 3 patented claims and 2 locations, 120 acres, and 160 acres of timber land, 6 miles E. of Washington, Nevada county.

Development: by 850′ incline, 950′ adit, with levels driven up to 800′ S. and 300′ N.

Equipment: water-power, 10 stamp mill, etc. The surface plant was burned in 1914, and new machinery was erected late in 1915. Idle several years.

CALIFORNIA ERIE CO. **CALIFORNIA**

Address: E. L. S. Wrampelmeier, pres.-mgr., 90 Nineteenth St., Wheeling, W. Va.

Property: 13 claims and 6 millsites, 320 acres, in the Gaston district, 3 miles S. of Graniteville, Nevada county, contains 2 parallel veins in slate. The Erie main ore shoot is 400′ long and 12′ wide; the Dublin Bay shoots 70′ and 100′, and 12 to 15′ wide. Ore above 200′ level averages $8 per ton.

Development: by 2,000′ adit, with a total of 14,000′ of workings.

Equipment: water-power, 2 compressors of 650 cu. ft. total capacity, shops, twenty 1,300-lb. stamps, tables, buildings, etc.

Production: $500,000 to 1915. Costs in that year were $5 per ton. Presumably idle.

CALIFORNIA EXPLORATION CO., LTD. **CALIFORNIA**

Address: F. A. Crew, sec., 20 Copthall Ave., London, E. C., England, or 1022 Crocker Bldg., San Francisco, Calif.

Inc. Dec., 1911. **Cap.** £120,000; 10s. par; 231,617 shares issued.

Financial statement for fiscal year ending Sept. 20, 1920 shows an operating profit of £2,519; cash, £9,093; accounts receivable, £552; accounts payable, £302, investments, £ 109,461. **Dividends:** 5% in 1916; 10% in 1917, 1918 and 1919.

Company is a holding corporation owning 127,000 shares of Plymouth Cons. Gold Mines, Ltd., of Calif., also an interest in Tolgus Mines, Ltd., and Tehidy Minerals, Ltd. of Cornwall. In 1913, the holdings of the Northern Ontario Exploration Co., Ltd. were acquired and stock exchanged on a basis of 3 Calif. Ex. for 2 Northern Ontario shares. The Plymouth mine was reopened in 1911 and transferred to the Plymouth Cons. Gold Mines, Ltd. in 1914

CALIFORNIA GOLD & COPPER CO. **CALIFORNIA**

Last Address: Mart. Rourke, agent, Malad City, Idaho.

Property: the California mine, 6 claims, in the Spenceville district of Nevada county. A 4′ vein in diorite, shows bornite and chalcopyrite; the ore is said to average 6% copper, with some gold and silver.

Development: by the 1,000′ California tunnel, also short tunnels and shafts in the Jackson and Sixteen to One.

CALIFORNIA GOLD MINING & DEV. CO. **CALIFORNIA**

Probably dead. **Last address:** 147 Prospect Ave., San Francisco. O. A. Ellis, sec. See Vol. XIV.

CALIF. & MASS. COPPER MINES CO. **CALIFORNIA**

Inactive. Described Vol. VIII. Property at Red Bluff, Tehama county, Cal., is leased for 99 years to **Chicago Copper Refining Co.**, which see.

CALIFORNIA MINING CO. **CALIFORNIA**

Controlled by King C. Gillette, Beverly Hills, Calif.

Property: in Rough & Ready district, near Grass Valley, Nevada county.

CALIFORNIA PLACER MINES CO. **CALIFORNIA**

Out of business. Company had a lease up to 1920 on the **You Bet M. Co.'s** property, in Nevada county.

CALIFORNIA RAND SILVER, INC. **CALIFORNIA**

Formerly the Rand Divide Mining Co.

Address: Bin 14, Bakersfield, Calif.

Officers: Alfred Carrell, pres.; Dwight L. Clarke, sec.; J. W. Jameson, gen. mgr., Randsburg, Calif. J. M. Fox, supt.

Inc. Aug., 1919, in California. **Cap.** $1,280,000; $1 par; all issued.

Dividends: for 2 years to Sept. 1. 1921, total $992,000; No. 20 was $25,000, leaving a surplus of $314,000.

Property: 200 acres, in process of patent, includes the Kelly silver mine, 1½ miles from Randsburg, San Bernardino county. Ore occurs in an 18" shoot, which widens to 15', averaging 150 oz. silver and considerable gold per ton. Parts of the claims are leased on royalty. The ninth level shows shipping ore for 342'.

Development: by incline, 730' deep. Lateral work at end of 1920, totaled 7,000' of which 4,500' was driven in that year. A new vertical shaft was down 395', September, 1921. Reserves valued at $2,000,000. A 100-ton flotation plant is under construction.

Production: 3,648 tons in August, 1921, of which 1,465 tons went to the Selby smelter.

Mine is a bonanza property.

CALIFORNIA SYNDICATE, THE **CALIFORNIA**

Dead. Was a successor to **Golden Gate Exploration Co.**, and was itself succeeded, apparently within a month, by the **Montacali Mines Syndicate,** which see.

Reported that California Syndicate was capitalized for 150,000 shares of no par value, 35,000 fully paid to be distributed among Golden Gate stockholders and 65,000 to be underwritten at $4.50 each.

CALIFORNIA TREADWELL GOLD MINING CO. **CALIFORNIA**

Company disbanded. See Vol. XIV.

CALIFORNIA TUNGSTEN MINING CO. **CALIFORNIA**

Address: R. C. Cortner, 670 Pacific Electric Bldg., Los Angeles, Calif

Inc. 1920, in California. **Cap.** $100,000.

CALUMET & CALIFORNIA MINING CO. **CALIFORNIA**

Dead. See Mines Handbook. Vol. XIII. for description.

CANYON MINES CORPORATION **CALIFORNIA**

Address: F. B. Keever, Sutter Hotel, San Francisco, Calif.

CARSON HILL GOLD MINES, INC. **CALIFORNIA**

Succeeded by **Carson Hill Gold Mining Co.**, which see.

CARSON HILL GOLD MINING CO. **CALIFORNIA**

General office: 614 Crocker Bldg., San Francisco, Calif. Boston office: 55 Congress St. **Mine office:** A. D. Stevenot, supt., Melones, Calif.

Officers: W. J. Loring, pres.-gen. mgr.; H. L. Smith, v. p.; with Edw. A. Clark, Wm. H. Coolidge and Wm. A. Ogg, directors, F. W. Batchelder, sec.-treas.; M. A. Donovan, asst. sec.-asst. treas.

Inc. Feb. 7, 1919, in Maine. **Cap.** $250,000; $1 par; issued 199,999.71 for $699,999 capital stock of its subsidiary, the Carson Hill Gold Mines, Inc. Of the unissued stock, $18,000 is reserved for conversion of company's gold notes. Bankers Trust Co., New York, and First Natl. Bank of Boston, transfer agents; Chase National Bank, New York, and National Shawmut Bank, Boston, registrars. Listed on Boston and New York stock exchanges.

Gold Notes: $309,600, four year 7% gold notes outstanding, due Oct. 15, 1923, being an unredeemed balance of $450,000 issue. Convertible into stock at $25 per share.

Net operative earnings for year ended Dec. 31, 1920, from Morgan mine were, $558,447; sundry income, $2,402; total eannings, $560,850; less development of Calaveras and Adelaide mines, $47,507, and less deprecia-

tion, taxes, interest, underwriting, etc., $248,202; reducing net profit to $265,541.

Balance sheet for 1920 shows assets: property, $2,767,986; sinking fund, $2,177; current, $145,238; deferred charges, $19,580. Liabilities include current, $176,175; deferred payments, $22,500; reserves, $532,614; special surplus, $625,661; earned surplus, $568,416.

For first 8 months in 1921, mine earnings were $229,481 and net, $120,024. Current liabilities over assets were, $16,181.

Property: the Calaveras and Morgan mines, 500 acres in Carson Hill district, Calaveras county. In 1921 company acquired a lease on the Melones mine.

Development: by 10,000′ of underground workings. On 1,600′ level ore is 8′ to 35′ wide and stoped for 375′. Ore developed and probable, Dec. 31, 1919, 215,233 tons high grade, and 445,733 total. Reserves increased 1920. Stoping 1921 on new 1,650′ level yielded 500 tons daily of $9 to $14 ore. The main orebody has been followed to the 1,750′ level.

Officially reported, September, 1921, that actual and probable ore reserves are 1,100,000 tons, averaging $7 per ton.

Equipment: 30-stamp mill with concentrator and cyanide plant, and full mining equipment.

Production: 111,662 tons mined and milled in 1920, yielding $1,120,030, or $10.03 per ton; a recovery equal to 90.13%.

Is a splendid and well managed property.

CARSON QUICKSILVER CO. **CALIFORNIA**

Office: 4061 Dupont Bldg., Wilmington, Del. **Mine adddress:** Ellard W. Carson, mgr., Cambria, Calif. C. D. Richardson, supt., Klau, Calif.

Officers: G. B. Street, pres.; C. V. Ferriday, v. p.; C. Underwood, sec.-treas., with F. S. MacGregor, directors; all of Wilmington, Del.

Inc. Jan., 1920, in Del. **Cap.** $200,000; $10 par. Annual meeting, Jan. 11th.

Property: the Klau mine, 7 claims, 5 patented, 102 acres at Klau, San Luis Obispo county, shows fissure veins of quicksilver ore.

Development: 3,239′ of workings in 3 tunnels, longest 1,000′ with a 280′ back.

Equipment: 20 h. p. gasoline engine and 50-ton Scott furnace. Output, 15,000 flasks to end of 1919. Development only done in 1920; shut down in November, awaiting better market for quicksilver.

CENTRAL CONSOLIDATED MINES CO. **CALIFORNIA**

Merged 1921 with Norambagua Mines, Inc., to form **Banner Cons. Mines Co.**, which see.

Address: 1004 First Natl. Bank Bldg., San Francisco. W. J. Webster, pres., c/o Atlas Powder Co., Wilmington, Del.; D. C. Norcross, sec., Newell Bldg., San Francisco, Calif.

J. M. Nicol, gen. mgr.; Paul W. Smith, supt., Grass Valley, Nevada Co., Cal.

Inc. in Calif. **Cap.** $300,000; 20c. par; 150,000 shares issued.

CENTRAL EUREKA MINING CO. **CALIFORNIA**

Offices: 519 California St., San Francisco, and Sutter Creek, Amador county, Cal.

Officers: W. P. Henry, pres.; I. N. Rosecranz, v. p.; J. Stadtfeld, sec.-treas., with G. W. Ebner, F. L. Wolfe, and H. G. Dodds, directors. Albion S. Howe, supt.; H. Warrington, asst. supt.

Inc. in California. **Cap.** 400,000 assessable shares. A total of 38 assessments called to July, 1919, when one of 3 cents was levied. Annual meeting fourth Tuesday in April.

Bullion and concentrate account for year ended April 28, 1921, was $424,068; balance in treasury $15,962. Dividends $94,227. Cash surplus on that date was $118,218.

Dividends: $926,323 from 1901 to 1908; 2c per share in Feb., 1915, and No. 67, of 3c., on Dec. 16, 1919; 32 cents equal to $125,000 in 1920. The total is 77 dividends to end of 1920 or $1,063,728. The monthly rate is 3 cents, or 17% on the 1921 price of $1.35 per share.

Property: at Sutter Creek, Amador county, adjoining the South Eureka on the north shows 3 parallel veins which have been developed. The veins are in the form of stringers, with strike N. 20° W., dip 55° to 70° E., and an average width of 6'. The east vein is 20' from the west vein, while the hanging-wall vein is 200' east of the west vein. East and west veins have slate walls; hanging-wall vein has a slate footwall and greenstone hanging-wall. Two series of ore-shoots have been developed, the north shoots being 60', the south shoots 200' long.

Development: by 4194' 3-compartment shaft, sunk on 57° incline. Shaft cuts the hanging-wall vein on the 500' level and is sunk on the hanging-wall side to the 1,900' level, at which point it is deflected to the west and passes into a slate formation. Below 3,425' the shaft is in greenstone. In May, 1918, there was not enough ore blocked out to supply 20 stamps for two weeks. Added to this, the company had to keep water down as the South Eureka had stopped work. Sinking was continued, and by August, 1919, the shaft was 3,720' deep. A winze below 3,500' opened good ore, while a good shoot was developed at 3,700' and reserves are now sufficient to keep the full plant in operation. On the 3,900' level the ore shoot was 330' long, 4½ wide, assaying from $11.40 to $28 per ton. The 2,700 and 3,600' levels also show good ore. Development during 1921, totaled 2,073'.

Equipment: a new transformer house, hoist building and new machinery installed 1921. The Mill has 40 stamps, vanners, and is complete in every way and running to capacity, Nov. 1921.

Production: for 1921, 37,856 tons of $11.004 ore net extraction; 34,705 tons of $13.15 ore during year ended April 1, 1920; total to that date was about $3,733,000.

CENTRAL SOUTH YUBA COPPER MINE — **CALIFORNIA**

Described in Vol. XIV. Property sold in 1915 to **Queen Regent Merger Mines Co.**, which see.

CERISE GOLD MINING CO. — **CALIFORNIA**

Office: Wilbur Springs, Colusa county, Calif.; Chas. L. Austin, gen. mgr. and supt.

Property: in Sulphur Creek, Colusa county, Calif. Company organized to carry on a general mining and milling business.

The 100-ton gold mill was burned down Sept., 1917.

CERRO GORDO MINES CO. — **CALIFORNIA**

Mine address: Keeler, Inyo county, Calif.

Office: Room 222, Bank of San Jose Bldg., San Jose, Calif.

Officers: F. J. Hambly, pres.; J. E. Richards, v. p.; A. L. Dornberg, sec.-treas.; F. C. Ross, asst treas.; with W. A. M. Van Bokkelen, directors. G. C. Warren, Jr., asst. sec.

Inc. July 16, 1914, in Arizona. **Cap.** $1,000,000; $1 par; all issued. 10,500 shares sold for $110 the lot at public auction in New York on Dec. 16, 1920. Guaranty Trust Co., New York, registrar and transfer agent.

Income for 1920 was $9,741 and expenses, $32,978, or $53,508; including depreciation and depletion, with total deficit of $263,706. This compares with income for 1919 of $19,070, operations, $71,139, plus $34,745 for depreciation and depletion, a total of $86,814. The previous deficit was $123,383, making $210,198 at end of 1919. Net current assests totaled $82,000. Revenue in 1918 was $183,489, and in 1917, $487,177.

Dividends: 2½c. in 1916; 22½c. in 1917; 7½c. in 1918; none since.

Property: the Cerro Gordo mines, 46 claims, 8 miles from Keeler, including the Union mine on Cerro Gordo hill and a water power on Lone Pine creek, Inyo county, formerly belonged to the Four Metals Sm. & Mng. Co.

The Union mine is an antigua worked by Mexicans in early days and opened to a depth of 1,200'. The principal ores produced are silver-lead, mostly carbonates, but with some lead sulphide; also zinc carbonate. The zinc ore occurs from the surface to the 900' level, and the silver-lead ore from the surface to the 1,150' level. Ores also contain gold and copper values. See U. S. G. S. Bull. 540, pp. 97-105.

Development: by the 900' Belshaw shaft, with a winze to the 1,150' level, and tunnels. The Troeger tunnel is now in over 6,000' and cuts the vein system 1,200' below the workings of the Union mine. Underground workings are said to aggregate 20 miles. New work in 1918 amounted to 4,603'; orebody was cut off by a fault above the 900' level and 500' of exploration has thus far failed to find it. In 1919, 1,400' of work was accomplished.

Equipment: includes a 75-ton mill with table and flotation plant; 100 h. p. electric hoist; compressor, capacity 1,200 cu. ft. free air per min., driven by a 150-h. p. constant speed motor. The former steam plant is intact and consists of 70-h. p. steam hoist, 350 cu. ft. compressor and 130-h. p. boiler. Electric power, voltage 400, is obtained from the Southern Sierras Power Co.

Production: Ore produced in 1916 reported as 1,497 tons lead-silver ore, net value, $44.723 per ton; 11,265 of zinc ore, $23.759; 27 tons of copper ore, $17.722 per ton, and 9,431 tons slag valued at $40,383. Net cost of all ore mined was given as $11.08, giving a net profit of $17.64 per ton. In 1917, production was 6,088 tons lead-silver ore, net value $45.665 per ton; 5,417 tons of zinc ore, $20.384; 14,034 tons of slag, net value $7.558 per ton. Net cost of all ore mined was $15.026. Production in 1918 was 619 tons zinc ore, 24.3 to 40.1% zinc; 2,166 tons lead-silver ore, 23.1 oz. silver, 21.4% lead; 9,389 tons slag, 2.9 oz. silver, 12.3% lead. In 1919 the output was 357 tons of $26.21 lead-silver ore, 167 tons of $12.45 zinc ore, and 159 tons of $3.92 slag, a total of $12,061. In 1920, production was 171 tons of silver-lead ore and 66 tons from lessees operations.

The mine was closed down in April, 1920.

CHEMUNG MINING CO. **CALIFORNIA**

Succeeded **Kibble-Cooke Leasing** (or Mining) Co., 1920.

Address: Alex McRae, Reno National Bank, Reno, Nevada. Tom McNamara, supt.

Has a lease on mine of Masonic Mines Association, at Masonic, Mono county, Calif., near Nevada line.

This mine has the largest production of the county for 1920. Erection of a mill is planned.

CHICAGO COPPER REFINING CO. **CALIFORNIA**

Dead. See Vol. XIII of this work for description of company.

CHIPPS CREEK MINING CO. **CALIFORNIA**

Address: Letson Balliet, Tonopah, Nev.

This is a private unincorporated company, driving a 1,300' tunnel in order to drain and work an ancient river channel about 6 miles S. of Belden, Plumas county, consisting of 500 acres. In May, 1920, it was said that the pay streak had been found, yielding $8 gold per cu. yd.

CHRISTINA COPPER CO. **CALIFORNIA**

Address: F. C. Fox, supt., Placerville, Cal.

Owns Seven Bells mine, an old copper producer.

CITY OF SIX MINING CO. **CALIFORNIA**

G. W. Henderson, pres.; A. E. Hodgkinson, sec.

Inc. in Calif. **Cap.** $75,000; $1 par; all issued.

Property: at Downieville, Sierra county, Calif. **Development:** by shaft and 1,300' tunnel.

CLIO VINDICATOR MINES, INC. **CALIFORNIA**

Address: Herman Houter, mgr., 244 Plymouth Bldg., Minneapolis, Minn. George L. Holmes, actg. mgr., Jacksonville, Calif.

Officers: J. P. Broman, pres.; H. Houter, v. p.; Geo. I. Gorham, sec.-treas.

Inc. in Maine. **Cap.** $1,000,000; par $1; 400,000 issued. Income 1920 from ore sales, $1,200. Expenses, $40,000.

Property: 6 claims, 2 patented, 65 acres, on Mother Lode at Jacksonville, Tuolumne county, shows gold ore with molybdenum and nickel, averaging $6 per ton.

Development: by 600′ incline and tunnel. Ore mined by glory hole and shrinkage stoping. Reserves said to be 250,000 tons.

Equipment: 10-stamp mill, 75-h. p. compressor, electric power, etc. Plan new shaft and 250-ton mill, 1921-22.

Operated throughout 1920.

CLIPPER MOUNTAIN GOLD MINING CO. CALIFORNIA

Office: 600-1 Hellman Bldg., Los Angeles, Cal.

Officers: B. J. Doak, pres.; E. Petersen, sec.; preceding with A. H. Hayes, C. J. Gardner and J. C. Meadows, directors.

Inc. Sept. 12, 1916, in California. **Cap.** $100,000; 10c. par; 625,646 shares outstanding.

Property: 4 claims, 80 acres, in Clipper Mtns., near Danby, San Bernardino county. A 50′ dike is said to traverse the property. In 1918, a two-compartment shaft had been sunk to the 300′ level and crosscutting started, but no further information is available.

Equipment: includes 32 h. p. engine, hoist, compressor, pump, etc.

Property reopened 1920 by the **Gold Reef Cons. Mng.Co.**, financed by Tom Reed Mining Co. of Arizona.

COAST RANGE DIVIDE MNG. CO. CALIFORNIA

Address: P. O. Box 184, Coyote, Calif.

Officers: Henry Peters, pres.; Frank Anderson, sec.

Inc. 1919, in Calif. **Cap.** $500,000; $1 par.

Property: a 5-year lease on 1,000 acres near Coyote, Santa Clara county. Developing at last account.

COCOPAH COPPER CO. CALIFORNIA

Idle. No recent information.

Address: 1117 Trust & Savings Bldg., Los Angeles, Calif. See Vol. XIII.

COFFEE CREEK GOLD MINING CO. CALIFORNIA

Address: C. T. Kerr, mgr., Redding, Calif.

Officers. C. T. Kerr, pres.-treas.; W. A. Crank, v. p.; L. J. Kennedy, sec.

Inc. June 2, 1921, in Calif. **Cap.** $600,000; $1 par.

Property: the Golden Jubilee mine, 14 claims, in Coffee Creek district, Trinity county, with a 4′ fissure vein in granite, that carries gold tellurides, the ore averaging $16.25 per ton.

Development: by 5,000′ tunnel with back of 800′ and overhead stopes.

Equipment: includes a 75-ton amalgamation and cyanide mill.

COGGINS MINE CALIFORNIA

Address: Arthur L. Coggins, Dunsmuir, Ore.

Property: in Siskiyou county, Calif., near the California Chrome mine, 3 miles S. W. of Dunsmuir, shows massive and disseminated chromite deposits in peridotite developed by open cuts; shipments carry 40% chromic acid. Workings connected with railroad by aerial tram. Was producing in 1920.

COLMA COPPER CO. CALIFORNIA

Address: Redding, Shasta Co., Calif.

Company started development work March, 1920, to extend the tunnel of the Uncle Sam mine to 5,000′ in length, 600′ below the orebodies of the Mammoth mine, Kennett district, Shasta county. This will take over two years work and will crosscut the veins of four claims.

COLUMBIA CHANNEL MINING CO. **CALIFORNIA**

Address: W. E. Sharon, pres., Palace Hotel, San Francisco. J. M. Harper, mgr.

Property: over 1,000 acres of patented ground, covering 5 miles of ancient channel, 7 miles E. of Forest City, Sierra county. The gravel lies on slate and porphyry, and has a lava capping. It is 4 to 5' deep and 600' wide.

Development: by 3,500' tunnel and 1,500' of workings.

COLUMBIA CONSOLIDATED MINES CO. **CALIFORNIA**

Office: 485 California St., San Francisco, Calif.

Inc. 1915, in Calif. **Cap.** $50,000; $5 par.

Property: 4 patented claims, 80 acres, 2½ miles E. of Washington, Nevada county. There are 4 veins in slate and quartzite, from 5 to 20' wide. The quartz carries up to $6 gold per ton and 1% pyrite.

Development: by 3 tunnels, 200 to 300' long.

Equipment: ditches, Pelton water-wheels, compressor, aerial tram, and 20-stamp mill.

Work was suspended in August, 1918, on account of abnormal conditions. Property owned by company in Patterson district, Mono county, sold in 1916 to **Nevada Progressive Gold Mng. Co., Inc.**

COLUMBIA HILL GOLD MINING CO. **CALIFORNIA**

Office: 342 Mills Bldg., San Francisco, Calif.

Officers: W. G. Morrow, pres., J. A. Kelly, sec.

Inc. 1895, in Calif. **Cap.** $20,000; par $1; all issued.

Property: 64 acres, patented, in Grizzly Hill district, Nevada county, 21 miles N. of Nevada City.

COLUMBIA MINES CO. **.CALIFORNIA**

Mine at Angels Camp, Calaveras county, Cal.

Officers. J. S. Rear, pres.; N. N. Merriman, v. p.; A. Caminetti, treas.; preceding with W. C. Tupper, W. P. Smith, F. M. Woods and J. G. Ferraris directors.

Inc. Jan., 1915, in California. **Cap.** $750,000; $1 par; all issued; no bonds

Property: 2 claims showing low-grade gold ore. Shaft reported to be down 250' with some drifting. Has 100-ton stamp mill. Stock was stricken from listing on New York Curb in June 1918.

Inactive.

COLUMBUS CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Address: 5930 Genoa St., Oakland, Calif.

Officers: D. J. Doyle, pres.; Carlo Dondero, sec.

Inc. 1898, in Calif. **Cap.** $300,000; $1 par.

Property: at Coulterville, Mariposa county.

COLUMBUS MINING CO. **CALIFORNIA**

Address: 216 Pine St., San Francisco, Calif.

Officers: J. Goldman, v. p.; S. G. O. King, sec.

Inc. 1912, in Calif. **Cap.** $300,000; par $1; issued 195,000 shares.

Property: 20 patented acres, near Tuolumne.

Development: by shafts and drifts.

CONFIDENCE GOLD MINES CORP'N. **CALIFORNIA**

Address: 604 Mission St., San Francisco, or Sonora, Tuolumne County, California.

Directors: W. B. Hunting, New York; E. S. Bolen and W. A. Stratta of Richmond, Va.; Edmund Juessen, mgr.

Inc. 1917, in Virginia. **Cap.** $600,000; shares $10 par; 1,000 preferred shares and 5,000 common. Listed on San Francisco Stock Exchange.

Property: Confidence group of claims and mill site, 12 miles E. of Sonora, opened by 33° shaft to depth of 1,100' with good ore opened on 800' level. Mine idle for 10 years past, has produced $5,000,000 gold.

Equipment: new hoist and air compressor installed 1917, and in 1918 a small cyanide plant was added.

CONFIDENCE SILVER MINING CO. **CALIFORNIA**

Address: 342 Mills Bldg., San Francisco.

Officers: Jas. Newlands, Jr., pres.; W. G. Morrow, sec.

Inc. 1919, in Calif. **Cap.** $74,880; par $3; all issued.

CONSOLIDATED AMADOR MINING CO. **CALIFORNIA**

Company dissolved. See Old Eureka Mining Co.

CONSOLIDATED MINES CO. **CALIFORNIA**

Offices: 710 I. W. Hellman Bldg., Los Angeles, and Randsburg, Kern county, Cal. Seth J. Tyler, supt.

Officers: W. H. Hevren, pres.; S. H. Ellis, sec.

Inc. 1902, in Calif. **Cap.** $200,000; 10¢ par; all issued. Stock listed on Los Angeles Exchange.

Property: 60 patented acres, in Kern county, Calif., near Randsburg, shows a vein containing gold and tungsten ore, developed by 350′ and 500′ shafts.

Equipment: includes 5-stamp mill, pumps, compressor and air-drills. Idle several years.

CONSOLIDATED ST. GOTHARD GOLD MINING CO. **CALIFORNIA**

Mine leased to **Delhi Mines Co.**, which see.

CONSOLIDATED WILSHIRE MINING CO. **CALIFORNIA**

Reorganized in May, 1920, as the **Wilshire Consolidated Mining Co.**, which see.

CONSTELLATION MINING CO. **CALIFORNIA**

Address: C. V. Manner, sec., 530 Forty-First St., Oakland, Calif. J. F. Leahy, pres.

Inc. 1905, in Calif. **Cap.** $100,000; $1 par; assessable; all issued.

Property: 5 patented claims in Campo Seco district, Calaveras county, shows a contact fissure vein with 56° dip in schist. The orebody is 2′ to 30′ wide and 250′ long. It carries chalcopyrite and averages 6% copper.

Development: by 2 shafts to depth of 400′, and 1,500′ of workings. Equipped with steam power. Idle, 1920.

CONTACT MINING & MILLING CO. **CALIFORNIA**

Probably defunct. See Vol. XIV.

CONTINENTAL MINES DEVELOPMENT CO. **CALIFORNIA**

No recent information. A holding concern only. See Vol. XIV.

COPPER GIRL MINING CO. **CALIFORNIA**

Address: 948 Market St., San Francisco, Calif.

Inc. 1918. **Cap.** $50,000. Inactive.

COPPER KING MINING CO. **CALIFORNIA**

Mine office: Academy, Fresno county, Calif.

Officers: B. N. Garrett, pres.; Houston Bank & Trust Co., Houston, Tex., J. R. Sims, v. p.; H. C. Bocchio, sec.; C. A. Lewis, treas.; D. C. Demorest, eng.; Wm. Stewart, trustee, at last accounts.

Joint stock association. **Cap.** 100,000 shares; $10 par; 50,000 shares issued. Stock was offered at $7.50 in newspaper advertisements in 1917.

Property: 11 claims, 220 acres, 10 claims owned in fee and one under lease and option to purchase, 5 miles northeast of Letcher and 16 miles to shipping point at Clovis.

Geology: The vein runs N. E.-S. W. and is a belt 100′ wide of mineralized schist and metadiabase containing lenses of iron and copper ore. Granodiorite bounds the belt to the east and diorite to the west.

Development: by 3 shafts, one working and two for ventilation, sunk on the dip of the vein. Main shaft has been sunk to the 8th level about 800′ and has about 3,000′ of drifts. In 1920, a 300′ tunnel was driven, and good ore reported opened.

History: owned originally by the Copper King, Ltd., a London company, of which W. H. Daily was gen. mgr. Company is said to have spent $1,250,000 on mine, palatial residences, and surface equipment, and to have produced 4,159,672 lb. of copper. Company went into hands of receiver in 1903. In 1907 property was sold for $44,000 to the Hart Mining Co., produced

an amount equal to the purchase price but was forced to close because of the low price of copper at that time. The property was idle thereafter till operated by the present company.

Production: to 1917, was reported to be 50,000 tons of 8% copper ore.

COPPER MOUNTAIN CONS. MINING CO. **CALIFORNIA**

Supposedly dead. Former mine near Redding, Shasta Co., Cal. See Vol. XII, 1916.

COPPER MOUNTAIN MINING CO. **CALIFORNIA**

Presumably succeeds Titantic Copper Mtn. Mng. Co., of doubtful merit and fully described in Vol. XIV.

Address: Soledad, Calif.

Officers: Henry F. Melville, pres.; P. H. Smith, v. p.-treas.; W. D. McPhie, sec., with Anton Aaroe, Hans N. Aaroe, Chas. F. Turner and Leopold Cantor, directors.

Cap. $1,000,000; $1 par; stock sold in London.

Property: about 20 claims, 500 acres, 10 miles from Soledad, San Benito county, showing an outcrop of copper carbonate ore, claimed to assay 3½-10% copper, with some gold and silver, also tunnel site, mill site and water right location. Claims reported surveyed for patent in 1921 and management plans tunnel work.

The secretary writes that company has "an excellent undeveloped prospect, with a fine future with proper plant and development work. The amount of money this property would turn out in dividends, dollars and cents, would depend upon the magnitude of plant and operations, everything is possible with good orebodies."

CORNUCOPIA COPPER MINING CO. **CALIFORNIA**

Care of Fred W. McConnell, atty., Healdsburg, Calif.

Inc. 1918, in Calif. **Cap.** $1,000,000. Inactive.

No information obtainable.

CORONA MINING & MILLING CO. **CALIFORNIA**

Office: 770 E. 4th St., Salt Lake City, Utah.

Officers: J. A. Headlund, pres.; J. S. Ryan, v. p.; J. A. Stanley, sec.; W. G. Romney, treas.; with Thos. W. Bell, J. P. Moss, J. H. Hurd, directors. Thos. W. Bell, supt.; C. E. Merwin, Spokane, Wash., and Moscow, Utah, fiscal agent.

Inc. 1915, in Arizona. **Cap.** $3,000,000; $1 par; issued $1,600,000. Farmers & Stockgrowers Bank, Salt Lake City, registrar. Annual meeting in June.

Property: the Confidence or Mormon Gold mine, 12 claims, 2 patented, 240 acres, in Funeral Range, Death Valley, Inyo county, 12 miles from Shoshone, a station on the Tonopah & Tidewater R. R. The mine was worked in wide early days by a small syndicate of Mormons.

Ore: free milling gold and a little silver in fissure vein in granite; said to assay $20 per ton. Outcrop of vein said to be 1,200′ long and from 4′ to 70′

Development: tunnels and several shafts, deepest 140′. Management claimed 117,000 tons of $20 ore. No recent information available.

COWBOY MINE **CALIFORNIA**

See **Old Cowboy Mining Co.**

CROESUS GOLD MINING & MILLING CO. **CALIFORNIA**

Address: 665 Fifth Ave., New York. **Mine address:** Walter B. Pearson, Alleghany, Calif.

Officers: Grant B. Schley, pres., 665 Fifth Ave., New York; C. G. Raynor, v. p.; W. J. Walworth, sec.-treas.; E. Richter, asst. sec.-asst. treas.

Property: 8 quartz claims and 1 millsite, including the old Plumbago mine, 2½ miles S. E. of Alleghany, Sierra county.

Geology: ore is gold quartz in veins in amphibolite schist, between 2 bands of serpentine.

Development: by 200′ crosscut tunnel and 3,800′ of drifting on the vein. A winze has been sunk 800′ below the tunnel at a point 2,300′ in, and levels driven from the winze.

Equipment: water power, generators, 2 compressors, hoist, machine-shop, buildings, 15 stamps, 4 vanners, etc.

The mine was closed late in 1918.

CULVER BAER MINING CO. **CALIFORNIA**

Address: Cloverdale, Sonoma Co., Calif.

Officers: C. E. Humbert, pres.; G. E. Brush, v. p.; E. A. Menihan, sec.-treas., with H. H. Moke and W. W. Furber, directors, all of Cloverdale.

Inc. 1900, in Calif. **Cap.** $100,000; $1 par; $59,761 issued; assessable. Annual meeting, March.

Property: 2,200 acres, near the geysers of Sonoma county, 20 miles from Cloverdale, carries quicksilver ore. No operations since 1918.

CURTZ CONSOLIDATED MINES CO. **CALIFORNIA**

Dead. Described in Vol. XII. Property now owned by E. Farrell and others of San Francisco.

CURTZ MINE **CALIFORNIA**

Address: E. Farrell, Markleeville, Alpine county, Calif., or San Francisco.

Property: 20 claims in Alpine county, 10 miles E. of Markleeville, worked several years ago by Curtz Consolidated Mines Co. Claims are said to show a porphyry deposit of copper ore and have been opened to a depth of 350′. Reopened in 1920.

See "Mines of Alpine County", Calif. Bureau of Mines, 1917, p. 10

DAGGETT REDUCTION & MILLING CO. **CALIFORNIA**

Address: F. A. Shorey, supt., Daggett, San Bernardino Co., Calif.

Company erected a cyanide plant in 1917 to treat 200,000 tons of tailings from 2 old mills, 2 miles S. E. of Calico, San Bernardino county. The average assay of 150,000 tons is 3.6 oz. silver and 60¢ gold per ton, with 0.5 lb. mercury in the form of amalgam. Recovery is 78% of the silver, 30% of the gold, and 15% of the quicksilver. Costs are 68¢ per ton, treating 75 tons in 2 shifts of 8 hours. Built with limited capital, this venture paid for itself in 6 months.

Several thousand tons of silver-bearing tailing were treated in 1920.

See E. & M. Journal, June 5, 1920.

DAIRY FARM MINING CO. **CALIFORNIA**

In which the Am. Sm. Sec. Co. hold a majority interest.

Property operated by Van Trent Mining Co., was practically worked out in 1917. See Vol. XII of this work; also Mines of Placer County, Calif. Mng. Bureau, 1917, p. 59.

DARWIN LEAD & SILVER MINES DEVELOP. CO. **CALIFORNIA**

Described in Volume XIV. Reorganized in 1920 as the **Darwin Silver Co.**, which see.

DARWIN SILVER CO. **CALIFORNIA**

Office: Room 705, 208 S. La Salle St., Chicago.

Mine address: A. G. Kirby, mgr., Darwin, Inyo Co., Calif.

Officers: E. W. Wagner, pres.; Geo. J. Sayer, v. p.; R. H. Livingston, sec.-treas., with C. N. Snyder, Jos P. Griffin and Paul M. Herzog, directors.

Inc. in 1920, in Delaware, as a reorganization of the Darwin Lead & Silver Mines Development Co. **Cap.** $2,000,000; $1 par; 1,125,000 issued; assessable. 500,000 shares held for converting $500,000 first mortgage, 7%, convertible gold bonds.

Property: 4 groups, 924 acres, 13,500′ on ore zone, including the Columbia, Defiance, Independence, Lane, Liberty, Lucky Jim, and Promontory mines, 1½ to 2 miles N. E. of Darwin. The veins are in limestone and ore carries lead carbonate and galena.

Development: in the Lane—by 750 and 725′ shafts, with over 2,000′ of drifts; in the Lucky Jim—by 820′ shaft and extensive workings; in the Promontory—by 320′ incline. In Oct., 1920, it was said that 50 men were at work in the Lucky Jim mine.

Ore reserves: estimated to be 390,269 tons worth $7,780,460 gross, and $2,735,494 net. This valuation was based on lead at 8 cents and silver at $1. Examined by Sidney Ball, F. R. Weeks, R. W. Hunt & Co. and others.

Equipment: a 50-ton pilot mill to be followed by 300-ton mill, also suitable buildings. Probably $1,000,000 spent 1919-20.

Production: about $500,000 from the Lane and $1,500,000 from the Lucky Jim. In 1920, some lead-silver-copper ore was produced. Closed down, August, 1921.

DAVIS CONSOLIDATED MINING CO. — **CALIFORNIA**

Owned by Reeves A. Davis, Happy Camp, Calif.

Property: 200 acres of patented land along the Klamath river, Siskiyou county, formerly known as the Van Brunt, and just S. W. of Happy Camp. Work has been continuous since 1870. The bedrock is schist, and the gravel is up to 100' deep.

Equipment: includes complete water system for hydraulicking, Indian and Grider creeks supplying over 5,000 inches of water. Three monitors are operated, receiving water from a 32" pipe. Employs 16 men.

Production: no figures are available.

DEADWOOD GOLD MINING CO — **CALIFORNIA**

Idle. **Address:** John T. Morgan, pres., or W. F. Du Bois, sec., Nevada City, Calif.

Inc. 1877, in Calif. **Cap.** $50,000; par $1; issued 10,218.

Property: 95 patented acres, 2 miles E. of Nevada City. Ore occurs in a vein up to 18" wide, carrying pyrite, galena, sphalerite and arsenopyrite.

Development: by incline shaft and 400' of drifts.

DEFENDER MINE — **CALIFORNIA**

F. B. Joyce, owner, Volcano, Amador county, Cal. Mine office: Defender, via Volcano, Amador county, Cal.

Property: 3 claims, 5 miles S. E. of Volcano.

Ore: is free milling by fine grinding, carries gold and some silver (parting value), with chalcopyrite, in a vein in granodiorite. The lode has a strike of N. 15° W., dip 85° W., and an average width of 3' 6".

Development: 360' shaft, with 1,500' workings. At 130' south of shaft on 200' level the vein is cut by a diorite dike 22' thick; other smaller diorite dikes cut the main shoot and seem to be associated with the ore occurrence.

Equipment: includes steam hoist, compressor and a 10-stamp mill.

Production: to date said to be 12,000 tons, yielding $140,000.

No recent news.

DELHI MINES CO. — **CALIFORNIA**

Address: Box 5021, Reno, Nevada.

Officers: A. A. Codd, pres.-gen. mgr.; G. V. Ward, sec.-treas.; H. B. Skewes, supt.

Inc. May, 1917, in Nevada. **Cap.** $3,000,000; shares $1 par. Is a successor of an old and successful company of similar name that has been inactive for many years.

Dividends: forty-five of 10c each and two of 25c each were paid by the old company.

Property: 11 claims, 5 patented, about 160 acres, in Columbia Hill district, 19 miles N. of Nevada city and Grass Valley, Nevada county. Claims contain two known vein systems, the Delhi and St. Gothard, the Delhi vein being the only one worked extensively. The vein is in slate. Ore is free milling gold, with 1% pyrite.

Mines are credited with production of $1,514,435 from 1890 to 1914. Company is also operating the Cons. St. Gothard Co's mine.

Development: by 4 tunnels, about 200' apart, No. 4, the lowest, being 1,700' long; also by 400' vertical shaft. Vein at this depth said to be 3' to 8' wide and 360' long. Flow of water was 350 gal. per min. in 1914, when work was stopped.

Equipment: surface tramway connecting tunnels, pumps, one 900 and one 1,600 cu. ft. compressor, twenty 1,000 lb. stamps, concentrators, ditches for water, power and buildings.

In August, 1920, company completed a 900′ tunnel, eliminating a 2-mile ditch and ½ mile flume and completed an hydro-electric plant in 1921.

DEL NORTE MINING CO. CALIFORNIA

Idle. Office: 728 Montgomery St., San Francisco, Calif.

Officers: Wm .Pierce Johnston, pres.; Frank J. Hurley, sec.

Inc. 1869, in Calif. Cap. $6,000; $10 par. **Property:** at Happy Camp, Siskiyou Co., Calif.

DELTA CONSOLIDATED GOLD MINES CO. (THE) CALIFORNIA

Office: Redding, Shasta County, Calif. Mine on Dog Creek, near Delta, Calif.

Officers: L. C. Smith, pres.; D. W. R. Dunton, sec., A. C. Halter mgr.

Inc. Sept. 3, 1903, in So. Dakota. **Cap.** $1,000,000; shares $1 par; all outstanding; assessable.

Property: the Pioneer group of 11 patented claims, 115 acres, and 80 acres timber land, on Dog creek, 6 miles west of Delta, shows quartz veins in andesite, the ores containing gold, silver, and a little copper. Ore snoots average 2′ in width, with length of 300′ and are said to average $22 per ton.

Development: by tunnels with 3,500′ of workings. Management claims to have 20,000 tons ore blocked out. Idle since 1915, but intends building a 50-ton stamp mill and cyanide plant.

Company has built a narrow-gauge railway connecting with the Southern Pacific tracks at Delta.

DEMAREST GOLD MINING CO. CALIFORNIA

Address: D. C. Demarest, pres.; or L. Monte Verda, sec., Angels Camp, Calaveras county, Calif.

Inc. 1898, in Calif. **Cap.** $150,000; $1 par; 124,000 issued.

Property: 340 patented acres, containing gold veins, developed by inclined shaft and levels. Equipped with mill.

DIADEM MINING CO. CALIFORNIA

Address: J. M. Harper, owner, Forest, Calif., but letters returned.

Property: 6 unpatented claims at Forest City, Sierra county adjoins Tightner property on north, shows gold in a quartz vein in much altered amphibolite schist.

Development: by 1,200′ tunnel and 200′ shaft with 125′ of drifts. Company claims $60,000 worth of ore blocked out and that shaft will be sunk to 500′ level. At present the property is a prospect. Only assessment work being done.

Reported reopened under new management Feb., 1921, and electric hoist, pump, etc., installed.

DIANA DEVELOPMENT CO. CALIFORNIA

Property: in the Benton district of Mono county. In December, 1920, Company reported driving a large tunnel into Blind Springs hill to cut several veins. The old mines of this part are said to have yielded millions in gold. Old dumps are to be milled also.

DINERO MINING CO. CALIFORNIA

Address: J. H. Hunt, 112 Market St., San Francisco.

Inc. 1915, in California, by A. T. Hathaway, W. J. Connors, and S. Montague. **Cap.** $2,000,000. 3,000 shares sold at auction in New York on Dec. 8, 1920, for a few dollars the lot.

Property: the Washington mine and Yuba Consolidated group of 17 claims (8 patented), mill site, water-rights, and timber land, about 800 acres, 5 miles E. of Washington, Nevada county. The Washington is said to have 15 veins. The Yuba group has yielded about $2,000,000 to former owners. The formation is granodiorite and slate.

Development: by 640′ Washington shaft, to be sunk to 1000′ depth, and at the Yuba, by 1,600′ tunnel and 960′ shaft, at 600′ from the portal, with levels at each 100′.

Equipment: hoist, pumps, and 30-stamp mill at the Washington; water-power, pump, 4-drill compressor, sawmill, and 30 stamps at the Yuba.

Work was resumed in 1915, but no further information is available.

DOUBLE O MINING CO. **CALIFORNIA**

Address: 1037 Monadnock Bldg., San Francisco, Calif.

Officers: O. O. Emmons, pres.; W. L. Dunn, v. p.; M. S. Emmons, sec.-treas., with R. E. Pierce, directors.

Cap. $150,000; par 10c.; 408,965 shares in treasury, May, 1921.

Property: 1,635 acres of placer ground, in Deadwood district, Placer county, 7 miles by trail from Michigan Bluff P. O. and 43 miles from Colfax. Company owns about 5,000′ on each of 3 channels, with valuable timber.

Hudson Sons Co., 109 Russ Bldg., San Francisco, sponsor stock on San Francisco Exchange.

DUNCAN-ADAMS MINES **CALIFORNIA**

Address: 430 Ochsner Bldg., Sacramento, Calif.

Officers: Chas. Duncan, pres.; J. J. Duggan, sec.

Inc. 1920, in Calif. **Cap.** $250,000; 25c. par; 554,000 shares issued.

Property: about 600 patented acres in El Dorado county, said to contain gold and silver.

DUTCH CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Address: J. F. Thompson, pres.; Chas. H. Segerstrom, sec.-mgr., Green & Jackson Sts., Sonora, Calif.

Inc. 1909, in Calif. **Cap.** $10,000; par $1.

Property: 70 acres in Tuolumne county, 2 miles S. of Jamestown, showing a N. S. quartz vein in slate.

Development: by 1,800′ incline shaft with levels at each 100′ down to 1,200′ level.

Equipment: hoist, pump, compressor and 40-stamp mill.

DUTCH-SWEENEY MINING CO. **CALIFORNIA**

Office: 1018 Crocker Bldg., San Francisco, Calif.

Mine at Quartz, Tuolumne Co., Calif.

Company practically ceased operations, Dec., 1917, and property now operated by the **Pacific Coast Gold Mines Corp.**, which see.

EAGLE BIRD QUARTZ MINING CO. **CALIFORNIA**

See **California Eagle Bird Mining Co.**

EAGLE COPPER CO. **CALIFORNIA**

Taylorville, Plumas county, Cal. Owns groups of claims covering low-grade pyrite deposits with limited development. Company built small smelter, 1912. Idle and probably out of business.

EAGLE SHAWMUT MINING CO. **CALIFORNIA**

Address: 1024 Merchants Exchange Bldg., San Francisco, Calif. Controlled by **Belmont-Shawmut Mng. Co.**, at last report.

EARLY MINING CO. **CALIFORNIA**

Address: Geo. H. Hook, sup., or W. H. Washburn, mill supt., Jerseydale, Mariposa county, Cal.

Property: a gold mine in southern section of auriferous belt of state. Ore medium grade and somewhat refractory. Mine unwatered 1917, after 1½ years litigation, and new oreshoot found at a vein intersection on 200′ level.

The property has been under a working bond to J. H. Robertson of San Francisco, at a price of $22,500. Mill has 50-h. p. gas engine, 10 stamps etc. Mine was small producer in 1919 and 1920.

EASTERN MINING CO. **CALIFORNIA**

Operations ceased on account of low price of chrome ore. See Volume XIV.

ELDORADO EXPLORATION CO. **CALIFORNIA**

T. J. Flynn, mgr.; Burr Evans, cons. engr., Placerville, Cal.

Property: the Teddy Bear claims on the Mother Lode, about 8 miles south of Placerville, Eldorado county, is said to show 2 veins. Some $60 ore reported found in 150′ adit, at 160′ depth, 1917.

Installed electric power in 1921, and a 10-stamp mill is operating on dump ore.

ELKO GOLD M. CO. **CALIFORNIA**

Address: Alonzo D. Hitchcock, Title Insurance Bldg., Los Angeles, Calif.

Inc. 1921, in Calif. **Cap.** $50,000.

EL ORO DREDGING CO. **CALIFORNIA**

Address: 818 Mills Bldg., San Francisco, Calif.

Officers: W. S. Noyes, pres.; B. S. Noyes, sec.

Inc. 1902, in Ariz. **Cap.** $600,000; par $4; all issued.

Operates 2 dreadges at Oroville, Butte county, and Yuba City, Sutter county. Ground near Yreka, Siskiyou county, exhausted in 1920, but 300 acres near Chico, Butte county, were being dredged in 1921. Operations at Oroville recovered 16.5c. per cu. yd., compared with the engineers estimate of 47c.; and recovered 15.44c. at Yuba, compared with the estimate of 15c. per cu. yd. The Oroville ground was cemented.

EL PORTAL MINING CO. **CALIFORNIA**

354 Pine St., San Francisco, Calif. No information.

EMPIRE MINES & INVESTMENT CO. **CALIFORNIA**

Address: J. W. Ward, sec., 375 Sutter St., San Francisco.

Mine address: F. W. Nobs, supt., Penn mine, Grass Valley, Calif. W. B. Bourne, pres.; G. W. Starr, mng. director.

A close corporation, controlled by the Bourne family. Dividends total several million dollars, the present annual profit being estimated unofficially at over $500,000.

Property: the Empire, Pennsylvania, Cassidy Hill, and Crown Point mines, a total of over 600 acres, 1¼ miles S. E. of Grass Valley, Nevada county. The two last mentioned mines were purchased since 1915. The Pennsylvania was acquired for about $500,000 in 1912. The Empire is the largest deep-mine gold producer in the State, and was seventh in the list of all gold properties in America during 1918. The mine was opened in 1850, and has never ceased operating since. G. W. Starr has been manager for 28 years.

Geology: the Empire vein outcrops in diabase-porphyry, continues in this formation to a depth of 1,700′, where it enters granodiorite. The average dip to 3,000′ is 30°, and from 2,800′ to 4,200′ the average is 55°. The vein is from 18 to 24″ wide. Ore is quartz, carrying both fine and coarse gold, up to 3% auriferous pyrite, and a little galena. It averages $13 per ton. Payshoots are irregular; between the 1,500 and 2,100′ levels little ore was found, so considerable advance exploration is necessary. All indications point to the vein persisting to great depth.

In the Pennsylvania the vein outcrops in granodiorite for 1,000′ N. of the shaft, but not S. of it. In the upper levels the dip is 20°; in the lower 40°. The average width is from 12 to 18″, with a maximum of 48″. The Cassidy vein on the surface crosses the contact of diabase and granodiorite, and has been developed to a depth of 400′ by shaft sunk at 32°. It is equipped with a 200 cu. ft. compressor, 150 cu. ft. compressor, 15 h. p. hoist, all motor driven, and suitable accessories.

The Crown Point vein lies in an altered serpentinized diabase porphyrite near its contact with slate. A 620′ incline was sunk and 2,500′ of development done. The vein is from a few inches to 48″ wide, carries coarse free gold and up to 3% sulphide.

Development: by the Empire 4,800′ incline shaft and winze below bottom level. The workings are extensive, covering fully 40 miles. About

1,300′ of new work is done each year. The lower levels are 400′ apart. Most of the recent work is below 3,000′, N. of the shaft. In July, 1920, extensive work was being done at 4,500′. One level is said to be 5,300′ long. The main shaft is to be sunk to 7,500′. Rich ore was said to have been opened in Dec., 1920.

The Pennsylvania incline is 2,600′ deep, but mine is reached through drifts at 3,400 and 4,600′ from the Empire mine. Reliable authority states that this mine will rival the Empire or North Star mines in importance. At 3,400′ the vein is of average width and high grade.

Equipment: includes water-power, 500 h. p. electric hoist at the Empire, capable of lifting 4 tons of ore from a depth of 7,500′, 50-h. p. electric hoist at the Pennsylvania, mine pumps, 4 compressors, crushing stations at the shaft head-frames, machine, blacksmith, and carpenter shops, electric tramway, 80-stamp mill, tables, and cyanide plant, treating 12,000 tons a month from both mines. An extraction of 97% is reported.

Production: from 1850 to 1863, the total was $1,056,234 from 28,100 tons of ore, excluding concentrates; from 1865 to 1878, a total of $1,911,081, also exclusive of concentrates; from 1878 to 1898, about $4,000,000; from 1898 to 1915, about $11,000,000; and from 1915 to end of 1920, about $6,000,000, making a grand total of at least $24,000,000. The 80-stamp mill can crush 80,000 tons per annum.

EMPIRE MINING & MILLING CO. **CALIFORNIA**

Address: 23½ Yakima, Wash. **Mine office:** Yreka, Siskiyou county, Cal.

Officers and directors: L. F. Brams, pres.; John S. Miller, v. p.; H. H. Dean, treas.; with J. C. Steinson and John H. Corbett, directors. G. S. Staley, sec.; J. C. Hubbert, supt., Yreka, Cal.

Inc. 1916, in Washington. **Cap.** $750,000; $1 par; increased from $500,000, Jan. 31, 1921. Annual meeting first Tuesday in January. Expenses in 1920 were $13,459.

Property: 25 claims, 2 miles from Yreka, also 2 patented claims, 7 miles from Yreka. Main group shows a gold vein in diorite, the ore running from $2 to $15 in gold per ton.

Development: totals 8,800′ of tunnels, the longest 2,300′. Also 1,050′ shaft work and 7,500′ open-cut, deepest shaft, 600′. Company claims to have 50,000 tons of ore blocked out.

Equipment: electric hoist, small compressor, and a 5-stamp pilot mill.

EMPIRE WEST MINES CO. **CALIFORNIA**

Address: J. W. Ward, sec, 375 Sutter St., San Francisco. E. L. Eyre, pres.

Inc. 1903, in Calif. Closely allied with the Empire Mines & Investment Co.

Property: the Omaha Consolidated, merged with the Menlo Mining Co. in 1896, in Grass Valley district, Nevada county, shows 3 main veins of quartz, carrying free gold and up to 4% sulphides. The Omaha vein outcrops in granodiorite, but enters diabase above No. 10 level.

Development: by 1,575′ shaft in the Omaha, 1,000′ shaft in the Homeward Bound. Workings totaled 10,555′ from 1899 to 1906.

Production: estimated to total $3,500,000 since 1857.

ENCINITAS COPPER CO. **CALIFORNIA**

Letters returned 1921 from former **office:** 715 Timken Bldg., San Diego, Calif., and from mine address, Encinitas, San Diego county, Cal.

Property: 8 miles east of Encinitas shows a vein in diabase and porphyry, said to carry 4% copper, 5 oz. silver and $4 gold.

Tests have shown the ore amenable to flotation and a 50-ton plant was to be installed 1917, but nothing more has been reported.

ENGELS COPPER MINING CO. **CALIFORNIA**

Office: 393 Mills Bldg., San Francisco. **Mine office:** Engelmine, Plumas county, California.

Officers: Henry Engels, pres.; F. Klamp, v. p.; E. E. Paxton, treas.-gen. mgr., with Richard Spreckles, I. J. Truman, Jr., J. F. Humburg, O. G. Traphagen, G. T. Cameron and C. Hedemann, directors. L. A. Bell, sec.

Operating staff: R. A. Kinzie, sup. eng.; W. R. Lindsay, supt.; J. J. Barrett, foreman at Engels mine; W. E. Kyle, foreman at Superior mine; W. J. Nelson, mill foreman.

Inc. 1901, in California. **Cap.** $2,000,000; $1 par. Increased August 5, 1919, to $5,000,000; 2,194,757 issued. Stock listed on Honolulu Exchange.

Financial Statement, years ending Dec. 31:

Assets.

Year	Property	Plant and Equipment	Investments	Current	Deferred Charges	Sundry	Total
1920	$1,070,333	$1,276,369	$432,500	$864,848	$272,693	$59,654	$3,916,745
1919	1,039,626	1,072,915	432,500	825,306	223,827	94,140	3,688,315
1918	1,026,838	996,919	432,500	531,681	164,778	33,112	3,185,830
1917	812,256	1,172,217	359,000	518,647	197,616	.....	3,059,736
1916	809,532	1,100,772	180,000	807,879	352,432	225,500	2,659,583

Liabilities.

	Capital	Reserves	Current	Undivided Profits	Sundry	Total
1920....	$2,596,800	$1,049,913	$115,927	$ 59,654	$93,051	$3,916,745
1919....	2,194,757	1,009,634	161,177	115,797		3,688,315
1918....	1,808,621	872,741	324,585	179,882		3,185,830
1917	2,000,000	443,492	132,235	400,210		3,059,736
1916....	2,000,000	172,716	108,951	377,915		2,659,583

Profit and Loss.

	Sales of Products.	Operating Etc. Charges	Profit	Deductions for Reserves	Balance from Previous Year	Dividends	Undivided Profits
1920.....	$1.130.958	1,077,837	$88.055	111.851	115,797	.....	59.654
1919.....	1,214,365	1,026,662	187,702	179,032	107,128*	.....	115,797
1918.....	1,781,637	1,302,464	479,173	$429,249	$400.210	$270,253	$179.882
1917.....	1,307,124	717,116	590,007	272,459	377.915	295.253	410,210
1916.....	1,039,516	487,947	551,569	155,703	115,501	133 451	377,915

*Charges against surplus deducted.

Depreciation is at the rate of 5% for buildings, 15% for machinery, and 20% for equipment.

Dividends: paid 1½% per share monthly from July 20, 1916, to Oct 20, 1918. Dividends suspended 1919 until copper market and cost conditions improve.

Property: 157 claims (about 3,245 acres), 23 of which, or about 475 acres, are patented. Also 990 acres of ranch lands acquired for tailings and timber. Part is leased at an annual rental of $2,700. The claims consist of groups—Engels and Superior, 2½ miles apart. The elevation is 5,263'. The property is 22 miles from Paxton on the Western Pacific R. R., Plumas county.

Geology: the copper belt is 1,800' wide on the Engels group, runs N. E. S. W., with a westerly dip, and has been developed for over 3,000' and is well adapted for development by tunnels. Orebodies consist of large lenses in porphyry, alongside of diorite dikes. Ore contains bornite, with some chalcocite and chalcopyrite, and averages 2¾% copper. A carbonate capping overlies a portion of the orebody, with sulphide ore at shallow depth. The geology has been the cause of considerable discussion.

Development: at Engels mine, amounts to five miles of drifts, crosscuts, and raises. One tunnel is 4,000' long, attaining a vertical depth of 700'.

The Superior mine, opened in the summer of 1916, has a 1,400' main tunnel, crosscutting the general strike of the ore zone. About 5,000' of tunnels has been driven. Orebody averages 2% copper, with large lenses of ore running from 15 to 20%.

New work totaled 8,823′ in 1920; in 1919, it amounted to 4,310′ of drifts, etc., 3,791′ of drilling in the Engels mine, and 2,833′ and 1,037′, respectively, in the Superior mine. The 2 mines produced 206,440 and 78,672 tons respectively in 1919 and 149,583 and 90,029 in 1920.

Three-compartment shafts have been sunk at both Engels and Superior mines, to reach orebodies at lower levels already proved by drilling. A 7,600′ adit is being driven 500′ below present workings; this will concentrate operations and do away with pumping.

Ore Reserves: Dec. 31, 1920, were 2,271,290 tons, including 382,483 tons of broken ore in stopes and 1,438,807 tons blocked out above the stopes between levels plus 450,000 tons of probable ore. This does not include ore, indicated by diamond-drill work beyond the present stope areas.

The manager states, "The Engels copper mine to-day has enough high-grade ore in one solid block, actually proven above the sixth level in the Superior mine, to more than pay for, at the present market price, all the company's stock now in the hands of the public. In spite of the laber shortage which has been acute, we have added 500,000 tons to our proven ore reserves, since Jan. 1, 1920 and should operating conditions not become worse, we confidently expect to add another 1,000,000 tons to our blocked out reserves before the end of the year."

Equipment: includes 1,000-ton Minerals Separation oil-flotation plant at the Superior mine (the Engels mill has been dismantled), 2½ miles of aerial tramways; 400 h. p. hydro-electric plant; 6 air-compressors with total capacity of 6,000′ per minute; two large double-drum hoists; trolley and storage battery locomotive; sawmills, complete shops; 2 up-to-date stores; recreation hall; fifty-two 5 room and eight 3-room houses rented to families at $6 to $10 per month; two-men rooms in the bunk-houses, hotel, etc. Board is supplied at both camps for 300 men at $1 per day, although it costs the company $1.60 per man. In Dec., 1920, the estimated efficiency was 80% of the pre-war standard. The company has spent $2,379,269 on its property.

Company controls 22 miles of standard-gauge railroad running from the mines to Paxton on main line of the Western Pacific, in Feather River canyon. This cost about $400,000, is well equipped, and is clear of bonded and other indebtedness.

Power used is hydro-electric, partly from company's own plant, but mainly from the Great Western Power Co.'s Las Plumas plant, from which transmission line costing $200,000 was built to the Engels property in 1917

Production and costs:

The monthly demand is 1,000,000 k. w. hr., at a cost of $14.600. The new rate is 0.7 cents per k. w. hr. for over 500,000 k. w. hr. per month.

Year	Ore Milled, tons	Copper, %	Recovery %	Copper, lb.	Silver, oz.	Gold, oz.	Cost per lb. cents
1920	239,612	2.21	.....	8,571,569	119,165	1,218	.....
1919	245,111	2.05	73.17	8,628,457	113,510	1,092	16.51
1918	265,866	2.23	77.94	9,419,957	119,708	1,108	19.58
1917	155,433	2.31	.....	5,940,741	.....	.....	.....
1916	138,712	2.28	71.63	4,312,408	.....	.....	14.84
1915	59,714	.....	.....	2,893,133	.....	.....	.....

From 450 to 500 men are employed.

ENTERPRISE GOLD MINING CO. — CALIFORNIA

Probably defunct.

Property: the Enterprise mine, 160 acres, in East Fork district, 7½ miles north of North Fork, in the Trinity Forest Reserve, Trinity county.

See Vol. XIV. of this manual.

ESTABROOK GOLD DREDING CO. — CALIFORNIA

Address: L. E. Richards, Trinity Center, Trinity county, Calif. F. W. Estabrook, treas., Nashua, N. H.

Inc. 1917, in Maine. **Cap.** $20,000.

Property: a dredging area on North Fork of the Trinity river, 28 miles from Delta, on the S. P. R. R.

Equipment: electric power totaling 1,590 h. p. and the largest capacity gold mining dredge in the world, a Bucyrus, which started work in May, 1920. The boat was designed to dig 45′ below water-level, which may be extended to 55′. Its normal capacity is 400,000 yd. per month. The boat weighs over 1,200 tons. The gold-saving tables have an area of 4,400 sq. ft. Handled 1,502,860 cu. yds. of stream gravel in 1919, and a large production is reported for 1920.

ESTELLE MINING CO. **CALIFORNIA**

Office: 803 H. W. Hellman Bldg., Los Angeles, Calif. Roy S. Troeger, supt.

Officers: R. C. Troeger, pres.-gen.-mgr.; Alfred H. McAdoo, sec., Adolph Ramish, treas.

Inc. 1902, in California. **Cap.** $100,000, $1 par; 98,013 shares issued.

Property: 41 claims, over 700 acres, including the Morning Star, Rochelle, Shamrock and Southern Cross groups in the Cerro Gordo district, Inyo county, 4 miles E. of Keeler. Property adjoins, and is the S. extension of the Cerro Gordo mine.

Ore: occurs in fissure veins and replacements in limestone, carrying silver and lead, also gold, copper and zinc.

Development: by a 520′ shaft and the 7,300′ Troeger tunnel, 2,200′ below the Morning Star adit. Seven veins are reported to have been cut, carrying both shipping and concentrating ore. Veins have stoping backs in virgin ground of 3,500′ above the Troeger tunnel. In August, 1920, a drift from the 100′ winze below the Morning Glory adit had opened 75′ of ore. The shoot is from 9 to 16′ wide, averaging $45 per ton in gold, silver, and lead.

Equipment: electric power, etc., and 7,100′ aerial tram from Morning Star adit to bins on the railroad at Keeler.

Production: normally about 20 tons daily, but operations curtailed 1920, owing to high costs, being as follows: gold, 231.65 oz.; silver, 49,975 oz.; copper, 36, 398 lb.; lead, 162,157 lb. Ore goes to Utah smelters.

EUREKA (OR HETTY GREEN) MINE **CALIFORNIA**

Sutter Creek, Amador Co., Calif.

Reopened 1920-21, after many years idleness, and $1,000,000 spent in extensive development and diamond drilling.

Nothing of value was found and the enterprise was abandoned

FAIRVIEW MINING CO. **CALIFORNIA**

Reorganized in 1914 as **Calumet & California Mining Co.**, which see.

FEATHER RIVER COPPER CO. **CALIFORNIA**

Address: Geo. W. Long, Heard Bldg., Phoenix, Arizona. H. E.Bush, supt.-v. p .;Fred J. Elliott, sec.-treas.

Inc. 1919, in Arizona. **Cap.** $1,000,000; par $1; 312,500 shares issued for property. New York interests carrying development cost.

Property: 19 claims, includes the Snowstorm mine, adjoining the Engels Copper Mng. Co. claims.

Development: by 2,000′ tunnel, to reach orebody 1.000′ below surface when about 2,500′ long. At 500′, a leached zone was entered, assaying 1% copper and $1.50 per ton in gold and silver. At 600′, chalcopyrite was exposed. High grade bornite and copper pyrite ore was cut 1921, in diamond drill work.

Equipment: electric power from Great Western Power Co., transformers, 300 cu. ft. Sullivan compressor, machine-drills, etc.

The owners are not booming the work, but are quietly spending $100,000.

FIRST NATIONAL COPPER CO. **CALIFORNIA**

See Balaklala Cons. C. Co.

Office: 111 Broadway, New York. **Mine nad works office:** Coram, Shasta county, Cal.

Officers: Thos. W. Lawson, pres.; Wm. A. Kerr, v. p. and treas.; A. R. Buchanan, sec.; preceding, with H. W. Hoops, E. H. Whiting, John A. Young, and E. M. Buchanan, directors. S. A. Holman, gen. mgr.

Inc. Jan. 20, 1908, in Nevada. **Cap.** $3,000,000; $5 par; assessable; paid in $3.75; 600,000 shares outstanding. Cash, bills and accounts receivable Dec. 31, 1919, were $217,405, compared with $170,849, June 30, 1918. Liabilities, $4,017.

Is said to have 4,000 shareholders, including American Smelters Securities Co., owning 80,000 shares. Stock is listed on the New York and Boston curbs. Empire Trust Co., New York and State Street Trust Co., Boston, registrars; Registrar & Transfer Co., New York, and International Trust Co., Boston, transfer agent. Annual meeting last Thursday in October, at Carson City, Nev.

Is a holding company, owning the entire capital stock of the Balaklala Consolidated Copper Co., which in turn owns the entire capital stock of the Coram Water Co., and other subsidiaries, and a third interest in the Balaklala Central Mining & Smelter Co.

Dividends: 25cts., Aug., 1916; 40cts. Aug., 1917; 30cts. in 1918; 15cts. Feb. 15 and Aug. 25, 1918, and Feb. 25, 1919.

The mining property and smelter are described under the above titles.

The Balaklala Consolidated Copper Co. had a bond issue of $1,500,000, which was paid by the First National, in 4 annual installments of $375,000 each. The First National authorized, 1909, a $1,000,000 bond issue, flotation of which was a failure, but pledged some of these bonds for a loan of $375,000, which loan presumably was paid by the proceeds of the last assessment. Property fully described under **Balaklala Consolidated Copper Co**

FIVE BEARS MINING CO. **CALIFORNIA**

Office: 838 National Life Bldg., Chicago, Ill. **Mine office:** Genesee, Plumas county, Cal.

Officers: F. A. Meidinger, pres.; A. Vermaas, sec.; J. D. Meidinger, treas.; preceding, with G. H. Goodhue, directors.

Inc. April 10, 1903, in South Dakota. **Cap.** $2,500,000; shares $1 par, issued, $2,428,174.

Property: 10 claims, 9 patented, 204 acres, well timbered, in Plumas county, 3 miles S. E. of Genesee and 18 miles from Keddie on the W. P. R. R. Ore contains chalcopyrite and chalcocite. The main vein is from 9 to 13' wide, assaying from 5.5 to 2.3% copper. From 1876 to 1893 the gossan was worked for gold.

Development: by 2 tunnels, 380' and 1,540' long. Mine has about 4,000' of workings, estimated to show 80,000 tons of ore, with 9,500 tons blocked out for stoping.

Equipment: includes a 50-h. p. water plant, a 2-drill air compressor, ten 700-lb. stamps, tables, and electric light plant. There are 11 buildings. Operated under a bond and lease with 25 to 30 men employed in 1917. Idle since.

FIVE PINES MINING CO. **CALIFORNIA**

Address: Five Pines, Trinity County, Calif. H. J. Van Ness, pres.; L. Van Ness, mgr.

Property: located in 1896, is on the N. E. side of Van Ness creek, about 1½ miles above its mouth and 2 miles N. W. of Minersville, Trinity county. Mine is said to have produced to 1915 almost $300,000, and to be the best producer of the district.

Ore: free milling gold quartz with calcite, occurs in a series of pockets in a contact vein between meta-andesite and overlying slate and sandstone.

Development: 225' incline shaft with a level at 125'.

Equipment: includes a small hoist and 2-stamp mill. Coarse gold and 80% of total value is recovered in hand mortar. Water power is used.

Employs 4 men. See U. S. G. S. Bull. 540, p. 73, and Mines & Min. Res. of Trinity Co.

FORKS OF SALMON RIVER MINING CO. CALIFORNIA

Address: 544 Market St., San Francisco, Calif., or J. D. Hubbard, supt., Sawyers Bar, Siskeyou Co., Cal.

Officers: B. M. Newcomb, pres.; A. C. Aiken, sec.

Inc. Nov. 1, 1909, in California. **Cap.** $200,000; $1 par; all issued.

Property: two mines, one a hydraulic mine, located on the North Fork of the Salmon river, 14 miles from Sawyer's Bar, Siskiyou county, and the other an old quartz mine near Sierra City, Sierra county.

Development: at the quartz mine is by 3 tunnels 1,700', 1,300', and 2,500' long, one with a back of 1,500'. Ore occurs in a shoot 6' wide and 600' long, that averaged nearly $20.

The placer mine is the largest in America, operating all the year. It comprises 520 acres of old placer locations, which were rich diggings in early days, with control of 4 miles of old channels and bars along the north fork of Salmon river. Bedrock is schist, covered by 20 to 60' of gravel. Three No. 5 giants with 6" nozzles, under 235' head handle 30,000 cu. ft. a month. The main flume carries 3,000 miner's inches of water, and the lower flume 2,000 inches. Equipped also with an 18" elevator and a water-power derrick handles rocks up to 7 tons.

Production: $250,000 in 1921.

FOSTER GOLD MINING CO. CALIFORNIA

Office: 112 Steward St., San Francisco. **Mine office:** Carrville, Trinity county, Cal.

Officers: C. T. Foster, pres.; E. E. Tway, v. p.; E. N. Harmon, sec.-treas. **Directors:** above with D. W. Rason, A. E. Gillespie, O. A. Kish, supt.

Inc. Nov., 1912. **Cap.** not stated. Is a close corporation with four principal stockholders. No bonded debt or chattel mortgage.

Property: 147 claims in Trinity Center district, Trinity county, as follows: 116 mining claims, 28 mill sites, and 3 placer claims. The mining claims comprise two groups, the Bonanza King, and the Bonanza Queen; they show a vein in gabbro, with course N. 53° W., and dip 60° N. E., which carries free gold. Length of vein within property stated to be 24,000'. High-grade ore occurs where the vein is crossed by a basic dike now serpentinized.

Development: entirely by tunnels, giving backs of 1,200'.

Equipment: includes 100 h. p. compressor and a 20-stamp mill. Through a subsidiary, the company owns an hydro- electric power plant of 1,000 h. p., concrete dam, flume, ditches, etc.

Production: company reports that ore worth $600,000 has been taken out of No. 2 tunnel and states that ore reserves blocked out aggregate 92,300 tons.

No 1920 information.

FRANCES COPPER MINING CO. OF CALIFORNIA CALIF.

Address: Thos. Allison, pres., 1117 Trust & Saving Bldg., Los Angeles, California.

Inc. Nov., 1915, in California. Cap. $100,000; 10c par; assessable; all outstanding.

Property: 2 claims in Kelso district, San Bernardino county.

Company does not reply to requests for information.

FRANCO-CONTENTION MINING CO. CALIFORNIA

Office: Casper, Wyo. **Mine** address: Stent, Cal.

Officers: W. D. Waltman, pres.; B. O. Lummis, sec., Casper, Wyo.

Inc. 1914, in Wyoming **Cap.** $200,000; $20 par.

Property: a gold mine. 180 acres, on Knight creek, Tuolumne county, closed down for duration of the war, and no later returns.

FREMONT CONSOLIDATED MINING CO. **CALIFORNIA**

Operated under lease by **Metals Exploration Co.**

Offices: 24 Market St., San Francisco, and Amador City, Amador Co., Cal.

Officers: C. M. Gooddall, pres.; G. N. Nash, sec.

Inc. 1899, in California. **Cap.** $500,000; shares $2.50 par. Reported to have paid $316,000 in dividends.

Property: 4 claims, 4,200′ on the Mother Lode, at Drytown, Amador county, 1½ miles north of Amador City, shows gold ore occurring in contact of black slate on the west, and metadiabase on the east. Vein strikes N. 25° W., dip 50° E., and has an average width of 6′. West of the main vein ore has been developed in schist. Orebodies occur as lenses, the ore being in the form of quartz stringers, cutting the schist. The rock is highly mineralized with pyrite.

Development: by the Fremont shaft, 2,950′ deep, sunk on a 51° incline, and the 1,500′ Gover incline north of the Fremont shaft. There are several miles of underground workings.

Equipment: includes a steam hoist at each shaft and a 40-stamp mill. Oil is used as fuel.

Mine was closed down in winter of 1918 due to high cost of gold mining, but was unwatered late 1920, machinery overhauled, and in 1921 development and exploration at greater depth started in the Fremont shaft.

FRIDAY COPPER MINES CO. **CALIFORNIA**

Address: 4479 Trias St., San Diego, Calif., also Friday Copper Mine, Julian, San Diego Co., Calif.

Officers: W. E. Sterne, pres.; L. A. Ellis, sec.

Inc. 1914, in Calif. **Cap.** $10,000; $1 par; all issued.

Property: 4 miles S. of Julian and 64 miles from San Diego. Ore is closely similar to that of Sudbury, Ontario, and carries 6% nickel, with but 1% copper. Ore is 35% sulphide. Described in U. S. G. S. Bull. 640, p. 77.

Development: by 250′ shaft and tunnel. Developing.

FRIDAY-LOWDEN COPPER CO. **CALIFORNIA**

Dead. See description in Vol. XIII.

GARDELLA DREDGING CO. **CALIFORNIA**

Address: Lawrence Gardella, owner, Oroville, Calif.

Operates 2 dredges. Active in 1920. On Clear creek, near Redding, Shasta county.

GASTON GOLD MINING CO. **CALIFORNIA**

Address: E. J. McCutcheon, pres., 1107 Merchants Exchange Bldg., San Francisco, G. W. Star, mng. dir., Grass Valley, Calif. W. H. Williamson, supt.

Property: 26 claims, 1200 acres, 6 miles N. E. of Washington, Nevada county. Of the 8 known veins, 2 are worked, the Gaston and Gambrinus. The former occurs at contact of slate and granite, and is 2 to 10′ wide; the Gambrinus 4 to 6′ wide.

Development: by a 2,600′ adit and 4,876′ drain tunnel, 800′ below the adit, both connected by a winze. The drain tunnel cut the Gaston vein at a depth of 800′ below the adit, but it was barren. In 1914, a short crosscut opened 6′ of ore showing free gold. This tunnel failed to open any ore in the Gambrinus vein. Reserves are given as 100,000 tons, averaging $4 per ton.

Equipment: costing over $200,000 includes a 120 k. w. hydro-electric power-plant, and 75 k. w. steam electric auxiliary, water-driven compressor, 10-stamps, Hardinge mill, plates, tables, shops and dwellings.

Production: about $1,000,000 from 174,000 tons of ore during 1899-1907. From 1908 to 1914 operations were suspended, and again from 1918 to 1921.

GENESEE VALLEY COPPER CO. **CALIFORNIA**

Address: Melvin Smith, pres., Sioux City, Iowa.

Inc. Nov. 1, 1909, in Nevada. **Cap.** $2,000,000; shares $1 par, non-assessable; issued $1,000,000. Annual meeting, August 1. Properties have been transferred to Mel. J. Smith, trustee, to satisfy creditors' demands.

Property: 12 claims, 240 acres, in 3 groups, and a 120-acre mill site. The country rock is meta-andesite and sandstone, showing small amounts of bornite, disseminated in a porphyry dike.

Company also owns the Native Son mine, 5 claims, adjoining the Gruss mine, 3 miles E. of Genesee, Plumas county, and 18 miles from Keddie, on the W. P. R. R.

Development: by 200' tunnel and 45' shaft opening a quartz vein in slate and altered andesite, carrying chalcopyrite.

GEORGIA SLIDE MINING CO. **CALIFORNIA**

Address: I. B. Brown, Georgetown, Calif.

Property 1½ miles N. of Georgetown, Eldorado county. The Bebee, Milvey Point, Eureka, and Pacific mines were taken over. Considerable exploration has been done. A zone of schist and slate traverses a porphyry belt, and is intersected by numerous gold-bearing quartz seams. Possibilities fair. Idle.

GHOST MINE **CALIFORNIA**

Railroad Flat, Calaveras Co. Reopened, 1921.

GIANT LEDGE GOLD & COPPER CO. **CALIFORNIA**

Idle for 9 years. Probably defunct. See Vol. XII and XIV. Mail unclaimed.

GIBRALTAR CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Address: Jacob Kieffer, pres.; W. I. Redding, sec., both of Downieville Sierra county, Calif.

Inc. 1881, in California, reincorporated in 1893. **Cap.** $250,000 50¢ par; 350,000 shares issued.

Property: 1,120 acres, covering 2 miles of an ancient channel, which lies on slate and has an overburden of andesite.

Development: by 3 tunnels, raises, and 310' shaft to bedrock. August, 1920, shaft had been unwatered and prospecting resumed.

GLOBE CONSOLIDATED LEASE, INC. **CALIFORNIA**

Out of business. See Vol. XIV.

GLOBE CONSOLIDATED MINING CO. **CALIFORNIA**

Out of business.

GLOBE GOLD MINING CO. **CALIFORNIA**

Address: 519 Beacon St., San Pedro, Calif.

Officers: E. A. Mills, pres.; W. B. Duncan, sec.

Inc. 1910, in Calif. **Cap.** $100,000; 10¢ par. Annual meeting, June.

Property: 6 claims, near Kelso, San Bernardino county, developed by tunnel, connecting with shaft.

GLOBE MINE **CALIFORNIA**

Mine acquired in 1919 by Metals Exporation Co., and sold late in 1920 to J. N. Kilner of New York, and Chas. Farmer of Hayfork. Property in Trinity county is credited with total output to date of $750,000.

GOLD BAR MINING CO. **CALIFORNIA**

Office: 255 California St., San Francisco, Calif.

Officers: J. J. McIntire, pres. and gen. mgr.; W. N. Lamb, v. p.; H. Easom, sec.; with W. P. Madill and Floyd Seger, directors.

Inc. Aug. 31, 1915, in California. **Cap.** $75,000; $1 par; 41,020 shares issued.

Property: 393 acres, patented, and 234 unpatented, in Railroad Flat, 30 miles from Valley Springs, Calaveras county. Proposed to develop a lava-capped drift-gravel channel, and wash gravel by improved method, the drop system. A sketch in prospectus indicates great optimism. No record of operations.

GOLD BASIN MINING CO. **CALIFORNIA**

Address: P. O. Box 713, El Centro, Calif.

Officers: George J. Shank, pres., A. A. Gibson, v. p.; Frank Birkbouser, sec., Brawley, Calif.; South Trust & Commerce Bank, treas. J. L. Taecker and S. T. McClintock, directors, all of Brawley.

Inc. Dec. 20, 1918, in Calif. **Cap.** $250,000; $1 par; 150,000 issued. Is a close corporation.

Property: 6 claims in mountains east of Glamis, covers a gold-copper quartz vein in granite, opened by 1,500′ of workings.

GOLD DOLLAR MINE **CALIFORNIA**

Address: Zimmerman & Anderson, Box 143, Redding, Calif.

Property: 14 claims, at Shasta, Shasta county, showing 5′ of ore, averaging $21.60 per ton; 20,000 tons, shipped by former owners to Keswick. Employs 2 men, working in 3,000′ tunnel.

GOLD DRIFT MINING & MILLING CO. **CALIFORNIA**

Address: L. C. Brickhouse, 936—8th St., Oakland, Calif., or I. O. O. F. Bldg., Reno, Nevada.

Mine address: Chas. Haas, supt., Quincy, Calif.

Officers: L. C. Brickhouse, pres.; Chas. Haas, sec. with Joe Mattos and Gurney Newl, Berkeley, Calif., directors.

Inc. Oct. 1, 1913, in Nevada. **Cap.** $1,000,000; $1 par; 50,000 issued.

Property: 20 claims, 5 patented, 125 acres, at Nelson Point, Plumas county, on middle Feather River, shows a quartz vein, 30′ wide in places, averaging $18 per ton in gold, silver and copper values.

Development: by several short tunnels. Has small Gibson concentrator, handling 18 tons daily, but the total output was but 250 tons in 1920.

GOLDEN CENTER MINING CO. **CALIFORNIA**

Officers: care White, Howard & McCormick, 607 J St., Sacramento; and Grass Valley, Calif.

Officers: Rodney McCormick, pres.; J. W. Howard, sec.; with Albert Bellania and G. H. Alltucker, directors. E. R. Abadie, Jr., supt.

Inc. 1913, in Calif. **Cap.** $300,000; $1 par; 285,000 issued.

Property: 150-acres, including ground under the town of Grass Valley, Nevada county.

Development: by over 6,000′ of workings, with 1,860′ main shaft. The flow of water is 340 g. p. m. The main shoot has been stoped from the 500′ to the 900′ levels, inclusive, N. of shaft.

Equipment: includes pumps, hoist, compressor, 20-stamp mill, etc. Cyanide plant to be erected.

Production: good yields were made for a time, enabling a dividend to be paid, and many improvements to be made; but in 1918 the $5.80 ore being mined did not pay operating expenses and asessments were levied to pay for further development. In May, 1919, work was confined to upper levels on account of insufficient pumping facilities to keep lower workings unwatered. In August, it was decided to suspend operations until financial arrangements could be made for putting in an adequate pumping system. Property in good hands.

GOLDEN GATE EXPLORATION CO. **CALIFORNIA**

Dead. Fully described in Volume XIV. Operated the Sheep Ranch mine in Calaveras county at a loss of $77,090 in 1919, selling only $10,434 worth of bullion. Option on property and all assets acquired first by The California Syndicate, and later, July, 1920, by the **Montacali Mines Syndicate,** which see. Reported that Golden Gate shareholders were to receive their pro rata of 35,000 fully paid shares of California Syndicate stock.

GOLDEN STREAK CONSOLIDATED GOLD MNG. CO. **CALIFORNIA**

Address: Henry Labner, pres., or F. H. Schulze, sec., Colfax, Calif.

Inc. 1916, in Calif. **Cap.** $100,000; $1 par; issued 6,650.

Property: 240 acres, 150 patented, in the Iowa Hill district, Mono county.

GOLDEN WEST TUNNEL MINING & MILLING CO. CALIFORNIA

Address: P. A. Coady, 709 Haas Bldg., Los Angeles, Calif. **Mine address:** Needles, Calif. **Officers:** Chas. P. Blanton, pres., Oatman, Ariz.; A. Rossiter, gen. mgr., sec.-treas.; Jos. Onetta, supt. Company issued 100,000 shares each to T. A. Dumont and H. C. Adams for claims and sold 50,000 shares at 50¢ for development and plant.

Property: 17 patented claims, in the Ibex district, San Bernardino, at north end of Manchester Mt., 26 miles from Needles.

GOLD EXPLORATION CO., THE CALIFORNIA

Address: F. O. Richardson, mgr., Downieville, Sierra county, Calif.

Inc. 1919, in Utah. **Cap.** $150,000.

Property: the Alhambra, Comet and Sovereign groups, 14 claims, in Ladies Canyon, in the Sierra City district. The Alhambra has a quartz vein in a serpentine-slate contact, containing gold, pyrite and galena; the Sovereign shows a fissure vein cutting across the slate, carrying free gold, 3% pyrite, and galena.

Development: by about 2,500′ of workings. In 1920, new work exposed a 30′ vein for a distance of 200′, with shoots of rich ore.

Equipment: water-power, air-compressor, 3 rolling mills, and other machinery.

GOLD MOUNTAIN HYDRAULIC & DREDGING CO. CALIFORNIA

Address: G. W. Fagg, 203 Grant Bldg., Los Angeles, Calif.

Officers: S. D. Graves, pres.; J. B. Tibbot, sec.

Inc. 1908, in Calif. **Cap.** $1,000,000; $1 par.

Property: 440 acres in the Edmonton district, 23 miles S. of Quincy, Plumas county, at elevation of 5,400′. Deposit consists of gold bearing gravel on slate and schist bedrock. Two giants with water under a 120′ head, are used for sluicing. Daily capacity is 1,000 cu. yd. Production is small.

GOLD POINT CONSOLIDATED MINES, INC. CALIFORNIA

Company disincorporated and property taken over by **Idaho Maryland Mines Co.**

GOLD QUEEN MINING CO. CALIFORNIA

Address: 54 Broad St., Bangor, Maine.

Officers: Lester R. Wiley, pres.; Groveland, Calif.; Jas. A. Dunning, sec.

Inc. 1905, in Maine. **Cap.** $4,000; $100 par.

Property: near Sonora, Tuolumne county.

GOLD REEF CONS. MINES CO. CALIFORNIA

Address: A. G. Allen, 399 Savin Bldg., Pasadena, Calif.

Officers: S. S. Wold, pres.; C. W. Post, v. p.; E. S. Harwood, sec.; E. P. Kepner, supt.

Inc. 1919. **Cap.** $200,000. The Tom Reed M. Co. has a $29,574 investment in company including a $4,000 assessment paid in 1920-21.

Property: the Clipper Mountain and Gold Reef mines, at Danby, San Bernardino county.

Reported early in 1920, that company was reopening the Clipper Mtn. (q. v.) mine.

GOLD STAR MINING CO. CALIFORNIA

Property acquired by **Mugwump M. Co.**, which see.

GOLD STATE MINING CO. CALIFORNIA

Address: P. O. Box 595, Bakersfield, Calif.

Not incorporated. Organized in 1918. F. G. Brassell, D. Bordagaray and C. P. de Sastlemolino, trustees. G. D. Aldrich, sec.; M. J. Errecart, mgr., Tehachapi, Cal.

Property: 5 unpatented claims in Green Mountain district, Kern county, showing gold ore in vein with granite walls.

Development: 545′ of tunnelling. Plans to build 3-stamp mill.

GOLDSTONE MINING CO. CALIFORNIA

Mail returned from former address: Goldstone, San Bernardino county, Calif. Probably dead.

Officers: F. A. Shorey, v. p.; G. M. Leonard, sec.; W. S. Hubbard, treas.; all of Springfield, Mass. A. E. Turner, cons. engr.

Cap. $2,000,000; shares $1 par.

Property: 14 claims in new Goldstone district, 35 miles from Barstow, developed by shafts and pits. Ore occurs at limestone-diorite contact.

Company well known at Springfield, Mass., on account of queer share dealings by certain firms.

GOLINSKY COPPER CO. **CALIFORNIA**

Dead. Formerly Golinsky Mng. Co., which once owned 14 claims, adjoining the Mammoth mine on the east and 4 miles west of Kennett, Shasta county, said to show an ore shoot 20′ wide carrying low-grade copper ore with gold.

GOLINSKY MINING CO. **CALIFORNIA**

Dead. See Vol. XIV.

GOOD WILL MINING CO. **CALIFORNIA**

Address: J. A. Peterson, pres., Paso Robles, Cal.; Geo. F. Root, v. p.; C. A. Iversen, sec.-treas.; B. F. Mason, supt., and J. A. Peterson, directors.

Inc. Jan., 1918, in Cal. **Cap.** $250,000; $5 par; outstanding 30,000 shares assessable.

Property: a manganese mine, with copper ore, 500 acres in Los Osos valley, San Luis Obispo county, 10 miles N. W. of San Luis Obispo. Copper ore said to average 3%.

Development: by 200′ shaft and 625′ of tunneling, with total of 1,450′ underground workings. There is a 4″x6″ compressor on the property.

Management gives receipts from ore sales as $15,050 for 1918, and ore reserves at 125,000 tons of 3½% ore.

GRASS VALLEY BOUNDARY CO. **CALIFORNIA**

Address: M. H. Brock, mgr., Grass Valley, Calif.

Inc. 1916, in Calif. **Cap.** $300,000.

Property: at Grass Valley, Nevada county, on western edge of camp.

Development: by 200′ shaft, opening 2 veins of gold ore. Dump ore, in part waste, run through new 5-stamp mill, returned about $8.50 per ton.

GRASS VALLEY BULLION EXPLORATION CO. **CALIFORNIA**

Address: G. E. Mainhart, Grass Valley, Calif.

Inc. 1919, in California. **Cap.** $1,000,000; $1 par.

Property: the Bullion group of 4 claims, 2 miles S. of Grass Valley, Nevada county, said to have yielded gold worth $1,000,000; was shut down for 13 years. Company also owns the Diamond mine, ½ mile N. W. of the Bullion.

Geology: a quartz vein, 1-5′ wide, in granodiorite to a depth of 200′, below which it passes into diabase . Ore carries free gold, galena and 4% pyrite.

Development: by 1,500′ inclined shaft and a total of nearly 5,000′ of workings. Stoping revealed ore shoots up to 150′ long. At 1,700′ there is said to be a good block of ore. Mine was unwatered in 1919.

Equipment: steam and electric power, Cornish pump, and 10-stamp mill erected prior to 1906.

GRASS VALLEY CONS. GOLD MINES CO. **CALIFORNIA**

Mine office: 6017 J. St., Sacramento, Calif.

Officers: Rodney McCormick, pres.; Scott Ennis, v. p.; J. W. Howard, sec.-treas., with F. H. Buck, A. E. Nelson, P. Huth, H. Kleinsorge, and S. Jones, directors.

Inc. 1916 in Calif. **Cap.** $900,000; $1 par; 615,709 issued.

Property: 120 acres, including the Allison Ranch mine, 2½ miles W. of Grass Valley, Nevada county which produced gold worth $2,300,000 from 46,000 tons of ore, and paid $1,200,000 in dividends from 1854 to 1866. In July, 1917, the adjoining Benoit tract of 168 acres was bought.

Geology: the vein occurs in an area of granodiorite, and is one of a series of parallel veins, dipping 45° W. Down to 600′ the vein was 18′ wide, and

averages 2′ below it. The quartz gangue carries free gold and 2 to 5% of sulphides. New ore opened 1921 on 600′ level.

Development: by 1,675′ incline and 11 levels, total workings aggregating about 2 miles. The flow of water is heavy, up to 1,000 gal. per minute. In June, 1920, a vein was reported cut by a raise above No. 10 level. A S. W. crosscut from the 600′ level to explore the Croesus and Keystone claims opened ore in January, 1921. A cross-cut on the 1,200′ level into Hartery ground failed to open any shoots. Altogether, over 2,600′ of prospecting drifts were driven in 1920, and some ore milled.

Equipment: 100′ head-frame hoist of 2-ton capacity from the depth of 2,500′, 1,500 cu. ft. and 500 cu. ft. compressors, boilers, crusher, 20 heavy stamps, 5 Frue vanners, and 100-ton cyanide plant.

Recent production figures not available. Company has spent about $800,000 on reopening this property.

GRAY EAGLE COPPER CO. **CALIFORNIA**

Office: 14 Wall St., New York.

Officers: Frank W. Holmes, pres.; Henry E. Dodge, sec.

Inc. 1916, in Maine. **Cap.** $1,000,000; $10 par; all issued. Entire stock issue owned by **Mason Valley Mines Co.** and property described thereunder.

GREAT EASTERN QUICKSILVER MINING CO. **CALIFORNIA**

Address: Guerneville, Calif.

Officers: George Roeth, pres., 450 Mountain Ave., Oakland, Calif.; Geo. Roeth, Jr., sec.

Inc. in Calif. **Cap.** $100,000; par $1.

Property: a quicksilver mine near Guerneville, Sonoma county, operated since 1875. Credited with production of 42,092 flasks to end of 1917. Inactive since March, 1919.

GREENBACK COPPER CO. **CALIFORNIA**

Dead. See Vol. XIV. Once worked same mine as Weringer Mines Co., at Woody, Calif.

GREENBLOWER MINING CO. **CALIFORNIA**

Address: H. J. Greenblower, Meadow Valley, Plumas county, Calif.

Property: a placer mine near Mt. Ararat, 23 miles from Quincy, Plumas county. Gravel available for hydraulicking is estimated at 500,000 yards. A concrete restraining dam, ditch, pipe-line, and wagon-road were planned at last account.

GREEN HORN MOUNTAIN COPPER CO. **CALIFORNIA**

Property acquired by **Atascadero Copper Co.**, which see.

GRIT GOLD MINING CO. **CALIFORNIA**

Address: Box 436, Sacramento, Calif.

Officers: Walter P. King, pres.; Chas. E. Swezy, sec.; Walter King, supt.

Inc. 1920, in Calif. **Cap.** $150,000; 10¢ par; 687,500 shares issued.

Property: in Spanish Diggings district, El Dorado county, 14 miles E. of Auburn, said to show 7-8′ veins of high-grade gold ore.

In 1921, a 5-stamp mill was erected. Production of $10,000 in bullion up to September reported.

GRIZZLY FLATS GOLD MINING CO. **CALIFORNIA**

Mail returned from former address: 638 Sacramento St., San Francisco, Calif.

Officers: F. C. Van Schaick, pres.; F. M. Hall, v. p.; W. H. Blanchard, sec.; R. H. Wilson, treas.

Inc. May 22, 1916, in Nev. **Cap.** $250,000; $1 par; $106,064 issued. Registrar & Transfer Co., New York, transfer agent and registrar.

Property: gold gravel claims at Grizzly Flats, Eldorado county.

Company attained much notoriety through the stock-selling campaign of R. W. Joy, who in March, 1920, re-joined J. L. Donohue, a promoter, under the guise of A. E. Manning & Co., New York. The New York Curb has given much publicity to these fly-by-night promoters.

GRIZZLY MINING CO. **CALIFORNIA**

Address: Oakland, Calif.
Manager: O. F. Heizer, Tuolumne, Calif.
Inc. 1918, in California. **Cap.** $150,000; all issued; par $1.
Property: 8 claims Tuolumne county. Quartz vein in slate, reported to be 8' wide, carrying free milling gold, assaying $8 per ton.
Development: by 3,000' tunnel with 20,000' of workings.
Equipment: includes 20 stamps, 2 Hardinge mills and a 100-ton cyanide plant.
Operated throughout 1920, with a small production.

GROSS STREET MINING CO. **CALIFORNIA**

Address: 1014 Mills Bldg. San Francisco, Calif.
Officers: E. B. Cushman, pres.; R. W. Bender, v. p.; H. B. Gee, sec.
Inc. 1919, in Calif. **Cap.** $200,000; 20¢ par.
Property: 40 acres, in Tuolumne county, Calif.
Development: by 300' shaft, tunnel and winze.

GROUSE CREEK MINING CO. **CALIFORNIA**

Address: 1014 Mills Bldg. San Francisco, Calif.
Officers: B. C. Brown, pres.; J. W. McCaughey, sec.
Inc. 1906. **Cap.** $50,000; par $1.
Property: an hydraulic gold mine in Klamath river watershed, Siskiyou county.

GRUSS MINING CO. **CALIFORNIA**

Office: 381 Bush St., San Francisco.
Officers: G. Gruss, pres.; W. J. Gruss, v. p.-mgr; with G. E. Hunt, J. L. Moore, and C. H. Snyder, directors. C. E. Hudson, fiscal agent.
Inc. in California. **Cap.** $250,000; 25¢ par. Security Transfer & Registrar Co., New York, and Registration Surety Co., San Francisco, transfer agents and registrars.
Stock manipulated on the San Francisco Stock Exchange to a high of $2.75 in 1920. Quoted at 35c. in 1921.
Property: 5 claims, 98 acres, 2 miles S. W. of Genesee, and 22 miles E. of Keddie on W. P. R. R., Plumas county, located in 1856, and held by the Gruss family since 1881. Examined by H. W. Turner, J. M. Nichol, Errol MacBoyle, and Mr. Miller of the State Corporation Commission (1920).
Geology: the deposit consists of shear-zones of crushed and brecciated slates and schists, near the contact of meta-andesite, with parallel stringers of quartz and calcite. Gold occurs in narrow seams and pockets containing limonite and manganese oxide; copper occurs as bornite, tetrahedrite and chalcopyrite, following calcite seams in altered schists, below 200' depth.
Development: by 400' shaft and tunnels, with a total of over 6,000' of workings. Most of the new work has been on the 200' level. At 350' N., the E. W. vein had been entered for 30', without reaching the hanging-wall, and assayed 20.1% copper, $14.47 gold, and $10.70 silver per ton, equal to a total of $89 per ton. According to H. W. Turner in Sept., 1920, 400 sacks of mill feed from the raise above 200' level assayed 2.96% copper, 0.05 gold and 2.8 oz. silver.
Equipment: a 15-stamp mill, electric power, hoist, compressor, shops. The mill has tube mill, Hendy ball mill, Dorr duplex classifier, and cost $78,000. Treatment of 25 tons daily started by mid-September, 1920, and concentrate was reported to assay 37.1% copper, 3.2 oz. gold and 32.8 oz. silver, worth $232.50 per ton.

GUILDFORD GOLD MINING CO. **CALIFORNIA**

Address: Placerville, El Dorado Co., Calif.
Officers: A. Baring Gould, pres.; E. W. Witmer, sec.
Inc. 1912, in Calif. **Cap.** $100,000; $10 par.
Property: 500 acres, near Placerville, Eldorado county, developed by tunnels.
Has been idle since loss of mill by fire in 1919.

GWIN MINE & DEVELOPMENT CO. **CALIFORNIA**

Address: F. B. Moors, 128 Sutter St., San Francisco, Calif.

Officers: Ansel M. Easton, pres.; J. J. Hachman, sec.

Property: the well-known Gwin gold mine, near Mokelumne Hill, Calaveras county, which, up to the time of closing, 10 years ago, had paid large dividends. Shut down on account of power conditions and want of modern machinery.

Development: reported (see M. & S. Press, July 5, 1919), that there was more developed ore, of better grade, and the mine looked more promising than it had for many years previous to closing down. According to Moors, the bottom of the 2,400′ vertical shaft and 450′ winze below that level show ore-shoots of a combined length of over 450 ft., averaging $10 per ton; also hundreds of feet of $5 ore. These orebodies are practically intact.

Production: about 1,000,000 tons of ore yielding $5,000,000 in gold.

HAMILTON MINING & SMELTING CO. **CALIFORNIA**

Mail returned from company's former office: 119 Golden Gate Ave., San Francisco.

Officers: A. J. Clapham, pres.; H. H. Vail, v. p.; H. W. Royal, sec.-treas., with G. A. Metcalf and J. E. Ramey, directors.

Inc. 1920, in Delaware. **Cap.** $1,650,000; $1 par. National Surety Co., San Francisco, registrar and transfer agent. Campbell, Graham & Co., 128 Water St., New York, fiscal agents.

Property: the Amina group of 14 claims, 280 acres, in the Amalie and Hamilton districts, Kern county. The district shows syenite and slate cut by trachytic dikes and quartz-porphyry cut by diorite dikes. Company's prospectus states 30 surface samples assayed $3.43 to $568.52 per ton; only 6 yielded below $10.

Development: by several hundred feet of tunneling and drifts. Three months' ore supply was reported in July, 1920.

The prospectus, put out by a New York brokerage house, states a carload of concentrate is expected each month, and dividends of 20% on capital probable.

Property may be good, but the company seems to be practically out of business.

HARDENBERG MINING SYNDICATE **CALIFORNIA**

Out of busines. See Vol. XIV.

HARVARD MINE **CALIFORNIA**

Address: J. W. Ferguson, owner, 2718 Hillegass St., Berkeley, Calif.

Property: about 11 claims, and mill sites, on the S. E. slope of Whiskey Hill, one mile S. W. of Jamestown, Tuolumne county, covering 5,000′ along the strike of the veins. The claims were sold to the above in Nov., 1920, for $5,000.

Geology: 3 veins,—the east, central and west—with strike N. 37° W., dip 60° N. E. and average width 10′, have been explored. Central vein consists of solid quartz 6′ to 12′ wide, but values are, as a rule, too low to mine. The east and west veins consist of a mass of quartz stringers cutting the schist and containing free gold. Main footwall is serpentine with hanging-wall of Calaveras slates. Ore occurs W. of the central vein. There are 7 distinct ore-shoots developed on the property ,average length 200′, width 6′. Veins are faulted on S. end of orebody between the 1,200 and 1,400′ levels, and on the N. end between the 1,100′ and 1,200′ levels; they are faulted 8′ to 25′ to the S. W.

Development: 3-compartment shaft (5 by 5′ each), 1,650′ deep, vertical to 700′ then an incline of 58°, with levels at 200′, 500′ 700′, 800′ and below this at 150′ intervals; lowest level is at 1,400′. Total underground workings about 4 miles. Ore pockets, 100 to 200 tons capacity, are in hanging wall of shaft.

HARVARD MINE, INC. **CALIFORNIA**

Property sold in Nov., 1920, to John Ferguson of Berkeley, Calif. See under **Harvard mine.**

HAZEL GOLD MINING CO. **CALIFORNIA**

Address: Box 27, Chico, or French Gulch, Calif. J. O. Jillson, pres.; J. W. Roper, sec.; Hamilton Eddie, supt.

Inc. 1896, in Calif. **Cap.** $900,000; $1 par.

Property: the Gladstone mine, the largest gold quartz producer in Shasta county, 178 acres patented, and 485 acres, unpatented, at 2,300′ elevation, on N. side of Cline Gulch, 5 miles N. E. of French Gulch.

Ore: free milling gold. Two fissure veins with E. W. strike and dip of 60° S. have been mined to 7th level; average width 2½′ to 3′; walls are slate. Ore shoot is 300′ long. Milling ore averages about $10 per ton.

Development: the upper 1,000′ of vein has been mined by tunnels, while lower portion is worked from a winze on the main adit (Ohio) level. On the lowest or 1,300′ level, a 700′ crosscut opened the vein in Nov., 1915. Mine makes about 70 gal. water per minute.

Equipment: includes a 375-h. p. double-drum electric hoist, compressor plant, electric haulage from mine to mill, 9 miles of power and 5 miles of telephone lines. An electrically driven 30-stamp mill is equipped with concentrating tables and electroplating plant. Stamps weigh 1,050lbs., drop 106 times per min., from height of 6″; capacity, 100 tons in 24 hours, through a 40-mesh screen; 92% extraction. Power-house destroyed by fire in 1918; loss $30,000.

Production: precious to 1901, said to be $85,000; 1901-1914 said to be $3,000,000; yearly production was about $360,000.

Mine shut down 1916.

HERNANDEZ QUICKSILVER CO. **CALIFORNIA**

Address: L. B. Ulrey, mgr., King City, Calif.

Officers: M. G. Ramires, pres.; P. Morasci, v. p.; A. E. Ruqualdo, sec.; First Nat'l Bank, King City, treas.

Inc. Dec., 1912, in California. **Cap.** $500,000; $1 par; outstanding $247,421.

Property: 6 claims in New Idria district, San Benito county, at an elevation of 4,500′. For 4 years prior to 1916, a small yearly production was made from ore mined from the outcrop.

Development: by an old 3,000′ tunnel, which opened little ore, and by two 50′ and one 160′ inclines. A shoot about 100′ long on the strike and 3′ thick was being mined in 1915, but no metal has been produced since 1916. Equipment consists of a fine-ore furnace of 4 tons capacity.

HESS GOLD MINES CO. **CALIFORNIA**

Address: Alturas, Calif.

Officers: F. M. Jamison, pres.; A. K. Wylie, sec.-treas.; with I. W. Giblems and S. H. McCartney, directors.

Cap. 1,000,000 shares; $1 par; 40,000 shares offered for sale at 12½¢ each in Nov., 1919.

Property: at Alturas in the Winters district, Modoc county.

Geology: vein is a replacement of the andesite hanging wall, and is from 3 to 10′ wide, carrying silver and gold in about equal proportion. The foot wall is diorite.

Development: by 300′ and 120′ shafts. All ore above 150′ and some down to 200′ has been extracted. The ore is said to have assayed $15.40 per ton on the 150′ level, $12 on the 200′, $20 at 250′, and rich ore is shown at bottom of main shaft. The 120′ shaft is to be sunk deeper and connected with the old workings. The vein has been stoped to the surface.

Equipment: includes steam power, hoist, compressor, stamp-mill and cyanide plant.

C. N. Miller & Co., sponsored the company but this firm is unknown to P. O. carriers at former address, 617 Pacific Bldg., San Francisco.

HETTY GREEN MINE **CALIFORNIA**

See Eureka Mine.

HIDDEN TREASURE GRAVEL MINING CO. **CALIFORNIA**

Address: Harold T. Power, pres.-mgr., 3301 College Ave., Berkeley, Calif. **Mine address:** Bullion, Placer Co., Calif.

Officers: James Nichelson, v. p.; Grace G. Power, sec.

Inc. July 3, 1914, in Calif. **Cap.** $360,000; $10 par. **Dividends:** $525,000.

Property: 1634.5 acres of gold-bearing gravel, 5 miles N. of Michigan Bluff in Damascus district, Placer county.

Development: by 830′ shaft, with 11,000′ of workings opening 5′ of pay gravel on bed rock, said to average $1.50 per ton.

Equipment: 200 h. p. electric plant, hoist, pumps, etc. Daily capacity, 400 tons.

Production: $120,000 to $160,000 yearly when operating, and total of $3,251,633 for Hidden Treasure and $750,000 for Mountain Gate. Idle several years.

HILDA GOLD MINING CO. **CALIFORNIA**

Address: Sierra City, Calif. Samuel H. Dolbear, cons. engr., 625 Market St. San Francisco.

Officers: C. P. Doelger, pres.; L. J. Baumer, v. p.; R. B. Ayres, sec.-treas.

Inc. Oct. 20, 1919, in Delaware. **Cap.** $1,000,000;$1 par; 500,000 issued.

Property: 11 claims, including a section of the Tertiary river channel, 4 miles from Sierra City, Sierra county. The mine has been worked in a desultory fashion by lessees since 1869. It has been explored by 2 hydraulic pits ,100′ surface tunnel and 520′ bedrock tunnel in slate, with 2 raises and drifts in the gravel-channel.

Extensive work during 1919-20 exposed no gravel of persistent value, and by October, 1920, all work was suspended.

HILDA GRAVEL MINING CO. **CALIFORNIA**

Address: 948 Market St., San Francisco, Calif.

Officers: Richard O'Connor, pres.; J. T. Hurley, sec.

Inc. March 31, 1896, in Calif. **Cap.** $100,000; par $1.

Property: 628.5 acres of placer claims, near Nevada City, Sierra county. Only limited development, and no production.

HINES GILBERT GOLD MINES CO. **CALIFORNIA**

Address: Greenwood, Calif.

Inc. July 13, 1918, in Calif. **Cap.** $1,000,000.

Property: 9 claims, on middle fork of American river, near Greenwood, Eldorado county, developed by tunnels opening veins of $10 sulphide ore; also a quartz vein, discovered 1920, showing high grade gold ore.

Equipment: 10-stamp mill, erected 1920.

HOPE MINES DEVELOPMENT CO. **CALIFORNIA**

Address: P. O. Box 154, Salt Lake City, Utah. **Mine address:** Sonora, Tuolumne county, Cal.

Officers: T. W. Whiteley, pres.: M. Reedal, v. p.; T. L. Mitchell, v. p.; C. W. Johnson, treas.; F. O. Horn, sec.; Geo. Weston, mgr.; preceding with G. M. Stenhouse, L. A. Jeffs and G. O. Quackenbush, directors.

Inc. 1913, in Utah. **Cap.** $500,000; $1 par; issued 370,000 shares; assessable.

Gross earnings for 1918 were $10,626, with operating expenses of $13,379.

Property: an old one, is on the Bonanza lead, ½-mile E. of Sonora, and is said to show free milling gold ore. Vein strikes N. 85° E. with dip of 23° W. and has 2′ average width; walls are mica schist foot and porphyry hanging.

Development: by 1,200′ main tunnel.

Equipment: includes a 25-h. p. gasoline engine and a 5-stamp mill.

Production: Average returns, normally amount to $1,500 gross per month. Operated as a pocket mine in 1920.

HORNITOS GOLD MINE CO. **CALIFORNIA**

Office: Hornitos, Mariposa county, Cal. H. W. Morris, pres.

Property: the Ruth Pierce gold mine, 2 claims, 4 miles from Hornitos, acquired in 1913 . Vein averages 3′ in width; developed by a 550′ shaft, part certical and part incline, with about 2,500′ of workings.

Equipment: includes a hoist, driven by 105-h. p. motor, 4-drill compressor, a 10-stamp mill and 2 Frue vanners. Was operating and producing in 1919 and 1920.

HORSE MOUNTAIN COPPER CO. **CALIFORNIA**

Address: M. Fulton, sec., 7th & D Sts., Eureka, Humboldt county, Cal.

Officers: B. C. Schnoor, pres.; David Wilson, mgr., Eureka, Cal; D. W. Stapp, supt.

Inc. Nov., 1910; reincorporated, February, 1914. **Cap.** $1,000,000; $1 par; 815,199 shares issued.

Property: 70 claims, near the Humboldt Copper Co., with which this corporation apparently is connected in ownership and management. Owns the Ruby copper mine on Horse mountain in the Hoopa range, Horse River district, on the watershed between Redwood creek and Trinity river, in T. 6 N. R. 1 E. For miles copper occurs along a serpentine-gabbro contact; claims show native copper in a vein 30′ thick having 2″ of high-grade ore.

Development: by 6 tunnels, No. 6 of 900′, another of 450′, 3,000′ in all.

Equipment: includes engines, boilers, 35 buildings and a $12,000, 50-ton concentrator with Huntington mill, installed in 1912. Concentrates shipped to the Tacoma smelters, averaging 20% copper and $4 gold per ton.

In 1918 company shipped 350 tons of chrome ore. In May, 1919, property was under option to Pittsburgh people. No later information.

HOWLAND FLAT MINES CO. **CALIFORNIA**

Address: W. W. Whitton, sec. 603 Union Savings Bank Bldg., Oakland, Calif. Edwin L. Oliver, pres., Cunard Bldg., San Francisco.

Inc. 1914, in Calif. **Cap.** $50,000.

Property: 6 claims, 155 acres, including the Miner's Home Gold gravel mine, in the Poker Flat district, 65 miles E. of Oroville, Sierra county. Ground covers over 3,000′ along an ancient channel at the base of Table Rock, in a region that has yielded $14,000,000.

Development: by 3,170′ tunnel, raises, and drifts. When work was suspended, gravel was yielding $7.75 per 18 cu. ft. car.

Equipment: gravel cars, water power, shops, sluices, etc.

HUDSON CONS. MINING CO. **CALIFORNIA**

Address: C. Dorr, Jr., pres.-mgr., Syracuse, N. Y. at last report.

Property: the Owasco mine, near Oroville, Butte county, said to show several well-defined mineralized ledges. No record of operations.

HUMBOLDT COPPER MINING CO. **CALIFORNIA**

Address: Eureka, Humboldt Co., Cal. T. L. Loofbourrow, pres.; W. L. Perrott, sec.

Property: 24 claims, well watered and timbered in Secs. 28-29, 32-33, T. 6 N., R. 4 E., said to show strong veins with a good showing of copper ore, also some gold.

Development: by 1,750′ of drifts, 210′ raise, 30′ winze, and 700′ of diamond drilling.

Equipment: consists of 3 surface buildings only. Shipped chrome ore in 1918.

IDAHO-MARYLAND MINES CO. **CALIFORNIA**

Subsidiary of **Metals Exploration Co.**

Office: 1213 Hobart Bldg., San Francisco. **Mine office:** Grass Valley, Nevada county, Cal.

Officers: Bulkeley Wells, pres.; Roy H. Elliot, v. p.; A. D. Snodgrass, sec.-treas.; with Errol MacBoyle, F. W. McNear, Rufus Thayer and C. G. Bonhus, directors. John A. Fulton, mgr., Grass Valley.

Inc. in Nev., 1919. **Cap.** $3,000,000; par $1. **Bonds:** authorized, $1,000,000; outstanding $413,000.

Property: 675 acres in Nevada county, includes the holdings of the Gold Point Cons. Mines, Inc., and the Union Hill Mines, which have been disincorporated.

Late in 1920, the 600′ level was reopened.

Equipment: one 20-stamp mill.

IMPERIAL LODE MNG. & RED. CO. **CALIFORNIA**

Address: 548 Equitable Bldg., Baltimore, Md.; 2127 Land Title Bldg., Philadelphia, Pa.; or Lavic, San Diego Co., Calif.

Officers: James Clendenin, pres.; W. I. Dickerman, v. p.; J. W. Bowen, sec.; C. E. Krebs, treas., with Fred Crabtree, G. T. Ladd, W. G. Moore, O. O. Robinson, C. E. Stubbs, B. F. Bond, and D. F. Rice, directors.

Inc. 1917, in Arizona. **Cap.** $2,500,000; $5 par; $230,000 reported paid in to May, 1920.

Property: 14 claims, 7 miles S. E. of Lavic, San Diego county. From 1884 to 1890, the mine is said to have yielded $200,000 from surface ore averaging $75 per ton.

Development: by tunnel and other workings to a depth of 450'. The imposing estimate of ore reserves gives a value of approximately $15,000,000 and an annual profit of $350,000, or 20% is expected. This is a very marked case of ore estimation run wild

INDIAN FALLS DEVELOPMENT CO. **CALIFORNIA**

Address: C. A. Darmer, pres., 754 St. Helena Ave., Tacoma, Washington, G. H. Goodhue, supt.

Property: 21 claims, 577 acres, including 148 acres of agricultural land, in Plumas county, 5½ miles N. of Keddie, on W. P. R. R. There are 5 quartz veins in slate and greenstone. Veins No. 1 and 2 carry a little gold and pyrite; No. 3 carries gold and copper, an 18" streak assaying $1 gold, 6.2% copper and 2 oz. silver. All vein outcrops show workable width and length. Short tunnels have been driven. There is little equipment, but good water-power is available.

INDIAN SPRINGS MINE **CALIFORNIA**

Address: J. Woodruff, Magalia, Butte county, Calif.

Property: an old drift-gravel mine in the Magalia district north of Oroville, which has produced $4,000,000 of gold. The adjoining Hupp mine has also been acquired, and both mines will be operated from the Indian Springs tunnel, 4,000' long. Los Angeles capital is interested.

INTEGRAL QUICKSILVER MNG. CO. **CALIFORNIA**

Mine address: Frank A. Mahon, mgr., Castella, Calif. Wm. J. Simpson, pres., 91 Park Row, New York.

Property: 46 claims and timber land in Trinity county, near the Altoona mine and 16 miles N. W. of Castella. Cinnabar ore occurs in lenses in a serpentine-porphyry contact. Chromite also is found on the property.

Development: by 180' shaft and 2,760' tunnel with a 300' back. **Equipment:** includes a 24-ton furnace.

INYO COPPER MINES CORPORATION **CALIFORNIA**

Probably out of business. See Vol. XIV.

INYO GOLD MINING CO. **CALIFORNIA**

Probably defunct. See Vol. XIV.

IRON MOUNTAIN COPPER CO. **CALIFORNIA**

Office: 301 First National Bank Bldg., Riverside, Cal. Mine near Blythe City, Riverside county, Cal.

Officers: Harwood Robbins, pres.; E. W. Tucker, v. p.; Holton Webb, sec.-treas.

Inc. about July, 1911, in California. **Cap.** $10,000; shares $1 par; issued, 5,000 shares.

Property: the Crescent group, 35 claims, about 700 acres, in Ironwood district, Riverside county, 26 miles S. of Blythe Junction on the Parker cut-off of the Santa Fe railroad. Claims show fissure veins in granite and porphyry, the main ledge being traceable 2 miles.

Development: by 120' shaft with a level at 100' depth that is 70' long and shows high-grade copper ore containing visible gold. Ore shipments by former owners averaged $100 per ton.

ISABELLA COPPER MINING CO. **CALIFORNIA**

Probably dead. Mail addressed to directors, unclaimed.

Inc. 1911. **Cap.** $500,000. Property in the Etna Mills district, Siskiyou county. A 100′ tunnel was being driven when last heard from.

ISLAND COPPER CO. **CALIFORNIA**

Office: 710 Easton Bldg., Oakland, Cal. **Mine P. O.:** Island Mountain, Trinity Co., Calif.

Officers: Frank A. Leach, pres.; C. H. Wilcox, v. p.; F. A. Leach, Jr., sec. E. R. Leach, mgr.

Inc. 1915, in Calif. **Cap.** $24,000; $1 par; all issued.

Property: 4 patented claims and other property aggregating 265 acres, in the S. W. corner of Trinity county, within 500 yards of the Northwestern Pacific R. R., operating from San Francisco to Humboldt bay.

Geology: a lenticular body of copper-iron sulphide occurs in metamorphosed sedimentary rocks, outcropping at several places. Development is said to indicate that these various outcrops are part of one mass, whose estimated dimensions are 90′ to 100′ in width, 450′ in length and a proven depth of from 60 to 145′. Ores carry 3½% copper 1½ oz. silver, and $2 in gold per ton.

Development: by over 2,500′ of workings, opening 275,000 tons of ore. Up to Jan. 1, 1919, 30,000 tons had been shipped. Mine idle since then.

JAMESTOWN EXPLORATION CO. **CALIFORNIA**

Probably dead. Described in Vol. XIII.

JAMISON MINING CO. **CALIFORNIA**

Address: F. B. Peterson, pres., 249 First St., San Francisco.

Property: 2 patented placer claims, 1 placer location, 9 patented quartz claims, a total of 581 acres, at Johnsville, Plumas county 7 miles S. W. of Blairsden on W. P. R. R.

Geology: 2 fissure veins, 10′ wide, encased in gabbro, carry free gold and pyrite. Vein No. 1 shows a pay-shoot 600′ long; in No. 2, four shoots have been worked for 800′.

Development: by 1,800′ tunnel and 225′ shaft, which are connected; also extensive drifts, one of which is 1,500 long, and another 1,150′.

Equipment: hoist, compressor, 20-stamp mill, buildings, etc.

Production: total gold output to Nov., 1913, was $1,430,000, including concentrates. In 1915, the monthly output was 1,900 tons of $3 to $4 ore.

Small shipments made by company in 1919 and by lessees in 1920.

JESSIE BELLE M., M. & SM. CO. **CALIFORNIA**

Dead. See Vol. XIII, Mines Handbook. Mine now owned by **Madera County Mng. Co.**

JOE CREEK COPPER CO. **CALIFORNIA**

Probably dead. See Vol. XIV.

JUMPER CALIFORNIAN GOLD MINES CO. **CALIFORNIA**

Address: P. E. de Caplane, 5 Rue Blanche, Paris, France. Lester S. Grant, mgr., Stent, Calif.

Inc. 1910, in Maine. **Cap.** $1,000,000; $1 par.

Property: 120 acres at Stent, Tuolumne county, 4 miles from Jamestown, on the Mother Lode. Ore occurs in a dike in amphibolite schist and in small veins cutting the schist. Rich pockets of gold have been found on the W. side of a diorite dike following the vein.

Development: by 200, 500, and 1,400′ shafts; with an 800′ winze below the second and one of 400′ below the third.

Equipment: electric power, hoists, compressor and 40-stamp mill.

Operated for nearly 3 years by lessees. Annual yield about $100,000. Company receives 25% royalty and charges $1 per ton for treating ore extracted.

Property optioned April, 1920, to G. L. Holmes, agent, for $100,000, payable before July 8, 1924, 20% royalty on gross output to apply on purchase price.

JUNIPER MINING CO. **CALIFORNIA**

Addresses: G. W. Gilman, supt., Bieber, Calif. and Redding, Calif.

Officers: M. A. Maher, pres.-mgr.; W. H. Paulk, sec., Adin, Calif.; with C. L. Joslyn, directors. Wm. Sharp, cons. engr., Reno, Nev.

Inc. 1920. **Cap.** $1,000,000.

Property: one patented claim, near Hayden Hill, 60 miles N. of Susanville, Lassen county, developed by 2 shafts, one 300′ deep, shows 5′ vein of gold ore in rhyolite breccia, with 65,000 tons reported blocked out between 100 and 250′ levels. Work continued to the point of crossing with a second vein. Reported to have produced $600,000 to 1917.

Equipment: includes 10-stamp mill; the treatment method has certain unusual features, and 60% of ore sent to mill, assaying $25 per ton, is rejected before reaching stamps. Operating in 1921.

Company has an option on adjoining holdings of Lassen Mng. Co.

KATE HARDY MINING CO. **CALIFORNIA**

Address: Knox Bldg., San Jose, Calif. Benj. F. Ballard, pres., Santa Rosa, Calif.

Inc. 1918, in Calif. **Cap.** $1,000,000; $1 par; 300,000 shares issued.

Property: 240 acres, including the Kate Hardy mine and mill, 2 miles S. W. of Forest, Sierra county, has been operated intermittently since 1860 and is credited with a production of over $225,000 in gold. The main vein in serpentine, is 10 to 30′ wide, and runs N. 20° W. and dips about 80° W. Pay-ore is quartz, carrying free gold and auriferous arsenopyrite.

Development: by 300′ and 650′ tunnels, with raises between and other workings. Six ore-shoots have been opened. In 1921, a 200′ shaft was sunk in ore below one of the tunnels.

Equipment: electric power, 700 cu. ft. compressor, new 10-stamp mill, concentrator, and buildings.

KELLY MINING CORPORATION **CALIFORNIA**

Address: H. H. Kelley, 115 S. Birch St., Santa Ana, Calif.

Officers and directors: H. H. Kelly, pres.; L. M. Kelly, v. p.; W. I. Stewart, sec.-treas.-supt.

Inc. July 19, 1917, Calif. **Cap.** $200,000; par $1; outstanding 159,150.

Property: 9 claims near Quincy, Plumas county, shows a quartz vein in serpentine.

Development: by 200′ and 460′ tunnels, with 350 lateral workings. Company claims to have about 20,000 tons gold ore averaging $8 per ton.

Not producing. Putting up a 50-ton concentrator, and 500′ tramway.

See the **Rose Quartz Mining Co.**, which is operating the Kelly property of 9 claims in this district.

KELLY SILVER MINE **CALIFORNIA**

See under **California Rand Mines Co.**

KENNEDY MINING & MILLING CO. **CALIFORNIA**

Office: E. C. Hutchinson, pres., 409 Montgomery St., San Francisco, Cal., James Spiers, supt.

Cap. $100,000; $100 par. Shares quoted at $2.25 in Jan., 1921.

Dividends: a large sum has been paid, but no figures are obtainable.

Property: 9 claims, covering 3,100′ on the Mother Lode, includes the Kennedy mine adjoining the Argonaut, 1 mile North of Jackson, Amador county. Company purchased the Zeila mine and 40-stamp mill at Jackson, about 1½ miles S. of the Kennedy, in 1915, for $35,000. The Zeila is worked out down to the 450′ level, but new ore bodies averaging $4 per ton are said to have been disclosed below the old workings.

Geology: the Kennedy vein, one of three veins in the Lode, outcrops in andesite passing downward into Mariposa slate, following roughly the contact between the two rocks. The vein dips 57° E. and the payshoots rake to the north. The best ore occurs near the footwall over a black gouge 1 to 2′ thick.

Development: by 3 shafts; the vertical south shaft, 2,300′ deep, north shaft, 2,500′ deep and the 3-compartment east shaft sunk to vertical depth of 4,200′ with crosscuts and drifts, run N. and S. on the veins. Shaft being

sunk with the object of reaching junction of two orebodies. Ore in the lower levels is generally of better grade than above.

Equipment: includes air-drills, 15"x30" and 25"x30" compressors, nine 80-h. p. boilers, oil-fired steam power, and 800-h. p. double-drum hoist.

The 100-stamp mill makes an extraction of 83%. Monthly capacity is 15,000 tons. Concentrates assay $100 per ton and tailings run about 60c. per ton. Concentrates are treated at the mine in a 10-ton chlorination plant with 2 roasting furnaces.

No production since 1918. Company ignores requests for data. When fire broke out in the adjoining Argonaut in 1920, it necessitated the flooding of both mines; which were not pumped out until late in the year. The Kennedy mill did not resume crushing of ore until October, 1921.

KENNETT COPPER SMELTER **CALIFORNIA**

Works address: O. J. Egleston, mgr., Kennett, Calif. A custom smelter owned by **U. S. Smelting, Refining & Mining Co.**, which see for detailed description.

KEYSTONE MINING CO. **CALIFORNIA**

Address: Carlton R. Downs, mgr., Amador City, Calif.

There are 468,005 shares issued. Two 10c. assessments were levied during 1920.

Property: the Keystone mine at Amador City, Amador County, covering 4,000' along the Mother Lode, has been operated continuously since its discovery in 1851.

The Keystone is a quartz vein, 12 to 200' wide, occurring on the contact between black clay slate footwall and meta-andesite hanging-wall. Two other veins, the Spring Hill and east veins, have been developed; the latter is now furnishing the ore. The contact vein was mined above the 900' level. See "mines of Amador County" State Mineralogist's Report, p. 34-36.

Development: by 3-compartment Patton shaft, 2,680' deep and 1,118' south shaft on 60° incline, with crosscuts and drifts E. and N. on the 100', 600', 1,000', 1,200' and 1,400' levels. Development work now being done on the 1,800'. Most of the 1916 output came from the 900', 1,000', 1,200' and 1,400' levels.

Equipment: includes 40-stamp amalgamation and concentration mill, making an extraction of 90%; electric hoist, 300-h. p. motor, air compressor and drills. Concentrates run $50 per ton; the tailing 30c per ton. About 80 men employed.

Production: for last 6 months of 1918 was 44,322 tons of $2.52 gold ore, producing $4,652 in bullion and $106,860 in concentrates; the total was reduced to $85,516 by freight and smelter charges.

In July 1920, the mill stopped and the mine was allowed to fill with water.

KING SOLOMON CONSOLIDATED MINES CO. **CALIFORNIA**

Now **Shipsey Mng. Co.**, which see.

KING SOLOMON GOLD MINING CO **CALIFORNIA**

Office: 814 Central Bldg., Los Angeles, Calif.

Officers: Benj. W. Hohn, pres.; John C. Stick, sec.

Inc. 1901, in Calif. **Cap.** $350,000; $1 par.

Property: the Pleasant View group, 100 acres, in Clear Creek district, Kern county, 4 miles E. of Havilah, shows a 3' vein with granite walls. The pay shoot, 300' long, contains free-milling gold ore.

Development: by 300' shaft and 3 levels.

Equipment: includes steam hoist, two h. p. boilers, assay office and other buildings; and a 5-stamp mill.

Production: 1912-1915, $40,000.

KING SOLOMON MINE **CALIFORNIA**

Owned by C. B. Cottrell, Westerly, R. I. W. H. Young, supt., Cecilville, Siskiyou county, Cal.

Property: 40 acres in Secs. 6 and 7, T. 38 N., R. 11 W., 12 miles S. E. of Sawyers Bar, Liberty district, Siskiyou county, shows a 5′ vein of free milling ore, with quartz porphyry foot and slate hanging-wall. The vein runs N. S. and dips 60° E. Developed by 460′ tunnel, 130′ shaft and drifts.

Equipment: includes an 8-stamp mill, hoist, boiler and buildings.

Mine has been a good producer and said to have fair ore reserves.

KINGS QUICKSILVER MINING CO., LTD. **CALIFORNIA**

Address: C. C. Jones, mgr., or Harry Cribb, asst. mgr., Parkfield, Monterey Co., Calif.

Property: a group of claims, in Sec. 20, T. 23 S., R. 16 E., Kings county, 14 miles E. of Parkfield.

Geology: the ore carries native mercury, cinnabar, and calcite, lying in a crushed zone, 35′ wide, running S. E. with dip 45° S. W. Country rock is serpentine. shale, and metamorphic sandstone.

Development: to depth of 200′ by 700′ upper and 850′ lower tunnels, with raises and winze.

Equipment: includes 10-ton Scott fine-ore furnace with brick condensers and 25-h. p. oil engine. Mine worked intermittently since 1902.

In Dec., 1919, Patriquin Bros., previous lessees, sold their interest to a new Canadian company.

KIRKPATRICK MINING & MILLING CO. **CALIFORNIA**

Address: c/o Schloss, Ackerman & Bradley, Mills Bldg., San Francisco

Mine Address: Thos. Brannigan, supt., Downieville, Calif.

Inc. 1919. **Cap.** $500,000.

Property: a high-grade gravel deposit, in Sierra county, equipped with a gravel mill, of new rotary type, operating efficiently, Sept., 1921.

KLEINSORGE MINE **CALIFORNIA**

Address: W. E. Kleinsorge, Sacramento, Cal.

Property: an extensive area 30 miles by road S. W. of Red Bluff, Tehama county, on the S. P. R. R., in rough and bare country.

Geology: the hills, which are steep, consist mainly of serpentine, in places much shattered. In this rock, chromite occurs as veins, pockets and disseminations. The last type of deposit covers a considerable area, and will only be commercial by concentrating.

Equipment: 7-mile road, two camps, 3 aerial trams, 10-stamp mill, loading bins, etc.

Production: started about mid-year, 1917, and amounted to several carloads monthly of ore assaying 45% Cr_2O_3 and low in silica.

Mine is closed on account of the unsettled market for chromite.

KROROMICK MINING CO. **CALIFORNIA**

Address: Coarsegold, Calif.

Property: the old Texas Flat mines at Coarsegold, Madera county, equipped with 20-stamp amalgamation and concentration mill. Some gold was produced in 1920.

LA GRANGE GOLD DREDGING CO. **CALIFORNIA**

Address: La Grange, Stanislaus county, Calif.

Inc. 1907. **Cap.** $300,000.

Property: 200 acres of dredging ground along the Tuolumne river. Gravel is 35′ deep, and lies on a soft bedrock.

Equipment: electric power and a 7-cu. ft. dredge, which was operating both in 1919 and 1920.

LA GRANGE MINING CO. **CALIFORNIA**

Address: c/o Amor F. Keene, 233 Broadway, New York City.

A subsidiary of **Gold Fields Am. Dev. Co.,** which see. Operations were stopped during 1918, and part of the equipment sold. Mine is in charge of caretaker. See Vol. XIII.

LASSEN MINING CO. **CALIFORNIA**

Address: L. C. Green, sec., Room 1001, 310 Sansome St., San Francisco. Property under option to the Juniper Mng. Co.

Property: the Golden Eagle mine, 4 claims and mill site, in part patented, adjoining the Juniper on E., on S. W. slope of Hayden Hill, Lassen county. Mine shows 2 veins in rhyolite breccia, with rhyolite intrusions. Ore carries free gold. Golden Eagle vein, 1 to 25' wide, has been developed by 835' shaft with levels at 150, 200, 300, 400 and 500'. Much of ground developed has been exhausted. Equipped with 150-ton mill and cyanide plant. Reported that the fines only of ore as mined carry values and crushing not needed; ore is simply dried and sized before treatment. Said to have produced $1,250,000 to 1917.

LE DUC GOLD MINING CO. **CALIFORNIA**

Address: B. A. Penhall, gen. mgr., Grass Valley, Calif.

Officers: C. F. White pres., San Francisco., W. G. Thomas, sec., Grass Valley, Calif., with John P. Jones, San Francisco. directors.

Property: 122 acres, 2 miles S. W. of Grass Valley, Nevada county, bonded from A. Le Duc, shows a lava-capped gravel channel under half the acreage, and on the other half 5 quartz veins.

Development: by 3, 400' of tunnels and drifts on 2 veins without disclosing any pay-ore. About $40,000 has been spent; work was resumed early in 1921, the 13th year of development under same management, without revenue from the property during that time.

LEVIATHAN COPPER MINE **CALIFORNIA**

Address: John L. Henry, 744 — 12th Ave., San Francisco, Calif.

Property: 3 claims, 60 acres, 8 miles E. of Markleeville, in the Mogul district of Alpine county. The Leviathan claim was first located in 1863. Examined by W. H. Weed in 1918, also by J. L. Henry, F. L. Sizer, W. T. Rickard, Waldemar Lindgren, and F. W. Guernsey.

Geology: ore occurs in andesite tuffs, the beds dipping 30° E. and pitching N. W. - S. E. Copper occurs as carbonate and oxide. Some ore is found in "chambers" and carries up to 30%, but the faces now exposed are not over 7%, as shown by samples cut by the writer and the faces are not all ore.

Development: by an upper, 650' tunnel and a lower, 928' tunnel, reaching a depth of 300'. Total workings are 2,200'.

Production: is given as $30,000. In the early days, 500 tons of 30% ore was shipped.

Litigation has been the principal cause of the idleness of this property. On Sept. 20, 1920, the Superior Court of California awarded title to Sarita N. Henry. Assessment work was done in 1920, and active exploration is expected to be resumed in 1922.

LIBERTY PLACER GOLD MINES CO. **CALIFORNIA**

Office: Hobart Bldg., San Francisco.

Inc. 1920, in Calif. **Cap.** $150,000; $1 par.

Officers: Claude Doak, pres.; Bruce Griffith, v. p.; with John Hanley and W. C. Doak, directors.

Property: 20 acres of gold placer ground, 4 miles E. of Roseville, Placer county. The gravel lies under 50' of lava overburden and is mined by shallow shafts. About 15,000 tons of cemented gravel is worth from $5 to $45 per ton. A 75-ton, motor-driven mill was erected in 1920.

LIGHTNER GOLD MINING CO. **CALIFORNIA**

Office: 1327 No. San Joaquin St., Stockton, Calif. **Mine address:** Alex. Chalmers, mgr., Angels Camp, Calif.

Officers: C. M. Jackson, pres.; B. F. Wellington, Jr., sec.

Inc. Oct. 26, 1896, in Cal. **Cap.** $125,000; par $1; assessable; 62,287 shares outstanding. **Dividends:** $550,000 to date. Assets, Feb., 1916, ere $255,-281 and liabilities, $85,186. Annual meeting last Thursday in Oct.

Property: 1 patented claim, 4¼ acres, in Angels Camp, Calaveras county, between the Utica and Angels quartz mines, shows a quartz fissure vein said to be 80' running N. W.-S. E., with dip of 70° and assaying $5 per ton. The mine is credited with a total production to date of $2,000,000.

Property was closed down in 1910, owing to caving of the old shaft sunk on the orebody, but operated hydro-electric plant and sold power.

Equipment: includes hoist, drills, compressor and 60-stamp amalgamation and concentration mill.

Management estimated ore reserves at 200,000 tons above the 300 level, Feb., 1916. The mine was unwatered in 1920; work ceased in September, but is to be resumed.

LINCOLN CONSOLIDATED CALIFORNIA

Property: sold to **Lincoln Gold Mining Co.**, which see.

LINCOLN GOLD MINING CO. CALIFORNIA

Successor to Lincoln Consolidated.

Address: Gordon R. Campbell, Calumet, Mich.

Inc. 1916. **Cap.** $250,000.

Property: at Sutter Creek, Amador county.

LITTLE BULLY HILL MINING & SMELTING CALIFORNIA

Probably dead. See description in Vol. XIII.

LITTLE BUTTE MINING & MILLING CO. CALIFORNIA

Address: 612 Security Bldg., Los Angeles, Calif.

Officers: W. J. Clark, pres.; J. W. Oakley, sec.

Inc. 1897. **Cap.** $500,000; $1 par; issued 445,956. Annual meeting in April.

Property: a group of gold bearing claims near Randsburg, Kern county. Idle.

LITTLE NELLIE MINING CO. CALIFORNIA

Address: Redding, Shasta county, Cal.

Operations resumed Oct., 1917, after two years' shut-down, during which time 30 diamond-drill holes were put down to an average depth of 800', defining lenses of 2 to 7% copper ore. Fifteen stamps were crushing gold ore; copper ore to be shipped to Mammoth. No news since.

LITTLE WONDER MINES, INC. CALIFORNIA

Address: 427 Chronicle Bldg., San Francisco, Calif.

Officers: T. C. West, pres.; Andrew Taylor, sec.

Inc. 1920, in Calif. **Cap.** $300,000; $1 par.

Property: near Mariposa, Mariposa county, reported under development.

LOCKWOOD CONS. GOLD MNG. CO. CALIFORNIA

Address: 1408 Turk St., San Francisco, Calif.

Officers: C. M. Bufford, pres.; A. P. Wagner, sec.

Inc. in Calif. **Cap.** $20,000; 14,314 issued. Annual meeting 3rd Monday in April. Last dividend, April, 1917.

Property: near West Point, Calaveras county, idle at last report.

LORETTO COPPER MINING CO. CALIFORNIA

Main office: Tonopah, Nev. **Mine office:** Big Pine, Inyo County, Calif. John G. Kirchen, mgr.; John Cole, supt. Is controlled through stock ownership by Chas. M. Schwab, and the Gail Borden estate.

Property: about 750 acres, east of Bishop, Inyo county, has a 40' vein, carrying ore said to average 4% copper, and about $3 gold per ton.

Development: by 1,700' main shaft, said to be in commercial ore, and 2 crosscut tunnels to the N. E. one of 90' length said to have cut a 74' vein. Improvements include a smithy and several small mine buildings.

Operations temporarily discontinued.

LOS PRIETOS QUICKSILVER MINES CO. CALIFORNIA

Address: 915 Higgins Bldg., Los Angeles, Calif.

Officers: F. M. Townsend, pres.; H. W. Waller, sec..

Inc. 1919, in Calif. **Cap.** $1,500,000; $10 par.

Property: 3,000 acres of quicksilver bearing land, near Montecito, Santa Barbara county. Was developing in 1919; no news since.

LOUISIANA DEVELOPMENT CO. CALIFORNIA

Letters returned. Probably dead. See description in Vol. XIII.

LUCILE GOLD & COPPER MINING CO. CALIFORNIA

Letters returned, 1919-20. Probably dead. Mine near Kelso, San Bernardino county, Calif.

LUKENS GOLD MINING CO. CALIFORNIA

Address: G. E. Lukens, pres.; or J. E. Lukens, sec., East Auburn, Calif.

Cap. $25,000; par 25c.; issued 70,000 shares. Annual meeting in May.

Property: 2 claims, at Pilot Hill, Eldorado county, showing auriferous copper ore, developed by shafts and drifts.

MADERA COUNTY MINING CO. CALIFORNIA

Property: Jessie Bell & Daulton mines, near Madera, Madera county. Small shipments of copper ore reported made in 1919.

MADERA ENTERPRISE MINES & LAND CO. CALIFORNIA

Probably dead. See Vol. XIV.

MADERA GOLD MINING CO. CALIFORNIA

Out of business. Described in Vol. XIII.

MAD MULE MINING CO. CALIFORNIA

Defunct. See Vol. XIV.

MAJOR GOLD MINING CO. CALIFORNIA

Idle. Address: 410 Santa Monica Blvd., Santa Monica, Calif. J. B. Proctor, pres.; E. De Los Magee, sec.

Inc. 1913, in Calif.

Property: at Nevada City, Nevada county.

MAMMOTH CONS. MINING CO. CALIFORNIA

Probably dead. Described in Volume XIV.

MAMMOTH COPPER MINING CO. OF MAINE CALIFORNIA

Formerly a subsidiary of U. S. Smelting, Ref. & Mng., stopped doing business Dec. 31, 1917; company has disincorporated and its property taken over on Jan. 1, 1918, by the U. S. S. R. & M. Co., which see.

MAMMOTH MOUNTAIN MINING CO. CALIFORNIA

Address: H. M. Russell, pres., Los Angeles; and A. G. Keating, mgr., Isabella, Kern Co., Calif

Inc. 1912. **Cap.** $100,000.

Property: 100 acres, in Keyes district, 5 miles S. of Isabella, Kern county, Sequoia Forest Reserve.

The mine has been worked for over 60 years. Has a 2′ vein between slate and granite.

Development: by 700′ tunnel and several thousand feet of workings. The ore is free milling, and is crushed in a 10-stamp mill.

MARIPOSA COMMERCIAL & MINING CO. CALIFORNIA

Office: 311 Balboa Bldg., San Francisco, Calif.

Officers: Edward H. Benjamin, pres.; Joseph H. Mooser, v. p.; Howard G. Stevenson, sec.-treas., with Charles W. Slack and Frank T. Maguire, directors.

Is a close corporation, owned by Hennen Jennings estate and the Hobart Estate Co.

Property: over 44,000 acres, patented, comprising the original Mariposa Grant, in center of Mariposa county, south of the Merced river. This covers 12 miles of the Mother Lode and 65 mines and prospects, that have produced upwards of $20,000,000. All the mines have been idle in recent years, owing to excessive cost of labor, etc.

Equipment: costing $500,000 includes a 500 k. w. electric power plant, supplying numerous towns on the property.

MARYSVILLE DREDGING CO. CALIFORNIA

Address: T. E. Sherwin, sec.-treas., 14 Ashburton Place, Boston, Mass.

Officers: R. L. Agassiz, pres.; Bulkeley Wells, mng. director; Thos D. Harris, mgr.

Inc. July 1, 1907, in Mass. **Cap.** $2,000,000; $100 par; 11,069 shares outstanding. Annual meeting, fourth Tuesday in January.

Property: 1,300 acres of placer ground at Marigold, Yuba county.

Equipment includes two 16 cu. ft. all-steel dredges. A third boat was destroyed by fire, May, 1919.

Two dredges were operated on theYuba river in 1919 and one in 1920.

MAXINE MINING CO. **CALIFORNIA**

Address: R. C. Kingdon, supt., La Porte, Plumas Co., Calif.

Property: a gravel mine, near Quincy, Plumas county. Operating 1921.

MAYFLOWER MINES CONSOLIDATED **CALIFORNIA**

Mine address: Charles Dow, supt., Nevada City, Calif.

Office: 124 Chronicle Bldg., San Francisco. G. L. Duffey, pres.; J. L. Levin, sec.

Inc. Dec., 1918 in Calif. **Cap.** $1,200,000; par $20. Is an Omaha, Neb. concern.

Property: the Greenman mine on Canada Hill, 149 acres, including the Mayflower placer mine, Nevada City district, Nevada county, shows 8 quartz veins, two of them faulted by three others. The Beckman and Grant veins have been worked. The Grant vein crosses a contact of slate and granodiorite, and carries free gold and 3% of sulphides.

Development: by 300′ incline on the Grant vein; by an 800′ adit with 1,500′ of drifts, and a 700′ shaft with 1,000′ of drifts on the Beckman.

Equipment: electric power, hoist, compressor, pumps, etc.

MAZOURKA COPPER CO. **CALIFORNIA**

General office: 112 West Adams St., Chicago, Ill. **Mine address:** Kearsarge, Inyo Co., Calif.

Inc. 1919. **Cap.** $2,000,000.

Property: 12 claims, including the Copper King group, and millsite, 247 acres, 5½ miles from Kearsarge, Inyo county. Sulphide ore shown in several open cuts, tunnels, and shafts, is reported to carry from 1 to 2% copper, $3 silver and $2.50 gold.

MCALPINE MINES CO. **CALIFORNIA**

Address: Coulterville, Mariposa county, Calif.

Officers: Frank R. Whitcomb, pres, and gen. mgr.; C. L. La Rue, and F. S. Ewer, v. p.; Fannie W. McLean, sec.-treas.; with M. C. Hassett, directors. W. A. Irwin, supt.

Cap. $1,500,000; shares $1 par; fully paid and non-assessable.

Company was formed by California people to reopen the old McAlpine mine on the Mother Lode, Tuolumne county, near the line between Tuolumne and Mariposa counties. The mine was a well-known producer in the 60's.

Property: 120 acres, covers 2,100′ on the strike of the Mother Lode, including the water rights of Moccasin Creek.

Development: a 650′ shaft with 2,000′ underground workings, is said to block out 350,000 tons of $7 ore.

Equipment: includes a 5-drill air compressor. A 200-ton mill will be erected, as soon as price conditions permit.

MELONES MINING CO. **CALIFORNIA**

Address: Melones, Calif. Fully described in Vol. XIV.

Property leased for 21 years to the **Carson Hill Gold Mines**, which see.

MENDOCINO MINING & MILLING CO. **CALIFORNIA**

Address: Napa, Calif.

Officers: J. M. Sullivan, pres.; Wallace Rutherford, sec., Napa, Calif.

Inc. May 9, 1919, in Calif. **Cap.** $75,000, increased to $300,000; $1 par; issued 105,000.

Is negotiating for new property, 1920, as the tract under lease and bond proved unsatisfactory.

MERCED RIVER MINES CO. **CALIFORNIA**

Address: c/o F. J. Salinsky, Call Bldg., San Francisco.

Officers: James Burns, pres.; Henry Murphy, sec.

Inc. 1908, in Calif. **Cap.** $75,000; par $10; 5,353 shares issued.

Property: 240 acres, 20 patented, of gold and quicksilver ground, near Coulterville, Mariposa county, developed by tunnels and shafts.

MERCHANTS FINANCE CO. (Western Metals Co.) CALIFORNIA

Out of mining business for the present. See Vol. XIV.

METALS EXPLORATION CO. CALIFORNIA

Office: 120 Broadway, New York; 201 14th St., Denver Colo., and Hobart Bldg., San Francisco. Is a close corporation.

Officers: Harry Payne Whitney, pres.; Bulkeley Wells, v. p.-mng. dir.; F. N. Watriss, v. p.-gen. counsel; Thos. J. Regan, sec.-treas.; F. G. Farish, gen. mgr.; R. H. Elliott, asst. mgr.

Purchasing department: John L. McMenamin, mgr., Denver, office; Hy. T. Neal, asst. mgr., San Francisco office.

This company examines and purchases mining properties. Its present interests are the Idaho-Maryland, Valdor Dredging, Yuba Development and Fremont Mines in California; the Gold Canyon Dredging and United Comstock in Nevada; the Anna Beaver Mining Co. in Oklahoma; the Radium Co. of Colorado, Humboldt Mines Co., and Colorado-Superior Mng. Co., in Colorado; and the Cache Creek Dredging of Alaska; all of which are separately described.

Company bonded Blue Nose mine 1921 at Johnsville, Calif., and is also opening the Bunker Hill mine, Calif.

METALS MINING CORPORATION CALIFORNIA

Address: 304 - 12th St., Oakland, Calif.

Inc. 1921, in Calif. **Cap.** $75,000; $1 par.

Property: in Trinity and Siskiyou counties, said to contain gold, silver and copper. Developing.

MEXICAN SMELTING & REFINING CO. CALIFORNIA

Office: 82 Beaver St., New York. A subsidiary of the Compania Metalurgica Mexicana, and holds title to the **Blue Ledge mine** in Siskiyou county, Cal., which see.

MINARETS MINING CO. CALIFORNIA

Address: 303 Sherman Way, Van Nuys, Calif.

Officers: F. J. Eddy, pres.; O. R. Harris, sec.

Inc. 1916, in Calif. **Cap.** $1,000,000 $1 par; issued 400,000 shares.

Property: 485 acres, in Minarets district, Madera county, 90 miles N. E. of Friant on the S. P. R. R., contains veins of base silver, lead, zinc ores. Developed by main working tunnel.

MODOC MINES CO. CALIFORNIA

Address N. E. Guyot, v. p.-mgr., Kingman, Ariz., and Highgrade, Modoc Co., Cal.

Officers: Wm. Wrigley, Jr., pres.; Jas. C. Cox, sec.-treas., Kesner Bldg., Chicago.

Inc. May 1, 1909, in Arizona. **Cap.** $1,000,000; all outstanding; shares $1 par. Annual meeting July 1. Is a close corporation.

Property: 259 acres, patented, in High Grade district, in the extreme N. E. corner of Modoc county.

Ore: gold, in a vertical quartz vein in rhyolite, with average width of 10", and proved for 150' in length downward to the 200' level. The ore in 25-ton lots returned $23 per ton gross.

Development: by 210 vertical shaft, with 1,800' of workings.

Equipment: includes 6x10" hoist. Steam power is used. In 1915 about 100 tons of $23 ore was shipped. Working conditions are bad, due to the heavy snowfall and opposition of ranchers and others. District has merit, but will doubtless remain undeveloped until better feeling prevails at New Pine Creek, Oregon, the railroad station for the district, according to officials of the Modoc company.

For geology of the district, see U. S. G. S. Bull 594, pp. 38-48.

MOHAVE UNITED MINING & MILLING CO. CALIFORNIA

Letters unclaimed at last address. Phoenix, Ariz., in April, 1920. Probably out of business. See Vol. XIV.

MOJAVE ANNEX TUNGSTEN MINING CO. CALIFORNIA

Office: 411-12 I. W. Hellman Bldg., Los Angeles, Cal.

Officers: J. B. Evans, pres.; H. G. Parsons, sec.-treas.; with C. M. Dunwoody, directors. P. H. O'Connor, supt.

Inc. Sept. 26, 1916, in Nevada. **Cap.** $250,000; shares $1 par.

Property: about 140 acres in the Clark Mountain district, San Bernardino county, Calif., 12 miles from Roach, Nev., on the Salt Lake Route. Claims are adjacent to the Mojave Tungsten Co. Wolfram veins said to carry 5% tungstic trioxide (WO_3).

Equipment: includes 20-ton mill.

MOJAVE TUNGSTEN CO. CALIFORNIA

Office 74 Broadway, New York.

Officers: G. F. Stringer, pres.; J. P. Smith, v. p.; M. A. Fitch, sec.; J. T. Anyon, treas., with W. W. Cohen, and A. H. Carlisle, No. 1 W. 34th St., New York, directors. F. S. Naething, supt., in California; N. H. Brown, supt. in Colorado.

Inc. Nov. 23, 1915, in Del. **Cap.** $1,000,000; par value $2; all outstanding. Traded on New York and Boston curbs. Transfer offices; The Corporation Trust Co., Jersey City., American Trust Co., Boston. Registrars; Empire Trust Co., New York; State Street Trust Co., Boston.

Statement issued Aug. 31, 1916, showed a profit of $34,888 for 8 months.

Property: (California) 32 claims in the Clark district, San Bernardino county, 20 miles from Jean, Nev., the shipping point. Tungsten occurs chiefly as wolframite in a quartz vein in gneissoid granite. The vein is practically vertical with N. W.-S. E. course.

Development: by 2 main and 5 prospecting shafts, disclosing numerous small bodies of high grade wolframite ore. The longest oreshoot so far encountered was about 125' long on the 100' level in No. 1 shaft.

Colorado Property: the Bracken group of 6 patented claims, at Boulder Falls, Boulder county, showing the well-known Good Friday vein with the usual ferberite ore.

Development: by 3 shafts, Burdette main shaft 350' deep, connecting with No 1 tunnel. There are 3 tunnels in the face of the mountain. Ore in No. 2 has been continuous for a distance of nearly 1,000'. On January 1, 1917, the consulting engineer estimated ore containing 330,000 lbs. of tungstic acid opened up.

Equipment: includes a small mill on the California property. At the Colorado property the Degge-Clarke mill was acquired in May, 1917; this was the leading custom mill of the district with a capacity of 1,000 tons of tungsten ore monthly.

The Colorado property of its subsidiary the Mohave Boulder Tungsten Mining Co., was sold at public auction, June 28, 1918.

MONARCH MINING CO. CALIFORNIA

Address: Vallicita, Calaveras Co., Calif.

Officers: Joseph Francis, pres.; Geo. Morrice, sec.

Inc. 1914, in Calif. **Cap.** $250,000; par $1; all issued.

Property: 100 acres of placer ground, near Vallicita, Calaveras county.

MONTACALI MINES SYNDICATE CALIFORNIA

Successor to the California Syndicate and Golden Gate Exploration Co.

Office: 61 Broadway, New York, and 1408 Hobart Bldg., San Francisco. **Mine address:** Sheepranch, via Murphys, Calaveras Co., Calif.

Officers: Percy Bullard and John F. Alvord, syndicate mgrs.; H. R. Plate, Western representative and mine mgr.

Montacali syndicate formed July, 1920, to take over option on Sheepranch mine; all payments to Jan. 1, 1922, have been met. No information

available as to the arrangment made with stockholders of predecessor companies.

Property: an option on the Sheep Ranch mine, about 132 acres, extending 9,000' along the strike of the Sheep Ranch vein, on the east belt of the Mother Lode, 17 miles N. E. of Angels, at an elevation of 2,200'; also not far from Murphys.

Ore: free gold occurs in a well defined fissure vein, the pay ore having width of 5' and a 72° dip. The hanging wall is gray schist and slate forms the foot-wall.

Development: by 1,700' incline and 4,700' of drifts. Work in 1920, confined to 1,400, 1,500' and 1,700' levels. Reserves in May, 1920, were estimated to be 107,000 tons of ore worth $12 per ton. Cost were given as $6 per ton.

Equipment: pump, hoist, and an old 20-stamp mill which was remodeled in to an 100-ton cyanide plant completed December, 1920. Power is purchased from the Utica Mining Co., whose hydro-electric plant is near Murphys. A total of 50-55 men employed.

Production: $10,434 in gold during 1919. New mill treating about 50 tons of $10-$20 ore per day with a recovery of 92-96%, and mine is said to be on a self supporting basis.

MONTEZUMA MINING CO. **CALIFORNIA**

Address: Algernon Del Mar, supt., Big Pine, Inyo Co., Calif.

Property: a group of lead-silver claims, 10 miles S. E. of Big Pine. Country rock is much faulted limestone and slate. Ore is mainly lead cabonate, with iron oxide and decomposed lime; also some galena.

Development: by tunnels, said to have opened large bodies of lead-silver ore. Shipments were made in 1920.

Equipment. includes a flotation mill erected in 1919.

MONTEZUMA MINING & REDUCTION CORP. **CALIFORNIA**

Company defunct. No assets. See description etc., in Vol. XIV. Mines Handbook.

MORINGTON MINING CO. **CALIFORNIA**

Address: C. N. Miller, fiscal agent, 617 Pacific Bldg., San Francisco.

Inc. 1920, in Nevada **Cap.** $1,000,000; $1 par; all issued. Listed on San Francisco Stock Exchange. Said to have been spent $40,000 to April, 1920; $40,000 in the treasury at that time.

Property: 3 claims near Hartman's Bar, on Middle Fork of the Feather River, Plumas county, acquired from the Marble Cone M. Co. The project involves a dam 35' high on the river, from which a 6 x 9' flume of 500 second-feet capacity, 2,000' long, will carry river past the pools containing the gold. A half yard of gravel from one pool yielded C. N. Miller $12.20 gold.

MORNING GLORY GOLD MINING CO. **CALIFORNIA**

Address: A. A. Codd, pres.-mgr., Reno, Nev.

Property: a bond on an old high-grade gold mine, reopened 1918; situated 1,500' from the Tightner mine, near Alleghany, Sierra county.

Development: by shaft to depth of 325', with levels at 150', 225 and 300', showing rich gold ore.

Equipped with 10-stamp mill operated by electric power and full mining plant.

MORNING STAR & TRENTON MNG. & MLG. CO. **CALIFORNIA**

Idle. **Address:** 406 First Natl. Bank Bldg., Oakland, Calif.

Officers. Sarah J. Robinson, pres.; E. C. Robinson, sec.

Inc. 1893, in Calif. **Cap.** $50,000; par $1.

Property: 250 acres of gold-silver ground, in Plumas county, developed by 300' shaft, 1,700' tunnels and equipped with stamp mill, power plant, etc.

MOUNT GAINES GOLD MINING CO. **CALIFORNIA**

Address: Hornitos, Mariposa county, Cal. Said to be financed by Los Angeles and Chicago capital.

Officers: Wm. B. Davidson, pres.; A. L. Irish, v. p.; D. J. Hoge, sec.-treas.; with A. E. Rutherford and P. B. Ellis, directors. W. J. McCray, mgr.

Cap. $150,000; shares 10c. par. The new company took over control in 1916 and paid for the mine partly in stock and gave a first mortgage trust deed for $66,000.

Property. 200 acres patented and 300 acres unpatented land in sec. 35, T. 4 S., R. 16 E., Mariposa county, 4½ miles E. of Hornitos, on the west vein of the Mother Lode, said to show gold ore.

Development: by 1,350′ incline with 11 levels and about 8,000′ of workings. The mine is full of water, but old records show a 5′ vein assaying $7 per ton.

Equipment: includes electric hoist, air compressor and 20-stamp mill with amalgamation and concentration tables. Electric power is obtained from the San Joaquin Power & Light Co. Idle.

MOUNTAIN COPPER CO., LTD. CALIFORNIA

Secretary's address: 3 Lombard St., London, E. C., England. **Operating office:** 332 Pine St., San Francisco, Calif. **Mine office.** Matheson, Shasta county, Calif. **Works office:** Martinez, Contra Costa county, Calif.

Directors: Major F. B. Lawson, chairman; Henry J. Wenham, J. T. Middleton, E. T. McCarthy and A. N. Frewer. Wm. F. Kott, gen. mgr.; M. J. Murphy, mine supt.; T. B. Swift, smelter supt.; Jardine, Matheson & Co., Ltd., 25 Madison Ave., New York, American sales agents.

Inc. Dec. 1, 1896, in Great Britain, and reorganized May 10, 1902. **Cap.** £250,000; shares £1 par. In 1899 the company changed its capitalization to £250,000 in shares and £1,000,000 in 6% debenture stock; shares £4 par, on which a first payment of £1 per share was made Jan. 16, 1905, leaving £750,000 of stock outstanding. The change in 1899 was practically a complete amortization. A further refund of 10s per share was made in 1918, leaving the outstanding, as at Jan. 1, 1919, £625,000. Payment of debenture interest was suspended in November, 1919, and on Dec. 16, 1920 the issuance of £250,000, £1 shares, to redeem debentures to same amount was deferred to January, 1926.

Dividends: before reconstruction, 1897-1901, aggregated 58½%. No more are to be paid until debentures are paid off.

Profits were, £150,255 in 1907; £28,115 in 1908; £24,557 in 1909; a deficit of £3,042 in 1910; profit of £55,069 in 1911; £81,686 in 1912; £53,456 in 1913; £35,562 in 1914; £106,365 in 1915; £232,106 in 1916; £114,674 in 1917; £36,124 in 1918; £6,861 in 1919; £16,600 in 1920.

Property: the Hornet mine, 10 miles N. W. of Redding. The Iron Mountain mine was closed down in 1921.

The Hornet mine, lying to the north of the Iron Mountain, developed about 5,000,000 tons of pyrite ore, averaging 1% in copper tenor, with patches up to 2.5% copper, and carrying 47 to 50% sulphur. Gold and silver content are very small, but the ore is valuable for the manufacture of sulphuric acid, saving the copper and precious metals as by-products. A description of the crushing and screening plant that prepares the pyrite for market will be found in the Mining and Scientific Press of Nov. 1, 1919, by L. C. White. The works were enlarged to 600 tons daily in 1920.

In 1921, company's office, equipment, etc. were moved to the Hornet mine and a 2½ mile aerial tram built to carry ore to the S. P. R. R., 1½ miles south of Motion station. The Iron Mountain R. R. is to be abandoned.

The 350-ton Mococo smelter, at Martinez, has extensive acid works built at a cost of approximately $1,250,000. The Hornet ores, low in copper but rich in sulphur, are burned, the sulphur fumes collected in lead-lined chambers and transformed into sulphuric acid by the Meyer chamber process, the cinder remaining after the roasting is leached for its copper content, a 150-ton leaching plant being added in 1917 for this purpose. The acid is sold crude and also is used as the basis of commercial fertilizers for which there is a considerable demand in the rich fruit and agricultural districts of California and the other Pacific coast states. The works also do

a general custom business and are fully equipped with steam, electric and pneumatic power.

The fertilizer plant was operated to full capacity in 1920 and a gas purifier, bluestone and pigments made.

Production: 129,448 tons of ore from Hornet mine in 1920. At one time, only a decade ago, this company was among the largest copper producers of the world, but has since greatly declined in output, production having been 29,727,040 lb. fine copper in 1901; 19,116,160 lb. in 1903; 6,814,000 lb. in 1907; 3,638,619lb in 1908; 2,775,197lb in 1909; 2,987,815lb in 1910; 5,400,000 lb. in 1911; 5,614,000 lb. in 1912; 6,890,000 lb. in 1913; 5,454,000 lb. in 1914; 7,280,712 lb. in 1915; 9,172,390 lb. in 1916; 8,122,325 lb. in 1917, and 6,802,612 lb. in 1918, 2,250,468 lb. in 1919. In Aug., 1919, the company stood at the head of Shasta county copper producers as the result of increased output and idleness of the Kennett smelter of the Mammoth Copper Co., but mines and works were closed in 1919 from April, and during large part of 1920.

Company has been managed with great prudence and marked success, both financially and technically, and has been able to solve the problem of the treatment of low-grade pyrite ores, with the manufacture of acid.

MOUNTAINEER MINES CONSOLIDATED **CALIFORNIA**

See Volume XIV.

MOUNTAIN KING MINING CO. **CALIFORNIA**

Office: 316 Kohl Bldg., Calif. & Montgomery Sts., San Francisco. Arthur Hillier, supt., Mountain King, Mariposa county, Cal.

Officers: Anthony McMillan, pres. and managing director; A. T. Dunbar, v. p.; J. C. Fitzsimmons, v. p.; G. A. Urquhart, sec.-treas.; with H. T. Harper and Geo. E. Hart, directors. B. C. Austin, mng. engr.

Inc. 1913, in Calif. **Cap.** $600,000; $1 par; assessable; 405,437 issued.

Assessments 5 and 6 were levied in 1920, 7 and 8 in 1921; the latter 5c. per share, was payable on Nov. 17. Annual report for year ending March 31, 1921, shows total receipts of $87,775 of which amount $87,282 was from sale of bullion and concentrate. Disbursements were $129,581, leaving a deficit of $41,805. Balance March 31, 1921, $1,276, as compared with $43,462 in 1920. Initial dividend of $18,950 paid May 31, 1916, equal to 3c. per share.

Property: 19 claims, patented, on the north fork of Merced river on the Yosemite Valley R. R., in Coulterville, Mariposa county.

Geology: the Mountain King quartz vein is in slate and greenstone, and carries gold and silver in iron pyrite and tetrahedrite.

Development: by 2,150′ shaft sunk at 55° incline; also by a 2,645′ tunnel on the 1,000′ level. In 1920-21 mining operations were mainly on the 1,000, 1,850 and 2,000′, levels; most of the ore coming from the two lower levels. On the 2,000′, an average width of 46″ of ore is exposed, which for a length of 200′ average $9 per ton. On Nov. 1, 1921, a crosscut was started to reach No. 2 ore shoot, which was cut at 2,000′.

Since 1913, company has done 9,822′ of drifting, 3,000′ of raising, 2,980′ of crosscutting and 1,398′ of sinking. Extensions in 1920 were 1,164′. Expenses have been 15% for plant and equipment, 4% for overhead, 81% for development, mining and milling.

For each dollar paid in by stockholders, approximately $3 worth of bullion and concentrate were taken from mine.

Equipment: includes air-compressor, hydro-electric plant, built in 1915, and a 30-ton stamp mill with concentrator. Power plant has one 350-kva. 3-phase, 4,000-volt generator direct connected to a turbine running at 600 r. p. m. Underground haulage is by electric trolley locomotive.

Production: years ending March 31:

	Tons Ore Milled	Value per ton	Recovered Amal.	Recovered Conc.	Recovered Total	Cost per Op't'g.	Cost per M'l'g.
1920 (11 mos.)	12,655	$7.46	69.3%	23.1%	92.4%	$6.784	$0.562
1919.....	23,648	5.63	78.9	13.1	92.0	5.168	0.488

1918.....	15,940	4.59	64.5	26.6	91.1	5.538	0.462
1917.....	13,186	3.09	53.2	35.1	83.3	3.646	0.331

Total mining costs for 1920, were $8.281 per ton, or $10.534 when depletion, depreciation and taxes, etc., are included.

Company is operating a mine with good equipment and capable management.

MOUNTAIN LION CONS. MINING CO. **CALIFORNIA**

Address: Exchange Natl. Bank Bldg., Santa Rosa, Calif.

Officers: N. McNeill, pres.; Geo. E. Remmel, sec.

Inc. Aug. 5, 1914, in Calif. **Cap.** $250,000; $1 par; 47,043 shares issued.

Property: 60 acres near Minersville, Trinity county, said to contain gold and silver. Is a prospect. Idle.

MOUNTAIN MONARCH GOLD MINING CO. **CALIFORNIA**

Probably dead. A Shasta county promotion. See Vol. XII.

MUGWUMP MINES CO. **CALIFORNIA**

Address: A. D. Foote, Grass Valley, Calif.

Inc. 1917. **Cap.** $1,000,000.

Property: about 1,000 acres, includes the Gold Star lode, 2 miles S. W. of Alleghany, and Young America lode, 1 mile S. of Forest City, both in Sierra county. Ground covers an ancient channel, 1,000′ of which on the Gold Star yielded about $1,000,000. It is up to 200′ wide and 10′ deep, covered with lava; 4,000′ of channel is said to be unworked. Samples give from $3 to $7 per ton. In the Young America mine, the channel yielded from $5 to $10 per mine car. Several quartz veins have been uncovered in serpentine.

Development: by 1,200′ ventilating tunnel and 1,800′ main tunnel, with long drifts into the gravel.

Equipment: water power, gravel cars, shop, buildings, and flumes for washing.

Was producing in 1919, but apparently not in 1920.

MURCHIE MINES CO. **CALIFORNIA**

Defunct. Property bought at sheriff's sale for $2,490 by C. F. Humphreys, Merchants National Bank Bldg., San Francisco, Calif.

Property. Murchie mine, 2 miles E. of Nevada City, Nevada county, under water since 1910 . The mine has a steep vein in granodiorite, with stopes 4-23′ wide, of $8 ore.

Development: by 1,150′ shaft. Total production reported to be $1,300,000. Examined in 1909 by J. Nelson Nevius.

MURRAY CREEK MINING CO. (REORG.) **CALIFORNIA**

Idle. **Address:** 302—26th Ct., Oakland, Calif.

Officers: P. H. Hansen, pres.; J. P. Rohrbach, sec.

Inc. 1896, in Calif. **Cap.** $100,000; $1 par.

Property: 67 patented acres at Cave City, developed by shaft and tunnels.

NAPOLEON MINING CO. **CALIFORNIA**

Address: 220 Battery St., San Francisco. **Works:** near Copperopolis, Calif. L. D. Adams, Milton, Calaveras county, Cal. D. E. Coughanour, supt.

Property: the Napoleon copper mine in Calaveras county, 10 miles S. W. of Copperopolis, held under 10-year lease. The ore is mainly chalcopyrite, occurring in lens shaped masses up to 20′ in width.

Development. by 500′ shaft which is only unwatered to 200′.

Equipment: in 1918 a new hoist was added, also 2 Diesel engines to drive a ball-mill, and a flotation unit, planned to treat 90 tons ore daily.

The mine was operated as early as 1881, and is credited with a past production of $1,200,000 in copper and gold.

Operated intermittently in 1919 with some production; idle during 1920.

NASSAU COPPER CO. **CALIFORNIA**

Address: Room 301, 381 Bush St., San Francisco. **Mine address:** Altaville (Nassau mine), via Angels, Cal.

Property: 2 patented claims, 40 acres, and 1,560 acres of agricultural lands, 4 miles north of Copperopolis, Calaveras county, covering a length of 15,840' on the lode. Ore occurs in lenses and streaks as copper sulphides, pyrite, gold, silver and zinc, in a 10' vein running N. 35° W. and dipping 65° N. E.

Development: by 280' shaft with 1,000' of drifting N. and S. on the 95' level, and 1,100' of drifting N. and S. on the 200' level. Mine worked under lease 1918-19. Shipments averaged 17.90% zinc, 5.22% copper, 4.60 oz silver, 0.20 oz. gold, 11.90% iron, 39% silica. J. A. Vigeant was reported negotiating for control, Jan., 1921.

NATIONAL GOLD MINES CO. — **CALIFORNIA**

Address: 315 Exchange Bldg., Los Angeles, Calif.
Officers: Dr. S. I. Kistler, pres.; A. C. Mahan, sec.
Inc. 1919, in South Dakota. **Cap.** $100,000; par 10c.

Property: 100 acres of gold quartz ground, in Sonoma county. Developed by 420' of tunnel work and equipped with air-compressor, etc.

NATIVE COPPER MINING CO. — **CALIFORNIA**

Inc. in 1911, to develop the Copper King, Native Copper and other claims on Table mountain, Monterey county. W. H. Kerr, Coalinga, Calif., pres., at last report.

NATOMAS COMPANY OF CALIFORNIA — **CALIFORNIA**

Office: 605 Alaska Commercial Bldg., San Francisco, Calif.

Officers: Frank B. Anderson, pres.; Herbert Fleishhacker, Frank W. Griffin, Fred W. Kiesel, W. Mayo Newhall, Louis Sloss, Louis Sloss, Jr., Geo. F. Weber, John D. McKee, v. p.'s; with Hy E. Bothin, directors, P. C. Knapp, sec.-treas.; Emery Oliver, gen. mgr.; L. D. Hopfield, supt. of dredging at Natoma, Calif.

Inc. December 24, 1914, in California, to take over all the properties of Natomas Consolidated of California.

Natomas Company of California is engaged in a number of enterprises, principally the development and sale of approximately 60,000 acres of land in Reclamation Districts 1000 and 1001; development and sale of the American River Lands; operations of gold dredges and rock crushing plants, and, through ownership of the stock of Natomas Water Company, the operation of a water utility and other minor projects. Annual meeting 3rd Tuesday in March.

Cap. preferred 6% non-cumulative $100; authorized, $7,250,000; outstanding, $6,823,200; common, $100; authorized, $9,250,000; outstanding, $9,249,500.

Bonds: $450,000 Natoma Land & Mining 20 year 6% 1st mortgage, dated Jan. 1, 1907; $146,000 outstanding, March 1, 1922; callable by consecutive numbers on interest dates at par. Redemption clause provides for the annual retirement of $20,000 on July 1, 1913 to 1917; $25,000, 1918-1922; $40,000, 1923-1925 and on Jan. 1, 1927.

General and refunding mortgage 6% 20-year gold, dated Jan. 1, 1915; $16,500,000 authorized; $10,095,200 outstanding, Jan. 1, 1922; 80% of all land sales are applied to sinking fund.

Company pays 2% income tax of both issues. Mercantile Trust Co., San Francisco, is trustee of first and pays interest on both issues. Interest on 2nd issue paid also by U. S. Mortgage & Trust Co., New York, or Swiss Bank Corp., London.

Earnings—Year Ended December 31:

	Net Profit Less Exp. Taxes, etc.	Cash Interest	Scrip Interest	Depreciation	Exhaustion of Mineral Area	Balance
1918	$1,570,799	$194,770	$542,262	$345,171	$486,421	$ 2,175
1916	1,246,589	219,476	577,338	364,697	464,695	379,617 *
1917	1,546,670	222,786	585,725	328,678	795,566	386,085 *

1918	1,220,777	126,301	644,350	308,827	642,660	501,361 *
1919	986,592	404,704	399,375	280,300	554,616	652,403 *
1920	822,803	707,763	10,797	283,243	598,404	777,404 *
1921	667,675	783,440	3,759	231,466	544,475	895,465 *
	*Deficit					

Property: over 15,000 acres of mining lands, near Folsom, Sacramento county, and near Oroville, Butte county; and about 70,000 acres of farm lands in Sacramento county.

Equipment: includes 10 large, modern, electrically-driven dredges, and 2 large rock crushing plants. Improvements in machinery and gold-saving apparatus and in methods to insure leaving the dredged ground suitable for agriculture, are being made continually.

Production: during 1919 the boats dug 20,485,530 cu. yd. recovering gold worth $1,775,124, of which $461,484 was profit. In 1920 material dredged amounted to 20,459,001 cu. yd., yielding $1,680,675 gross and $318,826, net.

In 1921 material dredged amounted to 16,369,703 cu. yd. on company land and 4,883,585 cu. yd. on other lands, yielding $1,694,121 gross, and $292,529 net.

In 1915, it was estimated that there was 216,000,000 cu. yd. of pay-gravel, but additions have been made, so that after 164,369,703 yd. of the original area have been dredged, there are 125,600,000 yd. still available, plus 40,000,000 yd. if pre-war costs should again prevail. The apparatus placed on the boats to save fine gold has recovered $107,000 net, most of which would have been lost under previous methods.

Rock Crushing: in 6 years to end of 1919, the plant at Fair Oaks produced 2,206,944 tons of crushed rock, 240,944 tons of washed gravel, and 275,724 tons of screened gravel; and the plant at Oroville 517,364 tons of crushed rock, and 508,016 tons of screened gravel. The crushed products and field gravel are sold throughout the State. Plants were leased 1920 and 1921

Land Department: reclamation work has cost $4,801,322 to date, inclusive of accrued interest, etc. To the end of 1920, 30,294 acres were sold for $4,964,626, of which $4,203,214 is still due. All of these properties are being irrigated, provided with roads, and generally prepared for sale. In addition to lands under sales contracts there are 43,000 acres awaiting development.

If Natomas were operating its dredges alone, good dividends could be paid; but until the land project is self-sustaining there can be no distribution of profits.

NEEDLES LEAD AND ZINC CONCENTRATOR CALIFORNIA

Address. D. L. Muir, mgr., Goldroad, Ariz. Is a custom mill, at Needles, San Bernardino county, owned by **U. S. S. R. & M. Co.**, which see for details.

NEOCENE PLACER MINING CO. CALIFORNIA

Address: I. V. Akey, pres., 624 I. W. Hellman Bldg., Los Angeles, Calif.

Inc. 1909. **Cap.** $250,000.

Property: 10 claims, 897 acres, of hydraulic placer ground, near Scales, Sierra county. About 600′ of the channel has been worked. Most of the hydraulicking has been 30′ above bedrock (volcanic ash and gravel on slate). The yield averages 50c. a yard.

NEVADA-CALIFORNIA SILVER MNG. CO. CALIFORNIA

Officers: Joseph B. Evans, pres.; C. C. Boak, and W. J. Douglass; all of Tonopah, Nev.

Property, the Carbonate mine, in Providence range, New York Mountain district, near Ivanpah, San Bernardino county, shows 5′ to 35′ vein, opened to depth of 750′, which has blocked out $100 ore.

Equipment: 20-ton mill, 3-drill compressor, etc.

NEVADA PACIFIC EXPLORATION CO. **CALIFORNIA**

Address: J. G. Kirchen, Tonopah, Nevada; and H. M. Thompson, mgr., Forest Hill, Calif.

Officers: N. K. Cooper, pres.; H. M. Thompson, v. p.-mgr.; B. M. Aikens, sec., with John G. Kirchen and P. T. Prather, directors.

Inc. 1920. **Cap.** $100,000

Property, the Snowbird mine, near Forest Hill, Placer county, and the Joseph mine near Volcanoville, Eldorado county. Veins occur in serpentine, slate, and amphibolite, capped with andesite.

Development: by 177′ shaft and over 1,000′ of workings. On the 75′ level an ore shoot was followed for 500′.

Equipment: includes a 50-ton mill, comprising stamps, ball mill, Aitkens classifier, Wilfley tables, cyanide plant and filter.

The Snow bird made a small gold output in 1920.

NEW ALMADEN CO., INC. **CALIFORNIA**

Controlled by New Almaden Quicksilver Mines Corp., which see. G. H. Sexton, pres.; C. A. Frank, sec., New Almaden, Calif.

NEW ALMADEN QUICKSILVER MINES CORP. **CALIFORNIA**

Address: 210 California St., San Francisco.

Property: company owns all of the stock of the New Almaden Co., Inc., which holds a lease for 25 years, from Feb. 4, 1915, on 7,200 acres of mineral and agricultural land at Almaden, Santa Clara county. The old mine was first operated by Mexicans in 1824. To the end of 1917 the total output was 1,021,183 flasks of quicksilver. This has been exceeded only by the Almaden in Spain, the Idria in Austria, and Santa Barbara in Peru. The New Almaden mine is now practically exhausted, and operations are confined to El Senador mine, 4 miles distannt. The Enriquita mine is not being operated. The mines and works are fully described in 'Quicksilver Resources of California', Bull. 78, State Mining Bureau, San Francisco.

Geology: the ores are composed of cinnabar, with some mercury, in a gangue of quartz pyrite, calcite, and dolomite. The latter is more prevalent than in most quicksilver areas. The rocks associated with the cinnabar include every variety of the metamorphic series. Where it is permeable sandstone, impregnations have resulted. Elsewhere the ore seems to occur exclusively in crevices in the rock, and close to evidences of faulting. The orebodies are stockworks, arranged along definite fissures and the deposits as a whole have a vein-like character, with clay hanging and serpentine footwall. Ore carries from 0.2 to 1% mercury.

Development: at the old mine, by 18 shafts, the deepest being 2,450′, and 100 miles of workings scattered over 2½ square miles of ground. At El Senador, adjoining the New Guadalupe, which see, there is a 1,300′ tunnel, with winzes sunk at 1,150′ and 1,300′. Levels have been driven from these winzes. Normally 60 men are employed underground.

Equipment: at El Senador; electric power, crushing plant, and reduction works consisting of a 50-ton Herreshoff multiple-hearth furnace, a 90-ton Scott furnace, Cottrell dust precipitator, and condensers. Six men attend to this plant. The plant was destroyed by fire in 1919 but has been replaced.

Production: in 1918, amounted to over 2,000 flasks from all sources, including cleaning up the old works.

NEW BLUE JAY MINING CO. **CALIFORNIA**

Address: I. H. Jordan, sec., 205 Brower Bldg., Bakersfield, Calif.

Inc. 1905, in Calif. **Cap.** $500,000; $1 par; 121,000 shares issued.

Property: 173 acres, patented, with gold-copper showings, in Trinity county. Developed by tunnels and equipped with hydraulic plant.

NEW GUADALUPE MINING CO. **CALIFORNIA**

Address: Motor Route A, Los Gatos, Calif.

Officers: H. C. Davey, pres.; J. B. McCauley, v. p.; F. A. Luedeman, sec.

Inc. Dec. 1907, in Arizona. **Cap.** $1,000,000; $1 par.

Property: 2,500 acres including the Guadalupe quicksilver mine, in Santa Clara county, 10 miles S. of San Jose, was discovered in the early 50's. Operated at one time under name of Century Mining Co.

See Quicksilver Resources of California, Bull. 78, p. 158, published by Cal. State Mng. Bureau.

Development: 700' incline shaft, tunnels, and many miles of workings. A concrete flume, 740' long, 55' wide, 9' high was built in 1917 to carry the stream over old mine beneath, so that the old 625' vertical shaft could be unwatered. A 12' vein of rich ore was reported cut early in 1920.

Equipment: includes electric hoists, air-compressors, and a reduction plant with two 18-ton coarse-ore furnaces, and two 30-ton fine-ore furnaces, also a 50-ton concentrating plant to handle material from old mine dumps. In 1917 company employed 75 men.

Production: total recorded output to 1919 about 106,772 flasks of quicksilver; in 1918 the yield was close to 1,000, but in 1919 only 200 flasks.

NEW IDRIA QUICKSILVER MINING CO. **CALIFORNIA**

Office: 70 Kilby St., Boston, Mass., and Merchants & Exchange Bldg., San Francisco.

Officers: Andrew Adie, pres.; H. C. Buckminster, sec.-treas., and gen. mgr.; with R. B. Sterns, F. Rothschild, Sydney Harwood, C. B. Wiggin, J. E. Simpson, and Jas D. Colt, directors. H. W. Gould, mgr., N. J. Martin, min. engr.

Inc. 1896, in Wyoming. **Cap.** $500,000; shares $5 par; all issued. Stock listed on Boston Stock Exchange. State Street Trust Co., Boston, transfer agent, American Trust Co., Boston, registrar. Annual meeting, third Wednesday in January, at Cheyenne, Wyo.

8,750 shares sold for 35 cents each at public auction in Boston on Dec. 30, 1920.

Dividends: paid since 1897, with total disbursements to date of $2,705,000; $3 in 1917; $2 in 1918; 25c. in 1919.

Assets.

Comparative Balance Sheet:

	Real Estate & Plant	Cash	Quicksilver	Profit & Loss
1920	$4,066,579	$ 13,976	$163,908	$299,363
1919	4,111,053	118,321	326,382	———
1918	4,171,756	17,869	305,984	———
1917	571,085	33,311	234,001	———
1916	186,471	9,575	200,000	———
1915	234,979	24,448	98,850	———
1914	258,170	6,823	73,200	———

Liabilities

	Capital Stock	Accts. & Notes Pay.	Profit & Loss	Tax Reserve	Deprec. Reserve	Total
1920.....	$500,000	$225,511	$.....	$.....	$3,818,315	$4,543,826
1919.....	500,000	240,948	1,051	.....	3,818,315	4,560,314
1918.....	500,000	157,203	.....	60,991	3,930,755	4,729,460
1917.....	500,000	237,713	.....	99,481	3,823,814	4,580,499
1916.....	500,000	37,284	118,128	.....	.....	754,501
1915.....	500,000	33,078	98,892	.....	.....	631,970
1914.....	500,000	.....	89,863	.....	.....	589,863

Property: 12 claims, 240 acres, and other patented land, including the Idria and San Carlos mines, 40 miles S. W. of Mendota and 58 miles S. E. of Tres Pinos, San Benito county. Fully described in Quicksilver Resources of California', Bull. 78 (1918), State Mining Bureau. Property has yielded 324,575 flasks of mercury to the end of 1919. It is the largest quicksilver producer in America.

Geology: the ore zone in this property is roughly elliptical and varies up to 285' in width and 800' in length on No. 5 level, and is 120' wide and 1,300' long on No. 10 level. The ore occurrence is not regular, comprising veins, cross-veins, stockworks, and impregnations, but the main orebody is a stockwork in sandstone and shale.

Development: totals about 20 miles comprising 10 tunnels, the lowest being a mile long, with a vertical depth of 1,500'. The San Carlos mine is opened by tunnels and a large open-cut, the ore averaging 0.7% mercury. As much as 12,300' of new work is done in a year.

Equipment: is complete, embracing water and electric power, semi-Diesel engines, compressors, gasoline hoists, storage-battery locomotive underground, gasoline motor on surface, aerial trams, one 2 miles long, sawmill, complete shops, and the most modern reduction plant know on any quicksilver property. The works employ 5 rotary-kiln furnaces, capable of calcining up to 500 tons of ore daily, fitted with Cottrell dust precipitators and wooden condensers. In June, 1920, fire destroyed surface equipment valued at $100,000, which has since been re-built.

Operating results:

	Flasks Quicksilver	Net Earnings	Cost per Flask	Average Price
1919	7,400	$ 1,050	$ 81.00**	$ 92.15
1918	10,700	167,540	103.00**	123.47
1917	11,000	207,762	73.00**	†105.00
1916	10,828	419,236	47.50*	89.57
1915	6,250	159,028	55.50	74.21
1914	6,550	Loss 45,010	52.	48.31
1913	9,700	65,012	30.	39.54
1912	9,600	73,763	31.60	42.46
1911	9,750	136,809	26.50	46.54
1910	10,800	186,939	26.	47.06
1909	8,900	109,639	27.50	46.30
1908	9,600	147,289	25.50	44 84
1907	7,675	89,650	25.50	41.50

* Includes cost of erecting new mill and aerial-tram, $70,000, or about $9.40 per flask. †On government requisitions; average price in open market was about $125. **Approximately.

Mine and plant shut down Nov. 1, 1920, awaiting a better market.

Owing to the heavy cost of re-building the plant, coupled with a lack of income during reconstruction and company's inability to produce mercury at a profit in competition with Italy and Japan, it was decided Dec., 1920 to appoint Jas. D. Colt, of Boston as receiver.

Reported late in 1921 that company had purchased the Sulphur Bank mine, which see.

NEW PROVIDENCE GOLD MINING CO. — CALIFORNIA

Former office: 2041 Emerson St., Berkeley, Cal. John D. Hammond, sec.

Property: 5 claims, 90 acres, including the Providence and Consuelo about 2½ miles S. E. of Tuolumne, Tuolumne county, said to show 2 parallel veins, 5' wide, in black Calaveras slate, running N. 8° E., with dip 45° E. Ore is gold with galena and 2% pyrite.

Development: by 1,300' shaft with levels every 100'.

Equipment: includes 10-stamp mill. No recent returns.

NOBLE ELECTRIC STEEL CO. — CALIFORNIA

Office: 995 Market St., San Francisco.

Property: 2 patented claims in Shasta county and other property, acquired from the Tehama Cons. Chrome Co. in 1915, in Tahama county,

shows chromite orebodies. In 1918, company operated under lease both chromite and manganese deposits in some 13 different counties of the State.

Equipment: at Nigger Hill, El Dorado county, a 50-ton concentrator, and at Heroult, Shasta county, 2 electric furnaces for the production of ferro-manganese and ferro-silicon. A second concentrator has been installed at the Pilliken mine in El Dorado county, held under lease.

NORAMBAGUA CONSOLIDATED, INC. **CALIFORNIA**

Address: Theodore Roosevelt Pell, sec., 542 Fifth Ave., New York.

Company consolidated with Central Cons. Mines Co., to form **Banner Consolidated Mines Co.**, which see.

NORTH BANNER CONS. TUNNEL CO. **CALIFORNIA**

Address: I. N. Rosecrans, sec., 525 Crocker Bldg., San Francisco.

Property: 3 patented quartz claims, 55 acres, 2 miles E. of Nevada City, Nevada county, idle since 1904. Production amounts to about $200,000, mostly from 1889 to 1892. The main vein has been developed by a 1,000′ adit and 500′ shaft below it. No equipment.

NORTH FORK MINING CO. **CALIFORNIA**

Office: Room 803, 57 Post St., San Francisco. **Mine office:** Forest, Sierra Co., Calif.

Officers: Lewis Tasheira, pres.; W. C. Wallace, sec.; Geo. F. Stone, supt.

Inc. 1909, in Calif. **Cap.** $300,000; par $1; assessable; 211,000 shares issued. Assessment No. 29, of 2c. per share, was due on Oct. 9, 1920.

Property: the North Fork mine and adjoining properties, 320 acres, in the Forest district, Sierra county, shows a quartz vein 4′ to 20′ wide in diorite and schist, with occasional lenses of ore containing arsenical sulphides and free gold.

Development: by 500′ incline, a 2,000′ tunnel and drift work.

NORTH STAR MINES CO. **CALIFORNIA**

Office: 22 William St., New York; 15 Exchange Place, Jersey City, N. J. **Mine address:** A. B. Foote, gen. supt., Grass Valley, Calif.

Officers: Geo. B. Agnew, pres.; Walter Douglas, v. p.; with C. E. Dodge, J. B. Pine, and Ernest Howe, directors. W. D. Pagan, sec.-treas.

Inc. April 10, 1899, in New Jersey. **Cap.** $5,000,000; shares $10 par; 250,000 outstanding. Stock is listed on Boston Exchange. New York office and Old Colony Trust Co., Boston, transfer agents. Central Trust Co., New York, registrar. Annual meeting, 2nd Wednesday in April.

In 1920, total production was $821,129, expense $744,995, operating profit, $76,134, but deducting interest, dividends, depletion, etc., net deficit was $51,415.

Total revenue from May, 1884, to 1919, inclusive, was $22,961,380, of which, $7,130,197 was profit.

Balance Sheet, December 31, 1920:

Assets		
Mining Property	$3,482,153.45	
Less amount written off for Depletion	2,903,481.45	$578,672.00
Homes Purchase		5,022.38
Plant and Equipment	1,329,367.15	
Less net amount received for equipment salvaged at Champion Mines	10,534.25	
	1,318,832.90	

Assets (con't)

Less amount written off for Depreciation	998,947.14	319,885.76
		998,253.12
Cash, investments, etc.		
		1,901,833.26
Total assets		373,166.74
Deficit as per detailed Surplus Account below		
		$2,275,000.00

Liabilities

Capital Stock (250,000 shares at $10)	$2,500,000.00
Less Dividends Nos. 55, 56 and 57, declared as Distribution of Capital Assets	225,000.00
	$2,275,000.00

Surplus Account

Deficit, December 31, 1919			$321,751.55
Profit and Loss, Year 1920			
Production	$821,129.50		
Interest and Dividends	39,786.85		
	860,916.35		
Investment Account, Loss	11,685.00		
Operating and Development Expenses	$744,995.31		
Depletion of Mines	122,800.00		
Depreciation of Plant and Equipment	32,851.23		
Loss		912,331.54	
Deficit carried to Balance Sheet			$373,166.74

Cash Statement, Year 1920

Receipts

Production	$821,129.50
Interest and Dividends Received	39,786.85
	$860,916.35

Outlays

Operating and Development Expenses	$744,995.31
Improvement and Property Purchase	4,052.53
Investment Account: Loss	11,685.00
Dividends (Distribution of Capital Assets)	75,000.00
	$835,732.84

Dividends: 2% in 1899; 5% in 1903; 6% in 1904; 8% in 1905; 10% in 1906 and 1907; 15% in 1908; 23% in 1909 and 1910; 17% in 1911; 12% in 1912 and 1913; 18% in 1914; 10% in 1915; 12% in 1916; 10% in 1917; 4% in 1918; 4% in 1919; 3 cents, Jan., 1921. The grand total is $5,569,540.

Property: 1,200 acres, including the North Star mine, 1½ miles S. of Grass Valley, and 440 acres, including the Champion mine, 1⅛ miles W. of Nevada City, Nevada county. See 'Mines of Nevada County' (1919), State Mining Bureau, San Francisco.

The North Star, the main producer of the group, was discovered 1851 and operated continuously to date, with exception of 10 years, 1874-1884, first by the original locators and later by the North Star Quartz, the North Star Gold Mining Co., and the North Star Mining Co. It is the second largest deep mine gold producer in the State, the fourth of all producers in the State and the thirteenth in America.

The Defender and Lone Star mines, 2 miles from Nevada City, were acquired in Sept., 1920. The latter is also known as the Murchie. It consists of 432 acres of patented placer and agricultural land. Four veins have been developed by a 1,150′ incline and numerous workings. Orebodies are similar to others of the district, but the ore was richer and carried more silver. The output to 1910 was $1,150,000.

Geology: the North Star and associated veins outcrop in diabase-porphyrite, but at 3,700 to 4,000′ on the dip the main vein passes into granodiorite. The system varies from a simple fracture to a complex of interlinked veins. They strike E. and dip N. The main vein is from 2 to 4′ wide, and dips 24°. Ore consists of quartz and altered wall rock, carrying fine and coarse gold, also auriferous sulphides, amounting to 2% of the ore. To the 150′ level some ore yielded up to $100 per ton; from 150 to 3,000′ the average was $20; and below 3,000′, $11.87. About 35% of the ground opened has been profitable.

Development: by a 2,400′ incline shaft; and the Central shaft, 4,000′ vertical and incline below it, making an incline depth of 6,300, equal to 2,500′ vertical. Levels have been driven E. and W. of this shaft from the 4,400, 4,700, 5,000, 5,600, 6,000 and 6,300′ stations. One foot of development yields 20 or 25 tons of ore.

On the 6,300′ level (2,500′ vertical) the North Star vein meets the 'X' vein, coming from the E. at an angle of 40°. The 'X' persists strongly, dipping W. and shows a good deal of milling ore scattered in a wide lode.

Development in 1920, 7,285′ at North Star and 304′ at Champion.

The Champion and Providence mines were closed, June, 1920, for good.

In Sept., 1920, the company was re-opening the old Massachusetts Hill and New York Hill shafts. The former is 1,800′ deep, and was closed in 1901. The orebody has yielded over $5,000,000 from 193,000 tons, the last 68,222 tons returning $1,078,075. The New York Hill mine has not been worked since 1885. Up to that time, 35,000 tons yielded about $500,000. Barren zones were encountered in both of these mines, but new shoots may be found.

Equipment: is complete to handle 400 tons per day. It includes a 100′ steel head-frame, duplex air hoist capable of hauling 4 tons from a depth of 7,300′ (incline), 3 compressors with total of about 4,000 cu. ft. capacity, electric power, water-power, sorting tables which reject 25%, 2 Wheeling crushers, electric locomotive and 2½-ton cars, 1,000-ton capacity concrete mill-bins, sixty 1,500-lb. stamps, each 10 driven by a 35-h. p. back-geared motor, 20-mesh screens, Richard pulsator classifiers and cones, Deister tables, and 350-ton cyanide plant for sand, slime and concentrate, employing Dorr thickeners, Devereaux agitators, Oliver filters, and Merrill precipitators. Residue is stacked by means of a clam-shell bucket-excavator.

Production: the North Star yielded 1,600,000 tons of $11.35 ore from 1850 to the end of 1919, a total of $18,000,000. Records of the Champion from 1851 to 1893 are not complete, but from 1893 to 1913, the total was $2,864,528 from 508,910 tons of ore. Recent outputs, of the North Star are as under:

Year	Tons	Value per ton	Gold Extracted	Cost per ton	Profit per ton
1920.....	79,026	$ 8.62	$ 821,129	$ ...	$ ...
1919.....	102,800	8.95	919,800	7.81	1.14
1918.....	99,550	7.79	775,688	7.29	0.50
1917.....	100,500	11.43	1,148,685	6.65	4.78
1916.....	111,330	10.42	1,160,007	6.26	4.16
1915.....	109,860	9.92	1,089,751	5.73	4.19

The whole group of claims owned by the North Star has yielded over $30,000,000.

NYMAN CONSOLIDATED MINES CO. **CALIFORNIA**

Office: 502 Humboldt Bank Bldg., San Francisco, Cal. **Mine office:** Stent, Tuolumne county, Calif.

Officers: A. L. Trowbridge, pres.; R. W. Barrett, v. p. ; F. G. Mudgett, sec., Fay Chadbourne, supt.

Inc. March 19, 1915, in California. **Cap.** $200,000; $1 par; assessable; 161,586 shares issued.

Gross earnings from July, 1915, to March, 1917, were $51,086, and cost of operation and maintenance, $53,614. Cash assets at end of April, 1917, were $8,791.

Property: 5 patented claims, 240 acres, patented on the Mother Lode between Quartz and Stent, 2 miles S. of Jamestown, adjoining the Dutch App on north and Cloudman-Jumper group on the south.

Geology: a contact zone between amphibolite schist and greenstone. Shows West or App vein 20 to 90′ wide, at N. end of Nyman claim; the Heslop or Middle vein is 50′ long, with $5 to $10 ore across 7′; the Knox & Boyle shows 2′ to 8′ of high grade ore on the 700′ and 800′ levels. The Mascot vein shows shoots of high grade ore in Calaveras slate hanging wall.

Development: by 15,000′ of underground workings, consisting of 700′ tunnel, 850′ vertical shaft and 2 incline shafts, one 825′ and the other 810′ deep, both dipping 60° E., with levels 100′ and 200′ apart. Drifts have been started on $6 ore N. and S. of old crosscuts that apparently had not been sampled years ago.

Equipment: includes 200-ton 40-stamp mill, with Frue vanners for 20 stamps and 22 buildings, 2,000′ double-drum hoist, 750 cu. ft. air compressor, pumps, electric power.

Production: in 20 months ended March 31, 1917, 8,550 tons yielded $51,000 of gold. Mill recovery was 85 to 90% by amalgamation and concentration. Output to date is $2,000,000. Costs with full equipment are estimated at between $2.50 and $3 per ton.

Completely described in Vol. XIV. Mine in hands of lessees, but apparently little, or no, production in 1919 and 1920.

OCEANIC QUICKSILVER MINE **CALIFORNIA**

Address: Murray Innes, owner, 217 Kohl Bldg., San Francisco, Cal. E. W. Carson, mgr., Cambria, San Luis Obispo county, Calif.; Thos. Knowles, supt.

Property: 3 patented claims, 500 acres, about 5 miles E. of Cambria, shows a contact deposit 800′x650′x20′ in width running N. W., with nearly vertical dip, in serpentine and sandstone formation. The ore contains cinnabar and iron sulphide, assaying 0.4% quicksilver.

Development: to depth of 650′ by 300′ vertical winze and 1,500′ tunnel. Underground workings total 5,000′. Mining is by caving and sublevel slicing.

Ore reserves: estimated by owner at 300,000 tons with 150,000 tons blocked out, July 1, 1917.

Equipment: includes 25 h. p. hoist, compressor, pump, ½-mile wire tramway, and two 50-ton Scott furnaces. A 300-ton concentrator was built by lessees during 1916, but is not now operated.

Recent production: 1920, 1286 flasks; 1919 (10 months), 1177 flasks; 1918, 1650 flasks. Total to end of 1920, 26, 664 flasks. Shut down Nov. 1, 1920, due to slump in price resulting from dumping of foreign metal.

OLD COWBOY MINING CO. **CALIFORNIA**

Address: A. E. Bryson, owner, 808 Citizens Natl. Bank Bldg., Los Angeles. Theodore Martin, sec., Security Bldg., Los Angeles Calif.

Inc. June 1, 1905. **Cap.** $1,000,000. Company is a close corporation.

Property: the Cowboy mine at Loraine, Kern county, 14 miles N. E. of Caliente. There is said to be a considerable tonnage of 20 oz. silver ore, one pay shoot being 230′ long and 12′ wide.

Development: by a 520′ tunnel and drifts. Lessees have abstracted over $60,000. Equipped with a 20-ton cyanide plant.

Mine worked 1919 under bond and lease by Walter X. Osborne, employing 6 men; work continued until October, 1920, when operations ceased.

OLD EUREKA MINING CO. **CALIFORNIA**

Office: 25 Broadway, New York. Mine at Sutter Creek, Amador county, Calif.

Officers: Wm. D. Thornton, New York, pres.; G. E. Tener, Pittsburgh, v. p.; J. D. Clarke, sec.-treas.; T. C. Gorrie, gen. mgr.

Inc. 1916, in Delaware. **Cap.** $30,000,000; $10 par; 138,628 issued. Bonds authorized, $116,000, 8%. Mechanics & Metals Natl. Bank, New York, registrar.

Property originally owned by Hetty Green, was purchased in 1916 from the Amador Cons. Mng. Co. Is credited with past production of $30,000,000. For history of the property, see Mining and Scientific Press, Vol. 112, No. 26.

Property: covers 3,200′ along the mineralized belt of the Mother Lode. Recent exploration on the old Eureka main vein shows the absence of workable orebodies; further development is to be carried on in the Railroad vein and in the greenstone area, to disclose the zone of commercial ore which on neighboring properties occurs below an horizon of impoverishment.

Property was unwatered in 1917, after a shut-down of over 40 years. The shaft was enlarged from a one to 3-compartment shaft below the 1,600′ level, and sunk to 3,550′ by mid-1920. Large quantities of ore have been found on the 1,200, 1,600, and 2,100′ levels; while an 8′ vein was opened at 3,000′ and good ore at 3,500′. Lateral extensions in 1920 were 2,000′.

Work planned for 1921-22, includes extension of 21st level and exploration on main vein south on 35th level.

Equipment: modern sinking pumps, 300-h. p. electric hoist, compressor, and necessary buildings.

OMEGA PLACER MINING CO. **CALIFORNIA**

Property: in the Washington district of Nevada county, at an elevation of 4,000′, has been hydraulicked for many years, the 1,300,000 yards removed averaging 13½c. per yard. About 40,000,000 yd. remain to be washed. The gravel which is up to 175′ deep lies on slate.

Although operating in 1919, company was apparently inactive in 1920.

ORD COPPER MINE **CALIFORNIA**

Property: once called the Osborn mine, is in San Bernardino county, 12 miles S. of Daggett. It shows a series of wide veins, said to be traceable 3 miles across country, with widths in places of 50′ of 2 to 3% copper ore and good gold value. Gangue is heavy in barite, making gravity concentration impossible. New York capital said to have taken over the property on a development basis, no payments for a year, but doing 300 shifts of work per month in 1919.

ORIENTAL GOLD MINING CO. **CALIFORNIA**

Defunct. See Vol. XIV.

ORIGINAL AMADOR CONSOLIDATED MINES CO. CALIFORNIA

Company dissolved; described in Vol. XIII. See also Amador Mines Company.

ORIGINAL MINING & MILLING CO. CALIFORNIA

Office: Merced, Merced county, Calif.

Officers: C. E. Kocher, pres.; S. B. Hart, sec.

Inc. 1911, in Calif. **Cap.** $200,000; par $1; issued 169,666.

Dividends: total $39,023.

Property: the Original Quartz mine, 3 claims, at Clearinghouse, Mariposa county, and near Coulterville, is said to cover a 2′ vein, with slate walls.

Development: by 700′ winze, and 4,000′ of workings.

Equipment: includes compressor, electric hoist, machine-drills, stamp mill and several buildings. Employs 40 men.

Production: to date $300,000.

Operating throughout 1919 and 1920; in latter year doing 600′ new work and making largest output in Mariposa county. In 1921, started work on 3,100′ conduit for a 500 h. p. power plant.

ORIGINAL SIXTEEN TO ONE MINE, INC. CALIFORNIA

Address: 607 Monadnock Bldg., San Francisco. M. C. Sullivan, supt.

Officers: H. U. Maxfield, pres.; Walter C. Beatie, sec.-treas.; M. C. Sullivan, supt.

Inc. Oct. 9, 1911, in California. **Cap.** $200,000; $1 par; 164,030 shares issued. Annual meeting 3rd Tues. in April.

Dividends: to date $90,292; last, 10c. per share, July 1, 1921.

Property: 6 claims, including 4 acquired from the Twenty-One M. Co. in 1920. ¾ mile S. W. of Alleghany, Sierra county, at an elevation of 3,500 to 4,400′. As the result of litigation between the Sixteen to One and Twenty-One companies, by which the former was awarded $93,000 in Oct., 1919, the Twenty-One claims were acquired for $60,000, thus partly defraying the judgment.

Geology: the Sixteen to One vein is in amphibolite, the pay ore occurring in a shoot, 80′ long and going down 100′ on the dip. In the Twenty-One group a quartz vein in talcose schist carries free gold with arsenopyrite. The Tightner, a second vein has walls of schist pinching at times and showing quartz with secondary pyrite.

Development: in the Sixteen to One-by 2 tunnels, one 1,025′ long, below which is a winze sunk 325′ on dip of vein. Tunnels are connected by 3 raises.

In the Twenty-One-by an old 165′ shaft, and 2,000′ crosscut and tunnel on the Tightner vein, gaining 900′ of backs. Three shoots were opened, namely (1), 120′ long, 2′ wide, and $7 per ton; (2) 240′ by 3½′ and $10; and (3) 300′ by 4′ and $11.

Extensions in 1920, totaled 1,100′.

Equipment: electric power, 2 compressors, hoist, shops, store, dwellings, crusher and pan-amalgamator on the Sixteen to One, and 10 stamps, Lane mill, and vanners at the Twenty-One.

Production: no official figures obtainable, but estimated to be from $150,000 to $300,000 from the Sixteen to One, and over $100,000 from the Twenty-One.

Company wes operating and producing during both 1919 and 1920.

ORO BELLE CONS. MINES CO. CALIFORNIA

Address: W. B. Andrews, 506 Texas State Bank Bldg., Fort Worth, Texas.

Officers: W. B. Andrews, pres.-treas.-mgr.; C. Wilson, sec.; with Thos. A. Merritt and Stella Andrews, directors.

Inc. 1916, in Nevada. **Cap.** $1,250,000; $1 par; 625,000 issued; 500,000 reported to have been given for the property, 1,000 shares issued to di-

rectors and incorporators and balance under option until Oct., 1918, to John Hays Hammond and associates, of New York.

Property: the Oro Belle mine and millsite, in Hart district, San Bernardino county, about 14 miles W. of Searchlight, Nev. **Ore:** mainly gold, occurs in two veins. On the 700′ level the vein is said to be 6′ wide and to show 4′ of ore averaging $8 per ton. The Woodward lode was cut on the 100′ level, showing a width of 125′ and giving assays of from $5 to $20.

Development: by 814′ vertical main working shaft with levels at every 100′ and a total of 2,700′ of lateral work.

In 1915, the Oro Belle was under lease to the Tonopah Belmont Development Co., but option was relinquished within the year; mine idle at present.

ORO BELLE MINES CO. **CALIFORNIA**

Reorganized, 1917, as **Oro Belle Cons. Mines Co.**, which see. Stock exchanged on basis of 2 old shares for 1 of the new.

ORO FINO MINING CO. **CALIFORNIA**

Address Haines Gridley, East Auburn, Cal.

Officers: Allen Mason, pres.; Geo. H. Hyde, v. p.; Haines Gridley, sec.-treas.-mgr.

Inc. Aug. 29, 1913, in California. **Cap.** $200,000; shares $1 par; 196,865 outstanding. Annual meeting, 2nd Monday in March.

Dividends: started Dec. 20, 1916. Paid to 1917, $11,722.

Property: the Bellevue and Bullion mines, 11 patented claims, 95 acres, in Ophir district, Placer county, 4 miles W. of Auburn. Shows a fissure vein, 1′-4′ wide, running E.-W., with dip of 75°, between schist hanging-wall and granodiorite foot-wall. Ore is quartz with some sulphides, assaying $7-$10 per ton in gold and silver.

Development: by 800′ vertical shaft, with a total of 10,800′ underground workings. Management estimated 40,000 tons of ore blocked out, Jan., 1920.

Equipment: includes 50 h. p. electric hoist, compressor, 3 electric pumps, and 10-stamp mill, with concentrators. Mill started operating in Oct., 1915.

Production: gross to 1921, $406,322.

OROVILLE DREDGING, LTD. **CALIFORNIA**

In liquidation. Property exhausted. See Vol. XIV for description.

For Colombian holdings acquired by Oroville Dredging Co. Ltd, a British corporation, see under Colombia, S. A.

PACIFIC CHANNEL CO. **CALIFORNIA**

Address: owner, J. E. Sexton, Palisade, Nev. **Mine address:** T. G. Patton, mgr., Pacific, via Placerville, Cal.

Property: 980 acres, in Eldorado county, opened by 700′ tunnel and 150′ drift on $1 gravel. Was worked in 1920.

PACIFIC COAST GOLD MINES CORP. **CALIFORNIA**

Address: care W. J. Loring, 614 Crocker Bldg., San Francisco.

Mine address: Quartz, Tuolumne county, Calif.

Officers: W. J. Loring, pres. and mgr.; John F. Davis, v. p.; C. H. Beesley, sec.-treas., with M. E. Loring and J. S. Wallace, directors. Phil. Huber, supt.

Inc. Dec. 5, 1917, in California. **Cap.** $1,500,000; par $1.

Property: the Dutch mine, formerly owned by the Dutch Cons. Gold Mining Co. and Dutch Sweeney Mining Co., 70 acres, and the App, Heslep and Hitchcock groups. Claims are on the Mother Lode and carry gold values. On the Dutch claim the vein splits into 2 veins about 75′ apart; the east vein is irregular, breaking up into stringers running in all directions, while the west vein is more regular. General course of veins is N. 35° W., with dip of 65° N. E. Both walls are of Calaveras slate.

Development: by inclined shafts. Main 2,250′ working shaft is sunk on 65° incline, with levels to the 1,200′ level at 100′ intervals, remaining levels

at 150' intervals. On the 1,650' level the orebody has an average width of 16'. Raises and drifts total 30,000'.

Equipment: includes 150 h. p. double-drum electric hoist, one 450 cu. ft. and one 1,000 cu. ft. duplex air-compressor. Water is pumped from 1,000', level by a triplex pump. A 300-ton reduction plant, comprises gyratory crusher, ball mills and plate amalgamation, with concentration by flotation and tables.

Operated throughout 1919 and for 3 months in 1920.

PACIFIC GOLD DREDGING CO. **CALIFORNIA**

Operating company in this state for **Yukon Gold Co.**, which see.

PACIFIC GOLD MINING & MILLING CO. **CALIFORNIA**

Office: R. 535 Title Insurance Bldg., Los Angeles, Cal. **Mine office:** Mokelumne Hill, Calaveras Co., Calif.

Officers: Max Muller, pres.; P. O. Bin U. Nogales Ariz. W. H. Rocholl, v. p.; Walter Wessels, sec.-treas.; A. M. Howat. mgr.

Inc. August, 1917, in California. **Cap.** $1,000,000; issued 995,000 shares. Par $1; assessable. Annual meeting, February.

Property: 420 acres, 1 mile E. of Mokelumne Hill, Calaveras county, shows a quartz vein in diorite with a 315' shaft, 300' tunnel and 4,000' underground workings. Shoots vary from 6' to 20' wide 60' to 150' long, and average 0.30 oz. gold, trace silver, 5% iron pyrite. Mining is by square sets and shrinkage stopes. Ore reserves reported to be 30,000 tons. Concentrate is stated to assay 3½ ozs. gold per ton, extraction averaging 86.7%.

Equipment: includes 100-ton ball mill and concentrator, 30 h. p. hoist, electric compressor, etc. In 1918, company received $40,908.40 from sale of concentrate. Ore treated 1917, 10,000 tons; 1918, 11,100 tons.

Idle during 1920.

PACIFIC MINES CORPORATION **CALIFORNIA**

Offices: 120 Broadway, New York. **Mine office:** Stagg, San Bernardino county, Calif.

Officers: J. N. Beckley, pres.; David I. Walsh, v. p.; J. H. Hobbs, sec.-treas.; Josiah Anstice, asst. sec. asst. treas.; with Jas. M. Curley, Col. Sir Henry Mill Pellatt and D. C. Mac Donald, directors.

Inc. 1910, in New York. **Cap.** $1,000,000; shares $5 par; reincorporated May 2, 1916, in Maine. Cap., $1,000,000; shares $1 par; 642,000 shares issued; 300,000 shares treasury stock offered to the public, 1916.

International Trust Co., Boston, and U. S. Corporation Co., New York, **transfer agents**; Federal Trust Co., Boston, and U. S. Corporation Co., New York, registrars. Company is a consolidation of the Bagdad Chase Gold Mining Co. and the Roosevelt Mining & Milling Co.

Dividends: to end of 1912, $205,440. Last payment of 2% paid July, 1916.

Property: 15 claims, patented, about 300 acres, in Bullion Mountain district, 9 miles from Ludlow. Country rock is trachyte porphyry and quartz monzonite. Orebodies occur in a silicified breccia along an E.-W. fault line, and have an average dip of about 35° N. Ores carry malachite and oxide with a little chalcocite and average 1.5% copper, 1.56 oz. silver and 0.36 oz. gold per ton.

Development: by about 8,000' of workings, including three shafts, deepest 300' and several tunnels. **Ore reserves:** estimated at 100,000 tons of $10 ore and 200,000 tons of $5 ore, according to report of F. W. Royer.

Equipment: includes an 85 h. p. Union gas engine, 3 hoists and a 10-drill compressor. Company also owns the Ludlow and Southern 9-mile standard-gauge railroad, with 2 locomotives. A concentrator was finished in 1918.

Production: to end of 1915 is estimated at $3,000,000. Production in 1914, 1915 and 1916 was about 100 tons a day. No production reported since. Probably idle.

PADDY PRIDE SILVER MINING CO. **CALIFORNIA**

Address: Bank Bldg., Tonopah, Nev. Mine at Shoshone, Inyo Co., Calif.

Officers: E. Marks, pres.; Patrick Miles, v. p.; John T. Overbury, sec.-gen. mgr., Tonopah, Nev.

Inc. 1920 in Nev. **Cap.** $300,000; shares 20c. par; 750,000 issued; non-assessable.

Property: the Oversight group of 5 claims, at Shoshone, Inyo county, 9 miles from Zabriskie, on the Tonopah & Tidewater R. R. Ore is reported to carry $12 gold, 44 oz. silver and 50% lead.

Development: by 2 tunnels, raises, winzes and drifts, said to have cut the veins at 300′ depth.

Shipping late in 1921.

PATRIQUIN MINING CO. **CALIFORNIA**

Address: Louis and A. G. Patriquin, Parkfield, Calif.

Property: Dawson quicksilver mine, near the King Quicksilver property, in Kings county, 14 miles E. of Parkfield. Under development since 1919. Ore is treated in 10-ton Scott furnace of the King company. The Patriquin mine in Monterey county has been idle several years. See description Vol. XIV.

PATTERSON MINING CO. **CALIFORNIA**

Address: 310 Sapsome St., San Francisco, Calif.

Officers: H. L. Huston, pres.; R. F. Lewis, sec.

Inc. 1920, in Calif. **Cap.** $100,000; $1 par.

Property: 102 acres, 75 patented, in Tuttletown district, Tuolumne county.

Development: by 502′ tunnel and two shafts, 600 and 700′ deep.

PENN-CALIFORNIA MINING CO. **CALIFORNIA**

Address: A. W. Hoge, gen. mgr., Nevada City, Calif.

Officers: Chas. Walther, pres.; A. W. Hoge, v. p. W. H. Ketchum, 2nd v. p.

Property: gold gravel mines, about 15 claims, 1,000 acres, including 2 miles of drift-gravel extensively worked from 1892 to 1900, when a large area was mined.

Development: a 1,000′ tunnel in granite was being driven early in 1920. Equipped with a 15-stamp mill.

PENN MINING CO. **CALIFORNIA**

Offices: 1713 Harris Trust Bldg., Chicago, Ill.; 727 Foster Bldg., Denver, Colo. **Mine office:** A. P. Busey, Jr., mgr., Campo Seco, Calaveras Co., California.

Officers: Chas. Loughridge, pres.; Wm. D. McIlvaine, sec.-treas.; D. C. Smith, supt.

Inc. June 1, 1910, in Wyoming, as successor of Penn Chemical Works. **Cap.** $250,000; shares $1 par. Is operated as a close corporation.

Property: 4 patented claims and 2,200 acres patented agricultural land, giving 5,280′ on lode, 4½ miles N. W. of Valley Springs terminus of S. P. R. R.

Geology: veins run N. W. with 65° N. E. dip and consist of quartz, talcose schist and clay containing copper pyrite, with pyrite and a little gold, silver and zinc. The ore as smelted averages 5% copper, 23% iron, 5% zinc, and $2.30 in gold and silver. Two veins 300′ apart are worked, the easternmost 50′ wide, with a 900′ ore shoot 15′ thick, the west vein with orebody 1,000′ long averaging 25′ wide.

Development: by No. 3 shaft, 2,900′ deep at 74° incline, with 11 levels, 150′ apart; and No. 2 shaft, 750′ deep. Total development 29,045′. In 1919 new work amounted to 5,395′.

Equipment: includes 2 electric hoists with 1,500′ and 2,500′ capacity drums. The smelter has a 400-h. p. steam and electric plant, ice plant, pumping plant and air compressor, capacity 1,400 cu. ft., to supply the

mine and smelter. Crude petroleum is used and 43 gallons per ton of ore smelted is consumed.

Smelter: of 300-ton capacity, a quarter of a mile from the mine, has one converter, 8 McDougall roasters, two oil-fired 150-ton reverberatory furnaces, and 100-ton blast furnace. Some cement copper is produced from mine water.

The company experimented on the Thiogen process for elimination of sulphur, mainly on account of fume litigation. The smelter was in continuous operation for over 16 years, but was closed April 1920, for extensive repairs.

Production:

	Tons Ore Treated	Lbs. Refined Copper
1918	36,097	3,076,858
1917	35,653	3,235,286
1916	43,210	3,973,111
1915	42,365	3,152,071
1914	42,928	4,007,149
1913	50,427	4,467,982
1912	51,163	5,175,875

PHILADELPHIA EXPLORATION CO. **CALIFORNIA**

Office: Albert Burch, mgr., Crocker Bldg., San Francisco, Cal.

Officers: Harold Boericke, pres.; Gideon Boericke, v. p.; John Boericke, sec., C. A. Joy, supt.

Inc. Oct., 1916, in Delaware. **Cap.** $100,000; increased to $200,000; assessable. Is a close corporation with only 5 shareholders.

Property: 14 claims, 3 patented, 140 acres, including the Green Mountain mine, near Crescent Mills, Plumas county, and 11 miles N. of Keddie on the W. P. R. R. Mines have not produced since 1886. **Ore:** gold-bearing quartz veins in meta-andesite and rhyolite.

Development: by 600′ shaft and 6,000′ tunnel. Workings were unwatered and reopened, 1917, closed down in August, 1918, and reopened again in May, 1919.

Equipment: includes 50 h. p. electric hoist, compressor, 5 centrifugal pumps.

Probably inactive in 1920.

PHOENIX CONSOLIDATED MINES CO. **CALIFORNIA**

Probably defunct. See Volume XIV.

PINE CREEK TUNGSTEN MNG. CO. **CALIFORNIA**

Property: twenty miles from Bishop, Inyo county, at an altitude of 11,000′; operated by Cooper Shapley, James Seager, Fred Close, and associates. Said to have 200,000 tons of ore that will average 1.34% tungstic oxide.

In 1918 a 200-ton mill was built, also a 2,200′ gravity tramway between the mine and mill. Closed down since 1919 to await better market.

PIONEER CHIEF GOLD MINING CO. **CALIFORNIA**

Company defunct. Fully described in Vol. XIV. **Address:** J. E. King, Box 64, San Andreas, Calif.

Property: Pioneer mine, 2 miles south of San Andreas, Calaveras county, is owned by Jos. Tilden and wife, and is under bond to J. E. King.

PITTSBURGH & MOUNT SHASTA GOLD M. & M. CO. **CALIF.**

Office: 516 Federal St., Pittsburgh, Pa. **Mine office:** Emil Jonson, mgr., Keswick, Shasta Co., Cal.; also D. A. McCormick, supt., Black Hawk mine, Randsburg, Calif.

Officers: J. J. Schneider, pres., Buffalo, N. Y.; R. Schmitt, v. p.; T. V. Scott, sec.-treas.; with E. G. Lang, J. S. Phillips, H. B. Haffner, R. W. Medick, G. E. Meyer, Frederick Reineke, J. P. Jayne, G. H. Clapp and H. C. Steul, directors.

Inc. 1903, in West Virginia. **Cap.** $2,500,000; increased 1921 to $5,000,000; $1 par; 4,528,450 shares issued. Bonded debt; $200,000 authorized 6% first mortgage notes, due May 23, 1923; $109,150 outstanding. Interest payable semi-annually. A 25% stock dividend was distributed May 25, 1921. Real Estate Sav. & Tr. Co., Pittsburgh, transfer agent; Dollar Sav. & Tr. Co., Pittsburgh, registrar.

Property: (A) the Bennington group, 10 patented claims, 175 acres, in Flat Creek district, Shasta county, N. of Redding, said to have been bought for $18,000 cash and $60,000 shares, also 20 patented claims, 1 mile from the Bennington, known as the Alleghany group. (B) the Black Hawk mine, 130 acres, in Rand district, Kern county, 2½ miles S. W. of Johannesburg, purchased in 1921.

Development: several thousand feet of underground work. A 4,400′ main tunnel and 2 other tunnels show a vein of gold and silver-bearing copper ore of varying tenor. A new double compartment shaft was down 521′ by January, 1921. On the Black Hawk, diamond drilling was in progress, fall of 1921.

Equipment: includes 15-stamp mill, boarding house, etc., with electric power. At Black Hawk, the 10-stamp mill of the Baltic mine is under lease, pending remodelling of own mill.

PITTSBURG GOLD FLAT MINES — **CALIFORNIA**

Address: Bert Schlesinger, 1225—1st Natl. Bank Bldg., San Francisco.

Inc. 1912. **Cap.** $1,000,000.

Property: 4 claims, 106 acres, in Nevada county, located in 1851, 1½ miles S. of Nevada City, has a production record of over $1,500,000 in gold. The vein which is in diabase is much faulted, and has irregular pay shoots 15″ wide, averaging $8.

Development: by 1,625′ shaft and several thousand feet of drifts, including one of 1,500′ on 1,300′ level. The Gold Flat-Potosi vein, 1,000′ W. of the Pittsburg, has been developed by 300′ and 400′ shafts.

Equipment: hoist of 2,500′ capacity, 850 cu. ft. compressor, Cornish pump, complete 20-stamp mill, etc. Idle.

PITTSBURG LIBERTY MINE — **CALIFORNIA**

Address: A. G. Cook, Masonic, Mono county, Cal.

Property: purchased at receivers' sale in 1914 for $20,000 by the Stall Bros., was formerly owned by the Pittsburg Liberty Mining Co. In April, 1920, A. G. Cook acquired the property from P. J. Conway of Reno, Nevada for $32,500. The mine, near Masonic was located in 1902 and started shipping to Selby smelter in 1907, it was operated until 1910 with a reported production of $600,000; idle until 1915 when work was resumed.

Geology: ore, which carries gold, is found in 5 veins occurring in metamorphic schist, quartzite, slate and intrusive granite. Veins strike N. 25° W. and dip to the east.

Development: by 172′ shaft and 2 adits, cutting the vein at 271′ and 413′ depth.

Equipment: includes 100-h. p. gasoline engine, and the 60-ton Pittsburg-Liberty mill which was remodeled and equipped with cyanide plant and tubemill in 1915.

Reported, November, 1921, that mine had been leased to H. C. Barnes et al.

PITTSBURG-SILVER PEAK GOLD MINING CO. — **CALIFORNIA**

Out of business. See Vol. XIV.

PIUTE MINE — **CALIFORNIA**

Controlled by R. W. Crampton, mgr., Santa Monica, Cal.; Geo Z. Smith, and F. A. Crampton, supt., Santa Monica.

Property: 13 claims, 260 acres, in Bullion district, near Cima, San Bernardino county, shows lead-silver-gold-platinum ore in limestone-granite contact deposits. Assays said to run 26% lead, 3.2 oz. silver, .05 oz. gold and 0.6 oz. platinum.

Development: 200′ shaft, 800′ of tunneling, with 1,000′ of workings.
Equipment: includes a hoist and compressor.
Production: in 1917, 1,000 lb. copper, and 306,000 lb. lead; none in 1918; developing in 1919.
Management planned developing to 400′ level and building a mill, in 1919.

PLACER CHROME CO. **CALIFORNIA**

Address: R. H. Farmer, gen. mgr., Newcastle, Calif. W. P. Netherton, treas. (Santa Cruz, Calif.), and Stanley Swanton are interested.

Property: 950 acres in fee and about 6,200 acres under lease in Eldorado county,, 8 miles S. E of Newcastle. Chrome ore occurs as lenticular bodies in serpentine, developed by small tunnels, shafts, etc., ore averaging 35% chromic acid is shipped direct, all other going to mill.
Equipment: includes a 1,890′ gravity tram and 100-ton concentrating plant. Was producing in 1920.

PLUMAS COPPER KING MINES CO. **CALIFORNIA**

Address: 206 Mills Bldg., San Francisco. M. H. McKelvey, supt., Engelmine, Calif.
Inc. 1920. **Cap.** $1,000,000.
Property: 19 claims, adjoining the Superior mine of the Engels company on the south, in Plumas county. Grab samples from the outcrop said to have assayed 1% copper, 3.9 oz. silver and $2.06 gold per ton. The deposit is a gossan capped quartz vein in granite, 3,000′ long on surface. A tunnel is being driven to cut the vein at a depth of 1,000′.

PLUMAS EUREKA CORPORATION **CALIFORNIA**

Office: 53 State St., Boston, Mass.
Mine address: Johnsville, Plumas Co., Calif.
Inc. 1916, in Mass. **Cap.** $50,000; $100 par.

Property: the Plumas Eureka mine, 2,500 acres, at an elevation of 5,500′, in Johnsville district, Plumas county, 8 miles W. of Blairsden. Mine operated since 1857, is credited with disbursement of over $17,000,000 in dividends, under former ownership. Originally worked by Sierra Buttes Co., property was acquired in 1897 by Johnson Graham M. Co. and in 1909 by Plumas Eureka M. Co. This company filed a voluntary petition in bankruptcy, August, 1915 and was reorganized in 1916 as Plumas Eureka Corporation. Company was producing in 1919 and remained active to March 1, 1920. The property was to be reopened in 1921 by new interests.

PLUMAS GOLD MINING CO. **CALIFORNIA**

Address: R. N. Costar, Seneca, Plumas Co., Calif., or c/o Karl Singer Ames Bldg., Boston, Mass.
Development: by 800′ tunnel and 40′ raise into gravel.
Property: 160 acres, patented, covering ¾ mile along a lava capped gravel channel on W. bank of N. fork of Feather river, 3 miles S. of Seneca, Plumas county.
Production: about $170,000 to end of 1914. A few men are employed in exploration.

PLYMOUTH CONSOLIDATED GOLD MINES, LTD. **CALIFORNIA**

Offices: 614 Crocker Bldg., San Francisco, Calif.; 20 Copthall Ave., London, E. C., Eng. **Mine office:** Plymouth, Amador county, Cal. Gen. mgr., Bewick, Moreing & Co., 62 London Wall, London, E. C., Eng.
Officers: C. Wanklyn, chairman; C. A. Moreing, W. J. Loring, John Barry, J. P. and David Richards, directors. F. A. Crew, sec.
Inc. Jan. 15, 1914, in England. **Cap.** £240,000; £1 par; all issued, 127,000 shares are owned by the California Exploration Co., Ltd.
In 1919, the revenue was £148,666, of which £24,426 was profit, plus £41,504 brought forward. Dividends amounted to £13,157. In 1920, the revenue was £124,740, of which £2,358 was profit. Dividends amounted to £12,000.

Dividends: 15% in 1915 and 1916; 10% in 1917, 1918, 1919 and 1920.

Property: the Plymouth Consolidated group of 13 patented claims and a tract of agricultural land, about 500 acres, at Plymouth, Amador county. Up to 1911, when reopened by the California Exploration company, the mine had been closed for 24 years. Unwatering was completed in 1914, and a little work exposed 110,000 tons of $6.35 ore.

Geology: the holdings cover 4,800′ along the Mother Lode, showing 3 fissure veins in Mariposa slate. The veins run N. S., and dip 65° E. Ore contains free gold and iron pyrite in shoots that are 6′ to 30′ wide and from 150′ to 300′ long. It averages 0.30 oz. gold and 0.14 oz. silver per ton. Owing to these shoots, the workings cut poor areas underlain by shoots of enriched quartz. At 1,600′ in depth the vein was poor, but payable downward to 2,450′, then again poor and unpayable from 2,450′ to 3,050′, where 10′ of $10 ore was cut. This widened to 12′ of $20 ore in a distance of 103′.

Examined by Albert Burch, W. J. Loring, Malcolm MacLaren, O. H. Hershey, and F. C. Merritt.

Development: by shaft, vertical to 1,600′, after which on 55° incline to a total depth of 3,225′, with a winze below bottom level. The shaft is to be sunk to 3,650′. New work in 1920 amounted to 6,723′, including 300′ of shaft-work.

Equipment: includes 500 h. p. electric hoist, 1,800 cu. ft., and 900 cu. ft. compressors, a 40-stamp 400-ton mill for amalgamation and concentration of ores, which makes a 90% extraction. The mill is equipped with No. 5 Gates gyratory crusher, 2 Hardinge mills, classifiers, tables and 42 vanners. A regrinding plant for the tailings recovered 25¢. per ton at an added operating cost of 7cts. per ton. The concentrates average $130 per ton, and the tailings average 70 cts. per ton.

Production:

Year	Tons	Gold, oz.	Silver, oz.	Value	Cost per ton
1920.....	91,350	28,294	6,556	$487,106	$4.90
1919.....	119,200	34,527	7,940	713,000	4.41
1918.....	125,300	33,382	8,530	698,315	3.75
1917.....	127,750	.....	.....	675,360	3.83
1916.....	125,000	32,693	8.016	681,150	....
1915.....	129,500	31,193	8,652	646,490	....
1914.....	44,775	11,132	.....	.....	....

The property is an old mine, dormant for 24 years, but made into a successful producer through the able judgment and operating ability shown by W. J. Loring.

POCAHONTAS MINING CO. **CALIFORNIA**

Probably idle. See Vol. XIV.

POKER FLAT GOLD GRAVEL MINING CO. **CALIFORNIA**

Address: Geo. Gray, sec., 110 Market St., San Francisco.

Property: 120 acres, in Poker Flat district, Sierra county, covering 2,000′ of a Neocene channel, capped with lava, opened by a 505′ shaft and 300′ incline below it.

PRUDENTIAL GOLD MINING CO. **CALIFORNIA**

Address: G. W. Root, 2239 Atherton St., Berkeley, Calif.

Property: patented land, 4 miles S. of Grass Valley, Nevada county, worked intermittently for many years.

QUAKER HILL MINES CO. **CALIFORNIA**

Defunct. **Address:** 42 Broadway, New York City.

Inc. Oct. 10, 1918, in Delaware. **Cap.** $4,000,000. Bonds, $150,000 6%.

Property: 12 miles E. of Nevada City, Calif., sold to satisfy mortgage on property.

QUEEN MINE — **CALIFORNIA**

Address: G. H. Hamstadt, owner, 453 S. Rugby St., Huntington Park, Los Angeles, Calif. W. W. Wishon, engr., Searchlight, Nev.

Property: 9 claims, 150 acres, in New York mountains, near Barnwall, San Bernardino county, said to show gold-silver ores in fissure veins in monzonite at or near limestone contact.

Development: by 1,250′ of workings. Recent work in No. 3, or lower, tunnel shows ore carrying 3% copper with one ounce silver per ton across the entire face of the drift. Assessment work only since 1917.

QUICKSILVER INVESTMENT CO. INC. (THE) — **CALIFORNIA**

See **New Almaden Quicksilver Mines Corp.** and Vol. XIV.

QUICKSILVER MINING CO. — **CALIFORNIA**

See **New Almaden Quicksilver Mines Corp.**, and Vol. XIV.

QUINBY MINING CO. — **CALIFORNIA**

Idle for years. Probably out of business. See Vol. XIV.

RAND DIVIDE MINING CO. — **CALIFORNIA**

Now the **California Rand Silver Mines**, which see.

RAND MINERALS CO. — **CALIFORNIA**

Probably idle, if not dead. See Vol. XIII.

RANDSBURG SILVER MINING CO. — **CALIFORNIA**

Randsburg, Kern county, California.

Property: the Coyote claim, adjoins the Kelly bonanza mine in San Bernardino county, and was bought for 255,000 shares from J. W. Kelly, John C. Wray, Harry Alderson and E. L. Blanck.

REDWOOD COPPER QUEEN MINING CO. — **CALIFORNIA**

Idle. **Last address:** Room 525 No. 519 California St., San Francisco. E. R. Leach, pres.; Thos Mellersh, sec.-treas., at last accounts.

Property: 840 acres, patented in Mendocino county, 25 miles from Cloverdale, the nearest rail point. Veins much broken by faults prominent on surface, have a 2′ to 4′ gossan capping, are traceable for a mile. Country rocks are brecciated porphyry and sandstone. Ores contain cuprite, melaconite, malachite, azurite, chalcopyrite, and tetrahedrite.

Mineralized zone is 300′ long, 10 to 40′ wide, 125′ deep, carrying kidneys and lenses of sulphide ore with as much as 8-9% copper and small gold-silver values. High sulphur content and absence of arsenic said to make ore desirable for manufacture of sulphuric acid. No recent information obtainable.

REINMILLER COPPER MINES CO. — **CALIFORNIA**

Address: John Reinmiller, Engelmine, Calif. C. N. Miller, fiscal agent. 617 Pacific Bldg., San Francisco.

Officers: John Reinmiller, pres.; N. H. Wright, v. p.; M. E. Bannon, sec.-treas., with J. F. Cowan and N. Cooper, directors.

Inc. 1920, in California. **Cap.** $2,000,000.

Property: 56 claims adjoining the Engels mine in Plumas county. The main vein is said to be 11′ wide on the surface, assaying 4½% copper, $1.50 silver, and $1 gold per ton. A 65′ shaft opened 6% ore and diamond drill work has developed four orebodies.

Development: by shallow shafts and tunnels. A 5½ by 7′ tunnel is being driven to cut the vein at a depth of 400′ below the 65′ shaft.

Equipment: steam power, compressor, dwellings, etc.

REWARD GOLD MINES CO. — **CALIFORNIA**

Address: Manzanar, Inyo Co., Calif.

Described in Vol. XIII. Property now owned by **Crown-Reserve Mng. Co.**, of Ontario.

RICHARDS KLONDIKE MINING CO. — **CALIFORNIA**

Address: 56 Bacon Bldg., Oakland, California.

Officers: O. E. Bozio, pres.; Howard J. Pensol, sec.

Inc. 1920, in California. **Cap.** $25,000; 25c. par.

Property: 120 acres in Plumas county. A prospect.

RISING SUN CONSOLIDATED MINES CO. **CALIFORNIA**

Address: E. C. Klinker, supt., Colfax, Calif., or c/o Meredith & Landis, Auburn, Calif.

Inc. 1920, in Calif. **Cap.** $250,000.

Property: 40 acres, including the Rising Sun mine, 1 mile N. W. of Colfax, in Placer county. Mine has produced over $1,000,000 in gold from a gold quartz vein in diabase, 6 to 36" wide.

Development: by a 900' 3 compartment shaft with 4' of ore reported cut on No. 6, 7, 8 and 9 levels.

Equipment: 10-stamp mill, hoist, compressor, etc., installed in 1920. Twenty men employed. The mill was operated only during 5 months in 1920, as ore on upper levels became exhausted.

ROCKY POINT CONS. MINES CO. **CALIFORNIA**

See **Bishop Creek Milling Co.**, also Vol. XIII and XIV.

ROSE QUARTZ MINING CO. **CALIFORNIA**

Property: 9 claims, 180 acres, including the Kelly mine, 1½ miles E. of Eclipse, and 24 miles N. W. of Quincy, Plumas county. Two quartz veins that accompany a porphyry dike in slate, carry free gold and auriferous arsenopyrite. No. 1 averages $9, and No. 2, where 15' wide, $4.80 per ton.

Equipment: includes 5-stamp mill, and a 1,500' aerial tram, being built to connect the tunnel and mill.

ROUND LAKE MINING CO. **CALIFORNIA**

Address: F. J. Mott, sec., Insurance Exchange Bldg., San Francisco.

Property: 2 claims, 40 acres, 12 miles S. of Blairsden on W. P. R. R., Plumas county, at elevation of 6,500'. Quartz vein carries free gold and 1% pyrite, but no ore has been mined, though a 300' shaft has been sunk on the vein, and two 50' shoots opened. A 5-stamp mill was erected in 1915.

ROUND VALLEY TUNGSTEN CO. **CALIFORNIA**

Address: H. C. Miller, supt., Round Valley, via Bishop, Inyo Co., Calif. D. S. Pancoast, treas., Pitman, N. J.

Inc. 1917, in Delaware. **Cap.** $100,000.

Property: tungsten claims near Round Valley. The main orebody reported to be 90' long and from 25 to 35' thick, averaging 1% WO_3.

Development: by two main adits and shaft. Mining is by shrinkage stoping and glory-holing.

Equipment: the mill consists of crusher, shaking screen, Marcy mill, Callow cones, Overstrom and Deister-Overstrom tables. Concentrates are dried, sacked, and shipped East.

No production figures are available.

ROXBURY GOLD MINES, INC. **CALIFORNIA**

Office: 84 Savin St., Boston, Mass. **Mine address:** Scott Bar, Siskiyou county, Cal.

Inc. 1919, in Delaware. **Cap.** $750,000.

Property: placer claims near Scott Bar. In Aug., 1919, company applied to State Water Commission for permission to divert water from Canyon and Kelsey creeks for hydaulicking. The present supply is only enough for two giants for about 4 months each year.

ROYAL GOLD MINES CO. **CALIFORNIA**

Acquired by **Stockholders' Mining Co.**, which see.

RUBY COPPER CO. **CALIFORNIA**

Office: 717 Kohl Bldg., San Francisco, Calif. **Mine address:** J. L. Williams, supt., Engelmine, Plumas Co., Calif.

Officers: Thos. J. Barbour, pres.; Andrew Falconer, sec.

Inc. 1919, in Calif. **Cap.** $600,000; $1 par.

Property: 19 claims, 2 miles S. W. of the Engels mine and 1 mile from the Indian Valley Railroad, said to show 60' of 4% ore. A rich streak, 3

to 12" wide, has been opened during the past year, by a 500' tunnel. In Oct., 1920, the 15-ton mill was producing daily about 1,000 lb. of 44% copper contrate, high in precious metals.

RUBY COPPER MINING CO. **CALIFORNIA**

Probably idle. See Vol. XIV.

RUBY KING COPPER CO. **CALIFORNIA**

Property: 6 patented claims, near Ladoga, Colusa county, developed by 1,200' shaft and 1,000' tunnel. Ore is iron oxide containing a small precentage of cinnabar. Although generally known as a copper mine, no copper ore has as yet been discovered and property is operated as a red ochre mine, by the Ruby King Mineral Paint Co., 1027 Eighth St. Sacramento, California.

Production: 500 tons in 1914. No recent returns.

RUBY SILVER MINING CO. **CALIFORNIA**

Address: C. C. Waring, Santa Monica, Cal.

Officers: F. A. Crampton, pres.-mgr.; C. C. Waring, sec.-treas.; J. R. Comerford, v. p.-supt. Company is a close corporation.

Property: 3 groups of claims near Cima, San Bernardino county, the Ruby Silver, 1 claim, Navajo group, 6 claims, 123 acres; Ruth mine, 7 claims, 132 acres; covering contact deposits 2 to 10' wide in limestone and granite. Examined by J. Nelson Nevius, A. H. Black, O. B. Suhr, and A. W. Clark.

Development: Ruby Silver mine has 250' tunnel and 500' workings,from which 40 tons lead-silver ore were shipped in 1917; Navajo group, 800' of workings, produced 120 tons copper ore up to 1918; Ruth mine, 210' shaft, and 2,000' of workings, produced 560 tons of lead ore to 1918, and is said to have 1,800 tons blocked out of 32% lead ore with some platinum.

Idle since 1918 due to the war, but management stated that development work would be done in 1922 and a mill erected.

SACRAMENTO VALLEY COPPER CO. **CALIFORNIA**

Probably dead. Letters returned in Dec., 1920. See Vol. XIV.

SAGAMORE MINES CO. **CALIFORNIA**

Probably defunct, like its two predecessors of similar name. See Vol. XIV

SAINT JOHNS MINES CO. **CALIFORNIA**

Address: Clifford G. Dennis, c/o F. W. Bradley, 1022 Crocker Bldg., San Francisco. **Mine address:** Vallejo, California.

Inc. May, 1914, in California. **Cap.** $150,000; $1 par; outstanding $90,000. Transfer office: 1022 Crocker Bldg., San Francisco. Annual meeting, first Monday in February.

Condensed balance sheet for 1918 shows; assets, $102,131. Liabilities include: capital stock, $90,000; surplus, $10,293; other liabilities, $1,838. Gross earnings, in 1918 were $57,125, with operating expenses of $57,198.

Property: 713 acres on Soscol ranch, 6 miles N. E. of Vallejo, Solano county is said to show cinnabar ore occurring in bunches in sandstone and shale over a width of 2' to 30'. Examined 1916 by O. H. Hershey.

Development: by 320' shaft and tunnels; greatest depth of workings, 320'. Management reports 12,000 tons ore blocked out, average assay 0.27% quicksilver.

Equipment: includes a 25-h. p. gasoline hoist, two 7½-ton Neate and one 15-ton Scott furnace, capacity 30 tons daily and a 25 h. p. oil engine with 15 k. w. generator.

Production: 1920, 151 flasks at cost of $123 compared with 228 in 1919, at $112 per flask, 513 in 1918 at $102, 495 in 1917 at $88 and 675 in 1916 at $92.11 per flask.

SALT LAKE-CALIFORNIA COPPER CO. **CALIFORNIA**

Inactive. See Vol. XIII.

SANTA ROSA MINING CO. **CALIFORNIA**

Mine address: Lee, Inyo Co., California.

Address: 2200 Broadway, Santa Rosa, California.

Officers: H. C. Brougher, pres.; B. F. Edwards, sec.

Inc. 1914, in Calif. **Cap.** $1,500,000; par $1.

Subsidiary of West End Cons. Mining Co. of Nevada, which is reported to own 350,000 shares.

Property: the Santa Rosa lead-silver mine, 378 acres, in the Lee district, Inyo county, E. of Serro Gordo and 26 miles from Keeler, said to show ore in veins along the contacts of limestone intruded by porphyry dikes. There are two systems of veins whose average width is 4'. The fine outcrops would indicate a high degree of mineralization, but the orebodies are apparently superficial.

Development: shallow shafts and tunnels said to show that rich ore was in all cases found close to the surface. The mine was reopened in 1916 after having been idle for several years. Was operated in 1920 in a small way by company and lessees.

Production: to 1920, $500,000 of silver, lead, copper ore.

SARITA MINES CO. **CALIFORNIA**

Probably idle. No recent returns.

Address: F. W. and G. E. Stall, mgr.; Masonic, Mono county, Cal. Not a share corporation.

Property: mine near Masonic, said to show a quartz vein in porphyry, dipping 45° W. and pitching W. Orebody is from 4' to 20' wide and shoots are from 50' to 200' long. Ore said to contain gold and silver, worth $20 per ton.

Development: by 700' tunnel to 200' depth.

Equipment: electric power, aerial tram, and 75-ton cyanide plant. Concentrate assayed $500 per ton; extraction was 90%.

SELBY SMELTING & LEAD CO. **CALIFORNIA**

See **Selby Smelting Works.**

SELBY SMELTING WORKS **CALIFORNIA**

Formerly Selby Smelting & Lead Co., described in Vol. XIII. In 1918 American Smelters Securities Co. assumed all assets and liabilities of that company and property is now known as Selby Smelting Works.

Office: Merchants' Exchange Bldg., San Francisco, Cal. **Works office:** Selby, Contra Costa county, Calif. F. S. Holbrook, asst. mgr.

Officers: Eugene B Braden, gen. mgr.; C. A. Thomas, mgr.

The smelter at Selby, on San Pablo Bay, near Carquinez Strait, receives ore by rail and water, from all the Pacific states, principally from Idaho and Nevada. The works include a 400-ton smelter having lead stacks, a refinery for parting gold and silver, a plant for the manufacture of bluestone, a shot tower and sheet lead rolls. At San Francisco a plant is operated for the manufacture of pipe, lead traps and mixed metals.

Equipment: includes steam, electric and air power. The plant includes a bag house, and also a special chamber having the Cottrell process for precipitating solids from fumes, before passing to the main stacks.

SENECA CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Address: J. J. Reilly, mgr., Seneca, Plumas Co., Calif.

Officers: J. J. Reilly, pres.; Edward R. Salinsky, sec.

Inc. in Ariz. **Cap.** $1,000,000; $1 par.

Property: 110 acres, including the White Lily mine, ½ mile above Seneca on North Fork Feather River, shows a quartz vein in schist and slate, near its contact with altered meta-andesite and diorite.

Development: by tunnel. **Equipment:** a 10-stamp mill and water power. Gold output to 1918 is $225,000.

Was a good producer in 1920. Prospects are considered good.

SHASTA BELMONT MINING CO. **CALIFORNIA**

Office: Carson City, Nev. **Mine office:** Winthrop, Shasta county, Cal.

Officers: Will E. Casson, pres.; W. Brougher, v. p.; Jas T. Davis, sec.-treas., with S. L. Lee, and W. H. Cavell, directors.

Cap. $1,000,000; shares $1 par; 730,000 issued, and 50,000 offered at 25c. each in Dec., 1916.

Property: the Graham group, 7 claims, 120 acres, in the Copper City district and in the west central part of the Shasta copper belt. The group is about 3 miles east of the Bully Hill mine and smelter, and 8 miles from the Mammoth mine. The property is said to have a surface outcrop resembling that of the Bully Hill mine.

Development: by a 75′ shaft, 4 short tunnels and several opencuts, all showing streaks and bunches of high-grade copper ore. Company made one small shipment of ore to the Mammoth smelter, which ran 7.21% copper and about 4 oz. silver. No report since 1917.

SHASTA COPPER EXPLORATION CO. CALIFORNIA

Address: 433 Holbrook Bldg., San Francisco, Calif., or Redding, Shasta Co., Cal. M. E. Dittmar, mgr.; Chas. Wheelock, supt.

Officers: O. Scribner, pres.; M. B. Downing, sec.

Inc. 1907, in Calif. **Cap.** $100,000; par $1.

Property: about 650 acres, lying between the Balaklala and Iron Mountain mines, near Kennett, is developed by 8 tunnels, of about 3,000′ aggregate length. No. 7 tunnel cut 3 small stringers of copper ore. Company did a large amount of exploration and development work, 1915.

Company involved in litigation with the U. S. S. R. & M. Co. (Mammoth) concerning ownership of mining claims.

SHASTA-KENNETT COPPER MINING CO. CALIFORNIA

Head office: 604 Mills Bldg., San Francisco, Calif.

Address: Kennett, Shasta Co., Calif.

Officers: Frank J. Blake, pres.; Kingsley W. Cannon, sec.-treas., 54 Sutter St., San Francisco, with H. B. Ward, M. B. Lindley and Carl Henrich, directors.

Inc. 1903, in Arizona. **Cap.** $1,500,000; $5 par.

Property: 80 acres, patented, adjoining the well-known Mammoth mine, in Shasta county, near Kennett.

Development: 1,200′ of tunnel work, said to show medium grade copper ore.

SHASTA MAY BLOSSOM COPPER MNG. & SM. CO. CALIFORNIA

Office: 604 Mills Bldg., San Francisco, Cal. **Mine office:** Winthrop, Shasta Co., Cal.

Officers: C. M. Bradley, pres.; J. W. Marshall, v. p.; E. Seaberg, sec.; A. L. Scanlon, treas.; with F. M. Ayer, director.

Inc. 1903, in Arizona, as a reconstruction of the Shasta May Blossom M. & S. Co. **Cap.** $3,000,000; $1 par. Alphonse Sutter, transfer agent, Nevada Bank Bldg., San Francisco.

Property: the Keith group, 22 claims, about 300 acres, ½ mile N. of De La Mar, in the Pittsburgh or Copper City district, shows several deposits between granite porphyry and slate. The East outcrop said to be 30′ wide and traceable for about 1,500′, shows copper ore with gold and silver. The middle vein, 5′ to 40′ wide, traceable 1,900′, and opened by tunnels with about 1,500′ of workings, is said to show a considerable tonnage of chalcoyprite ore. The West vein, reported to be upwards of 100′ in width, has a 100′ shaft and 780′ tunnel, showing ore assays 2 to 7% copper and $2 to $2,000 per ton in combined gold and silver. The mine as a whole, is reported to have about 4,000′ of workings.

About $60,000 spent on property in 1921, extending the lower tunnel and erecting new buildings.

Equipment: includes a hoist, air compressor, electric light and power station, and machine-shop.

SHASTA MONARCH MINING CO. CALIFORNIA

Last address: M. P. Fries & Co., 1635 Broadway, New York. **Mine office:** Kennett, California.

Property: 80 acres at Stella (Whiskeytown). Shasta county, has been worked for many years; credited with a production of $127,000 from 1870-1912. There are 4 parallel veins, strike N. 50° W., dip 50° N., in alaskite-porphyry near the contact with meta-andesite; pay shoot averages 18″ in

width; ore is free milling. For geology, see U. S. G. S. Bull. 540, pp. 38, 39, 50, 51.

Development: by tunnels.

Equipment: includes a 10-stamp mill erected 1914, at which time 10 men were employed. No recent data.

SHASTA NATIONAL COPPER CO. CALIFORNIA

Address: M. P. Fries & Co., 1635 Broadway, New York. **Mine office:** Kennett, Calif.

Officers: W. H. McEwen, pres.; M. P. Fries, v. p. and gen. mgr; Horatio Alling, sec.-treas., with S. S. Norton and A. Kennedy, directors.

Inc. in 1917. **Cap.** $5,000,000; shares $1 par. Company was organized to develop 1,000 acres of copper bearing land adjoining property of Mammoth Copper Co., Shasta Co. Reported in 1918 that the company had made final payment of $40,000 on some of its claims. Mine shut down in December, 1919.

SHASTA ZINC & COPPER CO. CALIFORNIA

Address: Walter Einstein, pres., 306 Hobart Bldg., San Francisco, Calif. J. C. Kinnear, gen. supt., Redding, Calif. J. C. Kinnear, cons. engr.; J. H. Ross, smelter supt.; D. C. Jackling, mng., director.

Inc. 1920, in Delaware. **Cap.** 200,000 shares. Bonds, $600,000, 8%, 4 years, issued July, 1921. Equitable Trust Co., New York, transfer agent. Butte and Superior Mng. Co., a Jackling enterprise, owns 36,000 shares.

Property: the Bully Hill mine, reported bought in 1920 by D. C. Jackling and Hayden Stone & Co. for $750,000 from the Bully Hill Mines, Inc. It comprises 450 acres 320 patented near De La Mar, Shasta county, including the Bully Hill, Rising Star, Rising Sun, and old Winthrop and Baxter groups, all in the eastern end of the copper belt. Owns 14-mile railway (Sacramento & Eastern), connecting with S. P. R. R. at Pitt station. Mine examined by A. H. Rogers.

Geology: ore occurs in nearly vertical N. E.-S. W. shear zones, or veins, in meta-rhyolite, varying from 4′ to 400′ and averaging 30′. Definite walls, if present, are post-mineral gouges; basalt forms the east wall. The ore forms irregular lenticular bodies that average 45′ by 200′ and are connected by narrow seams of ore. Ore is a complex mixture of sulphides carrying chalcopyrite with zinc and antimony and low gold-silver values.

Development: several tunnels, lowest No. 3 crosscutting the vein at 1,100′ and 600′ below the outcrop. A 950′ shaft was sunk at this point with levels 100′ apart, and all necessary connections for work and air. Work since 1918 by the Bully Hill company has been confined to the Rising Star mine.

The 400-ton smelter, idle since 1910, has been dismantled and moved to Winthrop. Some part was salvaged for use in erecting a 175-ton mill for the treatment of copper-zinc ore which carries gold and silver. Company has also constructed a 200-ton zinc oxide plant.

SHENANDOAH MINES CO. CALIFORNIA

Probably dead. See Vol. XIII. and XIV.

SHIPSEY MINING CO. CALIFORNIA

Formerly King Solomon Cons. Mines Co.

Office: 786 Pacific Electric Bldg., Los Angeles, Calif. **Mine address:** John Shipsey, Randsburg, Kern Co., Cal.

Inc. 1914, in Calif. **Cap.** $500,000.

Property: King Solomon group of 7 claims, in the Rand district, Kern county, ¾ mile W. of Johannesburg, said to have yielded gold worth about $2,000,000 in past 20 years, from depth of 520′, with levels at 50′ intervals. The vein is 3′ wide with granite foot and porphyry hanging wall. Free-milling pay ore occurs in a 1,400′ shoot. Equipped with 5-stamp concentration-amalgamation mill, and 20 h. p. hoist. Operated to end of 1919 by lessees, and by owners during 1920.

SIERRA ALASKA MINING CO. **CALIFORNIA**

Idle. **Address:** W. S. Schuyler, pres.-mgr., Pike City, Calif. Oliver Crook, sec.

Inc. Jan. 22, 1912, in California. **Cap.** $2,000,000; $1 par; changed in 1918 to $200,000; $1 par; all issued.

Property: 8 claims, 4 patented, and 2 patented homesteads, 480 acres, ½ mile N. of Pike, Sierra county. The mine was located in 1863, and bought by present owners in 1904.

Geology: the Alaska vein consists of calcite and quartz lenses, up to 16' across, in a wide lode in serpentine.

Development: by 900' three compartment shaft, with about 8,000' of workings, including a 1,300' drain tunnel at 120' depth.

Equipment: pumps, hoist of 1,500' capacity, 850 cu. ft. compressor, 40 stamps, Wilfley and Deister tables, etc.

Production: about $1,000,000 from 100,000 tons of ore to 1918. No recent figures obtainable.

SIERRA BUTTES MINE **CALIFORNIA**

Address: E. A. and J. O. Hayes, owners, San Jose, Calif.

Property: the Sierra Buttes mine, 15 claims, 660 acres, with timber land, near Sierra City, Sierra county. When operated by the English company (which controlled the Plumas Eureka) from 1870 to 1905, the gold output was $17,000,000.

Geology: the gold quartz veins lie between greenstone or serpentine, and quartz-porphyry. The Ariel vein is from 6 to 20' wide, the Mammoth 300' long and 15 to 20' wide.

Development: by several miles of workings, No. 9 tunnel on the Sierra City road being 7,200' long.

Equipment: 40-stamp mill and cyanide plant, 10-drill compressor, and aerial tram.

Mine and mill were idle 1919 and 1920, but limited operations were in progress in 1921.

SIERRA GIBRALTAR MINING CO. **CALIFORNIA**

Address: 347 Mills Bldg., San Francisco, Calif.

Officers: A. I. Schmidt, pres.; J. P. O'Brien, v. p.; H. C. Houghton, sec.

Inc. 1921, in Calif. **Cap.** $250,000; 50c. par; all issued.

Property: a group of 7 patented placer claims in Sierra county.

SIERRA RANGE COPPER CO. **CALIFORNIA**

Address: A. L. Beardsley, pres., Sioux City, Iowa. **Mine office:** Genesee, Plumas Co., Calif.

Property: the Mountain Lion group of 4 claims, 80 acres, adjoining Gruss and Five Bears mines, 2 miles S. of Genesee, and 18 miles from Keddie on the W. P. R. R. There is one 5' vein, in meta-andesite, traceable for 1,100' on the surface. Ore is quartz carrying bornite, tetrahedrite, gold, and silver.

Development: by 750' tunnel. Assessment work only done for years.

SIERRA STANDARD MINING CO. **CALIFORNIA**

Address: J. S. Frye, pres., Downieville, Calif.

Property: 2 claims and fractions, 80 acres, 3 miles N. of Downieville, Sierra county, acquired in 1910, shows a 4' gold quartz vein near a serpentine-porphyry contact. A cross-vein, stoped for 40' by 120', contains gold and arsenopyrite.

Development: by 1,000' of work in 6 short tunnels.

Equipment: water power under 125' head, compressor, and buildings.

SISKIYOU SYNDICATE **CALIFORNIA**

Address: I. J. Luce, pres., 618—2nd Ave., Seattle, Wash. Mine at Etna Mills, Calif.

Officers: I. M. Tetherow, v. p.; Alex. Parker, sec.; Jos. Stephens, treas.

Inc. 1909, in Washington. **Cap.** $750,000; 25¢ par; $700,000 outstanding.

Property: 3 groups of claims in southern section of Siskiyou county, said to show veins up to 3' in width. Developed by several tunnels, none over 300' in length.

SIXTEEN TO ONE MINE **CALIFORNIA**

Described in Vol. XIV. See **Original Sixteen to One Mine, Inc.**

SKIDOO MINES CO. **CALIFORNIA**

Company liquidated. Described in Vol. XIII.

SLATE RANGE MINERALS CO. **CALIFORNIA**

Address: L. D. Hirschfeld, mgr., P. O. Box 246, Bakersfield, Cal. T. A. Wells, pres.

Inc. 1916, in Calif. **Cap.** $50,000; $1 par; all issued. Annual meeting in May.

Dividends: Nineteen disbursements made to date; last dividend of 10% paid in 1918.

Property: the Copper Queen group, 60 acres, patented, in Inyo county, 8 miles N. E. of Trona, shows lead carbonate ore. In 1920, high grade galena ore, carrying silver was reported opened on the lower level.

Equipment: includes a 50-ton plant employing crusher, ball-mills, Overstrom concentrators, and K. & K flotation machines.

Production: in 1918, 1,331,440lb of lead, 1,786 oz. gold, 64,389 oz. silver, and 90,124 lb. copper, with gross receipts of $142,822.

Active 1919 and 1920, and was second largest producer in the county in latter year.

SOUTHERN CALIFORNIA GOLD DREDGING CO. **CALIFORNIA**

A "frost", now defunct. For lurid statements, contained in prospectus of company, see Vol. XIV.

SOUTHERN EUREKA MINING CO. **CALIFORNIA**

Address: 411 Hyde Bldg., Spokane, Wash, or J. F. Wardlow, Greenville, Plumas Co., Calif.

Inc. in Washington by George D. Needy, E. F. Yeager, M. A. DeHoff, Hal. J. Cole and H. R. Van Dreathen, all of Spokane. **Cap.** $2,000,000.

Property: the South Eureka, Hibernia, McClellan and Wardlaw mines, 12 claims, 450 acres, traversed by half a mile of the Crescent-Indian Valley and other lodes. 1½ miles S. of Greenville, thence 15 miles S. to Keddie on the W. P. R. R.

Development: by 3 tunnels 160', 585', and 800' long, with drifts and stoping on a quartz vein, in a contact fissure between meta-rhyolite and diorite. In one tunnel the vein is 3' wide, assaying $12.50 per ton.

Idle for a number of years.

SOUTH EUREKA MINING CO. **CALIFORNIA**

Address: 354 Pine St., San Francisco, Calif.

Officers: H. Malloch, pres.; Edw. Fox, sec.

Inc. in Calif. **Cap.** $1,800,000; par $5.

Company paid $100,000 for Oneida mine, in Amador county, near Martell station on S. P., as good ore was discovered at north end of the property in 1920. Mine closed down for 15 years, except for short intervals. The Central Eureka keeps the mine unwatered. Described in Vol. XIII.

SOUTH FORK GOLD MINING CO. **CALIFORNIA**

Idle. **Address:** 530 Bradbury Bldg., Los Angeles, Calif.

Officers: A. E. Pomeroy, pres.; E. E. Gardner, v. p.; Jas. H. Hurin, sec.-treas., with E. S. Field, directors.

Inc. 1873, in Calif. **Cap.** $1,000,000; $1 par; 727,738 issued, assessable. Annual meeting, June.

Property: 10 claims, 700 acres, within the town of Forest, Sierra county, at elevation of 5,500', acquired in 1910, and bonded December, 1915, to Thomas Wilson of Manhattan, Nevada. Ground covers an ancient lava-capped channel, 1,100' wide, carrying gold.

Development: by 5,500' of tunnel, raises and drifts. Work has not yet cut the old gravel channel, but did cross five quartz veins. Rich ore found

in shallow surface cuts on veins at each end of property. Property has electric power and full equipment.

SOUTH KEYSTONE CONS. MNG. CO. **CALIFORNIA**

Address: 408 Cluni' Bldg., San Francisco, Calif.

Officers: William Virges, pres.; Frank F. Wood, sec.

Inc. 1916, in Calif. **Cap.** $1,000,000; $1 par; 213,000 shares issued.

Property: 4 patented gold claims between Amador City and Sutter Creek, Amador county.

Development: by 1,000' shaft, unwatered March, 1917, and exploration started in North Star claim. This is one of the old Californian mines being reopened under modern conditions.

SOUTH STAR GOLD MINES CO. **CALIFORNIA**

Address: Room 414, 57 Post St., San Francisco, Calif.

Mine address: M. A. Thorson, Grass Valley, Calif.

Officers: A. W. Johnson, pres.; Wm. Sewart Scott, sec.

Inc. 1919, in Calif. **Cap.** $125,000; 25¢ par; 25,000 shares issued.

Property: 4 claims, 60 acres in the Rough and Ready district, Nevada county, 3 miles W. of Grass Valley. The main veins have been traced for 2,500' on the surface.

Development: by 100' shaft with 70' drift. Exploration resumed late in 1920. A 3' vein cut in 1920 at 105', depth shows free gold for 60'. Working 1921.

SOUTH YUBA MINING & DEVELOPMENT CO. **CALIFORNIA**

Address: c/o Kass-Hopkins Co., 1215 Hearst Bldg., San Francisco.

Inc. 1902. **Cap.** $500,000.

A property with favorable indications, but idle for several years. Described in Vol. XIII.

SPENCE MINERAL CO. **CALIFORNIA**

Idle. **Office:** 528 Mills Bldg., San Francisco, Cal. Mine near Spenceville, Nevada Co., Calif.

Property: 2 patented claims and 2 mill sites in the Spenceville district, located in 1862. A deposit with chalcopyrite and pyrite in a fissured zone, 50' wide, in altered diabase near contact with grano-diorite. Fifty feet of solid sulphide occurs in places. In 1900, 15 tons of pyrite were shipped daily.

Development: by 180' shaft and 3 levels. The mine was idle from 1906 to 1914. In 1915 the whole plant was burned. Lessees did some work in 1917.

STANDARD AMALGAMATED EXPLOR'N CORP. **CALIFORNIA**

Idle. Office: Gahm Bldg., Boston, Mass. Mine near Esmeralda, Calaveras county, Calif.

Officers: Frank E. Bramhall, pres.; W. F. Dwyer, v. p.; A. E. Reidel, sec.; H. H. Brown, treas., with Alfred Grover, E. Koessler, E. F. Curtis, Geo. Clark and J. L. Whitten, directors. Louis Robin, mgr.; Chas. Cuneo, supt., Esmeralda, Cal.

Inc. Jan. 2, 1909, in Nevada. **Cap.** $1,587,000; shares, $1 par; outstanding April 23, 1916, 1,264,223 shares.

Bonds: authorized and outstanding, $40,000. Company is successor of a corporation of same name, but greater capitalization.

Property: the Economic mine, 2 patented claims, 36 acres, near Esmeralda, is said to have a steeply dipping 6' quartz vein in slate.

Development: by a 700' tunnel, with total workings of 5,000'.

Equipment: includes a 20-stamp mill, 100 h. p. compressor and electric power. Planned to build a cyanide plant in 1918, but nothing new reported.

STANDARD TUNGSTEN CO. **CALIFORNIA**

Address: H. W. Hellman Bldg., Los Angeles, Calif.

Ore reserves exhausted and property closed down, Nov., 1918. Plant has been dismantled and sold. Property was described in Vol. XIII.

STARR KING MINE, INC. **CALIFORNIA**

Idle. **Office:** 58 Sutter St., San Francisco, Cal.

Officers: R. C. Kennedy, pres.; M. J. Lindsay, v. p.; W. H. Young, sec.-treas.; John Watt and George J. Pressley, directors. George S. Dean, supt.

Inc. Sept. 26, 1917, in California. **Cap.** $150,000; $1 par; 90,000 issued to Ronald C. Kennedy.

Property: Starr King and Sherman patented claims; American Gold 75 acres, includes claim, and two mill sites, situated in Sec. 15, Twp. 1 N. R. 16 E. M. D. M., also certain water-rights; all in Tuolumne county. Orebodies are said to average 3′ in width of $12 free-milling gold ore.

Development: consists of a 565′ incline, with 5 levels; a total of 2,800′ of work.

Equipment: electric hoist, compressor plant, 5-stamp mill and Wilfley table, electric transmission line, office and boarding-house.

Production: from 1886 to 1900 the mine was worked at irregular intervals by various owners, producing $300,000. See Vol. XIV.

STEIFER MINING CO., P. B. **CALIFORNIA**

Address: Oroville, Butte Co., Calif.

Operations resumed on property in 1921, but whether by company or not is not known. A power line was built and miners working to reach Mammoth gravel channel in Magalia ridge.

STOCKHOLDERS MINING CO. **CALIFORNIA**

Probably out of business, as mail was returned unclaimed in May, 1920. See Vol. XIV.

STOCKWELL GOLD MINING SYNDICATE **CALIFORNIA**

Address: E. E. Nichols, 246 Title Ins. Bldg., Los Angeles.

Officers: C. L. Mullholand, v. p., El Monte, Cal.; V. E. Stockwell, sec.; Harris Trenholm, supt., Trona, Cal.

Inc. Jan. 1920. **Cap.** $1,000,000.

Property: 4 claims, in Inyo county, 8 miles N. E. of Trona, said to show a quartz vein in granite and porphyry. Ore contains gold and silver, assaying about $15 per ton.

Development: by tunnels; total workings about 1,000′.

Equipment: includes a 25 h. p. hoist and a 35-ton cyanide mill.

Company was active in 1920.

SULPHUR BANK ASSOCIATION **CALIFORNIA**

Address: 6 Beacon St., Boston, or 817 Crocker Bldg., San Francisco. H. W. Gould, gen. supt.; N. J. Martin, mine supt. Geo. T. Ruddock, owner, 433 California St., San Francisco. The Association is a copartnership.

Property: a lease and bond on the old Sulphur Bank mine on E. shore of Clear lake in Lake county, 10 miles N. of Lower Lake City. This notable mine, first worked for sulphur in 1865, is credited with an output of 92,400 flasks of quicksilver from 1873 to 1906, largely in first 10 years. The region was one of great volcanic activity. Cinnabar occurs in seams and impregnations, associated with silica, in decomposed and broken basalt.

Development: by numerous shafts and open cuts. In 1917, several hundred thousand tons of ore were at the surface. Heat and gases make underground work difficult.

Equipment: includes a concentrator, roasting furnace and two 12-pipe retort-blocks.

Property reported sold to New Idria Mng. Co. in October, 1921.

SULTANA GOLD MINING CO. **CALIFORNIA**

Address: G. A. Nichols, 508 Crocker Bldg., San Francisco. Albert Chase, supt., Grass Valley, Calif.

Officers: J. E. Green, pres.; G. A. Nicholls, sec.

Inc. 1904, in Calif. **Cap.** $1,000,000; $1 par; issued 729,000. Annual meeting, January.

Dividends: $3,602 in Aug., 1907. Total, $14,409.

Property: the Bovee mine, 235 acres, 27 claims and fractions, 185 acres patented, 1½ miles S. E. of Grass Valley, adjoins the Empire on the S., and covers a number of veins of the Empire complex, a linked-vein system, all in diabase-porphyry, save on the 1,750′ level where one shaft entered grano-

diorite. The mines have yielded over $1,500,000; the value since 1903 being $750,000.

Development: by shafts 600', 965' and 1,750' deep, with winzes 1,100' and 1,250', respectively, below the first two, and several miles of workings. The mine was active throughout 1920, but no production figures are available.

Equipment: included 20-stamp mill, hoist and power house, destroyed by fire, July, 1921.

SUNNYSIDE COPPER CO. — **CALIFORNIA**

Idle and probably dead.

Mail returned from former address: Clyde Wardlow, Taylorsville, Plumas county, Cal.

Property: near the Engels mines. Development has been carried on for several years and machinery and buildings were erected in October, 1919.

SUTTER CREEK MINING CO. — **CALIFORNIA**

Probably dead. See Vol. XIII.

TABLE ROCK MINING CO. — **CALIFORNIA**

Address: 625 Market St., San Francisco. **Mine address:** Table Rock, Sierra county, Calif.

Officers: J. H. Hartley, pres. mgr., 2432 Webster St., Berkeley, Cal.; T. S. Elston, v. p.; W. W. Whitton, sec.-treas. with E. L. Oliver and Eula Sandow, directors. At last report.

Inc. Sept., 1915, in Nevada. **Cap.** $500,000; $1 par; issued 307,899 shares.

Property: 12 claims at Table Rock, Sierra county 14 miles from La Porte, Plumas county. An old gravel channel is being explored and developed. Management states that $26,000 was spent on development in 1918 and $1,500 monthly in 1919. Gravel is said to assay $2 and over in gold per ton. Property is claimed to have produced $3,000,000. In Oct. 1920, 20 men were employed, and coarse gold was being saved.

TECOPA CONSOLIDATED MINING CO. — **CALIFORNIA**

Address: L. D. Godshall, Tecopa, Calif.

Officers: Nelson Z. Graves, pres., 22 S. 3rd St., Philadelphia; L. D. Goodshall, v. p.; J. S. Sullivan, sec.

Inc. in No. Dakota. **Cap.** $3,000,000; $1 par.

Property: the Gunsite, Noonday, Columbia and War Eagle mines, 17 patented claims at Tecopa, Inyo county, has veins carrying lead, silver and gold, average assays being 12% lead, 9 oz. silver and 0.1 oz. gold per ton, and a little copper.

Development: by shafts, 300' to 400' deep, and by 2 tunnels, 1,500' and 4,000' long, cutting the vein at 1,000' depth.

Equipment: includes 100-ton concentrator.

Management states that ore sales in 1918 were $232,426, and that dividends of $30,000 were paid.

In 1920, shipments were 1,200 tons of ore monthly to the Murray smelter, until Dec. 1, when mine was closed to await better lead prices. The mill operated but a few months.

The Tecopa was the largest lead-silver producer in California, 1917-20.

TEDOC MINING CO. — **CALIFORNIA**

Address: 268 Market St., San Francisco, Cal. or W. A. T. Agard, supt., Red Bluff, Tehama county, Calif.

Owns chrome mines on Tedoc Mountain, 51 miles from Red Bluff, on Eureka road.

Closed on account of the chrome market.

THREE BUTTES & CONSUMNES COPPER MINES. — **CALIFORNIA**

Address: S. L. Watkins and associates, owners, Grizzly Flats, Cal.

Property: 30 sq. miles in Eldorado county, Cal., said to be heavily mineralized, carrying gold, silver, copper, molybdenum, etc.

No news in several years.

THREE SEVENS MINING CO. — **CALIFORNIA**

Address: T. R. Pell, 524-5th Ave., New York, N. Y. John Mulsly Grass Valley, Calif.

Property: the Norambagua gold mine, 70 acres, 1¼ miles S. of the Allison Ranch mine, and 4 miles S. of Grass Valley, Nevada county. Mine produced $1,000,000, prior to closing down 1868 to 1892, when it was reopened and worked intermittently by tributers until 1909. Present company reopened mine 1916-18, when work was stopped.

The vein is in granodiorite, and dips E. with quartz, averaging 5" in width, carrying fine gold and pyrite. The value varies between $40 and $100 per ton.

Development: by an old 567' incline, and by a crosscut adit with 250' shaft below it. South drift from bottom level exposed rich ore.

Company reported succeeded in 1919, by **Norambaqua Consolidated.**

TIGHTNER MINES CO. **CALIFORNIA**

Address: Chas. Taylor, Main & Church Sts., Grass Valley, Calif.

Mine operated by Fred Searls, Jr., for Alleghany Mining Co.

Officers: J. M. O'Brien, pres.; Dr. C. P. Jones, v. p.; Chas. Taylor, sec.-treas.

Property: the Tightner mine, at an elevation of 4,000', under the town of Alleghany, Sierra county, 31 miles N. E of. Nevada City.

Geology: ore occurs in a fissure vein in much altered schist. Faulting is frequent, and shoots irregular. The average width is 3 to 5'. The strike is 45° N. and dip 30 to 55° E. Specimen ore found in poorly defined shoots supplies the main supply of gold. Arsenopyrite also carries free gold. Galena concentrate assayed $100 per ton, and pyrite $40 per ton.

Development: by 6,500' main tunnel. This tunnel cut rich ore, but a fault cut off the vein 413' below it. The vein is opened by a second tunnel for 200' in length, at 800' depth. A 340' winze was sunk below the main tunnel. Most of the rich ore came from 2 points, one S. of the winze and one 700' N. of it. In 1920, the Red Star vein was cut in the main tunnel, and rich ore was reported, and 2,600' of extensions made.

Equipment: complete with 20-stamp mill, having a monthly capacity of 2,700 tons. Up to 100 men are employed when in full working order.

Production: about $2,000,000 to end of 1917. Small output since, until May, 1920, when mill started turning over.

TITANIC COPPER MOUNTAIN MNG. CO. **CALIFORNIA**

Fully described in Volume XIV. Presumably succeeded by **Copper Mountain Mng. Co.,** which see.

TOLL GATE MINING CO. **CALIFORNIA**

Property: Port Arthur group, W. of Altaville, Calaveras county; developed by 100' shaft.

TRAIL CREEK MINING CO. **CALIFORNIA**

Idle. **Address:** Callahan, Calif., G. A. Foster, pres.-supt.; G. Hart, sec.

Property: 100 acres in Trail Creek, Siskiyou county, reached by trail from Callahan. A fissure vein occurring between schist walls, with dip 60° N. and course N. 40° W., is said to carry an ore shoot 300' long and 2' wide. Workings consist of 850' tunnel, drifts and a stope 200' long.

Equipment: includes two Huntington mills, run by water power and several buildings. Owners claim 3,000 tons ore reserves. Production to July, 1915, $40,000. No later report.

TRASK & COFFER MINING CO. **CALIFORNIA**

Address: L. L. Coffer, Taylorsville, Calif. Gerald P. Roman, supt.

Inc. July 22, 1918, in Calif. **Cap.** $100,000; $1 par.

Property: the Beetle and Moonlight mines, 2 miles from the Engels mine and 1 mile from the Indian Valley R. R., in Plumas county.

Development: by 1,000' tunnel and drifts, said to have opened 4,000 or 5,000 tons of ore, containing 4% copper, 16 oz. silver and $2 gold per ton. Another tunnel and a 100' shaft are to be opened.

Equipment: includes a 5-stamp concentrating mill, with tables and vanners; compressor, and electric power.

Concentrate was shipped to the Garfield smelter in 1920.

TREASURE MINING CO. **CALIFORNIA**

Office: 576 Mills Bldg., San Francisco. **Mine office:** Amador City, Cal.

Officers: W. Rothchild, pres.; E. J. McCutcheon, v. p.; E. S. McCurdy, sec.-treas., with H. G. Stevenson and G. W. McEnerney, directors. O. H. Rohlfs, supt.

Inc. 1878. **Cap.** $500,000.

Property: one claim, near Amador City, Amador county, said to show a gold quartz vein in schist with dip 45° to 55° and N. W. strike.

Development: by 1,600′ incline and 800′ winze, with levels at 1,800′, 2,000′, 2,160 and 2,300′. In 1918, reported good ore in lower levels.

Equipment: includes 150-ton ball mill for amalgamation and concentration.

Active 1919 and 1920; concentrate is shipped to smelter.

TRINITY COPPER CO. **CALIFORNIA**

Out of business. Property sold on Jan. 19, 1920, to G. A. Haskell of Boston for $210,000, who immediately sold it to the Trinity Copper Corporation for $1. See Vol. XIV for tangled history.

TRINITY COPPER CORPORATION. **CALIFORNIA**

Successor to Trinity Copper Co.

Allen Arnold, 85 Devonshire St., Boston, is said to be interested, "Legal residence", Richmond, Va.

Officers: Thos. W. Lawson, pres.; A. P. French, v. p.; Allen Arnold, treas.; John N. Reynolds, sec. and asst. treas., all of Boston.

Inc. Feb., 1920, in Virginia, as successor to New Jersey corporation of almost same name. **Cap.** $5,000,000; $5 par; 291,829 issued; 240,000 for use in exchange for stock of the Trinity Copper Co., 20,000 for services; and 31,829 were subscribed for by shareholders at $2 each. An offering of 208,171 additional shares at $2, was made in January 1921. Stockholders to May 1, 1921. On Dec. 31, 1919, the old company had $79 in cash. Notes of Trinity Copper Co. had privilege of exchanging share for share up payable were $206,078; and other items, $58,187.

Exchange Trust Co., Boston, transfer agent; Federal Trust Co., Boston, registrar. Listed on Boston Stock exchange.

Property: consists of 1,200 acres of mining land, at Kimberly, Shasta county, including the Shasta King, Lost Desert and King Copper groups.

The Shasta King group, 12 claims, 4 miles E. of Iron Mountain, is on the south fork of Squaw Creek, adjoining the Balaklala mine.

Development: by tunnels, the main tunnel being 7 x 8′ and 1,145′ long, with double tram tracks, and a 7x 8′ double track tunnel driven 175′ lower. This development has opened a low grade pyritic orebody containing disseminated chalcopyrite; ore probably averages 2½ copper, 1 oz. silver per ton and small gold values. The mine has over 15,000 ft. of workings and about 400,000 tons of ore in sight.

The King Copper group, 23 claims, about 2½ miles S. of the Shasta King, has about 1,000′ of development work, but no ore as yet. The Trinity Corp. has no smelter of its own. See Mines Handbook, Vol. XIV, for further particulars.

TRINITY GOLD MINING & REDUCTION CO. **CALIFORNIA**

Address: c/o. D. W. Shanks, Mer. Natl. Bank Bldg., San Francisco, Calif.

Formerly operated the Headlight mine; inactive for many years. See Vol. XIII.

TROPICO MINING & MILLING CO. **..CALIFORNIA**

Address: 448 Wilcox Bldg. Los Angeles, Calif.

Officers: O. S. Richardson, pres.; S. E. Brown, sec.

Inc. 1909, in California. **Cap.** $300,000; par $1; 204,169 shares issued

Property: the Antelope valley, Tiger Head and other mines, 200 patented acres, at Rosamond, Kern county, equipped with 10-stamp amalgamation mill and 30-ton cyanide plant.

In both 1919 and 1920 development was continuous, mill being run part of time only.

TUNGSTEN MINES CO. CALIFORNIA

General office: 301 Holbrook Bldg., San Francisco, Cal. **Mine office:** Bishop, Inyo county, Cal.

Officers: F. M. Townsend, pres; F. W. Griffin, v. p.; M. E. Griffin, sec., with R. A. Kinzie, V. Klinker, H. T. Thompson, and J. C. McKinstry, directors.

Inc. 1916, in Calif. **Cap.** $3,000,000; shares $10 par

Property: a group of claims, purchased 1915 from A. J. Clark, situated in a narrow gulch known as Deep Canyon, 7 miles west of Bishop. Scheelite bearing garnet rock occurs in granite. (U. S. Geological Survey Bulletin 640-L, by Adolph Knopf, describes the district.)

Development: by 2 tunnels, one on each side of the new mill and connected therewith by 700′ tram line.

Equipment: 300-ton mill, built 1916, has rolls, trommels and tables.

Production: in 1918, about 100,000 tons of ore, averaging 0.5% WO_3 (tungstic acid).

Idle on account of the tungsten market.

TUOLUMNE GIANT GOLD MINES CO. CALIFORNIA

Office: 828 Story Bldg., Los Angeles, Calif.

Officers: J. E. Nelson, pres.; W. A. Newcomer, v. p.; Harold Larson, sec.-treas.

Cap. $1,000,000; $1 par; 645,000 shares in treasury, March, 1921.

Property: the Tarantula and Gold Ridge quartz mines, or Jones properties in Tuolumne county, which adjoin Eagle Shawmut on the north. The Tarantula group has 7 claims and mill-site; Gold Ridge has 3 claims and 4/8 section of patented land; total area about 300 acres.

Development: at the Tarantula, by 1,200′ tunnel and 700′ winze; at the Gold Ridge, by 120′ shaft and 70′ drift, which is said to show free gold for its entire length.

Equipment: twenty 1,250 lbs. stamps on the Tarantula, and 10 stamps on the Gold Ridge, with hoists, compressors, crushers, etc.

The property was worked continuously during 1920. In 1921, the 1,200′ tunnel was extended, cutting all the veins on both properties, at a depth of 700′. A new shaft will be sunk in the rich values of the Jones vein. The property has been examined by Frank W. Royer, Thomas A. Wetzel, Charles Early and E. A. Adams.

TWENTY-ONE MINING CO. CALIFORNIA

Property sold to **Sixteen to One Company**, which see. See also Vol. XIV.

TYSON MINING CO. CALIFORNIA

Address: W. H. Pleasants, Tyson Estate, Baltimore, Md.

Property: the Low Divide and French Hill mines in Del Norte county, 15-18 miles easterly of Crescent City, show chromite orebodies in a serpentine-diorite contact. In the 80's shipments were made to Baltimore, then the centre of the chromite industry. In 1918, mines were operated under lease by **American Exploration & Contracting Co.**

Company also owns chromite properties in Maryland including the old Soldier's Delight mine, 12 miles N. W. of Baltimore, which was operated by **Maryland Chrome Corp.** (q. v.), in 1918-19.

UBEHEBE COPPER MINES & SMELTER CO. CALIFORNIA

Probably defunct. See Vol. XIV.

UNION CHROME CO. CALIFORNIA

Address: 180 Sutter St., San Francisco. E. A. Wiltsee, pres.-mgr.

Property: the Forest Queen and Gray Eagle Chrome mines on Boulder creek, Shasta county. Irregularly shaped chromite orebodies in peridotite are developed by inclines and tunnels. In 1918, company held chromite-bearing properties under lease in a number of other counties and was operating also in Josephine county, Oregon.

UNION DEVELOPMENT CO. **CALIFORNIA**

Mail returned from former address: 713 Iowa Loan & Trust Bldg., Des Moines, Iowa.

Property: the Blazing Star mine ½ mile E. of West Point, Calaveras county. A 2′ quartz vein is developed by a 400′ shaft.

Probably defunct.

UNION HILL MINES **CALIFORNIA**

Company disincorporated and property taken over by **Idaho-Maryland Mines Co.**, which see.

UNITED AMERICAN MINING CO. **CALIFORNIA**

Address: Grass Valley, Calif.

Officers: C. C. Van Eaten, pres.; J. T. Hennessy, sec.

Inc. 1920, in Calif. **Cap.** $500,000; $1 par.

Property: in Rough and Ready district, Nevada county, 4 miles S. W. of Grass Valley, developed by 380′ shaft and 1,000′ of drifting. Ore contains gold, silver and copper.

Production: reported to total $50,000.

UNITED GREENWATER COPPER CO. **CALIFORNIA**

Office: Tonopah, Nev. **Mine office:** Dale, via Amboy, San Bernardino county, Calif.

Property: company was operating the Supply mine in 1915 and owned the O. K. mine. The former is developed by shafts of 800′ and 1,100′. Had a 50-ton cyanide plant which treated 60 tons of ore daily in 1915, averaging $14 per ton. No returns since.

UNITED STATES EXPLORATION CO. **CALIFORNIA**

Address: 617 Pacific Bldg., San Francisco.

Property: the Robinson mine, 35 miles N. E. of Oroville, in the Granite Basin district, Plumas county, held under lease. In 1916, the shaft was deepened, and rotary mills with capacity equal to 40 stamps were erected. Closed late in 1918 on account of unfavorable results of work.

UNITED TUNGSTEN COPPER MINES **CALIFORNIA**

Address: 401 Bradbury Bldg., Los Angeles, Cal.

Officers: Frank F. Peard, pres.-mgr., Hotel Maryland, Pasadena, Cal.; Dr. C. H. White, v. p.; Wm. K. Weaver, sec.-treas. Jos. Zanini, supt., Victorville, Calif.

Inc. 1916, in Arizona. **Cap.** $2,000,000; $1 par; issued 1,527,201.

Properrty: 18 claims, 360 acres, in Morongo district, San Bernardino Mtn., 45 miles S. E. of Victorville. San Bernardino county, under development by tunnels for past 3 years. Contact-metamorphic scheelite deposits carry a little bismuth.

Management reports large ore reserves and that machinery for a 25 to 50-ton mill is on the property.

United Tungsten-Copper Mines was in 1921 in process of consolidation, with the **Union Metals Corporation** and the Kaibab Smelting Co., as **Kaibab Cons. Smelting Co.**

UTACALA EXPLORATION CO. **CALIFORNIA**

Address: Morris P. Kirk, pres. mgr., Salt Lake City. Geo. H. Ryan, supt.

Property: the Towser zinc mine 9 miles from Darwin, Inyo county, and 34 miles from Keeler, the nearest railroad point, said to have the largest known deposit of hydrozincite, averaging over 40% zinc and 12% moisture. The greatest thickness of ore so far disclosed is over 25′. A small calcining plant, 10 to 12 tons daily capacity, reduces the moisture to 1½% thus making a saving in truck and railroad freights. Rate of shrinkage in calcining averages 22%.

During 1920, zinc ore was shipped to Empire Zinc Co., etc., until December.

UTICA GOLD MINING CO. **CALIFORNIA**

Utica mine closed permanently in 1918; see Vol. XIII for full description. The Gold Cliff at Angels, Calaveras county, developed to depth of 1,900, was closed down permanently, April 30, 1920.

VALDOR DREDGING CO. **CALIFORNIA**

A subsidiary of Metals Exploration Co.

Office: 58 Sutter St., San Francisco. **Mine office:** Junction City, Cal. Gerald H. Hulton, mgr., 1213 Hobart Bldg., San Francisco.

Officers: Bulkeley Wells, pres.; Roy H. Elliott, v. p.; A. D. Snodgrass, sec.-treas., with T. D. Harris and Jafet Lindeberg, directors.

Inc. March, 1916 in California. **Cap.** $200,000; shares $100 par; all issued. Annual meeting, third Tuesday in February.

Property: placer claims, near Junction City, Trinity county. Gravel contains gold, and metals of the platinum group.

Equipment: one 7 cu. ft. electric driven dredge.

Production: 1917, 1,494,860 cu. yd. at cost of 5.01 cents per yd.; 1918, 1,602,255 yd. at cost of 5.89 cents per yd; 1919,—1,154,898 yds at cost of 8.38c. per yd.; 1920,—1,479,846 yd. at cost of 6.81c. per yd.

Dredging started late in 1916. Costs are low.

VICTOR LAND & MINERAL CO. **CALIFORNIA**

Address: 512 Commercial Bldg., St. Louis, Mo.; or Angels Camp, Calaveras Co., Cal.

Officers: E. H. Ehler, pres.; J. A. Montreville, sec.

Inc. 1914, in Calif. **Cap.** $1,000,000; par $1; issued 439,700 shares. Company received a permit from California State Corp. Commission to sell 200,000 shares at 50¢ per share.

Property: 460 acres of gravel ground on Bald hill, near Angeles, Camp Calaveras county.

The mine was unwatered late in 1920 and in June, 1921, company was mining rim gravel and drifting for west channel.

VICTOR POWER & MINING CO. **CALIFORNIA**

Address: J. H. Sharpe, 1025 Hearst Bldg., San Francisco. **Mine office:** Knob, Calif.

Officers: J. H. Sharpe, pres.; A. Bonick, v. p.; A. A. Barber, sec.-treas.; with H. L. White, directors.

Inc. Oct. 1907, in California. **Cap.** $500,000; shares $1 par. 335,647 shares issued. Annual meeting in October.

Property: the Midas mine, 3,400 acres, in Harrison Gulch, Shasta county, including also the Gold Hill, Bonanza, Bull Moose, and other mines. The first-named is credited with a gold yield of $4,000,000.

Geology: quartz vein in diabase and slate, dipping 74° and pitching N. W. The orebody is 12″ wide and 200′ long, ore averaging $22 per ton.

Development: by 1,200′ vertical shaft, and tunnels. Workings total 45,000′.

Equipment: includes 250-h. p. Diesel engine, 70-h. p. electric hoist, 90-h. p. campressors, three 20 h. p. pumps, and reduction plant using 4 Gibson mills and concentrators, with daily capacity of 100 tons of ore.

Considerable amount of development done in 1920. For past history see Vol. XIV.

VIRGINIA-BELMONT MINING CO. **CALIFORNIA**

Office: 314 Kohl Bldg., San Francisco, Calif. Jack Wilson, supt., Bagby, via Coulterville, Calif.

Officers: J. F. Soule, pres., B. C. Austin, sec.

Inc. 1920, in Nevada. **Cap.** $1,000,000: $1 par; 500,000 shares issued.

Property: the Virginia mine, at Coulterville, Mariposa county, formerly owned by the White Gulch M. Co.

Development: by 900′ shaft and 10,000′ of drifting. The mine is credited with total production of $1,000,000 in gold.

Equipment: includes 10-stamps, Hardinge mill and 2 concentrators.

Operated both mine and mill during 1919 and 1920.

WALKER CONS. MINING CO. **CALIFORNIA**

Address: J. R. Walker, pres., Salt Lake City.

Property: paralleling that of the **Walker Mining Co.**, in Plumas county, said to have extensive orebodies shown by an 800′ tunnel and numerous surface workings. Diamond-drill work is used to explore the ground.

WALKER MINING CO. **CALIFORNIA**

Subsidiary of the **Anaconda Copper Mining Co.**

Office: 618 Kearns Bldg., Salt Lake City, Utah. **Mine address:** V. A. Hart, mgr., Portola, Plumas county, Calif.

Officers: J. R. Walker, pres.; O. M. Kucks, v. p; J. B. Whitehill, sec.-treas., with C. A. Walker and B. R. Howell, directors.

Inc. 1913, in Arizona. **Cap.** $1,250,000; $1 par; all issued. Also 100,000 $1 pfd. shares issued. Stock listed on the Salt Lake Exchange. In 1918, the Anaconda company, through its subsidiary, the International Smelting Co. exercised its option on control of the company. As reported, the deal called for 630,000 shares at $1 per share.

Property: 38 patented lode claims, and 2 placer claims, heavily timbered, elevation, 7,000′, in an unorganized district, at Spring Garden, 22 miles N W. of Portola, on the Western Pacific Railroad.

Geology: the claims show diorite largely overlain by volcanic tuff; the diorite showing fissuring and alteration for length of several claims. The vein 6′ to 8′ wide, occurs in an altered zone impregnated with sulphides containing copper, silver, and gold. The strike is N. W., and dip 65° N. E. This ore zone also contains several other parallel veins, 10 to 60′ wide. The combined length of the 3 ore shoots is 2,500′.

Development: the property was explored to a depth of 346′ by 2 shafts, and drifts from these shafts opened an orebody 800′ long, average width 16′ and averaging 4% copper. Diamond-drill holes indicate an additional length of vein of 900′. The 4,900′ main tunnel connects with the main incline shaft and develops the vein to a depth of 1,000′. The blind vein cut by this tunnel "doubles the ore reserves". A 450′ raise connects the tunnel and No. 4 level. New work in 1919 amounted to 1,819′, and in 1920, considerable drifting was done.

Equipment: electric power, hoist, compressors, etc. An aerial tram, 8.2 miles long, carries supplies from, and concentrates to the railroad. Auto-trucks are also used. Haulage in tunnel is done with electric locomotives.

The mill capacity was doubled in 1917, and now treats 200 tons daily. It employs ball-mills and flotation machines. Recovery is well over 90%.

Production: year ended Dec. 31:

Year	Ore treated, tons	Conc., tons	Conc. smelted,	Copper, lb.	Gold, oz.	Silver, oz.
1919	38,785	5,983	4,270	1,597,430	678	29,078

There were 8,500 tons of concentrates on hand in Nov., 1920.

Production: ceased, Oct. 25, 1920, but development and construction continue. Gradually this has become the second most important copper mine of California.

WERINGER MINES CO. **CALIFORNIA**

Dead and stock valueless. See Vol. XIV. The Weringer Copper-Silver mine is owned by Gus Schamblin, Woody, Calif.

WEST END CHEMICAL CO. **CALIFORNIA**

Office: Syndicate Bldg., Oakland, Calif. Mine office: Westend, Calif.

Officers: F. M. Smith, pres.-treas.; J. F. Carleton, v. p.; Geo C. Ellis, sec., with L. W. Bennett, Rufus P. Jennings, C. P. Murdock and R. L. Oliver, directors. J. W. Sherwin, gen. mgr.

Inc. 1920. **Cap.** $3,000,000; shares $1 par.

Property: 2,200 acres leased from the Federal Government and 680 acres patented, on Searles Lake, San Bernardino county. Townsite is known as Westend, on the Trona railroad. Contains colemanite, a borax-yielding mineral.

This property, formerly a part of holdings of the **West End Cons. Mng. Co.**, was taken over by the newly incorporated **West End Chemical**

Co., in spring of 1920. Stockholders received stock on a share for share basis; total 1,788,486 shares. In June, 1920, 600,000 shares were offered at par to raise funds for completing plant. Including funds expended by West End Cons., the enterprise cost $442,915 to March, 1920.

WESTERN MERCURY CO., INC. **CALIFORNIA**

Address: 68 Post St., San Francisco and Cloverdale, Cal.

Officers: Andrew Rocca, Jr., pres.-treas.-supt., Cloverdale; I. G. De Forest, v. p.; L. B. O'Farrell, sec., with C. A. Shurtleff, H. L. Johnston, E. C. Miles and Jos. Schorr, directors. Annual meeting second Monday in May.

Inc. April, 1916, in Cal. **Cap.** $300,000; $1 par; assessable; outstanding 231,538.

Property: 13 claims, one patented, 260 acres, in Macaymas district, 12 miles E. of Cloverdale, Sonoma county. The orebody is characterized by ledges of thinly stratified chert, inclosed by sandstone. Chert strata vary from ½ to 3" in thickness; ore averages ½% mercury.

Development: tunnels with 2,000' of workings. Ore reserves reported to be 30,000 tons, with 20,000' of this blocked out. Remained active throughout 1919.

Equipment: includes gravity tram from mine to mill, and a furnace with daily capacity of 85 tons.

Production: in 1918 amounted to 1,267 flasks of mercury. Total to date is about 9,000 flasks.

See p. 183, Quicksilver Resources of Cal., Bull. 78 of Calif. State Mng. Bureau.

WESTERN MINES CORPORATION **CALIFORNIA**

Dead. See Vol. XIV.

WESTERN PRECIOUS METALS CORPORATION **CALIFORNIA**

W. A. Simpkins, mgr.; J. H. Harris, supt., Grass Valley, Calif. W. E. Hatch, sec., 629 E. 115th St., Cleveland, Ohio.

Inc. 1920, in Nevada. **Cap.** $1,000,000.

Property: the Mitchell group of claims in the Grass Valley district, Nevada county, developed by 60' and 40' shafts. The latter is to be sunk to 500' on the incline, following a vein in which rich ore is said to have been cut. Company also owns 3 unworked groups in Tule canyon, Esmeralda county, Nevada.

WESTON JUDKINS CO. **CALIFORNIA**

Address: Mariposa, Cal. P. .W Judkins, C. H. Weston and I. L. Dearborn, owners.

Property: a gold mine in the Colorado district, near Mariposa. Mine is being worked under lease. Ore is said to average $8 per ton. Developed by 250' shaft. Equipment includes a 10-stamp mill.

WEST POINT & CALIFORNIA MINES CO. **CALIFORNIA**

Idle. Former address: K. C. Dunn, 1154 O'Farrell St., San Francisco.

Inc. 1915, in Calif.

Property: 2 claims, 25 acres, 3½ miles W. of Grass Valley, Nevada county. Mine has been operated in a desultory manner since 1875, producing a little gold. All equipment was burned in June, 1915.

WHITE BEAR MINING CO. **CALIFORNIA**

Office: 349 Mills Bldg., San Francisco, Calif. **Mine address:** John Costa, lessee, Downieville, Calif.

Officers: A. S. Macdonald, pres.; Richard Belcher, sec.

Inc. 1902, in Calif. **Cap.** $100,000; $1 par.

Property: 8 claims, 100 acres, covering 1½ miles along an ancient gravel channel, 6 miles N. of Downieville, Sierra county, at an elevation of 5,500'. The gravel consists of white quartz, lying on slate and serpentine and capped with lava; 1,200' of channel yielded $200,000.

Development: by a 2,200' tunnel and 1,000' of raises; also a 2,000' tunnel, 400' of raises and 200' of drifts, all in bedrock.

Production: no record of gold output, but in 1918, 250 tons of ore containing 40-45% chromite were extracted.

WHITE GULCH MINING CO. **CALIFORNIA**

Described in Volume XIV.

Formerly worked the Virginia mine now owned by the **Virginia-Belmont Mng. Co.**, which see.

Address: Coulterville, Calif. **Officers:** John F. Soule, pres.; Walter V. Wilson, sec.

Inc. 1912, in Calif. **Cap.** $100,000; par $1.

Dividends: to 1920, $29,700, last of 5%, June 2, 1918.

WHITE KNOB COPPER & DEV. CO., LTD. **CALIFORNIA**

Address: 224 West 57th St., New York.

Officers: John T. Smith, pres.; A. H. Carlisle, v. p.; Arthur Kennedy, sec.-treas., with F. A. Gaynor and Benoni Lockwood, directors.

Cap. $4,000,000 com. and $2,000,000 7% cumulative pfd stock; par $10. Preferred stock has precedence both as to assets and dividends and is convertible at par into common. Fransfer agent and registrar, Security Registrar & Transfer Co., New York. Is a holding company owning $1,200,000 of the capital stock of the **Argonaut Cons. Mining Co.**, which controls the **Argonaut Mining Co.**, at Jackson, Amador county, Calif., which see. Annual meeting, 2nd Tuesday of July.

Dividends: were begun on pfd. in 1914, with payments of 25c. per share in November; 10c. in 1915; 10c. in 1916; 25c. in 1917; 20c. in 1919; 5c. in 1920.

WILLOW VALLEY MINING CO. **CALIFORNIA**

Address: A. W. Hogue, owner, Nevada City, Calif.

Inc. May 18, 1915, in Calif. **Cap.** $1,000,000; $1 par. Annual meeting in May.

Property: 3 claims, 32 acres, 2½ miles E. of Nevada City, Nevada county, has several veins, showing gold and silver ore, in granodiorite and slate

Development: by 830′ incline and 527′ drain tunnel, with extensive workings. Shaft is to be sunk to 1,200′.

Equipment: 500 gal. p. m. pump, electric hoist capable of 2,000′ depth, compressor, crusher, 5-stamp mill, concentrator, etc.

Production: $310,000 from 13,000 tons of ore.

Idle several years.

WILSHIRE BISHOP CREEK CO. **CALIFORNIA**

Now The **Cons. Wilshire Mining Co.**, which see.

WILSHIRE CONSOLIDATED MINING CO., THE **CALIFORNIA**

Supposedly succeeded by **Bishop Creek Mining & Milling Co.**

Office: H. B. Kearns, sec., 200 William St., New York; **Mine address:** Bishop, Calif. J. V. Richards, mgr.; Stuart Elliot, asst. mgr.; Jack Albers, supt.; Roscoe Edyvean, mill supt.

Officers: Gaylord Wilshire, pres.; H. B. Kearns, sec.

In 1920-21, Mr. Wilshire is said to have raised $80,000 to remodel the 150-ton mill, etc.

Property: the Wilshire property on Bishop creek, Inyo county.

Development: by shaft opening a large body of gold bearing iron pyrite, with small copper and silver values. On the 300′ level a stope, 100′ long and 40′ wide, has been opened and an orebody, 420′ long and 15′ wide, is reported to average $11 per ton in gold.

The remodelled mill of 75 tons daily capacity, with ball mill and flotation machines, has been in operation since July 27, 1921, on ore averaging $7.50 per ton, making a $200 concentrate shipped to the U. S. Mng. & Sm. Co. at Midvale, Utah.

For past history of company, see Vol. XIV.

WISCONSIN MINING CO. **CALIFORNIA**

Property: gravel deposits, in Forest district, Sierra county.

WISCONSIN NORTH FORK GRAVEL MINES **CALIFORNIA**

Address: 116 Natoma St., San Francisco, Calif.

Officers: G. D. Clark, pres.; D. E. Hayden, sec.

Inc. 1912, in Calif. **Cap.** $250,000; $1 par; 213,188 shares issued; assessable. Assessment No. 44, of 2c. per share levied Aug. 3, 1920.

Property: at Forest, Sierra county.

YANKEE GOLD DREDGING CO. **CALIFORNIA**

Address: E. R. Healy, pres., Oakdale, Calif. C. R. Harris, engr.; S. G. Bent, supt.

Company declared bankrupt, July 14, 1921.

Property: several miles of dredging ground in Stanislaus county, near Knights Ferry. A dredge, with daily capacity of 3,000 cu. yd. was started late in Nov., 1920, but was lost in a flood, being swept several miles down stream and probably only valuable as junk.

YANKEE JOHN DEVELOPMENT CO. **CALIFORNIA**

Address: 501 Peoples Bank Bldg., Pittsburg, Pa.

Officers: W. L. Clark, pres.; G. B. Preston, v. p.; W. T. Drill, sec.-treas., with A. H. Bowman, A. M. Hast and H. T. Morris, directors.

Inc. 1913, in Delaware. **Cap.** $1,000,000; $1 par. Listed on New York Curb.

Property: 6 claims, 6 miles W. of Redding, Shasta county, said to show quartz veins in andesite and rhyolite.

Development: by 2 shafts, 50′ and 300 deep, with 1,500′ of workings.

Equipment: includes a gasoline hoist, compressor, and a 40-ton mill. Management gave ore reserves as 6,300 tons of $20 ore.

Mill closed June 1, 1920, all operation ceasing in September.

YELLOW ASTER MINING & MILLING CO. **CALIFORNIA**

Office: Dr. Rose L. Burcham, sec., 839 Citizens Bank Bldg., Los Angeles. **Mine office:** Randsburg, Kern county, Cal.

Officers: Albert Ancker, pres.; Arthur Asher, v. p.; Rose L. Burcham, sec.; V. H. Rossetti, treas.; H. L. Bennett, asst. sec., with R. H. Raphael and E. L. Kenny, directors.

Inc. Nov. 16, 1896, in Nevada. **Cap.** $1,500,000; $1 par; 1,079,999 issued. Annual meeting, May 16.

From 1898 to October 31, 1917, revenue totaled $8,725,588, of which $1,245,789 was distributed.

Dividends: have been irregular for many years. Paid $38,000 in 1916; last was $35,000, October, 1917.

Property: 47 patented and 6 unpatented claims, water rights and placer areas, totaling 796 acres, mostly at Randsburg, Kern county, and one mile from Johannesburg on the Santa Fe Railroad.

Geology: vein occurs in granite, schist, and porphyry. Main orebody is from 30′ to 40′ wide, with schist hanging-wall. Ore is low grade, averaging $3.21 per ton during 20 years. Gold is easily extracted.

Development: is extensive, aggregating about 27 miles of tunnels, stopes, open cuts and other workings to depth of 750′. Open cut work has produced most of the ore in the past. Reserves estimated in December, 1916, by W. W. Hegeman, at 6,278,529 tons of $1.77 ore.

Equipment: 150-h. p. and smaller hoists, 150-h. p. compressor, machine drills, steam shovels, pumping stations and several miles of water pipelines, 250-ton (per hour) screening plant, 100-stamp mill (back to back design, each 50 stamps driven by 150-h. p. motor), copper plates, steam boilers and engines, 3 oil-burning locos., sixty 3-ton side-dump steel cars, machine shops, assay office and the Rand Mercantile store. Recent additions are costing $250,000. A cyanide plant may be erected to treat 1,000,000 tons of tailing stored. Power is supplied by the Southern Sierra Power Co. So far, $747,972 has been spent in plant on the property.

Production: from 1898 to October 31, 1917, there was mined 2,713,384 tons, yielding $8,725,588, equal to $3.21 per ton. The cost was $2.44 per ton.

Production: years ending February 28:

Year	Tons	Value per ton	Cost p. t.
1918	100,948	.....	.....
1917*	98,105	$2.84	$1.80
1916	152,827	3.31	2.08
1915	166,446	3.14	1.83
1914	147,793	3.02	1.86
1913	131,481	3.03	2.22
1912	151,746	3.53	2.00
1911	162,683	2.52	1.71
1910	186,370	2.50	1.57

* 10 months.

Some development was done in 1919, but in 1920 operations practically stopped.

YOSEMITE DREDGING & MINING CO. **CALIFORNIA**

Address: J. W. Neill, Snelling, Cal.; or 159 Pierpont St., Salt Lake City, Utah.

Property: 400 acres along the Merced river, near Snelling, Merced county. Gravel is up to 20′ deep, and is easily dug.

Equipment: a dredge with 3¾-cu. ft. buckets, screen, Hungarian riffles, 10 Neill jigs, and tailing elevator. Electric power is used throughout. A feature on this boat is the recovery of platinum.

Production: gravel is reported to have yielded 6.74¢ per yard, against an estimate of 4.44c. According to J. W. Neill in 22½ months the boat dug 1,534,750 cu. yd. Besides the gold, there was recovered 41 oz. of platinum and nearly 1 oz. of osmiridium, valued at $3.438 and $25, respectively.

Property is in the hands of a capable manager.

YOU BET MINING CO. **CALIFORNIA**

Address: W. L. McGuire, sec., Crocker Bldg., San Francisco. **Mine address:** P. O. Box 290, Nevada City, Calif.

Property: gravel claims, including the Jerry Goodwin mine, in Nevada county, said to have yielded $3,000,000 from 50,000,000 yd. up to 1913. About 100,000,000 yd. are available. New work was started in 1913, and profitable hydraulicking done, but the debris dam did not settle the muddy water, and operations were suspended in 1918. The California Placer M. Co. leased the ground and attempted to mine cemented gravel. There is a full equipment of ditches, piping, and giants for sluicing. The California company spent about $150,000, which was practically a dead loss, owing to unreasonable government restrictions on the debris dams.

YOUNG AMERICA MINING CO. **CALIFORNIA**

Property acquired by **Mugwump M. Co.**, which see.

YUBA CONSOLIDATED GOLDFIELDS **CALIFORNIA**

Offices: 50 Congress St., Boston, Mass.; Chas. W. Gardner, engr., Insurance Exchange, California St., San Francisco, and Hammonton, Yuba Co., Calif.

Company is controlled by the **Gold Fields American Development Co.** itself a subsidiary of the **Consolidated Gold Fields of South Africa.**

Officers: Geo. L. Huntress, pres.; R. E. Paine sec.-treas.

Inc. 1905, in Maine. **Cap.** $2,500,000; $1 par; 2,400,000 shares issued.

Property: extensive dredging areas on the Yuba river.

The company's huge dredges dig 80′ below water level, and wash enormous quantities of gravel, 5 of them each handling 300,000 cu. yd. monthly. Recoveries have checked engineers' estimates very closely as a whole, though varying widely in individual tracts.

Recent returns are as under:

Year	Yardage	Average Cents	Total Yield	Cost Cents	Profit
1919-20.....	23,523,000	13.66	$3,213,213	6.99	$1,645,548
1918-19.....	15,996,000	19.49	3,117,791	7.22	1,962,426
1917-18.....	15,460,000	18.42	2,849,220	4.90	2,090,691
1916-17.....	18,490,000	14.86	2,748,197	3.99	2,009,500
1915-16.....	17,750,000	12.02	2,133,528	4.27	1,374,868

From Feb. 28 to June 30, 1920, the ground yielded 11.22c. per yard, costing 6.16¢., and showing a profit of $416,713. Throughout the year 8 dredges were operating in Yuba county, on stream gravel and tailings at Hammonton.

Company maintains a large machine-shop, wherein its dredges are made and repaired, and also makes them for other companies. The engineering concern is known as Yuba Manufacturing Co., with works near Marysville, Calif. Yuba Consolidated, the largest gold producer in California, is a pioneer in big dredging practice.

YUBA CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Out of business. See **Dinero M. Co.**

YUBA DEVELOPMENT CO. **CALIFORNIA**

Subsidiary of **Metals Exploration Co.**

Address: 1213 Hobart Bldg., San Francisco, Calif. Thos. D. Harris, mgr., Brandy City, Sierra Co., Calif.

Officers: Bulkeley Wells, pres.; R. H. Elliott, v. p.; Karl Brachine, v. p.; A. D. Snodgrass, sec.-treas., with Rufus Thaver, Thos. D. Harris and Lloyd Ackerman, directors.

Principal business of company is the construction of dams on the Yuba river, California, to provide impounding space for tailings from hydraulic placer operations. But, in 1920, it was operating an hydraulic mine at Brandy City.

ZENDA MINING CO. **CALIFORNIA**

Address: C. H. Clausen, Caliente, Kern county, Calif.

Property: 180 acres, including the old Zenda gold mine, 12 miles N. E. of Caliente. The vein has a granite footwall and quartz-porphyry hanging wall. It is 30′ wide, and has a 300′ ore shoot. There is said to be a large tonnage of medium-grade gold-silver ore developed by open-cuts and tunnels.

Equipment: includes an aerial tram, oil engines, and 10-stamp mil. with cyanide plant.

Mine was reopened in 1919, but closed down in June, 1920, on account of high cost of labor and supplies.

COLORADO

In 1921, Colorado produced $6,790,000 in gold; 5,400,000 oz. silver; 20,600,000lbs. lead; 3, 700,000lb copper and 2,400,000lb zinc. The decline in output was due to the closing down of the Leadville and Durango smelters during part of the year. The U. S. Zinc Co.'s Blende zinc oxide plant was closed down on June 3rd., as was the Pueblo plant. The Canyon Zinc, oxide plants of the Ohio Zinc Co.andEmpire Zinc Co. were idle throughout 1921.

The mineral production of the State for 1920 was $7,650,000 gold, 5,200,000 oz. silver, 43,000,000 lb. lead, 42,000,000 lb. zinc, with a total value of $29,833,499, which is a marked decrease from the 1919 output of $8,876,925 gold, 5,639,516 oz. silver, 35,859,090 lb. lead, 3,310,675 lb. copper, 51,445,429 lb. zinc, all of a total value of $22,427,893, which is $11,732,279 less than the value of metals produced in 1918.

ACACIA GOLD MINING CO. **COLORADO**

Office: 205 Burns Bldg., Colorado Springs, Colo., **Mine office:** Cripple Creek, Colo. K. Mackenzie, pres.; J. Yeomans, sec.-treas.

Cap. $75,000; 5¢ par; outstanding, Jan. 1, 1921, 1,438,989 shares. Gross production to Jan. 1, 1921, $1,509,827. Cash and securities on hand $2,934, in 1921. No liabilities. Annual meeting in January.

Dividends: to January, 1921, $136,703; last dividend, December, 1912, $14,380.

Property: the South Burns and Morning Star claims, patented, 20 acres, on Bull hill, Cripple Creek, Teller county.

Development: by 1,575' main shaft, and 3 shafts, 825', 425', and 330' deep, with 7,000' of drifting and crosscutting a rich ore shoot was opened on 1,300' level at the junction of the Eagle and Wilson claims, and good shipping ore on the 1,500'. Operations have been restricted on account of hight cost of supplies. The mine is operated under lease by Le Roun Leasing Co., Mt. Marie Gold Mng. & Leasing Co. and Patterson-Bradley Leasing Co.

ACAPULCO MINE **COLORADO**

Dr. W. W. Rowan, owner, Ouray, Ouray county, Colo.

Leased 1920, by W. E. Van Valkenburg, Ouray, and H. Monell, and crosscut driven. Property in Bear Creek section.

ACCORD MINING & MILLING CO. **COLORADO**

Idle. No returns secured from Georgetown, Colo., for 5 years. See Vol. XIV.

ADELAIDE MINE **COLORADO**

Operated part of 1920 by Oscar Karppinen and Co., Box 833, Leadville, Lake county, Colo. The mine is in the Iron Hill district.

AJAX GOLD MINING CO. **COLORADO**

See **Colburn-Ajax Mining Co.**

AJAX MINE LEASING CO. **COLORADO**

Address: E. A. Colburn, Denver, Colo.

Officers: William D. Waltman, E. M., pres.-mgr.; Dr. Lester S. Grant, cons. engr.; Herbert G. Colburn, supt. Governor O. H. Shoup, R. D. Brooks, Rodney J. Bardwell and P. E. Caplone of Paris, complete the directorate.

Inc. 1921, in Colo.

Property: a 5 year lease on entire Ajax mine, 28 acres, adjoining the Portland mine, at Cripple Creek, Teller county. This mine was formerly owned by Ajax Gold Mng. Co. and later bonded to the Colburn Ajax Co. Shipping ore steadily in 1921 to the Independence mill of the Portland company at Victor. Property has a production record, from former operations, of $5,000,000.

AKNEY COPPER MINING CO. **COLORADO**

Address: 207 Colorado Bldg., Fort Collins, Larimer Co., Colo. Operated in 1920.

AKRON MINES CO. **COLORADO**

Office: Jas. E. Dick, mgr., Whitepine, Colo.

Property: owns May, May Mazeppa, Ensign and North Star mines, drained by Akron 3,000' tunnel. Group totals 30 claims, 29 patented, 250 acres, in Tomichi district, Gunnison county, 11 miles north of Sargent. There are three fault fissure veins about 4' wide in limestone and granite, course N.-S., dip 45° E., containing ore reported to average 7 oz. silver, 14% lead and 14% zinc.

Development: by 360' shaft, and 4,200' of tunnels, etc., totaling 8,000' of workings.

Equipment: includes compressor, hoist, electric power, and new 80-ton concentrator.

Mine and mill operated during 1920.

ALAMOSA MINING & LEASING CO. COLORADO

Address: 533 17th St., Denver, Colo.

Operated Refugee silver-lead mine, near Idaho Springs, Clear Creek county, in 1920.

ALBERT BEACON GOLD MINING CO. COLORADO

Office: Cripple Creek, Colo.

Officers: at last accounts, Frank Vetter, pres.-treas.-gen. mgr.; F. W. Revoice, v. p.; John R. Dunn, sec., with Wm. Y. Seaman, D. W. Kilpatrick and A. M. McVicar, directors.

Inc. May, 1916, in Colorado. **Cap.** $250,000; 10 cts. par; 1,602,825 shares in treasury, Jan. 20, 1917. Annual report for 9 months, ending Jan. 1917, showed net receipts from ore shipments and stock sales, $11,596; expenditures for the same period amounted to $10,577.

Property: a 3-year bond and lease on the Prince Albert, Beacon and Eureka claims, 26.42 acres, patented, on Beacon hill, Cripple Creek, Teller county, credited with a past production of $1,000,000. Company's literature closely resembled that of a stock-jobbing scheme. Reported merged, May, 1917, with the Victory Gold Mining Co., which see, but no details of merger obtainable.

Shipments from the Prince Albert were reported for 1918.

ALBRO EXTENSION MINING & MILLING CO. COLORADO

Office: E. B. Dingle, lessee, operating as Albro Leasing Co.

Property: the Heliotrope mine, on Albro mountain, near Dumont, Clear Creek county.

Development: workings said to show an 8 to 12" band of smelting ore and a large body of auriferous copper ore which was mined and shipped to local mills in 1918, together with several carloads of direct smelting ore. A crosscut tunnel was driven 260' to drain the old workings. Drifting had progressed 500' at last accounts, and an aerial tram was to be erected to connect the mine with the Colorado & Southern Railroad.

ALCO MINING & MILLING CO. COLORADO

Address: Georgetown, Ohio.

Inc. 1910, with same officials as Accord Mining Co. described in Vol. XIV.

Property: group of lode claims on Saxon Mountain, near Idaho Springs, Clear Creek county.

Equipment: included hoisting plant.

Idle.

ALICE GOLD MILLS CORPORATION COLORADO

Dead. See Vol. XIV.

ALICE MINE COLORADO

Operated 1920 by Mohr & Markt, of Jamestown, Boulder county, Colo.

ALLARD MINING CO. COLORADO

Address: Mancos, Colo.

Property: the Allard gold mine at La Plata, La Plata county. Operated part of 1919, but made no shipments.

ALLERTON MINING & MILLING CO. COLORADO

Address: Silverton, Colo.

Property: a lease on the Joe and John mine at Red Mountain, near Silverton, San Juan county. Idle, 1920.

ALLGROVE MINING & MILLING CO. COLORADO

Probably dead. See Vol. XIV. for description.

ALLIED GOLD MINING CO. COLORADO

Office: 1216 Pearl St., Boulder, Colo.

Officers: H. F. Corfield, pres.-gen. mgr.; W. H. Jones, v. p.; H. C. Meade, sec.-treas.

Cap. $100,000; shares 25¢ par.

Property: the Congo Chief mine, 3 claims, on Idaho mountain, N. E. of Caribou, Boulder county. Company also developing the Buenaventura,

a gold mine, in the Salina district, consisting of 4 patented and 2 unpatented claims.

Operations started on the Congo in 1917. The property is said to be an extension of the No Name lode and carries galena, native silver and chlorides in a fissure vein, 3 to 8′ wide. Ore at depth of 10′ said to assay $225 to $400 in silver and lead, and shipments to have returned 36 to 490 oz. silver, 18% lead and 1.12% copper.

Development: by 370′ shaft and some drifting.

Equipment: includes 35-h. p. electric hoist and 3-drill compressor. Company reported having money enough to last until May, 1920, and operations were continued for part of the year on the Congo Chief.

ALMADEN MINES CO. COLORADO

Dead. See Vol. XIV.

ALOHA GOLD MINING CO. COLORADO

Property: the Coriolanus mine on Battle mountain, Cripple Creek, Teller Co., adjoins Colburn-Ajax Mining Co. on the north.

Ore: gold occurs in footwall of intrusive dike, phonolitic in character.

See Colburn-Ajax Mining Co.

ALPHA & OMEGA LEASING CO. COLORADO

Harry Search, supt., 222 McPhee Bldg., Denver, Colo.

Is a syndicate of stockholders of **Dig Gold Mng. Co.**, which has 5-year lease on, and is operating, the Alpha & Omega mine in the western part of Cripple Creek district, Teller county; see Dig Gold Co. A shoot of $80 ore was found on 400′ level, Sept., 1921

ALPHA MINES CO. COLORADO

Address: Portland, Me. **Mine address:** care Geo. Robinson, mgr., Breckenridge, Colo. Company owns control of **Warrior's Mark Mng. Co.**, which see

Officers: Hamilton P. Burney, pres., New York City; C. S. Flanders, v. p.; J. W. Hanly, treas.; Edw. H. Parry, sec., 342 Madison Ave., N. Y. City.

Inc. Jan. 7, 1921 in Maine. **Cap.** $2,000,000; $1 par; issued, $1,650,000, non-assessable. No bonds. Metropolitan Trust Co., Boston, registrar and transfer agent. Annual meeting, 3rd. Tuesday in Jan.

Property: 19 claims, 16 patented, about 400 acres, 7½ miles S. of Breckenridge, in the McBarnes mining district, on the Colorado & Southern R. R. Claims reported to show monzonite and quartz porphyry cut by fissure veins carrying silver-lead-copper ores in streaks 10″ to 24″ wide. See **Warriors Mark Mng. Co.** for further description.

Company also owns outright the Alpha mine, 2 patented claims, formerly a producing property, ½ mile from railroad. Mine contains 18″ vein of silver-lead ore.

Property examined by W. L. Shaffer and J. D. Galloway.

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ALPINE MINING & MILLING CO. COLORADO

Address: Red Cliff, Colo.

Property: the Alpine gold-silver-copper mine near Red Cliff, Eagle county

Mine and mill operated 1919 and 1920, and ore shipped.

ALTA MINES CO. COLORADO

Dead. See Belmont-Wagner Co.

ALTEZUMA GOLD M. & M. CO. COLORADO

A. L. Miller, mgr., Central Savings Bank Bldg., Denver, Colo.

Inc. in Arizona. **Cap.** $5,000,000; $1 par; 2,500,000 shares in treasury.

Property: 4 claims, 2½ miles from Montezuma, Summit county.

Ore: lead-silver.

Development: 4 tunnels, longest 190′, known as the Franco tunnel. Plans included the re-financing of company and driving the Franco tunnel an additional 200′, but have not been carried out. Idle for several years.

AMERICAN DREDGING CO. COLORADO

Address: S. L. Bright, Breckenridge Summit county, Colo.

Company has acquired several properties in the Breckenridge district, and was doing preparatory work in August, 1919. No news since.

AMERICAN GOLD & PLATINUM CO. COLORADO

Address: 637 Symes Bldg., Denver, Colo. **Mine address:** Wm. A. Hooton, supt., Ward, Colo.

Officers: John Ogden, pres.-mgr.; W. F. Bell, v. p.; F. S. Ogden, sec.-treas., all of Denver.

Inc. April 1, 1920, in Colo. **Cap.** $1,000,000; par $1; 500,000 issued.

Property: the Telegraph mine, 3 claims, 19 acres, and millsite, at Ward, Boulder county.

Geology: gold platinum ores occur as sulphide and arsenide deposit on contact between granite and schist. Ore said to average one ounce platinum and ½ oz. gold per ton.

Development: by 150′ shaft and 240′ tunnel, with 700′ of workings, all said to block out 40,000 tons of ore.

Equipment: a 30-ton mill, operated by electric power. Ore is handled by Ogden electro-amalgamation process.

AMERICAN METALS PRODUCING CO. COLORADO

Office: Central City, Colo. E. S. Moulton, pres.-mgr.; G. Whitney Adams, supt.-treas.

Cap. $100,000 in 30,000 preferred and 70,000 common shares; $1 par.

At last accounts operated a reduction plant at Blackhawk, Gilpin county, equipped with Moulton-Adams system to handle low-grade refractory ores. Plant treated custom ores. No recent information, and State reports do not mention plant, 1920.

AMERICAN MINES CO. COLORADO

Probably dead. Formerly operated mine and mill at Gold Hill, near Boulder, Colo. See Vol. XIV.

AMERICAN MINES CO. COLORADO

Idle. **Address:** American Nettie Mine, Ouray, Colo.

Property: American Nettie mine, 14 claims, near Ouray, Ouray county.

Ore: gold in broad, flat shoots, in quartzite, about 7′ thick and proved for 700′ in length. These orebodies are believed to be the northerly continuation or downward faults of the Wanakah orebodies, which intersect the great monzonite porphyry dike running due east through the Nettie ground.

Development: by 700′ tunnel and upraise.

Equipment: compressor, drills, machinery and amalgamation-concentration mill.

Production: in gold since 1889, $1,500,000.

Operated by leasers, 1919.

AMERICAN MINES DEVELOPMENT CO. COLORADO

Address: 726 Majestic Bldg., Denver, Colo.

Operates the Rialto gold-silver mine, at Central City, Gilpin county.

AMERICAN MINING & POWER CO. COLORADO

Name changed to Martin M. & P. C., succeeded by **Treasure Mtn. Mines, Inc.**, which see in this volume.

AMERICAN RARE METALS CO. COLORADO

Address: Chas. D. Heaton, supt., Egnar, Colo.

AMERICAN SISTERS MINE COLORADO

Office: care T. B. Burbridge, American Bank & Trust Bldg., Denver, Colo. Mine at Lawson, Clear Creek Co. Idle 1919, 1920.

Property: 27 claims, 13 patented, closed since 1904 on account of litigation. Credited with a total production of about $1,000,000, in lead-silver ore.

AMETHYST LEASING CO. COLORADO

Address: Creede, Colo.

Property: the Amethyst mine, near Creede, Mineral county. Ore carries gold, silver, and lead.

Operated part of 1919 and 1920, and shipped ore.

AMHERST MINING CO. — **COLORADO**

Office: 517 Cooper Bldg., Denver Colo. **Mine address:** Russell Gulch, near Central City, Gilpin county, Colo. S. G. Hamlin, mgr., Idaho Springs, Colo.

Inc. in Colorado. **Cap.** $50,000; $1 par. The widow of W. H. Chittenden, organizer and moving spirit of the company, is practically the owner.

Property: the Hampton mine, 4 claims patented, very close to the War Dance gold mine, and believed to carry an extension of the ore-shoot of that mine. The ore carries bornite, tetrahedrite, pyrargyrite, pyrite and marcasite, said to assay 2.7 to 35% copper, 6 to 35 oz. silver and 0.16 to 8.4 oz. gold per ton, lead 20-40%.

Development: by tunnels, shafts, and over 3,000′ of workings. In August, 1919, good ore was opened on the 600′ level, with shipments from that and the 400′ level. A 10″ streak had been opened on the 600′ level for 300′, in 1920; ore assayed 9 oz. gold, 20 oz. silver and 4% copper.

Equipment: includes electric pumps, electric hoist, compressor, and 10 drills. Property operated and shipped ore 1919-20. Believed to have merit.

ANACONDA MINING CO. — **COLORADO**

Iola, Gunnison Co., Colo.

Operated the Anaconda Copper mine at Iola, 1920.

ANCHORIA-LELAND M. & M. CO. — **COLORADO**

Address: Colorado Springs, Colo.

Inc. about 23 years ago. **Cap.** $600,000; $1 par. Irving Howbert, principal stockholder; Chas. Howbert, mgr.

Property: Anchoria mine on Gold hill. Cripple Creek, Teller county, is one of the old-time producers and dividend payers. In 1914 the company had a debt of $30,000, due to attempts made to open up new orebodies. The mine had been worked down to the barren zone, reaching from a depth of 500′ to 1,000′, the lowest development.

Operated during 1919, but made no production. Idle, 1920.

ANNA C. MINE — **COLORADO**

Mine address: Central City, Gilpin Co. Operated by C. F. House & Co., 216 18th St., Omaha, Nebr., in 1920.

ANNIE MINE — **COLORADO**

Operated in 1920 by J. B. Putnam, Rosita, Custer Co., Colo.

ANTORO MINES CO. — **COLORADO**

Address: Bonanza, Saguache county, Colo. Operated the Antoro silver-lead-copper mine, in 1920.

ANVIL LEASING CO. — **COLORADO**

Address: Silverton, San Juan Co., Colo.

Company is operating the Diamond, Topaz and Sapphire mines, producing copper ores with gold-silver values, in 1920.

APEX COPPER CO. — **COLORADO**

Office: 915 Colorado Ave., Colorado Springs, Colo.

Officers: T. J. Driscoll, pres.; Cab Johns, v. p.; A. T. Driscoll, sec.; J. O. Tufts, treas., with Dr. J. L. Lewis, directors.

Inc. in Colorado. **Cap.** $2,000,000; $1 par; issued $1,200,000. Annual meeting, April 19. Transfer office, that of company.

Property: 8 claims, 6 patented, 80 acres at Hayman, Park county.

Geology: fissure vein in granite. Ore carries gold and silver, and copper sulphides in ore-shoots 25′ long.

Development: by 250′ vertical shaft and 800′ of tunnels.

Equipment: steam hoist and 3-drill compressor. Building a 50-ton flotation plant, at last accounts.

No work done during 1919, or 1920.

APRIL FOOL LEASING CO. — **COLORADO**

Address: Creede, Mineral Co., Colo.

Operated the April Fool silver mine, at Creede, in 1920.

ARAPAHOE MINE **COLORADO**

Operated in 1920 by Ross & Thulin of Ward, Boulder Co., Colo.

ARAPAHOE MINING & MILLING CO. **COLORADO**

Defunct. Was a promotion of an alleged fraudulent character, in which Arapahoe stock was given for that of La Anozoia Gold Mng. Co. and operations were carried on for a few weeks in 1915 by a Thos. B. Everett, who also gave Digger Chief Mng. & Mlg. stock for La Anozoia, and who fathered the Minureka Mineral Milling Co. in 1919—N. G.

ARCUBELL GOLD MINE CO. **COLORADO**

Address: Box 127, Georgetown, Colo. No recent returns.

Officers: J. J. Culley, pres.-treas.; J. S. Armstrong, v. p.; W. G. Bell, sec.

Property: 20 claims, about 215 acres, in Clear Creek county; ore reported to carry gold and silver in a fissure vein, in granite, with dip of 30°, and N. E.-S. W. course. Company reports assays between $10 and $30 per ton. No work done in 1919.

ARGO MINE **COLORADO**

Address: Evans & Co., Jamestown, Boulder Co., Colo.

ARGO MINING & TUNNEL CO. **COLORADO**

Address: L. S. Stewart, Idaho Springs, Colo., who operated property in 1920.

Office: 79 Milk St., Boston, Mass.

Officers: F. A. Schirmer, pres.; Chas. C. Parsons, v. p.; Chas. G. Schirmer, sec.-treas., with F. Hargreaves, C. P. Woodbury, J. A. Caldwell and H. W. Davis, directors. R. E. Schirmer, mgr.

Inc. 1909, in Delaware. **Cap.** $1,250,000; $5 par; issued, $952,325. Debentures, $150,000 authorized; $135,000 issued. Company succeeded Argo Transportation & Tunnel Co., Ltd., which succeeded Argo Tunnel & Mining Co., Ltd., successor to Newhouse Tunnel Co., Ltd. Owns the entire stock issue of Argo Mining, Drainage, Transportation & Tunnel Co., which holds direct title to the tunnel.

Property: the Argo, more commonly called the Newhouse tunnel, 21,968′ long, with nearly 20 miles of workings, is perhaps the most celebrated mining tunnel in existence. It starts at Idaho Springs and passes under Russell gulch and Quartz hill, with terminus in the Gunnell vein. The tunnel has double tracks, of 18″ gauge, laid with 30-lb. rails. For the first 12,000′ the tunnel is 9′ high and 10′ wide, balance being 8′ high and 6′ wide. Grade is 5″ per 100′. The tunnel was begun January, 1894, and completed November 18, 1910, and provides drainage, transportation, ventilation and air service for drilling operations.

The mines under which this tunnel passes are estimated to have produced about $75,000,000 in metallic values, and the tunnel cuts sundry veins of ore carrying gold, silver, lead and copper, and several laterals have opened various orebodies of greater or less promise. The tunnel connects with the Concrete, Tremont, Prize, Burroughs, Kansas, Golden Edge, Gem, Sun & Moon, Old Town, Pozo, Saratoga and Gunnell shafts at depth of 1,600′.

Equipment: includes 5 locomotives, handling 153 one-ton cars each. Transportation charge for waste work through the tunnel is 17c. per ton, and on ores from 40¢ to $1.25, according to value.

During 1918 company was reported to have handled 19,700 tons of crude ore, paying producers $328,347, but later was forced to close down owing to the increased cost of power and mine supplies.

ARGO MG. DRAINAGE TRANSP. & TUNNEL CO. **COLORADO**

Office: 79 Milk St., Boston, Mass. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers. Chas. C. Parsons, pres.; H. W. Robinson, sec.; R. E. Schirmer, treas.-gen. mgr.; L. S. Stewart, supt.

Inc. 1893, in Colorado. **Cap.** $100,000. Is controlled through ownership of entire stock issue, by **Argo Mining & Tunnel Co., Ltd.,** and property described thereunder.

Balance sheet for fiscal year ending August 31, 1916, showed an operating loss of $2,151, compared with a net profit of $1,112 in 1915, the decrease being due to inactivity of several properties and subsequent slackening of transportation business. Property practically closed in 1920-21.

ARGO REDUCTION & ORE PURCHASING CO. COLORADO

Property acquired in November, 1920, by the **Gem Mining Co.**, which see.

ARIADNE MINES CORPORATION COLORADO

Address: Alfred B. Iles, Silverton, Colo.

Inc. 1920, in Colorado. **Cap.** $1,100,000; $100 par; $50,000 cash on hand at end of 1920.

Property: the Ariadne mine in the Cement district, 5 miles from Silverton, San Juan county. Ore carries silver, lead, and copper.

Development: by 650′ tunnel and other workings. Late in 1920, a 2′ vein of rich galena ore was cut at a depth of 550′. Under continuous development 1919-1920.

Equipment: an aerial tram is to be erected to connect the mine with rail.

ARIZONA MINE COLORADO

Operated part of 1920, by Anna G. Stewart of Idaho Springs, Clear Creek Co., Colo. Mine at Russell Gulch, Gilpin county, produces complex silver-gold lead-copper ore.

ARKANSAS VALLEY LEAD SMELTER COLORADO

Subsidiary of **American Smelting & Refining Co.**

Office: 120 Broadway, New York. **Operating address:** F. C. Gilbert, mgr., Denver, Colo. **Works address:** Edw. P. Chapman, supt., Leadville, Colo.

Has an annual capacity of 510,000 tons. Early in 1921, operations were placed on a 50% basis.

ASPEN CONTACT MNG. CO. COLORADO

Address: Aspen, Colo.

Operated the Lenado mine, at Woody, Pitkin county, developing silver-lead-zinc ore in 1920.

ASPEN MINE CO. COLORADO

Property: the old Aspen mine at Silverton, San Juan Co., Colo. Controlled by **American Smelting & Refining Co.** Operated by lessees who made small but steady shipments to the Silver Lake mill in 1917. Apparently inactive in 1919 and since.

ASPEN SAMPLING CO. COLORADO

Company operated an ore sampler at Aspen, Pitkin county, Colo.

ASPEN SILVER-LEAD MINES CO. COLORADO

Office: J. J. Yeckle, pres.-gen. mgr., Aspen, Colo.

Property: 8 claims, about 150 acres, at Aspen and Alma, Park county. The Alma property, known as the Border Ruffian mine, is located near Mt. Bross and adjoins the Dolly Varden mines. Samples taken from old workings were reported to give a silver content of 50-to 100 oz. and 50 to 70% lead.

Development: by the 850′ Deane tunnel on Porphyry mountain ,and 200′ N. drift. In August, 1921, the company was putting high grade silver-lead ore in the stock pile.

ATLAS MINING & MILLING CO. COLORADO

Mine address: R. H. Cabell, Jr., supt., Sneffels, Colo.

Officers: C. H. Austin, pres.; Fred Carroll, v. p.-gen. mgr.; C. C. Carson, sec.; A. B. Shipman, treas., with Wm. Story, Jr., directors.

Inc. February, 1904, in Colorado. **Cap.** $2,000,000; $1 par; 1,921,000 outstanding. Authorized bond issue, $200,000. Annual meeting in August.

Property: 28 claims, patented, 204 acres, in Mt. Sneffels district, Ouray county, includes the Atlas and Klondike mines. Ore, which occurs in 3′ quartz vein in andesite, is a complex sulphide, carrying grey copper, gold, silver and lead. Average assays are reported to run 9 oz. silver and 0.05 oz. gold per ton.

Development: by a 2-mile tunnel to depth of 1,500′, with a total of 9,000′ of workings.

Equipment: includes electric power, air compressor, tramway and 150-ton 20-stamp mill with table and flotation concentration, giving a 92-95% recovery. Management expects to solve further treatment of complex ores and increase average recovery. Employs 75 men.

Production: 30,000 tons in 1913, 35,000 tons in 1914, 40,000 tons in 1915, and 36,734 in 1916. Management estimates 50,000 tons of ore blocked out. In November, 1917, it was reported that the operating profit for the previous year was $50,477, the largest in its history.

Monthly profit reported to be $6,000. Mine was the principal producer of this county during 1919.

AUGUSTA METAL MINING CO. **COLORADO**

Out of business. Mine described in Vol. XIV, has been idle since 1908, except as operated by A. P. McCarver, Box 193, Ouray, Colo., during part of 1919, when work ceased again.

A. V. MINE **COLORADO**

Operated 1920, by Buchanan & Curtis of 206 W. 8th St., Leadville, Colo., for manganese ore.

A. Y. & MINNIE MINING & MILLING CO. **COLORADO**

Company has ceased doing business. The mines are operated on short time leases by individual lessees.

Address: John A. Ewing, agent, Leadville, Colo.

Property: the A. Y. and Minnie mine, lower California gulch, Leadville, Lake county, sold in 1879 to the Guggenheims, now the A. S. & R. Co. The mines have been prolific producers. At present they are leased to two syndicates, namely, the Bartell and L. and M. In November, 1920, the Bartell was shipping one car of silver-lead ore, netting $1,000 per car, each week. The L. and M. was shipping regularly. Wickland and Peterson were leasing in 1920.

AZTEC MINES CO. **COLORADO**

Property: the O. K. mine at Central City, Colo. A. H. Frost, pres., and J. R. Hastings, sec., Winona, Ont., Canada. Operated in a small way, by Henry R. Eilmann, lessee, in 1915-16. Mine showed narrow fissure vein, carrying gold and copper. No recent information. No work in 1919.

BACA MINING CO. **COLORADO**

B. T. Tipton, mgr., Crestone, Saguache county, Colorado. Property known as the Baca Land grant, originally belonged to Senor Don Luis Mana Baca as a gift from a King of Spain. The present owners opened the land to prospectors in July, 1914.

Property: 35,000 acres of mineral land, extending for 12 miles along the westerly slope of the Sangre de Cristo mountains, including 23 partly prospected mines near Crestone, on the D. & R. G. R. R. The largest mines of the group are the Eastern Star, Sunset, Julia D., Queen Esther, Von Moltke, Great Western and Independence, the latter being the only one developed by the company.

Geology: ore occurs in a well-defined contact vein 15-20′ wide, traceable 3 miles, and as fissure veins, pockets and shoots; country rock is altered granite and schistose gneiss, cut by intrusive dikes of porphyry, phonolite and iron-stained quartz, containing gold, silver, lead, copper and zinc. Smelter assays ran $18 gold, 500 oz. silver and 8% zinc.

Development: considerable amount of old workings, shafts and crosscuts. There is an unlimited water supply. Shipments made to the Pueblo smelter. Property has been worked for years by prospectors and lessees under 2 to 5 year leases. Miners receive free timber, water and assay services and pay 10-15% royalty on ore extracted. Reported October, 1920, to be leased to James Allen of Monte Vista, Colo., who will erect 3 mills to use flotation.

BACHELOR KHEDIVE MINES CO. **COLORADO**

Address: J. F. Kelcher, lessee, Ouray, Colo.

Property: 11 claims, patented, 83 acres, at Ouray, is a silver producer. Ore sales 1916, totaled $9,365, with net receipts of $3,200, and in 1918 were

$27,735 with net receipts of $5,281. Operated during 1919 and 1920, but no shipments.

BACHELOR MINE — **COLORADO**

Creede, Mineral county, Colo. Operated 1920 by Norman G. Corson of Creede.

BACKBONE MINE — **COLORADO**

Operated 1920 by M. Rosenburg of Silver Plume, Clear Creek county, Colo.

BACKOFF LEASING CO. — **COLORADO**

See **Keystone Cons. Mines Co.** Described in Vol. XIV.

BALD EAGLE MINING & MILLING CO. — **COLORADO**

Probably dead. Mail returned from former address: 307 Guardian Trust Co., Denver, Colo. Fully described in Vol. XIV of The Mines Handbook.

BALD MOUNTAIN MINES CO. — **COLORADO**

Probably defunct. Mail returned from former office: Breckenridge, Summit Co., Colo. Fully described in Vol. XIV.

BANKOK-CORA BELL MINING CO. — **COLORADO**

Probably defunct. See Vol. XIV, for full description.

BANNER GOLD MINING CO. — **COLORADO**

Address: 317 Exchange National Bank Bldg., Colorado Springs, Colo.

Officers: J. T. Hawkins, pres.; J. R. McKinnie, v. p.; E. C. Sharer, sec.-treas.; A. D. Aitken, asst. sec.-asst. treas.

Cap. $2,000,000; $1 par. Treasurer's statement, Jan 1, 1916, showed 11,000 shares in treasury, and $185 cash on hand. At last accounts taxes paid to 1915; liabilities, $490. Last stockholders' meeting June, 1903. Listed on Denver and Colorado Springs exchanges.

Property: 7 claims, patented, 68 acres, on Beacon hill, Cripple Creek, Teller county, shows 3' fissure vein, containing gold and silver, and the C. K. & N. vein, 3' wide where cut.

Development: by 90' 110' and 400' shafts, with prospecting on 3 levels. Worked through the 700' level of the Henry Adney shaft on adjoining property.

No recent information.

BANNER STATE GOLD, SILVER & COPPER M. CO. — **COLORADO**

Office: 367 Fulton St., Brooklyn, New York. A. G. Sullivan, pres.

Inc. 1908, in Colorado. **Cap.** $500,000; $1 par; none outstanding.

Property: one patented claim in Bobtail Hill, Lake district, Gilpin county. Not operating, but has 300' vertical shaft. Idle, 1919-'21.

BARON MINE — **COLORADO**

Operated 1920 by Charles Garfield of 205 South La Salle St., Chicago, Ill. Mine is at Salina, Boulder county.

BARSTOW LEASING CO. — **COLORADO**

Address: Lundberg & Johnson, Ouray, Ouray Co., Colo. Works at Ironton, Ouray Co., Colo. J. H. Fennessy, trustee. Property formerly owned by the Barstow Mining & Milling Co., is held under bond and lease by C. R. Wilfley and subleased to Lundberg & Johnson.

Property: 27 claims, patented, 199 acres, with 5-acre mill site, in Red Mountain district, Ouray county, 11 miles from D. & G. R. R. The Silverton R. R., operating in the summer, is 1 mile away. Ore, found in fissure vein in andesite with N. W. strike and dipping 75°, is reported as 8' wide and carrying 0.75% copper, 2.5% lead, 4% zinc.

Developed: by 2 shafts, 425' and 145' deep, and 2 tunnels, 3,200' and 1,300' long. Total length of workings, 10,300', reported to have developed 17,000 tons of ore with 8,000 tons in sight. High-grade gold ore was found.

Equipped: with 2 hoists, electric compressor, 6-drill compressor, and mill comprising 2 Blake crushers, 9x15", 40 stamps, 20 Wilfley tables, 2 slime tables and buddles.

The spar vein of this property was leased September, 1916, to Engineers Corporation, of Boulder, Colo., who work it for fluorspar. This vein, carrying

3′ of fluorspar, cuts across the Barstow vein. The deposit was struck at 1,100′ in depth and was reported to widen out to nearly 10′ of almost pure grade.

The mine and mill were operated during 1919 and 1920. In December, 1920, the Lundberg-Wilfley lease had opened a good body of gold-bearing quartz, also some sulphide ore, and shipments in 1921 exceeded 15 cars of $8,000 each, or better.

BASSICK MINING & REDUCTION CO. COLORADO

Fully described in Volume XIV. Property leased to **Querida Gold Mines Co.**, which see.

BATES LEASING CO. COLORADO

Company dissolved. Described in Vol. XIV.

BEACON MINES CO. COLORADO

Address: J. S. Anderson, supt., Cripple Creek, Colo.

Property: company has a lease on part of the El Paso Extension ground, Gold Hill, Teller county, and in August, 1919, found a rich shoot of gold ore on the 400′ level. The deposit was opened for 300′, and shipments realized $200 per ton. No news since.

BECKY SHARP MINE COLORADO

See **Old Town M., M. & Transportation Co.**

BELL BOY GOLD MINING & MILLING CO. COLORADO

Address: Chas. L. Tilton, pres.-treas., 332 Kittredge Bldg., Denver, Colo. Mines at Apex, Gilpin Co., Colo.

Officers: C. L. Tilton, pres.; Harland L. Percy, v. p.; I. V. Shell, sec., with P. R. Anderson, all of Denver and M. B. Wolfe of Loma, Colo., directors.

Inc. 1920, in Colo. **Cap.** $99,000; 20¢ par; 300,000 shares in treasury; shares offered at 50¢ in 1921.

Property: the Mackey mine, 17 claims, 5 patented, in Pine district, Gilpin county.

Geology: fissure veins, 4′-6′ wide, in granitic gneiss near monzonite mass, carry pay streaks ½′-2′ wide, of bornite, chalcopyrite, covellite and pyrite with copper and precious metals. Eighty-three samples cut throughout workings averaged $14.54 per ton; 15 cars of ore shipped averaged $23.73 per ton. Three ore shoots aggregating 250′ along vein, carry 10,000 tons of $20 ore according to report. Orebody blocked out on 4 sides is said to contain $100,000. Shipments, 1920, averaged $34.11 per ton, largely in gold.

Development: by 300′ shaft with 4 levels at 30, 140, 180 and 220′ on Mackey vein. Other veins also show ore, especially the Cronje, but lack deep development. Mine unwatered 1921, after several years idleness.

Equipment: complete and includes 30-ton concentration mill, hoist, compressor, tramway, etc.

BELLEVIEW-CHAMPION MINING & POWER CO. COLORADO

Office: 517 Cooper Bldg., Denver, Colo.

Property: the Champion-Trio mine in upper Clear Creek county. Ore carries gold, silver, lead and copper.

Early in 1919, it was reported that the production during the previous year averaged $2,500 a month. Three groups of lessees are mining silver ores that average $100 per ton. Main tunnel is 1,200′ long. Mine was operated part of 1919.

BELLEVIEW-HUDSON MINING & TUNNEL CO. COLORADO

Address: 402 Mining Exchange Bldg., Denver, Colo.

Property: the Belleview silver-lead-zinc mine, at Empire, Clear Creek county.

Operated during 1919, but produced no ore.

BELL MINE COLORADO

Address: George H. Short, 1424 Emerson Ave., Salt Lake City, Utah. Mine at Montezuma, Colo.

Property: the Bell silver mine, 5 claims, 9 miles from Keystone on the Colo. Southern R. R., in Summit county. Mine idle for 20 years, was reopened 1921. The vein in granite, averages 3′ in width, with stopes 15′ wide.

Development: by 6 tunnels and several thousand feet of workings. Little ore above No. 5 level, but 4,000 tons of $90 ore estimated above No. 6, or 300' below the surface.

Production: over $200,000. The last 16 carloads of ore assayed 37% lead and 116 oz. silver per ton.

BELMAN MINE — **COLORADO**

Address: W. R. Houghton, Idaho Springs, Clear Creek county, Colo., who operated this gold-silver mine in 1920.

BELMONT WAGNER MINING CO. — **COLORADO**

Offices: 500 Bullitt Bldg., Philadelphia, Pa. **Mine address:** John M. Warner, mgr., Telluride, Colo.

Officers: Clyde A. Heller, pres.; Wm. M. Potts and S. D. Sinkler, v. p's; with M. B. Cutter, J. C. Fraley, T. W. Synnot, C. B. Taylor, G. F. Tyler, and J. M. Wagner, directors J. K. Kitto, sec.-treas.; R. G. Wilson, asst. sec.-asst. treas.; C. Ducheneau, comptroller; Frederick Bradshaw, gen. mgr.; J. M. Fox, supt.; H. F. Hillard, mill supt.; W. E. Howard, auditor.

Inc. Sept., 1917, in Delaware. **Cap.** $1,000,000; $1 par. Annual meeting first Tuesday in May, at Philadelphia. Transfer office: 500 Bullitt Bldg., Philadelphia. Subsidiary of **Tonopah Belmont Development Co.**, of Nevada.

During 1919 there was a loss of $107,494. Losses in mill residue, costs and losses in marketing concentrates, and operating costs, were excessively high.

Property: consists of 81 claims, 26 of which are patented, including the Alta mine and the Crown Jewel claim, 2,000 acres, located in Gold King and Turkey Creek basins, San Miguel county.

Geology: a fissure vein, mineralized as a whole, running S. E.-N. W. at 60°, surrounded by San Juan tuff and breccia, and containing silver, lead, gold and copper.

Development: of mine is extensive. In 1920, 2,456' of exploratory work was done. The mill-level tunnel, 7 by 7', was being extended in 1921. Overhand stoping and waste fill methods used.

Equipment: electric power, compressor, underground locomotive, 3 aerial trams, crushing plant, 300-ton mill employing 7 Minerals Separation flotation units, bunkhouses, cottages, shops, and pumping plant.

Production: labor conditions caused a close down in 1918. Re-opened in 1919; seven months work yielded 27,338 tons, assaying 0.098 oz. gold and 6.10 oz. silver per ton, 1.02% lead, and 0.085% copper, a total value of $11.21 per ton. Operations were again suspended, November, 1920.

BELZORA-BASSICK MINING CO. — **COLORADO**

Address: care L. W. Fales, Lansing, Mich. Mine at Pitkin, Colo.

Officers: Geo. D. Wilcox, pres.; John T. Hall, v. p.; L. W. Toles, sec., with E. A. Richards, A. A. Stoddard and Mr. Morgan, directors.

Inc. in Colorado. **Cap.** $1,500,000; $1 par.

Property: about 235 acres in the Gold Brick district (Ohio City), Gunnison county. There are two ore deposits, one averaging 170' by 3' by 470', the other 35' by 2' by 400', both of which consist of sulphide ore containing lead and zinc. Mine is developed by tunnels almost 4,000' long. Operations ceased in 1920.

BENACK MINING CO. — **COLORADO**

Dead. Described in Vol. XIV.

BESSIE-CORA MINING CO. — **COLORADO**

Defunct. See Vol. XIV.

BETHEL MINING & LEASING CO. — **COLORADO**

Address: 207 W. 31st St. Los Angeles, Calif

Officers: T. L. Roberts, pres.; J. D. Anderson, sec.

Inc. February, 1920, in Calif. **Cap.** $20,000; $100 par; all issued.

Property: a gold-silver mine at Creede, Mineral county, held under lease and bond.

BEZANT GOLD MINING CO. COLORADO

Address: O. J. Duffield, pres.-mgr., Central City, Colo.

Officers: G. H. Putman, v. p.; L. A. Duffield, sec.; C. C. Hendrie, treas., directors.

Inc. August, 1908, in Colorado. **Cap.** $500,000; shares $1 par; 435,000 outstanding. Dividends to date 50c. per share.

Property: 3 claims, one patented, 14 acres, has a quartz fissure vein in granite and porphyry.

Development: by a 500' shaft and about 6000,' of drifts and crosscuts, said to have cut 3 veins, all carrying gold, silver and copper.

Equipment: includes complete electrical plant, 50-h. p. electric hoist, etc. Plans building a mill. Management claims a large tonnage of pitchblende (uranium) ore blocked out.

In 1920, a new 50' shaft was sunk at junction of gold and pitchblende veins, and drifts opened $32 gold ore 12" wide. Developing only in 1921.

BIG FIVE MINING CO. COLORADO

Office: 326 Century Bldg., Denver, Colo.

Officers: H. G. Sanderson, pres.; M. C. Daniels, v. p.; Wm. H. Smith, sec.-treas.

Inc. in Wyoming, June 1, 1912, as a reorganization of the old Big Five Tunnel Ore Reduction & Trans. Co. **Cap.** $750,000; $1 par; issued 400,579. Bonds outstanding, Dec. 31, 1918, $207,000. Cash on hand, Dec. 31, 1918, $5,786.

Property: the Edgar mine opened by the Central tunnel, over 9,000' long, at Idaho Springs. Clear Creek county. Ore carries gold, silver, lead, and copper. The Edgar vein showed up better than the others under development; receipts from Edgar ore during 1917-1918 were $342,797. Also owns 1,500 acres in San Juan and Clear Creek counties, and the Frances property, now idle, in Boulder county.

Equipment: includes storage battery locomotives capable of hauling 40 cars 2½ tons capacity from the mine to the mill, a distance of 4 miles.

Property was operated by lessees during 1919 and 1920.

BIG THREE MINING & MILLING CO. COLORADO

Address: 301 Central Block, Denver, Colo.

Property: the Big Three gold-silver mine near Rico, Dolores county. Operated in 1919 and 1920, but shipped no ore.

BIG TOAD MINING & MILLING CO. COLORADO

In debt and out of funds 1919, assets and liabilities taken over by **Dante M. & M. Co.**, which see.

BIRD CREEK MINING CO. COLORADO

Address: Creede, Mineral Co., Colo. Operated the Spar, or Bird Creek silver-lead-zinc mine during 1920, and in 1921 continued development of ore reserves preparatory to erection of a concentrating mill.

BIRMINGHAM MINING CO. COLORADO

Mail returned, marked unknown, from former mine office: Empire, Clear Creek county, Colo.

See Vol. XIV.

BISMARK MINING & DEVELOPMENT CO. COLORADO

Address: Sunset, Boulder Co., Colo. Operated the Bismark mine, producing gold-silver ore in 1920.

BLACK BEAR MINING CO. COLORADO

Subsidiary of the **Colorado-Superior M. Co.** and controlled by Bulkeley Wells, et. al.

Address: care Colo.-Superior Mng. Co., Telluride, Colo.

Inc. about 1894. Ike Navala, supt.

Property: 30 claims, includes Black Bear mine, in Ingraham basin, Telluride, San Miguel county. Ore carries gold, silver, lead, and zinc in

an 8' quartz vein. Mill returns average about $5.50 per ton, gold recovered being 30% of total. Developed by shafts, and equipped with electric plant and aerial tramway, connecting with the Smuggler mill at Pandora. Early in 1920, the shaft was down 300' below No. 5 level.

Production: averaged 170 tons daily in 1916. Mining and milling costs totaled $2.50 per ton. Daily output in 1918 was 180 tons.

BLACK CLOUD MINING CO. — COLORADO

Address: R. H. B. Little, lessee, Salina, Colo.

Property: Black Cloud mine and mill at Salina, Boulder county. Vein contains gold-bearing quartz, developed by shaft and several levels. Equipment includes air compressor, electric power and a 20-stamp mill. No work done during 1919.

BLACK FRIDAY MINE — COLORADO

Address: Preston, Harriet and Beaman, Silver Cliff, Custer Co., Colo. Operated, but no shipments made in 1920.

BLACK GIRL MINE — COLORADO

Address: Fred H. Herzinger, Ouray, Colo. Operated in 1920, shipping silver ore.

BLACK METAL REDUCTION CO. — COLORADO

Office: 2009 13th St., Boulder, Colo. Is a private partnership, consisting of Ira M. DeLong, pres.; W. B. Stoddard, mgr., and John B. Ekeley.

Property: a plant for the production of pure tungstic acid from the 60% tungsten concentrates of the district. Reported in 1917, to have $35,000 invested in plant; $25,000 in merchandise and stocks, and $9,100 cash. No later figures.

BLACK METALS MINES CO. — COLORADO

Mine office: Rollinsville, Gilpin county, Colo. Nelson Franklin, mgr.

Property: the Tip Top mine, and a custom mill at Rollinsville; also reported to have operated other properties. During 1917, company produced 1,223 tons of tungsten concentrate and paid a 20% royalty to the owners.

Developed by a 150' shaft. Produced a considerable amount of tungsten ore in 1918. Idle 1919-20.

BLACK PRINCE MINING CO. — COLORADO

Address: James B. Wheeler, mgr. Mine at Cardinal, Colo.

Property: the Black Prince big manganese vein in the Hiland-Stampede district of Boulder county.

In 1921, work showed the ore to carry 15 oz. silver per ton, with 3.5% lead and excess of iron-manganese content.

BLACK ROSE MINING & MILLING CO. — COLORADO

Address: 435 E. 13th Ave., Denver, Colo.

Property: the Black Rose gold-silver mine at Jamestown, Boulder county. Operated, 1920.

BLAIN MINE — COLORADO

Address: Cortellini & Madsen, 329 West 8th St., Leadville, Lake county. Operated in 1920-21.

BLENDE SMELTER — COLORADO

Owned by the **United States Zinc Co.** (q. v.), a subsidiary of the American Smelting & Refining Co.

Offices: 120 Broadway, New York. Operating office: F. C. Gilbert, mgr., Denver, Colo. Works office: J. D. Thomas, gen. supt., Pueblo, Colo.

Is a zinc smelter with 2,320 retort capacity. See Pueblo Lead smelter.

BLISTERED HORN MINE — COLORADO

Owned by C. J. Carpenter and John Waldron, Tin Cup, Gunnison county, Colo.

Property: shows several veins of gold-silver-lead ore developed by 2,000' tunnel, drifts and raises. The veins are from 2-12' wide and ore is of good milling grade. Was reported under development in 1919 and 1920.

BLUE BIRD GOLD MINING & MILLING CO. COLORADO

A close corporation; E. S. Johnson, pres., Colorado Springs, Colo.

Property: 13 acres, on Raven Hill, Cripple Creek district, Teller county, adjoining the Cresson, has 1,865' shaft and shipped 50 tons a day during 1917-18. Leased on 20% royalty until Dec., 1922, to Franklin Leasing Co.

BLUE FLAG GOLD MINING CO. COLORADO

Fully described in Volume XIV. Succeeded by **Blue Flag-Silverton Gold Mines Co.**, which see.

BLUE FLAG-SILVERTON GOLD MINES CO., THE COLORADO

Office: 703 Exchange Bldg., Denver, Colo.

Officers: J. F. Erisman, pres. and gen. mgr.; Jos S. Pigall, v. p.; W. B. Warren, sec.-treas.; with A. R. Ulrich, D. A. Schaffnit, J. M. Burkhart, R. S. Burns, and J. A. Dingwall, directors. Company is a close corporation. Succeeds the Blue Flag Gold Mining Co., which see in Vol. XIV.

Inc. in 1921, in Colo. **Cap.** $3,000,000; par $1.

Properties: the Blue Flag mine on Raven hill, Cripple Creek, Teller county; the Laurium group at Breckenridge, Summit county; also holdings in the Harshaw district, Santa Cruz county, Ariz.; the Yellow Jacket placer in Idaho, and at Ballarat, Calif. Reported in May, 1919, that company had purchased the Bertha B and the Rattler lodes, comprising about 12 acres, on Raven hill, Cripple Creek.

Cripple Creek property: development at the Blue Flag includes the 1,420' main shaft, and a connection with the Moffat tunnel at depth of 1,150' where a drift was continued to the Scott shaft of the War Eagle Cons., which controls the tunnel. This has improved ventilation and gives a public transportation tunnel.

The equipment of the Blue Flag includes complete mining plant and 150-ton mill, including a flotation unit.

Breckenridge property is developed by tunnels at the Laurium, one over 1,800' long. Ore carries gold, silver, lead, and zinc. Exploration continued during 1920.

BLUE MOUNTAIN MINING CO. COLORADO

Address: c/o W. L. Peterson, Craig, Colo

Operated a silver-zinc mine at Youghal, Moffat county, 1920.

BLUE RIDGE MINES CO. COLORADO

Address: 213 Charles Bldg., Denver, Colo. **Mine address:** Walter R. Stewart, supt., Dumont, Colo.

Property: the Hiawatha tunnel, also the Blue Ridge group of 7 claims, a silver-lead mine at Dumont, Clear Creek county. Also owns and operates Happy Thought groups, 10 claims, in Morris and Fownieville district, and Albro group of 9 claims, all under development by the Hiawatha tunnel, 1,400' long in mid-1921.

Operated and produced high grade silver-lead ore, during 1920-21.

BLUE RIVER DREDGING CO. COLORADO

Now the **Blue River Placer Mining Co.**, which see.

BLUE RIVER PLACER MINING CO. COLORADO

Successor to Blue River Dredging Co.

Address: 1718 California St., Denver, Colo. T. B. Thomas, supt., at Breckenridge, Colo.

Inc. Jan., 1921, in Colorado.

Property: placer claims in the Breckenridge district of Summit county. The boat of the Powder River Gold Dredging Co. was purchased in Oct., 1919, and is now in operation.

BOB LEE CONSOLIDATED MINING CO. COLORADO

Dead. See Vol. XII.

BOLIVAR MINE COLORADO

Address: H. F. Bargar, Breckenridge, Colo. Mine at Montezuma, Summit county, operated, 1920.

BONANZA DEVELOPMENT CO. COLORADO

See **Bonanza Mines Corporation.**

BONANZA MINES CORPORATION COLORADO

Company address: Independence, Kansas. **Mine address:** Idaho Springs, Colo.

Officials: A. E. Gees, pres.; with C. L. Jaynes, supt.; B. D. Arbuckle, Frank Heilig, v. p.-mgr.; C. E. Angell, sec.-treas., Independence, Kans.; W. E. Caney, and W. J. Briggs, directors.

Inc. 1918. **Cap.** $250,000.

Property: the Chicago Belle and Bonanza groups, 21 claims, 6 patented, in Morris district, Clear Creek county. Developed by 1,800′ Pioneer tunnel, to drain 100′ and 200′ levels of shaft and cutting Chicago Belle vein, exposing high grade ore. Spent $30,000 on development in 1920.

Equipment: includes oil engines, compressor, machine-drills, etc.

BOND SYNDICATE LEASING CO. COLORADO

Address: Ward, Colo.

Property: the Puzzler mine and Strong mill in the Ward district, Boulder county. Company started operations in Dec., 1920.

BOREAS GOLD MINING CO. COLORADO

Address: L. A. Jackson, Boreas, Summit county, Colo.

Inc. in Colorado, Sept., 1918. **Cap.** $50,000. A close corporation.

Property: at Boreas, in Summit county, 160 miles from Denver, on the C. & S. railroad. The mine is reported to contain gold-bearing sulphides in quartz.

No work done in 1919-20.

BOREN GULCH GOLD MINING CO. COLORADO

Office: 625 Denham Bldg., Denver, Colo. **Mine address:** W. A. Becker, mgr., La Plata, Colo.

Officers: Dr. Geo. H. Holoran, pres.; E. M. Becker, sec.; S. N. Francis, v. p.-gen. mgr.

Cap. $1,000,000; $1 par; in treasury 300,000 shares. No debts.

Property: 23 claims, including the Cornell, Mt. Edna, and Taylor Tunnel mines, operated through 3 tunnels, longest over 815′. Mine contains a large surface blanket vein, 4 to 6′ wide, crossing entire property, with gold, silver, and copper. Some milling ore was opened, but none was shipped, 1920.

BOREN GULCH MINING CO. COLORADO

Reorganized, 1916, as **Boren Gulch Gold Mng Co.**

BOSS MINE COLORADO

Address: Berryman & Co., Blackhawk, Gilpin county, Colo., who operated the mine in 1920.

BOSTON MINE LEASING CO. COLORADO

Mail returned marked unknown from former office: 60 Congress St., Boston, Mass. See full description in Vol. XIV.

BOSTON-SIERRA MADRE MINE INDUSTRY CO. COLORADO

Property sold for taxes in 1914 to L. E. Armstrong. Fully described, Vol. XI, Copper Handbook.

BOULDER CANON TUNGSTEN CO. COLORADO

Defunct, following Armistice. See Vol. XIV.

BOULDER COUNTY MINES & TUNNEL CO. COLORADO

Address: J. G. Clark, Boulder, Boulder Co., Colo.

Inc. October, 1919, in Colorado.

Development: by 2,700′ tunnel connecting Caribou hill and Idaho mountain with Boulder County mountain to develop known orebodies. Of the distance driven, 1,200′ is said to be in ore. Reserves said to equal 2 years' mill capacity.

Equipment: includes a 100-ton flotation mill, started in August 1920.

BOULDER ORE SAMPLING CO. COLORADO

See **Chamberlain Ore Sampling Co.**

BOULDER TUNGSTEN PRODUCTION CO. COLORADO

Office: Boulder, Colo.

Officers: J. G. Clark, pres.; N. H. Brown, v. p.; Fred N. Totman, sec.-treas.; R. L. Alexander, supt.

Inc. Dec., 1911, in Colorado. **Cap.** $1,500,000; $1 par. Commenced operations Jan. 1 1912. During 1916, company sold $400,000 worth of tungsten. March, 1918, a bond issue of $500,000 was reported authorized, presumably for development and the purchase of crude tungsten ores to meet market demand.

Property: 37 claims, 165 acres, in the Grand Island district, 2 miles from Nederland, Boulder county, said to show 4 to 10% tungsten ore in veins a few inches wide.

Development: by 1,400' main tunnel, 400' below upper workings.

Equipment: 40-ton concentrating mill. In 1917, a refinery for the treatment of tungsten ores was erected, said to be the largest and most complete of its kind in the United States. Mine closed since 1919 on account of low price of tungsten.

BRADFORD MINES CO. COLORADO

Address: Central City, Colo.

Property: the St. Johns gold-silver mine at Blackhawk, Gilpin county. Operated during 1919-20, but shipped no ore.

BRANT INDEPENDENT MINING CO. COLORADO

Dead. Described in Vol. XIV. Property sold in 1919 at foreclosure sale to Senator Geo. Hetherington as trustee and transferred to **Roosevelt Mines and Electric Co.**, q. v.

BRECKENRIDGE MINING & CYANIDE CO. COLORADO

Address: 806 Railroad Bldg., Denver, Colo. Operated Fox Lake silver-copper-iron mine, at Breckenridge, Summit county, in 1920.

BREECE MINING CO. COLORADO

Office: 665 5th Ave., New York. **Mine office:** Breece Hill, Leadville, Colorado.

Officers: E. B. Schley, pres.; C. G. Raynor, v. p.; W. J. Walworth, sec.; Emil Richter, treas., with T. W. Wagner, H. P. Chilton and R. J. Spettel, directors.

Inc. in New York. Cap. $5,000,000; par $25; all outstanding. Listed on Boston Stock Exchange. Transfer office: 665 Fifth Ave., N. Y. Registrar, American Exchange National Bank, New York. Annual meeting, second Wednesday after first Monday in October.

Property: a gold-silver mine on Breece hill, Leadville, Lake county, leased and royalties cover all company expenses.

Operated and producing during 1919-20. Inactive 1921.

BRIDGEWATER MINE COLORADO

Address: W. H. Potts, Tolland, Gilpin Co., Colo., who operated this gold-silver mine in 1920.

BRIGHT DIAMOND MINING & MILLING CO. COLORADO

Defunct. See Volume XIV. Property bought in at tax sale by Ouray Union **Mining & Milling Co.** and leased in 1921 to Welch-Worland Mines Syndicate, which see.

BRODERICK MINING & MILLING CO. COLORADO

Address: Idaho Springs, Colo.

Inc. 1916, in Colorado.

Property: the Lamartine gold-silver-lead mine and Oneida-Stag mill at Freeland, Clear Creek county. Old dump said to contain 50,000 tons mill ore.

Former shipments ran very high in gold and silver, and mill ore reported to be $8 per ton.

Operated during 1920-21, and ore shipped. In 1921, was crosscutting on 10th, or tunnel level to undercut orebody mined on 7th level.

BROOKS-SNYDER LEASE COLORADO

Address: G. W. Morgan, 2920 S. Elati St., Englewood, Colo., who operated the Brooks Snyder mine at Breckenridge, Summit county, in 1919-1920, and shipped very high grade ore in 1921.

BROWN MOUNTAIN SMELTING CO. COLORADO

Reorganized, 1916, as the **Ouray Smelting & Refining Co.**, which see.

BROWN REIN DEER MINING CO. COLORADO

Address: Silver Plume, Clear Creek Co., Colo. Operated a lead-copper mine of the same name in 1920, but did not ship ore.

BUCKEYE MINES & MILLING CO. COLORADO

Address: Box 468, Colorado Springs, Colo.

Officers: E. S. Johnson, W. J. Shinn, R. C. Argo, of Colorado Springs.

Inc. in Colorado. **Cap.** $50,000

Property: a lease on the Blue Bird Gold Mining & Milling Co., mine, on Bull hill, Cripple Creek, Teller county, developed by the Blue Bird shaft, down 1,875'. Worked part of 1919, and shipped some ore. In October, 1920, lessees were opening rich gold-silver ore.

BUFFALO CHIP MINE COLORADO

Address: Duffield & Fraiser, Central City, Gilpin county, Colo., who operated mine in 1920.

BUFFALO HUNTER MNG., MLG. & DEVEL. CO. COLORADO

Address: Silver Cliff, Colorado.

Property: the Buffalo Hunter silver mine at Silver Cliff, Custer county. Operated and produced during 1919.

BULL DOMINGO DEVELOPMENT & MINING CO. COLORADO

Address: Westcliffe, Custer county, Colo. Company was reorganized in 1918. It has equipment from the old Geyser mine, capable of working to a depth of 3,000'. The Bull Domingo mine worked in 1920, was a big producer years ago. Ore carries silver, lead and zinc. Reported to have leased the Bull Domingo mill from the **Passiflora** company.

BULLION MINE COLORADO

Address: Thos. R. Cudahy, Central City, Gilpin county, Colo., who operated mine during part of 1920.

BULL RAVEN MINING & DEVELOPMENT CO. COLORADO

Address: Cripple Creek, Colorado.

Officers: L. J. Slowthower, pres.; W. P. Price, v. p.; J. F. Underwood, sec.; all of Colorado Springs; H. D. MacDonald, treas.; E. P. Arthur, E. M., cons. engr., both of Cripple Creek.

Inc. September, 1921, in Colorado. **Cap.** $100,000; par $1.

Property: the Mary Ann mine on Raven Hill and the Maude Helena on Blue Hill, both at Cripple Creek, Teller county.

BURKE GROUP COLORADO

Address: J. W. Burke & Co., Montezuma, Summit county, Colo., who operated mine in 1920-21.

BURLINGTON-BOULDER MINING CO. COLORADO

Address: Warren Bros., Jamestown, Boulder Co., Colo.

Officers: W. K. Farmer, pres.; A. D. Bly, v. p.; E. L. Lilleberger, sec., Ottawa, Ia., C. E. Seal, treas.; also directors.

Property: the Burlington fluorspar mine in Boulder county; reported under development in 1920.

BYRON MINING & LEASING CO. COLORADO

Address: Idaho Springs, Colorado.

Property: the Lord Byron gold-silver-lead mine at Freeland, Clear Creek county.

Operated part of 1919, and shipped some ore. Idle 1920.

CADIZ MINING CO. COLORADO

Probably defunct. No returns obtainable and mines not operated 1920. See Vol. XIV for description.

CALEDONIA MINING & MILLING CO. COLORADO

Office: Silverton, San Juan county, Colo. G. A. MacKenzie, mgr

Property: early in 1918, company commenced operations on the Peerless-San Juan silver-lead mine, in Minnie Gulch, Silverton, Ouray county. This property had been inactive for many years due to litigation.

Equipment: consists of 75-ton mill, crusher, triplex rolls, ball-mill, flotation machine, and four Wilfley tables.

Mill operated part of 1919, but idle since.

CALHOUN CONSOLIDATED MINES CO. COLORADO

Probably defunct. See Vol. XII. Mine at Central City, Gilpin county.

CALLIOPE CONSOLIDATED MINING CO. COLORADO

Office: 753 Klamath St., Denver, Colo. S. W. H. Schroder, pres.; C. A. Larson, sec. in 1921.

Inc. Feb. 9, 1914, in Colorado. **Cap.** $100,000; par $1; outstanding 49.-525 shares. No bonds. Annual meeting, February 9. On Feb. 9, 1920, it was proposed to increase the capital to $1,000,000; $1 par.

Property: 10 patented claims in the Bachelor district of Ouray county. Developed by 2,800' tunnel. The ore deposit is a quartz vein carrying gold silver, lead, copper and zinc.

Equipment: includes a compressor, 75-h. p. transformer, and rock-drills. A mill is contemplated.

No work reported for 1919, but late in 1920 it was stated that the mine had been acquired by a syndicate headed by Max Grossman of Chicago, Illinois.

CAMP BIRD, LTD. COLORADO

Office: No. 1 London Wall Bldgs., London, E. C. 2; also Colorado Natl. Bank Bldg., Denver, Colo. J. B. Glasser, company's agt. in the U. S. **Mine address:** Ouray, Colo.

Directors: F. W. Baker, chairman; J. A. Agnew, L. Clerc, F. A. Govett, F. H. Hamilton, A. S. Elmore, and O. de Rivaud. A. A. Kelsey, sec; C. L. Johnson, asst. sec.

Inc. Sept. 8, 1900, in England. **Cap.** £1,100,000, increased to £1,350,-000 in Dec., 1909, and in July, 1911 to £2,100,000, consisting of 750,000 7% cumulative participating preference shares of £1 each, 649,625 issued, and 1,350,000 ordinary shares of £1 each, 1,100,051 issued.

Dividends: on pref. shares were paid semi-annually to June 30, 1920. On ordinary shares the first dividend paid in 1902-03 was 20%, last one paid Nov. 30, 1915, 5%; total 210%.

Financial statement: years ended June 30:

Year	Oper. Rev.	Oper. Profit	Other Rev.	Brought forward	Total Rev.	Adm. Exp.	Pfd. Divi.	Carried forward
1918.....	£4 295	*£4,869	£71,473	£21,487	£88,091	£73.346	£45,474	£29,272
1919.....	7,371	*9,827	87,864	29,272	107,309	8.373	45,474	53,462
1920.....	1,530	*31.128	118,628	53,462	140.962	22 782	45,474	**37,440
1921.....	109	*16,989	17,576	37,440	38,027	18,122	.....	19,905

*Deficit. **After £35,266 written off from Tunnel company advances.

Balance sheet, June 30, 1921, shows assets of £1,187,102 as investments; war bonds, £7,800; cash, £4,368, with mining properties carried at £744,-454. Profit and loss was £19,905; and total liabilities were £374,358, excluding £1,749,676 capital stock.

Company owns a 54% interest in Santa Gertrudis Co., Ltd., Mexico, and controls the Camp Bird Tunnel, Mining & Transportation Co., which see below. It owns also 29,944 shares of Messina (Transvaal) Development Co. stock out of a total of 727,154 issued of which Santa Gertrudis owns 33,-500 shares; 100,000 shares of the National Mining Corp.; 263,250 shares and £60,000 in notes of the Mexican Corporation; and 24,998 shares of Am. Chem. & Met. Corporation.

Property: the company was formed in 1900 by F. W. Baker and John Hays Hammond to acquire from Thos. F. Walsh the Camp Bird gold mine, near Telluride, Colo. Purchase price was $5,000,000. This property returned handsome profits for 10 years, when the lower levels showed signs of impoverishment. Other properties were then sought with the idea of making the company a mines-investment organization. The Santa Gertrudis silver mine was floated in this way and holdings acquired in the Messina.

Geology: the Camp Bird mine is at an altitude of 11,000′ and 8 miles from rail, which necessitated hauling supplies and concentrates over a mountain road, making operating costs comparatively high. The Camp Bird orebodies occur in a fissure vein in andesite. The ore has for its base hematite, which is associated with iron, zinc and lead sulphides; it occurs in streaks, being less persistent and narrower with depth, and less regular in its relation to the walls. Stoping width was 5 to 8′. The mine was exhausted by mid-1916, and milling was suspended until exploration work should open more ore. See Vol. XIII for other details.

Production: from April 30, 1903, to June 30, 1916, was 820,730 tons treated, yielding £4,778,591, at an expenditure of £1,798,227, leaving a profit of £2,980,363. No production 1917 to 1921.

Until something is found in the mine Camp Bird will have to depend upon dividends from Santa Gertrudis for future revenue, also from The Mexican Corporation, Ltd., and other interests. Investors wishing to study the financial results of the Camp Bird-Santa Gertrudis connection should read "A Post-Mortem," in the "Mining and Scientific Press" of Feb. 6 and May 24, 1919.

Camp Bird Tunnel, Mining & Transportation Co.
(Subsidiary of Camp Bird, Ltd.)

Operating officials: W. J. Cox, pres.; T. H. Woods, supt.; J. B. Glasser, purchasing agent and accountant.

Up to June 30, 1921, Camp Bird, Ltd., had invested in and advanced to this company the sum of £81,462, excluding £35,266 written off. Its business is the further development of the mine. It owns 4 claims. According to agreement, Camp Bird, Ltd., is responsible for maintenance of property.

Work in the Camp Bird in 1920 and 1921 on the main level, 3,000′ below the surface, showed that the vein is strong, 4-5′ wide, carries values in places of 10 oz. silver and one ounce gold per ton, but the 5,758′ of work done during the year failed to develop commercial orebodies and the mine was shut down indefinitely Nov. 30, 1920.

CAMP BIRD MINING, LEASING & POWER CO. COLORADO

Probably defunct, as letters addressed to former office, Pitkin, Gunnison county, Colo., are returned unclaimed. See Vol. XIV.

CAMP CREEK MINING & MILLING CO. COLORADO

Address: 2719 W. Bijou St., Colorado Springs, Colo.

Property: the Camp Creek gold-silver mine at Camp Creek, El Paso county. Operated part of 1919, but shipped no ore.

CAPITAL MINING & TUNNEL CO. COLORADO

Address: F. C. Baumon, supt., Georgetown, Clear Creek Co., Colo.

Property: the Aetna mine, developed by 16,000′ of tunnels, said to show specimen ore running up to 2,300 oz. gold, 2,150 oz. silver, 72% lead and 31% copper.

Equipment: includes electric as well as steam power, compressor, and 200-ton concentrator.

During 1917, extensive development was reported on the Aetna vein, the W. drift being 8,450′ long. In the Davenport mine, the vein is reported cut at 375′ in the W. upper level.

During past 3 years mine has been kept open and retimbered, but no new work done. Part of mine is leased to miners.

CARBONATE GROUP COLORADO

Described in Vol. XIV. Idle 1920. Geo. E. Moon owner, Breckenridge, Summit county.

CARBONERO MINE COLORADO

Address: Ruuttila-Brown Leasing Co., Ophir, via Ames, Colo.

Property: 8 patented and 10 unpatented claims, including the Carbonero gold-silver-lead mine at Ophir, San Miguel county.

Development: by the Shoofly tunnel, being extended in 1921. A large quantity of ore is said to be available.

Production: in 1921, up to 100 tons daily from development work. Some high grade ore has been shipped.

CARIBOU METALS CO. COLORADO

Address: J. G. Clark, Boulder, Colo. **Mine address:** Cardinal, Colo.

A reorganization, 1918, of the **Degge-Clark Mining, Milling & Refining Co.**, Boulder, Boulder county, Colo. **Cap.** $2,000,000.

Property: 1,500 acres, including the Caribou silver mine, (formerly worked by the **Caribou Mines & Mills Co.**), at Caribou, 4½ miles N. W. of Nederland, Boulder county, said to have produced $7,000,000. Due to the interlacing cross veins, with consequent inability to determine extra lateral rights, the No. Name, Sherman, Columbia, Kalamazoo, Federal, Socorro and Spencer claims have been combined to make the Caribou Metals group. Company is also said to hold title to 1,000 acres of patented timber and mineral lands north of Caribou Park, carrying tungsten ore.

Geology: ore occurs in a fissure vein, varying from 3-12′ in width, with pay-ore 6 to 36″ wide, showing argentiferous galena and silver glance. This vein dips to north and crosses veins to the northwest. The main cross vein is the No Name lode, intersecting the Caribou on angle of 42°.

Development: in original claim by 7 shafts, along the main lode, main shaft being 1,040′ deep; also by a 700′ tunnel.

In 1920, ten sets of lessees were said to be shipping high-grade silver-lead ore from the Caribou group.

CARIBOU MINES & MILLS CO. COLORADO

Office: Boulder, Colo. Mine at Cardinal, Colo.

Inc. in 1916. **Cap.** $200,000. Company purchased from the trustee in bankruptcy the holdings of the **Cariman Mining & Milling Co.**, in the Cardinal district of Boulder county.

Property: the Caribou and Poorman groups of claims, and the Boulder County tunnel a great development, drainage and transportation tunnel from Cardinal toward the Caribou workings. The tunnel was 6,000′ long, 1921, with 7,000′ more to be driven to reach the Caribou vein system. Lessees are reported to have made several moderate fortunes in 1917-1920. In the 80's the Caribou mine is said to have been considered the best silver producer in Colorado.

Equipment: at last reports included the 100-ton Caribou mill, the 100-ton Cardinal mill and a cyanide plant.

CARNOTITE PRODUCTS CO. COLORADO

See **Radium Company of Colorado.**

CARNOTITE TRUST CO. COLORADO

Address: care Clarence A. Wood, Denver, Colo. **Mine address:** Bay State Mine, Naturita, Montrose Co., Colo.

Property: carnotite-bearing claims. Ore was shipped, and a reduction plant erected in 1920.

CAROLINA MINING CO. COLORADO

Address: E. M. Rabb, supt., Cripple Creek, Colo.

A Boston corporation operating under bond and lease the Colburn-Ajax property on Bull hill, Cripple Creek, Teller county.

Development: by 2,000′ shaft. Orebodies are 250′ long and 4 to 8′ wide, with ore reported to average better than $20 per ton.

Idle 1919-20.

CARRIBEAN TRUST CO. COLORADO

Mine address: Ophir, San Miguel county, Colo. Geo. L. Bingham, mgr., at last report. A high copper concentrate is reported produced by treating the ore in a flotation plant. The Ruuttila-Brown Leasing Co., was the only operator in Ophir in 1920.

CARTER MINING CO. COLORADO

Address: Carroll M. Carter, mgr., Ohio City, Gunnison Co., Colo.

Officers: C. M. Carter, pres.; O. M. Carter, v. p.; B. H. Carter, sec.-treas., with W. O. Murdie, directors.

Inc. 1918, in Colorado. **Cap.** $250,000; par $1; 100,000 in treasury.

Property: 79 claims, 750 acres, near Ohio, Gunnison county. Mine yields gold and silver ore from fissure veins in granite and porphyry. Pay shoots ½-10′ wide, 100-900′ long. Ore varies from $2 to $500 per ton; average $70.

Development: by 8,000′ of tunnels and 1,400′ shaft, with 3 miles of mine levels, etc. No ore actually blocked out, but much nearly so.

Equipment: 3 Pelton wheels driving compressor, dynamo, and 20 stamps.

Operated part of 1920 with earnings of $30,000 and expenses of $40,000. Total production to date, $1,000,000.

CASHIER GOLD MINING & REDUCTION CO. COLORADO

Address: P. O. Drawer 46, Warren, Pa. **Mine office:** Central City, Gilpin county, Colo.

Officers: Wm. Muir, pres.; F. M. Lockwood, sec.; E. E. Allen, treas.-mgr.; with H. P. Stone, M. A. Bliss, J. T. Meals, E. J. Lesser, W. P. Volgamore and F. L. Bensinger, directors. Wm. Auger, supt.

Cap. $1,000,000; $1 par; 733,614 issued.

Property: the Pittsburgh Meeker and Brooklyn mines, carrying chalcopyrite and tetrahedrite, principal value being silver, running up to 700 oz. per ton. The Pittsburgh is developed to depth of 1,000′, by shaft, drifts and upraises. Average assays run 3.64 oz. gold, 7 oz. silver and 6.10% copper. Equipped with boiler, pump, hoist and drills.

A 50-ton mill was erected and operated in 1918.

Plan sinking shaft to the 1,200′ level for which purpose $30,000 was voted at directors' meeting in May, 1918. Has been a small but steady producer for years.

CASHIER MINING & MILLING CO. COLORADO

Property sold in 1920 to the **Royal Tiger M. Co.**, which see.

CATASTROPHE MINE COLORADO

Idle. Mail returned from former mine office: Boulder Falls, Boulder, Colo. In 1918, mine was operated under bond and lease by I. N. Blair, G. M. Newmeyer, and L. K. Guiler, producing ferberite ore assaying 25% tungstic oxide.

CATHERINE GOLD MINING CO. COLORADO

Out of business. See Vol. XIV, and Modoc Cons. Mines Co.

CENTRAL CONS. TUNNEL MINING & MILLING CO. COLORADO

Probably defunct. Mail returned 1921 from former office: 511 Exchange Bldg., Denver, Colo. See Vol. XIV, this book.

CHAMPAIGN MINE COLORADO

Address: R. H. Baxter & Co., Alma, Park county, Colo. who operated mine 1920.

CHAMPION MINE COLORADO

Address: Geo. S. Hewes, Blackhawk, Gilpin county, Colo. who operated and shipped ore in 1920.

CHAMPION MINING CO. COLORADO

Probably dead. See Vol. XIV.

CHASFIELD MINING & MILLING CO. COLORADO

Address: Silver Plume, Colo. Operates the Gold Belt tunnel at Silver

Plume, Clear Creek county. Property reported under lease and bond to **Silver Gem Mng. Co.**, October 1921.

CHICAGO TUNNEL COLORADO

Address: care Handberg, Miller & McIntosh, Gunnison, Colo., who did work in this tunnel at Pitkin, Gunnison county, in 1920.

CHIEF MOUNTAIN MINING CO., THE COLORADO

Office: 810 Majestic Bldg., Denver Colo. F. G. Dinsmore, pres.; S. H. Alexander, sec.

Inc. Jan. 1, 1918, in Colorado. **Cap.** $5,000,000; par 1 cent.

Property: the Old Square Deal group of 73 claims, on Chief Mountain, near Frisco, Summit county. Gold, silver, copper, lead, zinc are found in a quartz fissure vein occurring in granite.

Development: by 850′ shaft and 2,300′ tunnel. Until recently property reported in litigation. Idle since 1919.

CHIPETA MINING, MILLING & SMELTING CO. COLORADO

Address: Ouray, Colorado.

Officers: Thos. P. Mitchell, pres., Ouray, Colo.; Matt Karcich, v. p., Trinidad, Colo; J. J. McCarthy, sec., Ouray; Jos. Dalass, treas., Trinidad.

Inc. June, 1918, in Colorado. Fully financed by September, 1919.

Property: the H. A. C. property, or Romeo-Juliet gold-silver mine, 53 claims, 547 acres, in the Bachelor district, near Ouray, Ouray county.

Operated during 1920, but no ore shipped, though a 20′ vein of mill ore was cut on the 750′ level.

Equipment: includes electric power line and compressor. Company's stock sold largely to coal miners of eastern Colorado.

CHRISTMAS GOLD MINING CO. COLORADO

See **Vindicator Consolidated Gold Mining Co.**

CHRYSOLITE MINE COLORADO

Address: M. L. Buchanan & Co., Leadville, Colo.

Property: claims on Fryer hill, Leadville district, Lake county. Ore carrying 11 oz. silver per ton and 40% lead was being mined in 1920.

CIMARRON MINE COLORADO

Address: John M. Wagner, Telluride, San Miguel county, Colo. Mine and mill operated in 1920.

C. K. & N. MINING CO. COLORADO

Probably dead. Described in Vol. XIV of this book.

CLARE MARIE MINING CO. COLORADO

Address: Central City, Gilpin county, Colo. Mine operated during 1920; ore is silver-lead, but none was shipped.

CLEAR GRIT MINE COLORADO

Address: Peck & Peterson Lease, 314 E. 3rd St., Leadville, Lake Co., Colo.

CLIMAX MOLYBDENUM CO. COLORADO

Associated with the American Metal Co., Ltd.

Office: 61 Broadway, New York. **Mine office:** Climax, Colo.

Officers: B. F. Philipson, pres.; J. Loeb and Hy. Bruere, v. p.'s; J. B. Beaty, sec.-treas.

Property: about 600 acres, on Bartlett Mountain, about 16 miles N. E. of Leadville on South Park Branch of Colorado & Southern R. R. Also, the adjoining property, at Buffehrs, acquired in 1918 from the Molybdenum Products Co.; is equipped with 2-mile aerial tramway and 250-ton mill, in which a secret process for treatment of molybdenite is said to be used.

Geology: lode formation is thickly foliated quartz-porphyry and decomposed granite or alaskite granite, with disseminated stringers of molybdenite and a little iron pyrite. Molybdite, the yellow oxide, appears in considerable amount where oxidation has occurred.

Development: construction started July, 1917, and first shipment was reported Feb., 1918. Mining is done through two tunnels, the upper one 12,100′ above sea-level is 830′ long. Near the portal crosscuts are driven at

right angles for 400' both ways. Another adit, 300' lower down, is to be lengthened to 2,200'. In the lower one the E. W. contact dips 70° to the S. E. Mining is done by parallel shrinkage stopes 800' by 25' with pillars of the same width between. It is planned to carry stopes to surface and break down the intervening pillars. Company has developed 25 acres of patented ground. Purchase of property, development and erection of plant, called for expenditure of $600,000 to October, 1918.

Equipment: includes 4,700' tramway and mill of 1,000 tons daily capacity. Employs Minerals Separation process.

Production: $500,000 worth of 70% molybdenite up to May, 1918.

The Climax is the largest molybdenite mine in the world, and is admirably managed, its output being about 60% of the total production of molybdenum ore.

The mine has been closed since April, 1919 on account of the low price of molybdenum.

C. M. S. MINES CO. **COLORADO**

Address: Creede, Colo.

Property: the Solomon silver mine near Creede, Mineral county. Not operated since 1919.

COBB MINE **COLORADO**

Address: H. S. Victory, Jamestown, Boulder Co., Colo., who operated mine 1920.

COBURG MINING CO. **COLORADO**

Address: Lake City, Colo.

Property: the Coburg mine at Lake City, Hinsdale county. Ore carries gold, silver, lead, and copper. Operated, but shipped no ore, during 1919-20.

COCHRAN BROTHERS **COLORADO**

Address: 2024 Spruce St., Boulder, Colo. Operated the No Name mine at Wall Street, Boulder county, in 1920.

COCOMONGO MINES CO. **COLORADO**

Address: 552 Ohio Bldg., Toledo, Ohio.

Property: the Cocomongo silver-lead mine at Bonanza, Saguache county. Mine and mill both operated and shipments made in 1920-21.

C. O. D. CONS. GOLD MINING & DEVELOPMENT CO. **COLORADO**

Letters returned from former address: Cripple Creek, Colo.

Officers: L. A. Van Tilborg, pres.; Claude Sachs, sec.-treas. E. J. Evans, supt.

Inc. 1915. **Cap.** $200,000; shares 10¢ par.

Property: the C. O. D. mine in Poverty Gulch, Cripple Creek district, Teller county, which was one of the old-time producers, credited with an output of $1,000,000 in gold. The main 3-compartment working shaft was bottomed at 800', with the 10th level the lowest. Drained by Roosevelt tunnel.

Equipment: includes a 65-h. p. air compressor, hoist, etc.

No production reported since 1919.

COLBURN-AJAX GOLD MINING CO. **COLORADO**

Address: 416 E. 10th Ave., Denver, Colo. **Mine address:** Victor, Colo.

Reported Dec., 1916, to have bought the **Ajax Gold Mining Co.** for $480,000.

Officers: E. A. Colburn, pres.; Wm. Lennox, v. p.; B. L. Gorich, sec.-treas., with E. A. Colburn, Jr., and C. H. Dudley, directors.

Cap. $500,000; $1 par; none outstanding.

Property: 11 claims patented, 33 acres, on southwest slope of Battle Mountain, Cripple Creek district, Teller county, shows quartz fissure veins in granite, phonolite, and basalt. Veins dip 72° S. W. with strike of N. 32° W. Lessees found good gold ore in the Ajax mine from the 400' to the 2,000' levels. The veins are from 2 to 4' wide, and the ore is probably the extension of ore-shoots previously worked. Average grade of ore shipped in 1917 was $18.64 per ton.

Development: is by means of the 2,000' Ajax shaft, with over 20 miles of underground workings.

Equipment: includes a steam hoist and 40-drill air-compressor. Output to date said to total $5,000,000. Property operated by lessees.

The Ajax mine, formerly held under bond and lease, was relinquished in 1920. See **Ajax Leasing Co.**

The Mexican Metals Co., has a 5-year lease on the mine, from 1917, and the **Carolina Mining Co.** was also reported working in the mine.

COLD SPRING MINING CO. COLORADO

Address: Boulder, Colo.

Owns the King No. 1 and No. 2 at Crisman, Boulder county, worked during 1920.

COLDWATER COPPER MINING CO. COLORADO

Out of business. See Vol. XIV. The Wolverine mine, formerly owned by this company, is at Cowdrey, Jackson county, and is operated by Burr Lobdell.

COLE MINING CO. COLORADO

Succeeded by **Silver Plume Mines Co.**, which see.

COLLOM MINE COLORADO

Address: Tuck & Co., Idaho Springs, Clear Creek Co., Colo., who operated this gold-silver mine in 1920, but shipped no ore.

COLOMA MINING CO. COLORADO

Mail returned from former address: Central City, Gilpin county, Colo.

See Vol. XIV. for litigation, etc.

COLONEL SELLERS MINE COLORADO

Controlled by **Empire Zinc Co.**, which see.

COLORADO-ARIZONA MINES CO. COLORADO

Address: Garfield, Colo.

Property: the Madonna gold-silver-lead-zinc mine at Garfield, Chaffee county. Operated and shipped ore, 1919. No shipments 1920-21.

COLORADO BLUE BELL MINING CO. COLORADO

A promotion of W. M. Sheridan & Co., indicted by Federal authorities for many fake promotions in July, 1919.

COLORADO-CARR MINING CO. COLORADO

Mail returned 1921 from former **mine office:** Central City, Gilpin county, Colo. Harry L. Elman, mgr. Operated in 1916, after many years of idleness, and $2,000 shipments reported in 1917.

COLORADO CENTRAL MINES CO. COLORADO

Office: 412 Boston Bldg., Denver, Colo.

Succeeded to all assets of Colorado Central Mining Co. in 1918. Company operated both mine and mill in 1919 and 1920, but on June 23, 1920 was declared bankrupt and its affairs placed in hands of a trustee. See Vol. XIV for description of property.

COLORADO CENTRAL MINING CO. COLORADO

Described in Vol. XIV. Succeeded by **Colorado Central Mines Co.**

COLORADO CONCENTRATING CO. COLORADO

Controlled by Silver Mining & Reduction Co., which see.

COLORADO & CONNECTICUT GOLD MINING CO. COLORADO

Property reported turned over to **National Finance and Holding Co.**, Toledo, Ohio., which see.

Mail returned from former address: Lake City, Hinsdale county, Colo.

COLORADO CONSOLIDATED MINES & POWER CO. COLORADO

Address: Major French, Sherman, Colo., or Lake City, Hinsdale Co., Colo.

Property: the Black Wonder mine at Lake City, Hinsdale county. A power plant and mill were erected 1921. Company cleaned out old mine workings, built dam and pipe line for power plant, and altered mill, built 25 years ago, changing from chlorination to flotation.

COLORADO CO-OPERATIVE MINING CO. COLORADO

Address: William G. Griffin, mgr., La Plata, via Durango, Colo.

Property: 18 miles N. W. of Durango, in La Plata mountains, shows 5 veins running to a common center, opened by 20 tunnels and open cuts.

COLORADO FUEL & IRON CO. COLORADO

General office: Fred Farrar, sec., Boston Bldg., Denver, Colo.

Inc. Oct. 21, 1892, in Colorado. **Cap.** $44,200,000 com., and $2,000,000 pfd; of which $34,235,500 and $2,000,000 are issued. Funded debt outstanding Dec. 31, 1918, $5,835,000, general mortgage 50-year, $1,000 gold 5s., due Feb. 1, 1943; general mortgage 6s, $40,000; Grand River Coal and Coke, 1st mortgage, 6s, $846,000; Colo. Ind. Co. 1st mortgage 5s, $37,630,000. Total funded debt $44,351,000.

Property: besides steel works at Pueblo, Colo., and coal mines, company has iron mines in Colorado, New Mexico, and Wyoming.

Production: from the iron mines: 813,728 tons in 1912; 853,878 in 1913; 614,699 in 1914; 441,026 in 1915; 709,601 tons in 1916; 886,909 in 1917; 809,491 in 1918; 715,145 in 1919; 756,682 in 1920; 398,313 in 1921.

The iron mines of this company warrant its inclusion in the Handbook but details of revenue from coal, coke, iron and steel are omitted.

Company is practically the only metal mine operator in Wyoming, mining iron ore at Sunrise. In 1921, company took lease on large iron deposit on Apache Indian reservation near Winslow, Ariz. It is a large well managed progressive company.

COLORADO GILPIN GOLD & RADIUM MINING CO. COLORADO

Office: 517 Drexel Bldg., Philadelphia, Pa.

Officers: Wm. Wright, pres.-gen. mgr.; Hon. Edw. Hart, v. p.; R. R. Grumer, sec.-treas., at last accounts.

Property: the German, German Annex, German No. 2 and the Belcher Mines, at Central City, Gilpin county, developed to depth of 350′ and reported to carry a vein, from 18″ to 2′ thick, containing gold and pitchblende.

Equipment: included power plant, compressor, etc. A notable shipment of 112 tons of ore, valued at $85,000 and estimated to contain 715 milligrams of radium, was sent to the Colorado School of Mines for the U. S. Bureau of Mines in 1916. Is a close corporation which refuses information concerning its operations.

COLORADO GOLD DREDGING CO. COLORADO

Dead. Was controlled by General Development Co. and owned placer claims near Breckenridge, Summit county. Dissolved and liquidated in 1918.

COLORADO GOLD KING MINING & EXPL'N. CO. COLORADO

Address: 1646 Grant St., Denver, Colo.

Operated a gold-silver mine at Tolland, Gilpin county, during 1920, but shipped no ore.

COLORADO MANGANESE MINING & SMELTING CO. COLORADO

Idle and probably defunct. **Former address:** Denver, Colo.

Property: Black Diamond mine, 5 claims in western part of San Miguel county, 50 miles by road from Placerville, on the D. & R. G. R. R. Formerly shipped ore to rail by burros.

Development: comprises 250′ of tunneling.

COLORADO METAL MINING ASSOCIATION COLORADO

Office: 324 Tabor Opera House Block, Denver, Colo.

Officers: G. M. Taylor, pres.; Jesse F. McDonald, R. M. Henderson and Rulkley Wells, v. p.'s A. M. Collins, treas.; M. B. Tomblin, sec. G. E. Collins is governor, and J. F. Welborn, C. A. Chase, and G. A. Stahl are vice-governors.

Connected with the American Mining Congress. Is an organization formed to protect the mining industry and to foster an interest in mining.

COLORADO METALS & CHEMICAL CO. COLORADO

Controls the Fourth of July Group in Boulder county, Colo., jointly with the **Cons. Copper M. M. & Sm. Co.**, and property is described under latter title.

COLORADO MINE COLORADO

Address: Walter & Pughe, Gold Hill, via Salina, Boulder Co., Colo. Mine at Summerville, shipped gold-silver ore in 1920.

COLORADO MINERAL SEPARATION CO. COLORADO

E. R. Winn, former secretary, reports company dissolved and assets distributed. See Vol. XIV for account of corporation and holdings.

COLORADO MINING AND DEVELOPMENT CO. COLORADO

W. S. Leebrick, pres., Idaho Springs, Colo.

Property: Little Mattie mine, Idaho Springs. Reported sold to John B. Fowler and M. G. Hansom for $41,000, but sale contested in District Court.

Company said to have successfully operated the mine for 40 years, prior to 1918.

COLORADO MINING LAND & INVESTMENT CO. COLORADO

Idle. No recent returns. **Office:** Walsenberg, Colo. Mine near Hillside., Fremont county, Colo. E. L. Neely, pres. and mgr.

Inc. 1911, in Colorado. **Cap.** $750,000; shares $1 par.

Property: 110 acres, owned partly in fee and partly leased, said to show gold, silver, copper and lead which assayed to $30 per ton.

COLORADO PAYROCK SILVER MINES CO. COLORADO

At last accounts address was: E. C. Bennett, sec.-treas., Kenmark Hotel, Denver, Colo. Ernest Le Neve Foster, supt.

Cap. $250,000; 50¢ par.

Property: the Payrock mine at Silver Plume, Clear Creek county,—an old mine "that has produced millions."

Shares advertised at 20¢ in 1917; no later sales reported.

COLORADO PITCHBLENDE CO. COLORADO

Dead and property now owned by the **J. Gillingham Hibbs Ore Co.**, which see, Vol. XIV for history of old company.

COLORADO SILVER MINES CO. COLORADO

Address: D. E. Brown, fiscal agent, 210 Kittredge Bldg., Denver, Colo.

Officers: Admiral G. H. Barber, U. S. N., pres.; G. C. Felton, v. p.; Frank Hunt, sec.-treas.; Theo. D. Benjovsky, E. M., gen. mgr.; with M. R. Foley, E. O. Phlegar, J. R. Riedy, and A. V. Dickson, supt., directors.

Inc. 1920, in Colorado. **Cap.** $1,000,000; $1 par.

Property: the Alie Bell gold silver mine at Romley, Chaffee county, developing in 1919 and 1920.

Development: by tunnels. A raise between No. 3 and 4 levels is said to have opened a continuous shoot 400′ long. In May, 1920, reserves were estimated to be 18,000 tons. Shipments to Salida averaged $12.13 for mill ore and $24.40 per ton for sorted ore.

Equipment: over $75,000 has been spent, and it includes steam power, compressor, shops, ore-house, and dwellings. In stock selling campaign 1920, company advertised extensively. Stock being offered at par.

COLORADO-SUPERIOR MINING CO. COLORADO

Subsidiary of the **Metals Exploration Co.**

H. G. Polsgrove, mgr.; Isaac Partanen, supt., Telluride, Colo. Company owns the Black Bear Mining Co.

Officers: Bulkeley Wells, pres.; O. J. Larson, v. p.; Aylmer Reeves, sec.; A. D. Snodgrass, asst. sec.; Edwin Hendrickson, treas., with E. B. Adams and Harry Johnson, directors.

Cap. $1,000,000; shares $1 par; 561,635 outstanding. Bonds authorized $250,000 (8%); issued, $156,100.

Property: the Black Bear mine, 322 acres, patented, at Telluride, San Miguel county, at an altitude of 12,500′.

Ore: sulphides of lead and zinc containing gold and silver in a vein averaging 10′ in width and supposed to be a continuation of the Argentine vein in the neighboring Tomboy mine.

Development: to depth of 1,100′ by shaft, 500′ from N. W. end of property, and crosscuts totaling 5,100′ of workings.

Ore is treated at the Smuggler Mng. Co.'s mill.

Ore reserves were estimated at 100,000 tons, which averaged better than $5 per ton, with 75,000 reported blocked out, July 31, 1917.

Equipment: included electric hoist, 2 compressors and a 250-ton flotation unit.

Production: for 1916, 7,055 oz. gold, 68,306 oz. silver, 2,354,459lb lead, 2,233,536lb zinc and 15,509lb copper.

Lead concentrates averaged 1.81 oz. gold, 18.47 oz. silver, 48.88% lead, 4.90% zinc, 1% copper; zinc concentrates: 0.27 oz. gold, 6.95 oz. silver, 6% lead, 23.96% zinc. Recovery ran from 40% for zinc to 75% for lead. About 6,548 tons of concentrates were produced. Concentration ratio was 7.4 to 1.

See **Radium Co. of America.**

COLORADO TUNGSTEN GOLD & SILVER CO. **COLORADO**

Out of business. Formerly controlled by Morton & Co., 15 State St., Boston.

COLORADO-UNITED MINES CO. **COLORADO**

Address: Citizens Natl. Bank Bldg., Boulder, Colo. Mines at Wall Street, Boulder Co., Colo. Arthur J. Hoskin, geologist.

Inc. 1920, in Colo. **Cap.** $150,000.

Property: the Concord, Great Britain, Forest and lesser groups, near Wall Street. A large force of men was employed 1920, developing Concord, Ogalala, Walters and Forest mines.

Equipment: a 100-ton mill was erected 1920.

COLORADO UTAH MINES HOLDING COMPANY **COLORADO**

Office: 411 Bonfils Bldg., Kansas City, Mo.

Officers: Charles E. Havener, pres.; Guy A. Swallow, v. p.; V. R. Alexander, sec.-treas. Trustees: Charles E. Havener, chrm., Kansas City; Guy A. Swallow, Topeka, Kansas; John W. Phares, Wakeeney, Kansas. Alfred Bell, cons. eng.; Victor Blanc, Denver, Colo., analytical chemist and assayer; Judge Chas. L. Kagey, Beloit, Kans., couns.; and William S. McClintock, Kansas City, Mo., attorney.

Organized under Trust Estate Laws of Missouri, August, 1921. Cap. $50,000,000; par $100; 37,500,000 common and 12,500,000 preferred.

Properties: (1) all the holdings of the Utah-Colorado M. & M. Co. of Denver, Colo. (listed elsewhere in this Handbook.) (2) the personal properties of Charles E. Havener, comprising: 320 acres near Willard, Utah, covering "Willard Iron Mountain;" 120 acres smelter site, adjoining the city limits of Denver, at Manchester Heights and Mississippi Sts.; the Hartman patented claim; 13 patented claims formerly owned by the Baby Eddie Mining Co., 5 patented claims of the Crazy Girl group; all located in Clear Creek county, Colo. Company also has other properties under contract of purchase. All these properties are now controlled by this company.

Development: (see Utah-Colo., M. & M. Co.) comprises the 200′ Hartman tunnel in valuable chemical ores; 180′ Baby Eddie tunnel, cutting several fissure veins of silver-lead ore carrying Bismuth and Uranium of high value; 980′ Crazy Girl tunnel, which adioins the Baby Eddie, 250′ farther up the mountain. These two tunnels cut the same veins, and drifting and stoping was done on them in 1921. At the Willard Iron Mountain, a large tonnage of surface iron is shown and proven by a number of shafts, one of which is 140′ deep. About 10,000 tons of this ore has already been shipped. The 140′ shaft proves that underneath the iron, the schist carries silver, gold and copper values. This entire property is said to be a blasting and steam shovel proposition.

Ore values: shipments from the Crazy Girl show values said to run from $70.00 per ton up. The Willard Utah Iron is the best grade obtainable and commands the highest market price.

COLORADO-UTAH MINES OPERATING CO. **COLORADO**

Dead, but details unobtainable. See Vol. XIV. of this book, for description.

COLORADO VANADIUM CO. **COLORADO**

Company bankrupt, 1921; John L. Stivers, Montrose, Colo., receiver. Company said to owe $400,000, and about 50 suits are pending.

Address: Sawpit, San Miguel, Co., Colo.

Officers: F. G. Carpenter, pres.; and Frank Gardner, mgr., Sawpit, Colo. **Inc.** 1917. **Cap.** $3,000,000.

Property: the Bear Creek and Dragon mine and the Sawpit mill, near Fall Creek station, Telluride, San Miguel county; also claims on the Bear Creek side of the San Miguel river. Late in 1920, vanadium ore had been discovered in the White Cliffs near Telluride.

Equipment: includes a compressor, 2,300′ aerial tram and a concentrating plant.

Operations discontinued 1920, owing to bankruptcy of company.

COLTUCK DEVELOPMENT CO. **COLORADO**

Address: 948 Gas & Electric Bldg., Denver, Colo. **Mine address:** P. McDonough, mgr., Empire, Colo.

Inc. Oct. 2, 1919, in Colorado, as a Declaration of Trust Co.; Wm. G. Krope, trustee. Cap. $150,000; par $100; $143,900 in treasury.

Corporation is a leasing company operating for 2 years past in only two mines at Empire, Clear Creek county, mainly on the Mint mine, developing low grade orebodies and looking for shipping ore. No shipments to date, 1921.

COLUMBIAN MOUNTAIN MINING & LEASING CO. **COLORADO**

Address: 934 17th St., Denver, Colo.

Property: a silver-lead-copper mine at Empire, Clear Creek county, on which the company is driving a new tunnel, in the canyon below Georgetown. A promising vein system is to be cut.

Equipment: includes a 7-drill compressor and various buildings, etc.

COLUMBIA SILVER & GOLD MINING CO. **COLORADO**

Mail returned from former office: Tabor Block, Denver, Colo.

Officers: S. B. Brigham, pres.; with L. S. Ordway, P. L. Hanson, C. R. Braiser, and C. B. Demarest, directors.

Inc. 1919, in Colo.

Cap. $25,000; $1 par.

Property: 25 acres, in Jackson district, Clear Creek county, adjoining Little Mattie, Newton, and Black Eagle mines. In Sept., 1919 the Star tunnel was being driven to cut the Columbia vein. No ore was shipped during that year.

COLUMBUS MINES CO. **COLORADO**

Probably idle. Does not reply to letters.

Office: 905 First Nat'l Bank Bldg., Denver, Colo. Jas. Doyle, pres.

Inc. in Colorado. **Cap.** $50,000.

Property: 3 claims in California district, La Plata county. Development work was started in 1916; in 1918, work on crosscut tunnel was being prosecuted.

COMBINATION MINING & MILLING CO. **COLORADO**

Office: 524 Quincy Bldg., Denver, Colo. Frank Straub, sec.

Cap. $100,000; 1 cent par.

Property: A silver-lead-zinc mine at Sulphur Springs, in Grand county, operated but not shipping in 1920. Company also owns 147 acres in La Plata district, Grand county, which is developed by a 700′ tunnel. Ore carries gold, silver, copper, and zinc. The company also had over 3,000 acres of oil lands under lease in Wyoming.

COMMODORE LEASE **COLORADO**

Address: 828 Equitable Bldg., Denver, Colo.

Operated the mine of this name at Creede, Mineral county, in 1920.

COMMONWEALTH MINING CO. **COLORADO**

Office: 925 Foster Bldg., Denver, Colo.

Property: the Magnolia gold-silver mine and Eddy mill at Montgomery, six miles north of Alma, Park county. Also reported in control of the Lee Goss, Peru Extension, Populist, Prospect, Palmetto, Columbia, Logansport, and Chicago mines.

Geology: Archean granite is overlain by successive beds of Cambrian quartzite, Silurian white limestone, and Carboniferous or blue limestone.

Quartzite is divided by an intrusive flow of white porphyry. Orebodies occur as veins and masses, cutting all these rocks.

In the Magnolia, a shoot 8' thick, 12' high, and running $30 per ton was opened. Company has aerial tramway, 3,800' long and a 500-ton cyanide mill.

Operated part of 1920, but shipped no ore.

COMMONWEALTH SILVER MINES, INC. **COLORADO**

Address: care I. F. Cleaveland, 149 Broadway, New York.

Is a consolidation of the **Gem Mining Co. and Gem Tunnel** company, the latter controlling the **Newhouse or Argo** tunnel.

Officers and directors: I. F. Cleaveland, pres.; J. Bennett Southard, 217 Broadway, New York, John A. Forney and A. L. Kenyon, v. p.'s.

Property: includes the Little Mattie mine of the Golden Edge Co., also includes all that of the Gem Mining Co. and includes control of the Newhouse (Argo) drainage tunnel, 4½ miles long, undercutting 1,100 veins of Seaton mountain at 2,000' below surface.

Equipment: a modern hydro-electric plant, two concentration mills, etc.

Appears to be a large and meritorious enterprise, but promoters have been deaf to requests for information.

COMMONWEALTH TUNGSTEN GOLD & SILVER CO. **COLORADO**

Out of business. See Vol. XIV

COMSTOCK MIN. MILLING & EXPLORATION CO. **COLORADO**

Address Central City, Colo.

Operated the Comstock silver mine near Central City, Gilpin county, part of 1920. No ore shipped.

COMSTOCK TEDDY BEAR MINE **COLORADO**

Address: B. Ross, Trustee, 516-18th St., Denver, Colo. Mine is at Lawson, Clear Creek county. Operations were suspended in 1920.

CONGRESS COPPER MINE CO. **COLORADO**

Address: care Frank L. Ross, Gas & Electric Bldg., Denver, Colo. Company controlled by Mr. Ross and F. B. Goudy.

Directors: J. B. Ross, pres.; Guy W. Mallon, v. p.; Frank L. Ross, sec.-treas.-mgr.

Inc. April 16, 1908, in Colorado. Cap. $500,000; shares $10 par. Bonds, $100,000 authorized, at 6%; all issued.

Property: the Guston silver mine near Red Mountain, in district of that name, Ouray county. This mine, idle except for leasors work for 25 years past, is said to have produced $7,000,000 in silver with ¾ of the vein unexplored. For eight years shipments of crude ore averaged $91 per ton and for one year $363 per ton.

The Congress mine, is also under personal control of Mr. Ross, 3 claims, 30 acres, the Congress, Arlington and Midway lodes in the Red Mountain district, Ouray county, 12 miles S. of Ouray and 12 miles N. of Silverton.

The Congress is a famous old mine worked 1884-93, said to have produced about $400,000 worth of ore, averaging 18% copper and 11oz. silver per ton, with small gold value. Also owns the Guston mine, in same district.

Development: by 400' shaft with about 1,500' of workings, showing chalcocite, reported by company to average about 5 to 10% copper, 10 oz. silver, and ½ oz. gold per ton. Mine has electric equipment, including hoist and compressor plant.

In May, 1919, operations were suspended, but company expects to resume when the price of copper reaches a profitable figure.

CONGRESS GOLD & COPPER MINING CO. **COLORADO**

Out of business. Described in Volume XIV. Property now owned by **Congress Copper Mine Co.**

CONQUEROR MINING REDUCTION & POWER CO. **COLORADO**

Company out of business for 5 or 6 years, but not yet dissolved. Property transferred to **Golden Empire Mining Co.** and, when legal matters are settled, the Conqueror Co. will be dissolved. In the reorganization, old shares were exchanged for new.

CONSOLATION MINE COLORADO

Address: J. O. Evans, Jamestown, Boulder Co., Colo. Mine operated for fluorspar part of 1920.

CONSOLIDATED COPPER M., M. & SM. CO. COLORADO

Probably dead. Mail returned from former address: Eldora, Boulder county, Colo. See Vol. XIV.

CONSOLIDATED FRANKLIN MINES CO. COLORADO

Mail returned from former address: Equitable Bldg., Denver, Colo.

Property: the East and West Franklin gold-silver-lead mines at Idaho Springs, Clear Creek county. Shipments made, 1919, but idle 1920-21.

CONSOLIDATED LEASING CO. COLORADO

Address: care Dr. C. E. Kahler, 998 Franklin Ave., Columbus, Ohio. Mine address W. T. Harpel, supt.-asst. mgr., Eldora, Colo.

Officers: Dr. Kahler, pres., E. L. Rexford, v. p.; Wm. G. Groezinger, sec.-treas., 105 Gates St., Columbus, Ohio.

Property: a lease on the Gold Dust mine of the Swarthmore Cons. **Mng. Co.** (which see), near Eldora, Boulder county. A 25-ton mill was erected in 1920, and was operating in August.

CONSOLIDATED MINES DEVELOPMENT CO. COLORADO

Idle 1919 and 1921. No recent returns.

Office: 717 Majestic Bldg., Oklahoma City, Okla. **Mine** at Alice, Colo.

Officers: L. T. Samuelson, pres.; J. A. Best, v. p.; W. C. Bickford, sec.-treas., with W. G. Harper and W. G. Luckenga, directors. W. G. Harper, mgr.

Inc. in Colorado. **Cap.** $1,500,000; $1 par; 850,000 outstanding. Annual meeting, second Monday in October.

Property: 10 claims, 2 patented, 102 acres, in Upper Clear Creek and Argentine districts, Clear Creek county, said to show a quartz vein in granite, 6′ wide, running N. E.-S. W. and to assay $18 in gold, silver, and copper.

Development: by tunnels, 1,100′ and 400′ long, said to prove 200,000 tons of ore.

Equipment: 7-drill compressor, electric power and a flotation unit. A 100-ton mill was planned.

CONSOLIDATED MINES & REDUCTION CO. COLORADO

Dormant, if not dead. Mail returned from former office: 433 Century Bldg., Denver, Colo. **Mine office:** 412 E. Bennett Ave., Cripple Creek, Colo. Fully described in Vol. XIV.

CONSOLIDATED REALTY & INVESTMENT CO. COLORADO

No returns from former address: Boulder, Colo. See Vol. XIV. for description.

CONSOLIDATED SPECIE PAYMENT MINING CO. COLORADO

Address: Idaho Springs, Colo. **Inc.** in 1917.

Property: the Two Brothers gold-silver claims near Idaho Springs, Clear Creek county. Veins contain gold-silver-copper ore, developed by 2,800′ tunnel. The vein was intersected 2,800′ from the portal of the tunnel and 1,000′ of drifting has been done to the west. Average grade of ore said to be around $100 per ton. Regular shipments were being made in October, 1919.

Equipment: includes electrically-driven air-compressor and a 20-stamp mill. Worked by lessees.

CONTACT MINE COLORADO

Address: Peter Peterson, Rollinsville, Gilpin Co., Colo. This gold-silver mine was worked but shipped no ore, in 1920-21.

CONTINENTAL MINES DEVELOPMENT CO. COLORADO

Address: 307 Mining Exchange Bldg., Denver, Colo. Company operated the Idaho Pride mine at Idaho Springs, Clear Creek county, part of 1920, shipping some ore.

CONTINENTAL MINES, POWER & REDUCTION CO. COLORADO

Office: 935 Equitable Bldg., Denver, Colo. **Mine office:** Lombard, Clear Creek county, Colo.

Officers: Henry I. Seemann, pres.-gen. mgr.; Cyrus Locker, v. p.; Wm. H. Warinner, 2nd v. p.; A. W. Craig, sec.-treas.

Inc. Nov. 7, 1905, in Colorado. **Cap.** $5,000,000; $1 par; issued $4,370,761. Annual meeting, first Wednesday in November.

Property: 182 claims, 70 patented, 2,000 acres, in the Lincoln district, Clear Creek county, said to show 75 fissure veins and contact deposits, ranging in width from 2' to 75'. Country rock is gneiss, schist and granite, with porphyry dikes. Veins proved to depth of 1,000' and traceable 4 miles. Ores are sulphides, reported to carry 1 to 7% copper, 1 to 35% lead, from a trace to 6% zinc, 1 to 200 oz. silver and $5 to $500 gold per ton.

Development: by approximately 4 miles of workings including shafts of 135', 150' and 200' and various tunnels, one about 4,000' long. The mine is estimated by management to show 300,000 tons of ore.

Equipment: includes electric power, 150-h. p. at mine and 150-h. p. at mill. 25-h. p. hoist and 7-drill air-compressor. There are about 20 buildings.

The mill has 20 stamps, one 8x12" crusher, 3 Card tables, 3 Wilfley tables and 2 sizers, capacity 100 tons per day. Company planned continuous development and was to add an oil flotation plant to the mill, increasing its capacity to 200 tons per day, and selling commercial current. At last accounts the president reported that nothing was being done because of lack of money.

CONTINENTAL MINING CO. **COLORADO**

Office: Silverton, Colo

Officers: J. B. Allen, pres.; Silverton, Colo. J. H. Slattery, v. p.; W. A. Way, sec., with M. J. Heller, supt. and J. H. Slattery, directors.

Inc. in Colorado. **Cap.** $1,500,000; $1 par; 23,000 shares in treasury. Transfer office: Silverton. Annual meeting in December.

Property: 18 claims, about 150 acres, including the Buffalo Boy mine, in the Eureka district, San Juan county, said to show quartz vein in fissure carrying gold and silver. Company spent $8,000 on development work in 1916

Development: by vertical shaft and tunnels. Tunnels are 3,000' long with 4,000' of development, having a depth of 500'. Ore-shoot said to be 1,500' by 350', and 200,000 tons blocked out. Average assays were reported to be $18.

Equipment: electric hoist and electric pump.

Operated part of 1919, but shipped no ore. Litigation among the stockholders settled 1920.

CO-OPERATIVE METAL MINES CO. **COLORADO**

Address: 309 Charles Bldg., Denver, Colo.

Operated the W. I. M. Tunnel at Empire, Grand county, in 1920, developing but not shipping gold-silver-lead ore.

CO-OPERATIVE MINING & LEASING CO. **COLORADO**

Address: 936 West Colorado Ave., Colorado Springs, Colo.

Property: a lease on Block 8, School Section 16, adjoining the Isabella mine at Cripple Creek, Teller county.

Development: by 1,500' of drifting on upper levels and 875' shaft with levels at every 135'. In the lower levels a stope 600' long 5' to 8' wide and 125' high, was reported to average $12 to $14 a ton, but could not be mined owing to water. Company had 200,000 tons of tailings said to run $3 per ton

Operated part of 1919.

COPPER & SILVER KING MINING & DEVELOPMENT CO. COLO.

Address: 512-515 Exchange Bldg., Denver, Colo.

Operated in 1920, the Bartlett & Copper King gold-silver mines at Fort Collins, Larimer county, but shipped no ore.

COPPER CREEK MINING CO. **COLORADO**

Corporation dissolved Oct. 20, 1919. See Vol. XIV.

COPPER KING MINES PRODUCTS CO. **COLORADO**

Dead. See Vol. XIV for description and record.

CORNUCOPIA LEASING MINING & MILLING CO. **COLORADO**

Address: % H. E. Biggle, 1054 Adams St., Denver, Colo. John E. Havens, pres., 1131 York St., Denver, Colo. **Mine address:** Silver Creek, Central City, Colo.

Company actively developing an extension of the Cornucopia gold mine and 2 veins of Perigo system, in Gilpin county, connecting workings with Reform mine. Company operated mine and mill during 1920.

CORPORATION OF AMERICAN MINES **COLORADO**

Address: 77 Broad St., New York. **Mine address:** M. T. Gilchrist, supt., Dumont, Colo.

Officers: A. R. Specht, pres.; E. L. Keiser, Milton, Pa., v. p.; John Sowall, sec.-treas., with Geo. L. Robinson, J. S. Malone, C. W. Barnekov and G. E. Scofield, directors.

Inc. April, 20, 1917, in Ariz. **Cap.** $3,000,00; par $1; issued 1,693,738. Registrar & Transfer Co., 120 Broadway, New York.

Property: the Specht, or Clear Creek and Gilpin tunnel, 90 claims, 6 patented, 5,562 acres, at Dumont, Clear Creek county. Mine produces gold and silver ore.

This is an ambitious project to drain and work the company mines 1,000′ below existing workings and to collect toll from mines owned by others. The project is sound, and if the orebodies of the various mines continue downward and to the tunnel level, the company's operations here may prove as profitable as those of the Newhouse and other long tunnels (see Gem Mining Co.) Property examined and endorsed by E. LeNeve Foster and various other engineers.

CORRY CITY MINES **COLORADO**

Mail returned from former address; Silver Plume, Clear Creek county, Colo. William Copper, mgr.

Early in 1919, it was reported that operations would be started driving the Desch tunnel 100′ and operating the Neshotah mill. No later news obtainable.

CORTELLINI, JOHN **COLORADO**

Address: Leadville, Colo.

Property: the above leases the Dolomite and Garbutt gold-silver mines, the P. O. S. silver-lead mine, and the Small Hopes zinc mine, in the Leadville district, Lake county.

The Dolomite and Small Hopes operated part of 1919, but only the latter made shipments, the Garbutt was worked all the year, but operations ceased at the P. O. S.

COTTON TAIL MINING CO. **COLORADO**

Address: Cripple Creek, Colo.

Property: the Red Bird gold mine at Cripple Creek, Teller county.

Operated part of 1919, but shipped no ore. Idle 1920.

COTTONWOOD GULCH MINING CO. **COLORADO**

Address: Canon City. **Mine address:** Eureka Mtn. mine, Buena Vista, Chaffee Co., Colo.

Operated this silver-lead mine part time in 1920, but shipped no ore.

CRAMER & CO. **COLORADO**

Address: 121 S. Toledo Ave., Leadville, Colo.

Operated the Crescent, Catalpa and Star 5 mines at Leadville, Lake county, for manganese ores in 1920.

CRAWFORD MINING CO. **COLORADO**

Probably dead. Warren Prosser, c/o Mary Murphy Mining Co., 307 Boston Bldg., Denver Colo., was supt. in 1918.

Property: the Genessee mine, and mill formerly leased by James M. Hyde of Stanford University, California. The mine was operated 1917-18 and large bodies of silver-lead and copper ore opened up. No recent re-

turns. Mine idle 1920, but worked in 1919 by the **Red Mtn. Mines Co.**, which see.

CREEDE CONTACT MINING CO. **COLORADO**

Address: Creede, Colorado.

Property: the Acanthus silver mine at Creede, Mineral county. Operated part of 1919, but shipped no ore. Idle 1921.

CREEDE EXPLORATION CO. **COLORADO**

Out of business. See Vol. XIV.

CREEDE UNITED CO. **COLORADO**

Dead. No operations since 1918. See Vol. XIV.

CRESSON CONSOLIDATED GOLD M. & M. CO. **COLORADO**

General office: 800 Exchange Natl. Bank Bldg., Colorado Springs, Colo. **Mine office:** Cripple Creek, Colo.

Officers: A. E. Carlton, pres.; C. K. Boettcher, v. p.; A. F. Zang, sec., F. P. Shove, treas., with Spencer Penrose, T. B. Burbridge, C. M. MacNeill, L. G. Carlton, I. T. Snyder, directors. A. L. Blomfield, gen. mgr.

Inc. Sept. 21, 1894, in Colorado. **Cap.** $1,250,000; par $1; $1,220,000 issued; no funded debt. Transfer agent, Columbia Trust Co., New York and company office. Registrar, Bank of America, New York and Colorado Title & Trust Co., Colorado Springs, Colo. Listed on New York Curb and Colorado Springs Mining Exchange. Annual meeting 1st Tuesday after 1st Monday in September.

Financial statement for year ended Aug. 31, 1921, shows net receipts from ore sales, $825,687; other revenue, $5,641; Total expenses deducted, $400,084, leaving net profit, $431,244. Reserves for depreciation $103,484; for depletion, $842,812. Surplus for year, $637,029. Net profits for 4 months to Jan. 1, 1922, were $257,480.

Dividends: 8% in 1908; 12% in 1909 and 1910; 19% in 1911; 20% in 1912; 25% in 1913; 30% in 1914; 145% in 1915; 85% in 1916; 120% in 1917 and 1918; 100% in 1919; 20% in 1920; 10%, Jan. 10, 1922. Total to that date $8,745,163. From Sept., 1916, to Sept., 1919, inclusive, distributions were 10¢ per month, but payments now are only made as profits warrant. Total dividends nearly $9,000,000 to end of 1921.

Property: Cresson and the Trilby mines, about 49 acres on Raven hill, Cripple Creek, Teller county, was considered of little value, until 1914, when a sensational discovery was made in a cavern, or vug 14' by 33' by 36' found on the 1,200' level, whose walls were coated and lined with rich telluride of gold. One shipment returned $468,637. The former owners divided $1,200,000 in first half of 1915, and in July, 1916, sold property to the present company for over $4,000,000.

Development: extensive by 1,935' shaft with intermediate levels at 100' intervals. For the year to August 31, 1920, drifts, crosscuts, etc., totaled 3,588', together with 907' of diamond-drilling. Workings connect with Roosevelt drainage tunnel on 1,600' level.

Ore reserves: in May, 1920, Louis R. Noble reported net value of fully developed reserves as $1,623,987, against $2,537,889 in Feb., 1919. This amount does not, however, include a rich strike reported on the 10th level, estimated to be 60' by 8½', and assaying $40 per ton. Late in 1921 it was reported that the largest orebody of district had been cut between the 1,100 and 1,200' levels, which should net $1,500,000 or $1 per share and that ore had been found on the 1,600 and 1,700' levels. Ore production about 200 tons per day.

Productions: years ending Aug. 31: 1920, 106,626 tons; $1,471,307 gross value, or $14.79 per ton; $935,853 net value, or $8.77 per ton. The tonnage in 1919 was 94,920, and in 1918, 89,730.

In Jan., 1921, the output was 8,000 tons of ore. There were 130 men employed.

CRESTED BUTTE MINING CO. **COLORADO**

Address: Crested Butte, Colo.

Property: the Forest Queen silver mine at Irwin, Gunnison County.

Operated during 1919, but shipped no ore. Idle 1920.

CRIPPLE CREEK DRAINAGE & TUNNEL CO. COLORADO

Address: A. E. Carlton, Colorado Springs, Colo. Is a drainage company, doing no mining.

Officers: A. E. Carlton, pres., with Irving T. Snyder, R. Roelofs, Irving Howbert, executive committee; Colo. Title & Trust Co., treas.; W. R. Waterton, sec.; T. R. Countryman, engr.; C. H. Fuller, supt.

Cap. $1,000,000; $1 par.

Company drove and controls a drainage tunnel through properties of Cripple Creek, Teller county, producers, from western slope of Grouse Mtn. toward the Golden Cycle and Vindicator mines at the N. E. end.

The tunnel as originally driven had a length of about 14,300′. In sections it is 9′ wide, 7′ high, with a ditch on one side, 2′ deep and 4′ wide. Grade is 0.3%. Average cost per foot of tunnel was $27.27, the cost being defrayed by the larger companies of the district. An extension financed in the same manner was completed during 1918, giving the tunnel a total length of 22,000′. This extension, 7,700′ long, passes under the Elkton and Rose Nicol mines, and laterals have been driven to connect with the Portland shaft at 1,950′ and Cresson shaft at 1,800′ depth. Early in 1921, the flow of water was about 1,000 gallons per minute.

CRIPPLE CREEK GENERAL MNG. & EXPL'N CO. COLORADO

Dead. See Vol. XIV.

CRIPPLE CREEK GOLD MINING CO. COLORADO

Address: Victor, Teller county, Colo. Company is a close corporation. Geo. Harris, mgr.; B. J. Corbett, supt.

Property: the Fortuna mine at Victor, first worked about 16 years ago, operated unsuccessfully for a time, closed down and again reopened in 1914.

The mine shows veins 18″ to 24″ wide, in contact between black schist dike and granite.

Development: by 220′ shaft and drifts on the Strong vein, which traerses the property. Shaft was to be sunk an additional 300′. Two levels said to show large bodies of fair grade ore, and a few shipments reported to have assayed $15 per ton.

Equipment: hoist, air compressor, electric compressor, and 80-h. p. boiler.

Operated during 1919, but shipped no ore. Idle 1921.

CRIST MINE COLORADO

Address: Charles E. Thompson, Livermore, Colo. This gold-silver mine at Fort Collis, Larimer county, was operated part of 1920, but no ore shipped.

CROWN POINT MINE COLORADO

Address: Schoellkopf & Stroehle Leasing Co., Idaho Springs, Colo.

Property: at Idaho Springs, Clear Creek county, operated during part of 1920. The Virginia mine is worked by same lessees.

CROWN PRINCE CONSOLIDATED MINING CO COLORADO

Office: 948 Gas & Electric Bldg., Denver Colo. **Mine office:** Empire, Clear Creek county, Colo.

Officers: Wm. G. Krape, pres.-mgr.; J. E. Rinehart, v. p.; D. Erickson, sec.; with Daniel Erickson, directors.

Inc. June 9, 1910, in Arizona. **Cap.** $3,500,000; shares $1 par; outstanding, 3,433,014.

Property: the Mint and Hecla mines, 17 claims, 85 acres, near Empire. Gold-silver ore occurs in veins and is low grade.

Development: by 75′ shaft and tunnels, longest 1,025′, with total underground workings of 7,000′. Equipment includes electric hoist.

Production claimed to have been $200,000 in the past. Operations in 1920 reported to consist of drifts on veins in which only low values were found as levels had not yet reached ore-shoot.

CUMBRE MINING CO. COLORADO

Company dissolved. See Vol. XIV.

DANA MINING CO. COLORADO

Office: Boulder, Colo.

Officers: Jas. B. Simpson, Boston, pres.; A. S. Coan, Boulder, v. p.; M. McClure, sec.-treas.

Property: the Hoosier group of mines at Summerville, Boulder county, worked slightly in the past. Has a 600' tunnel at roadside level, and drove a 90' crosscut, 300' from portal, disclosing silver and gold ore, in 1918.

DANIEL PETERS MINE COLORADO

Address: Walter E. Burlingame, Box 628, Denver, Colo. Mine at Silver Plume, Clear Creek county, contains silver-lead ore. Operated, but not shipping, 1920.

DANTE GOLD MINING CO. COLORADO

See **Dante M. & M. Co.**; also **Big Toad M. & M. Co.**

DANTE MINING & MILLING CO. COLORADO

Office: 224 Temple Court Bldg., Denver, Colo.

Officers: L. K. Aitken, pres.; W. Arthur Perkins, v. p.; A. D. Aitken, sec.; R. A. Schwab, treas.; E. P. Arthur, Jr., supt.

Inc. 1895, in Colorado **Cap.** $1,250,000; $1 par; all issued. Company has no liabilities, and had $17,555 cash and $1,575 securities in the treasury, Jan. 1, 1919. Stock listed on the Colorado Springs Mining Exchange. Charter renewed Nov. 25, 1915, for 20 years.

Cripple Creek Group.

Property: Dante mine, about 10 acres, patented, in Sec. 20 on Bull Hill, Cripple Creek, Teller county. Said to show gold ore averaging $20 per ton. Late in 1920 a strike of ore assaying $25 per ton was reported cut on the 600' level by a sub-lessee.

Development: by 1,200' shaft with 7,000' of crosscuts and drifts, and 520' shaft with 3,800' of crosscuts and drifts.

Equipment: 75-h. p. hoist, air compressor, complete machinery plant, 1,000' of cable and surface buildings. During 1918 a cyanide plant with a daily capacity of 50 to 75 tons was installed to treat low-grade ores.

Production: (gross) to Jan. 1, 1919, $1,213,136; in 1918, $87,758.

Operations 1919-20 did not prove remunerative and early in 1920 an arrangement was made to take over property and liabilities of the Big Toad M. & M. Co.

Big Toad Group.

Property: 17 claims, 300 acres near Alma, Park county, held under 5 year bond and lease. Purchase price, $50,000, to be paid at the rate of $10,000 yearly; first payment was due Sept., 1917. Claims are on the Eastern slope of Mt. Bross, and are said to show 2 veins on the surface carrying gold, silver and lead.

Development: consists of 250' tunnel to be driven 500', and an old shaft.

Equipment: includes a 100-ton mill and 4,200' aerial tram.

In December 1920, the **Edna Forest M. & M. Co.**, which see, was given a lease on part of the Dante mine.

DARNELL LEASING CO. COLORADO

Address: Del Norte, Saguache Co., Colo.

Operated the Esperanza gold-silver-manganese mine at Center, Saguache county, throughout 1920, shipping ore.

DAY STAR MINES CO. COLORADO

Idle 1920. No recent returns.

Main office: Marion, Ind. **Mine office:** Pitkin, Gunnison county, Colo.

Inc. 1906, in Colorado. **Cap.** $1,000,000; $1 par; 700,000 shares outstanding. Annual meeting in August.

Officers: Isaac R. Wagoner, pres.; Edwin Caldwell, sec.; J. H. Deakin, treas.; John E. Clark, gen. mgr., all of Marion, Ind.

Property: 19 lode mining claims, 40 acres of placer ground and a mill-site in Quartz Creek, a total of 198 acres, about 9 miles from Pitkin, Gunnison county.

Development: in 1918, three tunnels, 650', 140' and 180' long respectively, had been driven on a vein showing some ore said to run 92 oz. silver, 4.35% copper, $40 gold, 20% lead, and 20% zinc.

DEADWOOD LEASING CO. COLORADO

Dead. See Vol. XIV. Mail returned from former address: Victor, Colo.

DEEP SHAFT MINING CO. COLORADO

Address: Breckenridge, Colo.

Property: the Deep Shaft mine on Shock hill, near Breckenridge, Summit county. After 15 years suspension, due to litigation, mine was re-opened in 1920.

Development: by 700' shaft, deepest in district save the Brooks Snyder of Wellington Mines Co.

Equipment: electric power (Colorado Power Co.), operating hoist, compressor, and dwellings.

DENBIGH MINING CORPORATION COLORADO

Address: 85 Devonshire St., Boston, Mass.; or Silver Plume, Colo. Temple H. Fay & Co. of Boston is interested.

Officers: W. Roch, pres.; J. F. Lindel, v. p.; G. A. Haskell, treas.; J. N. Reynolds, sec., all of Boston, Mass., with H. F. Wells and J. E. Berry, of Boston, J. J. Mendell of Manchester, Mass., and W. H. Perry of Beverly, Mass., directors. H. S. Bushnelle, mgr.

Inc. in 1916, in Colorado. **Cap.** $1,000,000; $1 par; all issued. Listed on Boston Curb. Indebtedness, $20,000.

Property: a lease and bond for $250,000 on the Terrible mine and other properties of the Whiting Mining & Milling Co., and of the Terrible—Dunderberg Mining & Power Co. These mines are one mile from Silver Plume, Clear Creek county. Properties have been worked for 40 years and comprise 43 patented claims, about 300 acres. The company controls a number of old-time producing mines, and the dump from the Seven-Thirty, Mammoth, Brown and Dunderberg workings, known as the "Big Slide in Brown gulch."

Ore: carrying silver, lead and zinc occurs in a fissure vein in granite and schist. Vein dips 70° N. and strikes N. E. The sulphide pay ore in each mine occurs in shoots, each over 250' long, and streaks of varying size.

Development: by a working tunnel with 7 levels above it and 7 below it, reached by a 70° shaft, 600' deep. Method of working is by shrinkage stoping. Total extent of workings is about 5 miles. A winze 70' below deepest workings is in $50 ore for the entire depth.

Equipment: includes hoist, pump, and 100-h. p. compressor. Both water power and electricity are used. The 75-ton mill contains crushers, rolls, jigs, and tables, and can, it is said, treat the ore at the very low cost of $1 per ton. The manager estimated 1919 that $39,000 was needed to complete the new shaft, repair mill, and do other work.

The Big Slide property is believed to have possibilities in depth and in virgin ground, provided that funds are sufficient for the plans outlined.

The 1917-18 market campaign of Thos. W. Lawson of "Frenzied Finance" fame, sent the stock to $2¼ with a gradual decline to 20c. in May, 1919, after the "campaign" had ended. In October, 1919, Mr. Lawson issued a statement claiming that he dropped the stock because 400,000 shares that had been tied-up in a Trust Co. pool, were being unloaded in the form of receipts, and claimed the company was on the verge of bankruptcy, with $25,000 in debts. His reorganization committee formed the Denbigh Mining Corporation to take over the property, old stock exchangeable for new on payment of 10c. a share. This was, it is said, approved by the stockholders, but a meeting was called by Henry F. Wells, for December 3, 1919, to con-

Operated and produced during 1919-1920. Operations in 1921 were in the Terrible mine, where new work on the 13th level showed smelting ore a foot or more thick for 130' in length, averaging 100 oz. silver and $10 gold per ton. The death of Mr. Fay in Nov., 1921, deprived the company of its chief financial backer.

DENVER-BOULDER TUNGSTEN PROD. & DEV. CO. COLORADO

Idle.

Address: 514 Mining Exchange Bldg., Denver, Colo.

Officers: D. S. Young, pres. and supt.; G. P. Howard, v. p. and treas.; F. E. Wire, sec.

Inc. in Colorado. **Cap.** $100,000; par 10c.

Property: 10 claims on Lee Hill, Boulder county, showing tungsten ore with gold value. The company has closed down to await relief by tariff legislation. Management reported that it had lots of ore, but no market for it.

DENVER CITY CONSOLIDATED SILVER MNG. CO. COLORADO

Address: 1343 High St., Denver Colo.

Property: the Denver City zinc mine at Leadville, Lake county. Operated, and shipments made, part of 1919 and 1920.

DENVER LEADVILLE MINING & TUNNEL CO. COLORADO

Address: E. M. Tressler, sec., 241 Coronado Bldg., Denver, Colo.

On Oct. 19th, 1921, the stockholders are said to have approved the transfer of company's property to a new corporation.

DENVER MINE COLORADO

Address:: Hatton & Todd, Montezura, Summit Co., Colo.

Development: work only was done at this silver-gold mine during 1920.

DENVER MINING & MILLING CO. COLORADO

See **Denver City Cons. Silver Mines Co.**, which apparently succeeded this company. At last report officers were Hinsdale Smith, Springfield, Mass., pres.; D. A. Roller, Equitable Bldg., Denver, Colo., sec.

Inc. in Colorado. **Cap.** $100,000; par 10c.

Property: 100 acres, patented, at Wortman, Lake county; held under long-term lease and option.

Reported that a mill has been erected and is turning out lead and zinc concentrates. Company claims to have $200,000 worth of ore blocked out.

DENVER MINING POOL CO. COLORADO

Office: 319 Guardian Trust Bldg., Denver, Colo.

Inc. 1920, in Colorado.

Property: the Atlantic silver-lead mine, 3 claims, at Blackhawk, Gilpin county. Mine lies between the Alaska and Hard Money mines. Quartz porphyry contact.

Development: by 150' shaft with levels on contact at 80' and 150'. Operated part of 1920-21, but made no shipment.

DERRY MINING & LAND CO. COLORADO

Address: R. F. Lafferty, gen. mgr.

Inc. March, 1915, in Colorado. **Cap.** $100,000.

Owns placer land near Leadville, on which Derry Ranch Gold Dredging Co. (which see) operates a dredge.

DERRY RANCH GOLD DREDGING CO. COLORADO

Office: New York Engineering Co. 2 Rector St., New York. **Operating office:** Robert F. Lafferty, mgr., Leadville, Colo.

Officers: A. C. Ludlum, pres.; R. F. Lafferty, v. p.; George Sommer, sec.-treas., with John Nisbet and N. D. Wanless, directors.

Inc. in Colorado. **Cap.** $100,000; $100 par; all issued.

Dividends: 75% in 1916; 25% in 1917; 35% in 1918; 14% in 1919; 51% in 1920, a total of 200%.

Property: 1,800 acres of placer ground near Leadville, owned by the Derry Mining & Land Co., and under lease to the Dredging company.

Development: drilling proved an average depth of 30', containing 25c per yard.

Equipment: modern 5½ cu. ft. dredge, digging 75,000 yards per month using electric power. No work is done during the winter.

Production:

Year	Yardage	Av. per yd.	Total gold
1920	324,132	43¢	$140,150
1919	487,931	19	82,626
1918	453,000	20	93,000
1917	518,000	21	112,000
1916	499,000	24	120,000
1915 (2 months)	142,900	44	62,291

This is a profitable dredging enterprise, owned largely by Mr. Ludlum.

DES MOINES MINE — **COLORADO**

Address: George Walker, Jamestown, Colo.

Property: at Jamestown, Boulder county, was operated in 1920 for the fluorspar in the veins.

DETROIT & COLORADO MINING CO. — **COLORADO**

Mortgage on property foreclosed by its bondholders, 1918. Has been idle 10 years because of litigation and has now lost its property. See Vol. XIII. The Detroit-Colorado and Coming Wonder mines, in San Juan county, were being worked by lessees in 1920.

DEVIL'S HEAD COPPER MNG. & DEV. CO. — **COLORADO**

Mail returned 1921 from former office: 700 Commonwealth Bldg., Denver, Colo. See Vol. XIV.

DEXTER GOLD MINING CO. — **COLORADO**

Address: Anderson & Benkleman, 802 Paul St., Denver, Colo.

A close corporation controlled by Eastern capital.

Property: the Dexter mine, on Bull hill, Cripple Creek, Teller county, under lease to C. W. Benkleman, of Denver, and Anderson Bros., of Victor. Gold ore occurs in veins, 4' wide and proved for 175'.

Development: by 1,300' shaft, crosscuts and tunnel. Mine was a steady producer for several years. Average output amounted to 600 tons monthly, showing values from $10 to $30 per ton.

Equipment: compressor, power plant and surface buildings.

Operated 1920-21.

DIAMOND CONSOLIDATED MINING CO. — **COLORADO**

Mail returned from former address: Silver Plume, Clear Creek county, Colo. See Vol. XIV.

DIG-GOLD MINING CO. — **COLORADO**

Address: 222 McPhee Bldg., Denver, Colo., or Victor, Colo.

Inc. 1915. **Cap.** $150,000.

Property: the Alpha and Omega mines, at Cripple Creek, Teller county. Ore occurs in a vein, 5' wide on 200' level. Surface work said to show a number of veins containing low-grade ore.

Development: by 270' shaft on line between the two claims. Mine is drained to 200' level by the Roosevelt tunnel. Work in 1921 was on West vein, driving north to junction with Keystone.

Equipment: includes hoist and air compressor.

Property operated 1921, by a syndicate of company stockholders, under 5-year lease.

DIGMORE MINING & MILLING CO. — **COLORADO**

Address: Malmo, Nebraska. The Digmore mine at Ward, Boulder county, Colo. was operated 1920, by J. F. Logan of Rowena, Colo.

Property: the Sans Souci gold-silver mine at Ward, Boulder county

Operated part of 1919, but made no shipments.

DIME LEASING CO. **COLORADO**

Address: Boulder, Colo.

Did development work only in 1920 on the Dime gold mine at Crisman, Boulder county.

DINERO MINING & TUNNEL CO. **COLORADO**

Address: Jones Lease, 1343 High St., Denver, Colo. Mine at Leadville, Colo.

Property: the Dinero gold-silver mine at Leadville, Lake county.

Operated by Jones Lease and produced during 1919 and 1920.

DIVES LEASING CO. **COLORADO**

Address: care D. MacLean, Durango, Colo.

Property: the Dives and Trilby mines at Howardsville, San Juan county. Ore carries gold, silver and lead.

Operated and produced during 1920.

DIVES-PELICAN AND SEVEN THIRTY MINES **COLORADO**

Address: J. H. Robeson, Georgetown, Colo., or G. L. Cole, Springfield, Mo.

Property: 81 patented claims in the Silver Plume district of Clear Creek county, reported sold to New York interests early in 1920. The mines have yielded several millions worth of silver-lead ores. Dumps are estimated to contain 600,000 tons of $6 to $9 ore. In 1920, Burleigh tunnel was reopened and the mine opened 400′ deeper from the Colorado Central ground.

Equipment: includes a 200-ton concentrating plant, to be improved and enlarged.

D. L. & W. MINING & REDUCTION CO. (THE) **COLORADO**

Former office: 629 Davidson Bldg., Sioux City, Iowa.

Company dissolved. See Vol. XIV for former holdings, etc.

D. M. & CHANCE MINING CO. **COLORADO**

Address: Creede, Colo.

Property: the Last Chance, New York, and Del Monte mines in the Creede district of Mineral county. Ore carries gold, silver, and lead.

Operated and produced during 1919 and 1920.

DOCTOR JACK POT MINING CO. **COLORADO**

Office: State Bank Bldg., Cripple Creek, Colo.

Officers: A. E. Carlton, pres.; V. H. Mann, sec.-treas.; L. G. Carlton, mgr., with H. L. Shepherd, Ira Harris, and A. M. Stephenson, directors.

Inc. Aug. 31, 1905, in Wyoming. **Cap.** $75,000; shares 2½c. par; $71,160 outstanding. Colorado Title & Trust Co., Colorado Springs, transfer agents. Annual meeting second Wednesday in June. Listed in Colorado Springs and Denver.

Dividends: to Jan. 1, 1919, $143,264; last dividend, $30,000, paid Dec., 1916.

Property: 15 claims, 99.3 acres, patented, on Raven hill, Cripple Creek, Teller county, said to show gold ore in fissure veins. Three fractional claims were purchased at a cost of about $5,000, in 1916.

Development: by tunnels and vertical shafts, amounting to several miles of workings with deepest at 900′. The Raven tunnel is over 3,000′ long. A total of 577′ of work was done in 1916 without developing any ore.

Equipment: includes a 52 h. p. electric hoist and air compressor. Electric power is used. A tramway was erected in 1918 to the Ingham dump.

Production: in 1918, lessees produced 524 dry tons of ore with gross value of $6,025, netting company $1,129. In 1916 the output was 15,216 tons of $7.47 ore. The total output of this mine, 1903-1919, is about $2,850,000.

The Ingham mine of this company was worked under lease 1920 and 1921, producing mill ore.

DOLD MINING CO. **COLORADO**

Address: C. J. Dold, Leadville, Colo.

Property: the old Northern mine of 8 acres, in Downtown section of Leadville district, Lake county, adjoining the Coronado on the north, held under a 10-year lease from the **Leadville Basin Mines Co.**, which see. Ore carries silver, lead, and manganese.

Development: by two 640′ shafts. There are three ore horizons at as many contacts, which are porphyry and limestone. Newell shaft was reported re-opened, 1918, when production was 25 tons of manganese ore daily Rich lead carbonate ore, high in silver, was opened at 640′ in 1919, and shipments made.

DOLLY B. MINE **COLORADO**

Address: Harvey & Co., 431 Harrison Ave., Leadville, Colo. Mine at Leadville, Lake county, was operated, and silver-lead ore mined and shipped, 1920.

DOLLY VARDEN MINES **COLORADO**

Owned by the **Louisiana-Colorado Mining Co.**, which see.

DOLORES SILVER MINES, INC. **COLORADO**

Address: Sterling, Colo.

Operated the Emma mine and mill at Rico, Dolores county, in 1920.

DORA CONSOLIDATED MINING CO. **COLORADO**

Address: Silverton, Colo.

Officers: E. P. Ricker, pres. and gen. mgr.; with Joseph Boyce, resident, director.

Property: 26 claims and 8 millsites, patented, 300 acres, near Silverton, San Juan county, formerly known as the Hercules Consolidated. Total output since the late seventies is said to be over $10,000,000.

Geology: claims show fissure veins traversing a complex area of schists, quartzite and granites, overlying San Juan tuffs, in turn overlain by andesite and sedimentaries. These are traversed by dikes of diorite, etc. A large amount of smelting ore said to be exposed.

Development: by 6 crosscut tunnels, one 2,400′ long, giving a depth of 1,500′. Workings total 30,000′. Shipping in 1918 and 1919; idle 1920.

DOTY MANGANESE CO, THE **COLORADO**

Dead. See Vol. XIV.

DOUGLAS MOUNTAIN COPPER CO. **COLORADO**

Idle 1920-21.

Office: 209 Chamber of Commerce Bldg., Denver Colo,

Officers: R. J. Morris, pres.; Robert Pherson, v. p.-gen. mgr.; V. C. Walters, sec.-treas.

Inc. in Colorado. **Cap.** $1,000,000; $1 par; 640,000 shares in treasury.

Property: 31 claims, 600 acres, together with lease and bond on Bromide mine, 4 claims, 40 acres, located 70 miles from Craig, Moffat county, and within 10 miles of Utah, in the Escalante hills. Ore contains chalcocite and bornite. Vein is reported to show 20″ to 6′ of ore that will average 25% copper.

Development: on Sutton group, by 700′ of tunnels. Company reports 8,000 tons of ore blocked out averaging 12% copper. Bromide mine, by 249′ shaft and 3 levels, 1,300′.

Equipment: hoist, compressor; a 20-ton reverberatory smelter planned at the Sutton mine, also an ammonia leaching plant.

DOWN TOWN MINES CO. **COLORADO**

Office: 129 West 8th St., Leadville, Colo.

Officers: J. C. Waldeck, pres.; H. W. Mann, v. p.; C. J. Walker, sec.-treas.; Jesse F. McDonald, mgr., with W. T. Nardin, directors.

Inc. March, 1914, in Colorado. **Cap.** $600,000; $10 par. Stock entirely owned by Western Development Co., which see. Company has 20-year leases on several of the Down Town mines at Leadville.

Income 1920, from ore shipped, $325,000, at net loss of $15,000 for years operations, but completion of new plant of Western Zinc Oxide Co. will furnish market for 18,000 tons yearly of company's zinc ore.

Property: 400 acres, includes 15 old mines which have produced several millions of dollars. These mines had been idle for many years, and it was thought that all the valuable ore had been extracted, but in former mining no zinc ore was taken out.

Development: by shafts 400' to 875' 'deep, and 158,400' of underground workings. Reserves 200,000 tons.

Production: for the year ended June 30, 1918, was 60,934 tons of ore valued at $755,000. Operating expenses were $350,000. Company planned in 1918 to reopen the Coronado shaft.

Equipment: compressor, 175-h. p. electric hoist, electrically-driven pump.

Company is the largest producer of Leadville. Shipments for 1920, mainly iron-silver ore from the Penrose, ran about 2 cars daily, and totaled 45,364 tons yeilding $357,803 gross.

DOYLE CONSOLIDATED MINES CO. — **COLORADO**

Mail returned 1921 from former address: 1426 U. St., Washington D. C.

Mine office: Mancos, Montezuma county, Colo.

Officers: Hon. Jas. Doyle, pres.; Earl P. Hopkins, v. p.; E. R. Marden, sec., D. T. Thompson, treas., with Wm. W. Fry and J. J. Butler, directors. R. J. Doyle, mine supt.; R. C. Morrison, mill supt.; C. F. Doyle, engr.

Inc. Oct. 21, 1907, in Arizona, as consolidation of the Mancos Mining & Development Co., the Cliff Dwellers Gold Mining Co. and the White Quail Copper Co. **Cap.** $10,000,000; $1 par; issued about 3,000,000.

Property: 31 claims, in 3 groups of about 300 acres in Rush basin, part of the California mining district, Montezuma and La Plata counties, in southeastern Colorado. Claims are in a high part of the Sierra La Plata, 3½ miles from La Plata city and 4 miles from the Colorado Southern railroad. The White Quail property contains a copper-bearing "dike" of monzonite-porphyry, said to be 150' across and to average 2½% copper and $4 gold for this entire width. Other claims cover about a mile of the apex of the Sundown (or North Star) vein, a flat dipping fissure in red quartzite, carrying milling ore with gold and silver values. Company developed properties for several years, through Columbus tunnel. Had 10-stamp mill in 1910 and erected a new 150-ton mill, operated July, 1912. Company advertised for lessees in 1914.

Property has thus far failed to fulfill the extravagant claims and promises of the White Quail promoters or their successors. More recent information not obtainable. The stock selling campaign appears to have been more successful than the mining and milling operations. Presumably dead and stock valueless.

DRECKSHAGE MINING & TUNNEL CO. — **COLORADO**

Address: Crested Butte, Colo.

Property: the Dreckshage silver mine at Gothic. Gunnison county. Operated during 1919 and 1920, but shipped no ore.

DROPNER MILLING, MINING & TRANS'N CO. — **COLORADO**

Mail returned May, 1920 from former office: Georgetown, Colo.

Officers: H. E. Crist, pres.; E. Larson, v. p.; Thos. Rendahl, sec.-treas. and supt.

Cap. $3,000,000; $1 par; 200,000 shares in treasury.

Property: 23 claims, 300 acres, at Dropner, Clear Creek county. Has a contact vein between porphyry and granite, showing gold, silver, copper, and traces of platinum and molybdenum.

Development: by 3 tunnels, 650', 100' and 100' long. No shipments reported. Mine was worked part of 1919. Idle 1920.

DRUID GOLD MINING CO. — **COLORADO**

Office: 307 Boston Bldg., Denver, Colo.

Officers: W. N. Vaile, v. p.; C. A. Chisholm, sec.-treas.; Geo. E. Collins, E. M. mgr., with H. N. Berry, directors.

Inc. in Colorado. **Cap.** $1,000,000; $1 par; all issued.

Property: 11 claims, 95 acres, near Central City, Gilpin county. Ground has a complex system of fissure veins, carrying gold, silver, lead and copper in Archean schist. Developed by 1¼ miles of workings, including 1,200' tunnel and several shafts, deepest 650'. Equipped with steam hoists.

Production: property operated continuously from 1904 until 1919 with total production of $388,649.31. Closed down June, 1919. Total production since location, about $750,000. Ore shipped averaged about 1.30 oz. gold and 16 oz. silver per ton, with some lead and copper.

DRUMMOND MINING & MILLING CO. **COLORADO**

Address: 226 Temple Court, Denver, Colo.

Operated the Tom Moore mine at Lawson, Clear Creek county, part of 1920, but shipped no ore.

DUBUQUE MINING & TUNNEL CO. **COLORADO**

Out of existence several years. Described, Vol. XIII.

DUMONT MINING & MILLING CO. **COLORADO**

Address: Dumont, Colo.

Officers: George Wight, pres.; Ernest Wight, v. p., both of Denver; C. W. Lerchen, sec. and mgr., Dumont; Simon Batterman, treas., and Robbie B. Sercher, director.

Inc. Jan. 27, 1917, in Colorado. **Cap.** $100,000; $1 par; 51,000 issued.

Property: 6 patented claims, 30 acres, known as the Syndicate property; also the Kokomo Pioneer mill at Dumont and the Pioneer Gold mining property and mill at Empire, all in Clear Creek county.

Ore: lead-bearing fissure veins in granite schist. Vein is 4' to 14' thick, runs E.-W. and dips at 15° to 45°. Ore has an average value of $7.45 per ton.

Development: by McClelland and other tunnels. 100' to 900' long, with total of 4,500' of work and a depth of 1,000' said to block out 30,000 tons of ore.

Reported 1921 that company was working on the complex ore problem preliminary to resumption of milling operations. Idle 1919 and 1920.

DUNKIN MINING CO. **COLORADO**

Address: 1543 High St., Leadville, Colo.

Property: the Dunkin silver mine at Leadville, Lake county. Operated and produced during 1919 and 1920.

DUNKIN MINING CO. **COLORADO**

Address: care Forman & Robinson, Breckenridge, Summit county, Colo. Boston Safe Deposit & Trust Co., Boston, transfer agent..

Property: the Dunkin mine, on Nigger Hill, 1½ miles from Breckenridge, Summit county, worked under long time lease by O. K. Gaymon, Theo. H. Knorr and W. W. Wharton of Breckenridge, and J. A. Summer of Salt Lake City. Claims show lead-sulphide ore carrying good value in gold. Several rich pockets of ore were reported found in 1914-15 and to have netted the lessees $15,000, $30,000 and $35,000. The Wolftone vein, under development, is said to carry lead-carbonate ore, valued at $40-$50 per ton at a depth of 500'.

Development: by 600' shaft, tunnel and crosscuts. During 1920, development was continued, but no ore shipped..

DURANGO LEAD AND COPPER SMELTER **COLORADO**

Owned by the American Smelting & Refining Co.

Office: 120 Broadway, New York. Operating address: F. C. Gilbert, mgr., Denver, Colo. **Works Address:** R. P. Raynolds, supt., Durango, Colo.

Has an annual capacity of 210,000 tons.

EAGLE MINE **COLORADO**

Address: Bonanza, Saguache Co., Colo., or C. M. Glasgow, St. Louis, Mo.

Property of **Saguache Eagle Mng. Co.**, which see.

EAGLE MINING & MILLING CO. **COLORADO**

Property sold to **Empire Zinc Co.**, of Colorado, which see.

EAGLE ORE CO., **COLORADO**

Out of business. The plant sold Dec. 31, 1920, to **Eagle Samplers, Inc.,** which see.

EAGLE PASS MINING & MILLING CO. **COLORADO**

Address: M. S. MacCarthy, mgr., 627 First National Bank Bldg., Denver, Colo.

Inc. May, 6, 1913, in Colorado. **Cap.** $250,000; shares $1 par.

Property: 3 claims (the Eagle Pass, Bodie, and Roosevelt), 1 patented, 30 acres, at May Day, La Plata county, showing ore carrying gold, silver and lead in fissure veins in limestone and porphyry. Developed by 1,000' tunnel. Only assessment work done for years. In October, 1919, the upper levels were leased for a year. A prospect.

EAGLE ROCK TUNGSTEN PRODUCTION CO. **COLORADO**

Dead. See Vol. XIV.

EAGLE SAMPLERS, INC. **COLORADO**

Address: A. W. Oliver, mgr., Victor, Cripple Creek, Colo.

On Jan 1, 1921, company took over the sampling plant of the Eagle Ore Co. at Victor, which is in active operation.

EARLY BIRD MINING & MILLING CO. **COLORADO**

Address 409 Central Block, Pueblo, Colo. C. B. Blitzkie, owner.

Property: the Early Bird gold-silver-lead mine near Silverton, San Juan county. Mill ore will be treated in the Bagley mill acquired 1920 by Blitzkie.

Operated part of 1919 by lessees, who shipped rich gold-silver ore. Idle 1920.

EAST ARGENTINE MNG., MLG., POWER & TRANSP. CO. **COLO.**

Address: Georgetown, Clear Creek Co., Colo. Did development on the Sydney tunnel in 1920.

EASTERN STAR MINE **COLORADO**

Address: G. H. Bibb, Silverton, San Juan Co., Colo.

Development only done in 1920.

EAST LAKE MINING & MILLING CO. **COLORADO**

Address: W. M. Elwell, sec., Wedgewood Bldg., Toledo, Ohio. **Mine address:** N. Nelson, mgr., Edwards, Eagle Co., Colo.

Officers: C. N. Harps, pres., Findlay, Ohio.; J. T. Montgomery, v. p.; W. M. Elwell, sec.-treas., with Wm. Stilt, E. L. Grove, G. M. Book and C. R. Campbell, directors.

Inc. Dec., 1904, in Colo. **Cap.** $750,000; par $1; 600,000 issued. Bond issue $50,000; $35,000 issued. Affiliated with Packard Power & Mining Co.

Property: 150 acres, patented, near Edwards, Eagle county, is again under development (1921) after 3 years' idleness. A 3,000' tunnel is being driven and drifts run on several veins containing streaks of shipping ore 4 to 5" thick. A 50-ton shipment in 1914, ran $70 per ton. Lessees formerly worked mine through Big Five tunnel.

EAST NOTAWAY MINE **COLORADO**

Address: Petter Lentz & Co., Central City, Gilpin Co., Colo. Thos. Martin, supt.

Operations resumed in 1920 and 1921 and new work done on 600' level, or 150' above water level in shaft.

ECLIPSE LEASING CO. **COLORADO**

Address: F. R. Marsh, pres. 402 Bennett Bldg., Colorado Springs, Colo.

Inc. 1917, to operate a five-year lease on the Jo Dandy mine, Raven hill, Cripple Creek, Teller county. Operated and shipped ore during 1919-20.

ECLIPSE MINE (ASPEN) **COLORADO**

Address: F. R. Leaver & Co., Aspen, Pitkin Co., Colo., which operated mine in 1920.

ECLIPSE MINE (NUCLA) **COLORADO**

Address: Sullivan Bros. & Clark Akers, Nucla, Montrose county, Colo.

EDGAR MINE **COLORADO**

Address: Alfred Friedman & Co., Idaho Springs, Clear Creek Co., Colo.

This mine, whose ore carries gold, silver, and lead, was operated and shipments made during 1920.

Is an old mine worked since 1914 by Friedman & Carnahan.

EDNA FOREST MINING & MILLING CO. COLORADO

Address: T. W. Meers, c/o Gold Sovereign M. & T. Co., 223 Burns Bldg., Colorado Springs, Colo.

Inc. 1920, in Colorado.

Property: leases secured in December, 1920, on the lower levels of the Dante and Gold Sovereign mines, on the S. slope of Bull hill, Cripple Creek, Teller county.

Development: at the Dante by a main 1,200′ shaft with 7,000′ of workings; at the Gold Sovereign by a 1,350′ shaft. Working in 1921.

EDNA MINING CO. COLORADO

Dead. See Vol. XIV.

EGYPTIAN MINING CORP. COLORADO

Mail returned 1921 from former address: Sunshine, via Boulder, Colo.

Cap. $50,000.

Property: 6 claims, at Sunshine, Boulder county, 8 miles from Boulder.

Development: by 100′ shaft, also a 150′ tunnel with crosscuts to parallel veins.

Operated part of 1919, but made no production. See Vol. XIV.

ELECTRO COPPER CO. COLORADO

Address: William R. Rathburn, Denver, Colo. **Mine address:** Camp Rathburn, Mile Post 155, Denver S. L. R. R., Eagle Co., Colo.

Officers: W. R. Rathburn, pres.-mgr. G. H. Newkirk, v. p.; Edwin Park, sec.; F. E. McAllister, treas.; C. W. Doolittle, registrar. Wm. Kelly, J. N. Wyman, E. E. Lloyd, and B. C. Johnson, trustees.

Property: 163 acres in the Yarmony Creek district, including the Baily copper mine at Copper Spur, near McCoy on the Moffat railroad, in Eagle and Routt counties. Ore is malachite in granular sandstone. The deposit is said to be of "blanket" formation.

Development: by tunnels and shafts. The main adit is 750′ long, with 1,500′ of laterals, and a shaft is down 300′. All workings are said to be in the blanket deposit of ore, which carries 4% copper or more, with low gold and silver contents.

Equipment: complete camp, steam boilers, hoist, and a 500-ton electrolytic leaching plant, on which construction was started early 1921.

ELK MINING & MILLING CO. COLORADO

Address: Silverton, Colo. J. J. Cusick, v. p.-mgr.

Property: the Elk mine, 325 acres on Red Mountain, near Silverton, San Juan county, said to show several veins in andesite from 2′ to 7′ wide, carrying gold, and silver ore.

Development: by tunnel driven at a depth of 1,200′. Management installed new machinery in 1917 and expected to drive tunnel 1,000′; also planned to erect a concentrating mill. Some work done 1919, but no ore shipped. Idle 1920.

ELK MOUNTAIN MINING & MILLING CO. COLORADO

Address: Kokomo, Colo.

Property: the Wilfley mine and mill in the Kokomo-Robinson district, Summit county, N. of Leadville.

Ore occurs as replacements in limestone and carries silver, gold, lead and zinc. In summer of 1917 it was reported that a vein 4′ to 10′ wide had been opened, assaying as high as 1,000 oz. silver per ton. No recent information obtainable, save that the mill operated during 1919.

ELK PARK MINING CO. COLORADO

Address: 200 Enterprise Bldg., Denver, Colo. **Mine Address:** care C. A. McNeil, mgr., Apex, Gilpin Co., Colo.

Property: the Anne H. mine at Apex, Gilpin county. In July, 1920, ore assaying 2 oz. gold, 16% copper and 3 oz. silver was opened on the

200' level; also 30" of $11 milling ore. The stamp-mill was to be improved by adding a flotation plant.

ELKTON CONSOLIDATED MNG. & MLG. CO. **COLORADO**

Address: P. O. Box 138. Colorado Springs, or Cripple Creek, Colo.

Officers: George Bernard, pres.; A. E. Carlton, v. p., with M. F. Stark, C. G. Kingsbury, C. B. Ferrin, D. C. Goddard, and E. P. Shove, directors. H. M. Ragle, sec.-treas.; R. P. Windsor, supt., at last accounts.

Inc. 1892, in Colorado; extending 1912 for 20 years. **Cap.** $3,000,000; $1 par; 368,116 shares in treasury. Annual meeting in February. Listed on Colorado Springs Exchange. Company is one of the oldest in the Cripple Creek district.

Balance sheet as of Dec. 31, 1920, shows; assets, $3,680,193, which includes mining property, $3,141,484 and plant, etc., $68,022; treasury stock, $368,116; Cripple Creek Drainage & Tunnel Co., $98,400; cash, $2,706; accounts receivable, $1,909. Current liabilities were $16,122.

Earnings in 1920 from ore sales amounted to $154,117; miscellaneous earnings, $572. Expenses were $151,538, making profit, before depletion charge, of $3,052.

Dividends: to Jan. 1, 1919, were $3,579,460; the last dividend paid May 24, 1915, was $50,000; previous to this date the rate had been 2c. a share quarterly.

Property: the Elkton group, 93½ acres, patented, on Raven hill, in Cripple Creek district, Teller county, includes Appie Ellen, Thompson, Raven, Tornado Gregory and Ida May mines. The Ida May group of claims was purchased in 1911. Ore is a sulpho-telluride in fissure veins in breccia and granite.

Development: by shafts, with many miles of workings. The main shaft, 1,630' deep, has 18 levels, and is connected with the Roosevelt tunnel by a raise from the tunnel-level. Since October, 1916, only lessees have operated on the property.

The 16th, 17th and 18th levels showed a decrease in value in 1916. The management believed they were in the so-called lean zone, but expected an enrichment when deeper developments were possible. No new developments up to 1920.

Production: (from the Elkton mine)

	Tons Ore	Value p. Ton	Cost p. Ton(a)	Freight & Treatment
1920..(by lessees)	27,089	$5.69	(includes 23,300 tons dump ore)	
1919..(by lessees)	8,884	9.84	(Includes 5,372 tons dump ore)	
1918	3,284	11.40	$....	$7.04
1917	24,854	6.22	....	2.79
1916	36,036	8.09	....	4.17
1915	16,510	18.42	3.30	5.63
1914	29,509	18.37	2.62	5.34
1913	28,814	18.88	2.40	5.95
1912	29,163	19.01	2.22	5.85

(a) Total cost of ore shipped includes underground labor and sorting, sampling and loading, but not development.

Total production to 1921, about $13,000,000. Present production under leasing system, mainly from ore sorted out of old mine dump. Underground production for 1920 was 3,789 tons of an assay value of $38,667 and net mill return of $21,203, compared with 3,511 tons in 1919 of gross value of $53,888, and net mill return of $35,498. The Raven Hill property was leased for 5 years, from 1921, to the Elkton Leasing Co.

ELKTON LEASING CO. **COLORADO**

Address: George Bernard, mgr., Cripple Creek, Colo.

Organized 1921, to operate the Elkton mine under a 5-year lease from the Elkton Cons. Company, which see.

EL MAHDI MINE **COLORADO**

Address: Alex Martin & Co., Ouray, Ouray Co., Colo., who operated the mine in 1920.

EL PASO CONSOLIDATED GOLD MINING CO. **COLORADO**

Office: 800 Exchange National Bank Bldg., Colorado Springs, Colo. Also, 20 Broad St., New York; and Cripple Creek, Colo.

Officers: Fred W. Bailey, v. p.; Daniel Thatcher, sec-treas., with J. K. Corbiere, W. C. Sherwood, Geo. W. Gano, R. M. Rankin, A. E. Carlton, A. J. Stybr and G. N. Miller, directors, F. R. Crawford, mgr.

Inc. Feb. 27, 1893, in Colorado. **Cap.** $2,500,000; par $5; outstanding 490,000 shares. No bonded debt. Stock transferred at office of secretary, Colorado Springs. Colorado Title & Trust Co., Colorado Springs, and Registrar & Transfer Co., New York, registrars. Annual meeting, 2nd Monday in April. Fiscal year ends March 31. Listed on Colorado Springs Exchange and New York Curb.

Dividends: (on old stock of $1 par) 1903, 2½c.; 1904, 13½ c.; 1905, 23c.; 1906, 7c.: 1907 and 1908, 2c. each; 1909, 1c.; 1910, 2c.; 1911, 2½c.; 1012, 5c.: (on stock of $5 par): March 31, 1913, 12½c.; Feb. 25, 1914, 10c.; none since. Total dividends, $1,707,545.

Revenue in 1920 was $1,639 from royalties. After paying all charges there was a loss of $6,257.

In 1919, the income was $10,879 with a loss of $38.61. Current assets at end of 1920 were: cash in bank, $13,489; stocks and bonds, $11,554, with practically no liabilities.

Property: 70½ acres in the Cripple Creek district, Teller county, including Elkton and Tornado mines developed by three shafts to a depth of 1,350′. Has been a prominent operator for a great many years. For geology of the Cripple Creek district, see 16th Ann. Rept. of Colo.; also U. S. G. S. Bull, 260, 1915, pp. 85-98. Orebodies occur at vein intersections in vicinity of phonolite dikes.

Development: by 3 shafts. In 1917, management stated that the prospects of finding pay ore below the 1,000′ level did not warrant further exploration work, and therefore, company has confined itself strictly to leasing.

Production: in 1920 was 1,807 tons of $7.12 ore of gross value of $12,871, with royalty to company of $1.639; in 1919 was 2,951 tons of a gross value of $16 per ton, or $48,832, from which company derived $10,076 royalty.

Ore shipments and discoveries in 1919 and 1920 were disappointing. For statement of 1917-1919 litigation and dissensions, see Vol. XIV.

EL PASO EXTENSION GOLD MNG. CORP'N **COLORADO**

Address: C. W. Hays, gen. mgr., Parkersburg, W. Va. **Mine address:** J. S. Anderson, supt., Cripple Creek, Teller Co., Colo.

Inc. in West Virginia

Property: the Rocky Mountain and North Slope claims, 9.55 acres, on Beacon Hill. First named claim has old 250′ shaft.

Also, a 5-year bond and lease on the Index mine, formerly operated by the Index Mining Co. The mine, situated on the southwestern slope of Gold Hill, was idle for about 7 years, In 12 months' operations the shaft was sunk 200′ to the 1,150′ level, and company and sublessees have shipped regularly about 7 cars of ore a month, averaging better than $30 per ton. Work has shown a promising quartz vein, 665′ from surface, and a highly mineralized dike of basalt containing sylvanite, reported to average $80 per ton.

In August, 1919, company acquired control of the Lexington Gold Mining Co.'s 13 acres on Gold hill and the Laura D mine. In 1920, an electric hoist was erected at the Rittenhouse shaft, where low-grade ore has been opened and 3,000′ of development done.

Production: about 2 to 8 cars, or 400 tons a month of $100 ore, throughout 1920 and 1921.

Reported 1921 to have acquired holdings of **Moonlight Gold Mining Co.**, 23 acres, on Gold hill.

EL PASO GOLD KING MINE — **COLORADO**

Address: Owen Roberts, lessee, Cripple Creek, Colo., Sam McDonald, mgr.

Property: owned by the Gold King Mining Co. in Poverty Gulch, Cripple Creek district, Teller county, is developed by 1,007′ shaft, which is to be deepened. Lessees were reported to be making shipments in 1918. In Dec., 1920, the above named lessee had resumed work after a 2-year shutdown. A strong vein of $20 ore was discovered on the surface Aug., 1921, and shipments were reported made.

EMANCIPATION MINE CO. — **COLORADO**

Address: Boulder, Colo.

Property: a gold-silver mine at Gold Hill, Boulder county, Operated part of 1919, but shipped no ore. Idle 1920.

EMBORIUM MINE — **COLORADO**

Address: Hoffman & Boyd, Silverton, Colo.

Property: at Red Mountain, San Juan county, shows gold-silver-lead bearing ore. Operated during part of 1920.

EMPIRE CONSOLIDATED MINES CO. — **COLORADO**

Address: Empire Clear Creek Co., Colo.

Operating North Empire mine and Empress tunnel, 1920.

EMPIRE STATE MINES & RED. CO. — **COLORADO**

Probably dead. No returns securable. See Vol. XIV.

EMPIRE ZINC CO., THE — **COLORADO**

Subsidiary of the New Jersey Zinc Co., 160 Front St., New York.

Office: Canon City, Colo.

Officers: Edgar Palmer, pres.; A. P. Cobb and J. E. Hayes, v. p.'s; A. B. Schultz, sec.; H. S. Wardner, treas.; G. F. Wolff, comptroller.

Owns or controls the following **properties:**

Small Hopes Mine, Leadville, Colo. Formerly owned by Small Hopes-Boreel Mng. Co. Is opened by the Robert Emmet, 800′ and McCormick, 500′, shafts. Produced zinc, lead and iron sulphides; also some zinc carbonate in 1920.

Eagle Mines, Gilman, Colo. Two mines in Battle Mountain district, Eagle county, formerly owned by Eagle M. & M. Co. Ore is mainly zinc-iron sulphide and is treated by a roasting and magnetic separation process. Formation is considered similar to that at Leadville. By new mine connections, mining costs will be reduced. Reserves are estimated at 2,000,000 tons of 15% zinc ore, carrying lead and iron. Operated 1920.

Empire Zinc Mill and Oxide plant, Canon City, Colo. This is a combined magnetic and wet mill designed to treat complex sulphide ores. Ores for this mill are purchased from outside producers. A complete ore-testing plant is also maintained. The treatment works operated steadily in 1919-1920.

Hanover Mines, Hanover, New Mexico. Equipment consists of mill of 250 tons daily capacity using raw magnetic separation and 800-h. p. power plant equipped with Diesel type of crude oil engines. Ore is principally zinc sulphide associated with hornblende, serpentine and other metamorphic minerals, occurring as irregular-shaped masses in limestone near igneous contacts.

Republic Mine, Hanover, New Mexico. Bought from Republic Mng. & Mlg. Co., January, 1920, for $500,000, includes the Welch group of 90 acres, in Central district, Grant county, adjoining Hanover mine. Zinc and iron ores are opened by 3 shafts and 1,586′ total workings. Reserves estimated to be 50,000 tons of 20% zinc ore and indications of a large tonnage of ore carrying 50-60% iron.

San Xavier mine, 20 miles south of Tucson, Ariz. Is idle, though

camp and plant are kept in order. The oxidized zone has produced a considerable tonnage of copper, lead and zinc carbonates. The sulphide zone shows a large tonnage of low grade zinc ore of a very complex nature.

The Colonel Sellers mine, in California Gulch, near Leadville, Lake county, Colo., is worked out, and operations were discontinued in 1917. No production figures are available.

The **Kelly mine,** including former Tri-Bullion holdings, in Magdalena district, Socorro county, and **Cleveland** mine in Pinos Altos district, Grant county, New Mexico, have been exhausted and closed, as is the case also with the **Potosi** mine in Yellow Pine district, Clark county, Nevada. See Vol. XIV for description of these 3 mines. The Small Hopes mine is closed down, and the Empire mill was not operating during 1921.

In Mexico, company controls **El Batamote** mine in Alamos district, Sonora; **La Penascosa** mine in Monclova district, Coahuila; and **La Bufa** group in Venado district, S. L. P. All are zinc properties, the two latter being active at last account.

EQUITY CREEDE MINING CO. **COLORADO**

Company declared bankrupt January, 1920. See Vol. XIV for particulars about corporation.

ERMA LEASING CO. **COLORADO**

Address: care Iowa Tiger mill, Southwestern Mng. Co., Silverton, Colo.

Property: a lease on the Silver Lake mine, near Silverton, San Juan county, from which shipping ore was sent to the Durango smelter and concentrating ore to the I. T. mill, in 1921.

EURADES MINING CO. **COLORADO**

Address: W. E. Cuthbert, Ouray, Ouray Co., Colo.

Property: the Des Ouray and Benach mines, in Uncompahgre canyon, near Ouray, re-opened in 1920. Veins are in andesite. Exploration is by crosscut tunnels. Operated for 18 months and early in 1921 cut the big Blanchard vein showing 5′ to 8′ of gold-silver ore, some of it high grade. A complete mining plant is at work. Work suspended August 1921, owing to a bank failure in Chicago.

EVANS GROUP SYNDICATE **COLORADO**

Address: H. W. Nicholls, Salina, Colo.

Property: the Evans mine, at Summerville, Boulder county, on which a lead-zinc vein was exposed by dredging operations. The syndicate was sinking a shaft to develop this vein. Operated 1920.

EVERGREEN GOLD & COPPER MINES CO. **COLORADO**

Reorganized as the **Evergreen Mines Co.,** which see.

EVERGREEN MINES CO. **COLORADO**

Office: 408 Empire Bldg., Denver, Colo. **Mine office:** Apex Gilpin county, Colo.

Officers: J. L. Tapp, pres.; Geo. E. Bell, v. p.; Wm. C. Hollister, sec.-treas.; preceding with W. J. Tapp, E. F. Krewinghaus, M. C. Shaffer, Edwin Ettinger, J. C. West and A. M. Roth, directors. Etienne A. Ritter, cons. engr.; Shad Reid, supt.

Inc. Sept. 17, 1914, in Colorado. **Cap.** $2,000,000; $1 par; outstanding a little over 1,000,000 shares. Notes authorized and outstanding, $75,000 Annual meeting, third Tuesday in August.

Company is a reorganization of the Evergreen Gold & Copper Mines Co.

Property: the Evergreen mine with 11 claims, 3 patented, 70 acres, in the Pine mining district.

Geology: the property shows Archaen gneiss and crystalline schists, cut by pegmatite, with an eruptive rock called "evergreenite." This dike is 3 to 12′ in width, bounded on either side by ore-bearing contact zones of about 50 to 80′ width. The ore deposit is unusual, carrying secondary bornite disseminated irregularly through monzonite.

Development: by tunnel and 850′ shaft. Two ore shoots were found on the 100′ level, 1 on the 200′ and a new one south of this on the 350′ level. Main orebody is 15 to 18′ thick. There are 4 known ore shoots, carrying chalcopyrite bornite and covellite, estimated by management to average 3.5% copper, 2 to 8 oz. silver and 50c to $4 gold per ton. The upper workings show some malachite and tetrahedrite. Underground work amounts to over 4,000′. A shoot of bornite ore 5′ thick was cut on 200′ level in 1919; and late in 1920 another rich shoot was opened.

Equipment: includes electric power with a 45-h. p. hoist and 4-drill air compressor. A 100-ton mill has one No. 4 Telsmith gyratory crusher, Marcy mill, Dorr classifier, and 2 Card tables. Flotation plant installed and began operations August, 1916. Concentrates gave average value of $110 a ton from $5 crude ore.

No production figures are available. Operated during 1919 and 1920, but shipped no ore.

EXCELSIOR MINING, MILLING & ELECTRIC CO. **COLORADO**

Office: 401 Interstate Trust Bldg., Denver, Colo.

Officers: F. B. Wiborg, pres.-treas.; W. F. Robinson, sec.; E. Flood, supt.

Cap. $250,000; $1 par, fully issued.

Property: the Excelsior mine at Frisco, Summit county, shows lead-copper ore with gold and silver. Developed by 2,600′ tunnel and 120′ shaft. In 1917, the mill was remodeled to a 50-ton capacity, and a flotation unit added.

Also a lease and bond from the Stratton Cripple Creek Mng. & Dev. Co. on the Longfellow mine, consisting of 2 claims adjoining the Golden Cycle and Vindictor mines, at Victor, in Cripple Creek district, Teller county. And also has a lease on the Polar Star group at Georgetown, Clear Creek county.

Operating and producing during 1919 and 1920.

EXPRESS HEADLIGHT MINING & DEVEL. CO. **COLORADO**

Address: Villa Grove, Saguache Co., Colo.

Operated the Express and Headlight gold-silver mines in 1920, but shipped no ore.

FAIRFIELD MINE **COLORADO**

Address: J. F. C. Webb, Russell Gulch, Colo. The mine near Central City, Gilpin county, was operated and ore shipped throughout 1920.

FANNIE B. MINING CO. **COLORADO**

Office: 213 Coronado Bldg., Denver, Colo.

Property: the Fannie gold-silver mine at Blackhawk, Gilpin county. Operated in 1919 and 1920, but shipped no ore.

FANNY BARRETT MINING & LEASING CO. **COLORADO**

Address: 317 Exchange Natl. Bank Bldg., Colorado Springs, Colo.

Property: the Fanny Barrett manganese mine at Alma, Park county. Operated part of 1919, and shipped ore.

FANNY FERN MINING CO. **COLORADO**

Address: J. C. Foster, lessee, Lake City, Hinsdale Co., Colo.

Property a lease on the Fanny Fern gold-silver-lead-copper mine at Lake City, Hinsdale county. A shoot 10 to 36″ wide and 400′ long was reported developed in 1920.

Shipments have been made during the past 5 years. Values in 1920 were reported to run from $60 to $350 per ton.

FANNY RAWLINGS MINING CO. **COLORADO**

Office: 6 N. Nevada Ave., Colorado Springs, Colo. **Mine address:** A. M. Belcher, Box 457, Leadville, Colo.

Officers: John A. Himebaugh, pres.; Charles D. Hayt, v. p.; Walter C. Frost, sec.-treas.; W. R. McConihay, mgr.

Cap. $1,000,000; **par** $1; cash in treasury, Jan., 1920, $13,307. Has $5,700 loaned at 5½% and secured by lien on first-class improved real

estate; U. S. savings stamps, $1,000; stock 5,551 shares. Last stockholders' meeting held June 29, 1912. Listed on Colorado Springs Exchange.

Dividends: to date, $55,000; last of $5,000, paid Feb. 10, 1920, the first since Dec., 1908. All taxes paid and company has no debts.

Property: the Fanny Rawlings claim, about 10 acres, on Breece Hill; Lake county, near Leadville. Leased to Charlestown, W. Va., parties, who are operating on the 600' level. The Fanny Rawlings company receives 20% to 35% royalty on all shipments made by the lessees.

Development: on south half of claim said to have cost $255,000.

Shipments in 1918 said to run 4.25% copper 15 oz. silver, and a little gold. In December, 1920, sub-lessees on No. 3 and 4 levels shipped 50 tons of $50 silver ore per week; and zinc carbonate ore was sent to the Western Zinc Oxide Plant. Production steady from 200 and 400' levels throughout 1921.

FARNCOMB HILL GOLD DREDGING CO — **COLORADO**

See Tonopah Placers Co., which operates company's ground, also Vol. XIV.

Former address: Breckenridge, Colo.

FARWELL MOUNTAIN COPPER CO. — **COLORADO**

Probably dead. Described in Vol. XII. Mine in Routt county, Colo.

FAUNTLEROY GOLD MINING CO. — **COLORADO**

Office: 317 Exchange National Bank Bldg., Colorado Springs, Colo.

Officers: Verner Z. Reed, pres.; L. L. Aitken, v. p.; A. D. Aitken, sec.-treas.

Cap. 1,250,000 shares; $1 par. In treasury Jan. 1, 1919, $29.69; no stock. All taxes paid. Liabilities $3,563. Last stockholders' meeting, April 18, 1911. Listed on Colorado Springs Exchange.

Property: 5 claims, 20.3 acres, patented, on Gold hill and Mineral hill, Cripple Creek, Teller county.

Development: on the Little Fauntleroy, consists of 900' of work done from the Ophelia tunnel, 278' below surface. Shaft from surface also connects with tunnel. The Garfield claim has an 80' shaft with 100' of drifting.

Gross production to date, $8,311. Mine idle 1919 and 1920.

FERRO-ALLOY CO. — **COLORADO**

Subsidiary of The Vindicator Gold Mng. Co.

Office: 603 Symes Bldg., Denver, Colo.

Officers: Nelson Franklin, v. p.-mgr.; S. B. Tyler, supt.

Operated a ferro-alloy plant at Iron Mtn., Utah Junction, Adams county, in 1920. See same title under Wyoming.

FIDELITY GOLD MINING CO. — **COLORADO**

Address: Twin Lakes, Lake Co., Colo.

Controlled by Chas. J. Fox., 3316 N. 17th St., Philadelphia, Pa.

Property: 12 patented claims in the Lackawanna gulch section 6 miles from Twin Lakes, near Leadville, developed by several tunnels. A 4' vein of smelting ore was opened up on the 1,200', or lowest tunnel level, reported to assay $200 per ton in gold, with silver and copper values. In September, 1919, new work opened ore running 3 to 7 oz. gold and 100 oz. silver in an old tunnel. The two streaks of high-grade ore were 6 to 10" wide in a vein of 48 to 60".

Development: by tunnels, with main adit at 12,100' elevation.

Operated part of 1919 and shipped ore. Apparently idle in 1920, but late in 1921, very rich copper-silver ore was cut in a vein 3 to 5' wide.

FIFTY GOLD MINES CORPORATION — **COLORADO**

In bankruptcy since 1910. In July, 1919, a deed was recorded at Gilpin, conveying from G. A. Bierbaum to the **Gilpin Giant Mines,** all the holdings of the Fifty corporation. This included the mill and all equipment.

FINDLEY MINES CO. — **COLORADO**

Address: Cripple Creek, Colo.

Officers: L. G. Carlton, pres.; A. E. Carlton, v. p.; V. H. Mann, sec.-treas.

Inc. Jan. 1, 1912, in Wyoming. **Cap.** 2,000,000 shares; par value 2½c. In treasury, Jan. 1, 1921, 750,000 shares.

Dividends: total $337,500; last dividend, $12,500, paid September, 1906, by original company. Colorado Title & Trust Co., Colorado Springs, transfer office. Annual meeting 2nd Wednesday in June. Last meeting, June, 1913. Stock listed on Colorado Springs Exchange. Liabilities, $22,700 demand notes.

Property: 5 claims, patented, 12.5 acres, on south slope of Bull hill, Cripple Creek, Teller county.

Ore: carries gold and occurs in fissure veins. Workings are extensive, aggregating about 6 miles. Property fully equipped with machinery.

Litigation: Stratton C. C. M. & D. Co. vs. Findley, re extra-lateral rights to the Basket and Luce vein. The vein is being worked by lessees and royalties are being deposited in escrow pending settlement.

Production: gross to date is $1,651,183.

Operated and produced ore during 1919. Idle 1921. See Strattons. **Cripple Creek Mng. & Dev. Co.**

FIRST NATIONAL MINING CO. **COLORADO**

Address: Creede, Colo. Operated the Molly S. mine at Creede, Mineral county, during part of 1920, and shipped some ore.

FLAT TOP CAMP MINE **COLORADO**

See **Radium Co. of Colorado.**

FLORA BELL MINING CO. **COLORADO**

Address: 712 Interstate Trust Bldg., Denver, Colo. **Mine address:** St. Elmo, Colo.

Property: the Flora Bell mine at St. Elmo, Chaffee county. Ore carries gold, silver, lead and zinc.

Operated and produced during 1919 and 1920.

FLOWER OF THE WEST GOLD MINING CO. **COLORADO**

Probably dead. See Vol. XIV for description.

FLUORSPAR PRODUCTION CO. **COLORADO**

Address: Jamestown, Colo. Operated a concentration mill at Jamestown, Boulder county, in 1920.

FOREST QUEEN MINES CO. **COLORADO**

Address: 612 E. & C. Bldg., Denver, Colo.

Officers: R. A. Sullivan, pres.; Edwin Gaylord, v. p.-gen.-mgr.; J. H. Redding, sec.-treas.

Property a 5-year lease from May, 1917, on the Forest Queen mine on E. slope of Ironclad hill, Cripple Creek, Teller county. Ore said to average $15 per ton. Main shaft 1,000' deep, worked 1920 and 1921.

Regular shipments were made to the Golden Cycle mill in 1919.

FOUR-MOST MINING & MILLING CO. **COLORADO**

Office: 509 Pennsylvania St., Denver, Colo.

Property: the Four-Most mine at Frisco, Summit county. Ore carries gold, silver, and lead.

Operated part of 1919, and shipped ore. Idle 1920.

FOWLER MINING & DEVELOPMENT CO. **COLORADO**

Address: Fowler, Colo.

Property: the Silver Real silver mine at Rosita, Custer county.

Operated part of 1919, but shipped no ore. Idle 1920.

FRACTION LEASING CO. **COLORADO**

Address: Idaho Springs, Colo.

Operated the Fraction mine at Idaho Springs, Clear Creek county, in 1920.

FRANK HOUGH MINING CO. **COLORADO**

Office: 830 Equitable Bldg., Denver, Colo. **Mine:** Lake City, Hinsdale county, Colo. **Inc.** 1907, in Colorado.

Property: on Engineer mountain, has a 2,500′ tunnel developing a large body of copper sulphides, including bornite, with assays up to 27% copper, 47 oz. silver and $5 gold per ton. Mine shipped several hundred tons of high-grade silver-copper ore, under former ownership.

Equipment: includes 800-ton shipping bins.

Production: estimated at 250,000 lb. fine copper in 1909, and 600,000 lb. in 1910. Property considered promising, but was closed down in 1912 because of destruction by fire of its surface equipment. Idle, 1916-'20.

FRANK ZARTZ LEASING CO. **COLORADO**

Address: 514 W. Chesnut St., Leadville Colo.

Operated the Robert E. Lee and Little Silver mines at Leadville, Lake county, in 1920.

FREE COINAGE CONSOLIDATED MINES CO. **COLORADO**

Address: Killen, Reinert & Downey, 717 Cooper Bldg., Denver, Colo.
Mine office: Independence, Colo.

Officers: J. B. Neville, pres.-sec.; C. W. Maleham, v. p.-treas.; with A. V. Hunter, directors.

Inc. 1917, in Colorado. **Cap.** 1,500,000 shares; one mill per share par; 395,710 outstanding. Company is successor of Free Coinage Mng. Co.

Property: the Pinto mine and Free Coinage group, 5 patented claims, 40 acres, in Cripple Creek district, Teller county, said to carry the Pinto, Wilson, Black Dick and Pueblo veins. The Delmonico, adjoining them, was acquired for $500,000 in April, 1917.

Development: will be through the 1,125′ Delmonico shaft, into Pinto and Wilson ground, two mines that have a $2,000,000 production. Mines are being operated by lessees, S. Cox and others. L. F. LeBrun, who had a lease on the Wilson claim, secured a three-year extension; he also obtained additional ground. The lease now covers 1,300′. An important discovery of rich surface ore was made September, 1921.

Production: over $2,000,000 in gold from above the 750′ level.

FREEDOM MINING & MILLING CO. **COLORADO**

Probably dead. See Vol. XIV for description.

FREELAND DEVELOPMENT & TUNNEL CO. **COLORADO**

W. L. Shaffer, gen. supt., Idaho Springs, Clear Creek Co., Colo.

Property: a lease on the old Freeland group, of the Freeland Dev. & Trans. Co. fully described in Vol. X. Ore contains gold, silver, lead and copper. Operations reported resumed in 1920.

FRENCH FLAG MINING & MILLING CO. **COLORADO**

Address: Chas. S. Ripley, P. O. Box 366, Idaho Springs, Colo.

Property: French Flag mine, at Idaho Springs, Clear Creek county. Ore contains gold-silver-copper-lead.

Development: by shaft and crosscuts. The Wyoming Valley tunnel in Gibson gulch drains the property at 1,000′ depth. The mine was unwatered early in 1921.

FRENCH GULCH DREDGING CO. **COLORADO**

Address: Box 1038, Colorado Springs, Colo.

Company has a dredge operating in French gulch, about 2 miles east of Breckenridge, Summit county. The machine is working on a channel 400 to 500′ wide and digging 38′ deep. Said to produce $1,000 gold per day during the season. Operating steadily.

FRONTENAC LEASING CO. **COLORADO**

Address: Russell Gulch, Colo.

Property: the Frontenac mine at Russell Gulch, Gilpin county. Ore carries gold, silver and copper.

Operated and shipped during 1919 and in 1920.

FULLER, MacCULLOCH CO. **COLORADO**

See Vol. XIV. Failed in business in 1919.

GALENA MT. GOLD & SILVER CO. **COLORADO**

Address: Silverton, Colo.

Officers: Harry Lazarus, pres., Delta, Colo.; A. S. Popper, v. p.; N. S. Lazarus, sec.-treas.

Inc. 1907, in Colorado. **Cap.** 120,000 shares; 111,000 outstanding.

Property: the Anti-Periodic group of 7 claims, 6 patented, about 45 acres, Galena Mountain, San Juan county. Has six fissure veins in porphyry and trachyte showing sulphide ore assaying $8 to $1,000 per ton in gold, with some copper. One vein, 27′ wide, reported to assay $12 in gold and silver for the entire width.

Development: by about 1,800′ of underground workings, including 500′ crosscut tunnel being driven to cut big vein at 300′ depth. Company has produced $18,000 worth of ore. No work done during 1919-21.

GALLIC-VULCAN GROUP — COLORADO

Address: Lake City, Colo.

Property: 2 patented claims and 2 mill sites on North Henson creek, 11 miles from Lake City, Hinsdale county. Elevation is 10,000′. Ore carries lead, copper, silver, and gold.

Development: by tunnels and a total of 4,000′ of workings. Near the breast of main adit are said to be veins from 6″ to 4′ wide, carrying ore of good grade. There is a mill on the property.

GAMBETTA MINE — COLORADO

Address: W. E. Bowden, 431 W. 1st St., Leadville, Lake Co., Colo. Operated throughout 1920.

GARBUTT LEASING CO. — COLORADO

Address: 329 W. 8th St., Leadville, Colo. John Cortellini, mgr. Company is a close partnership and does not divulge results of its operations.

Property: the Garbutt, Negro Infant, King Solomon and Ontario mines, at Leadville, Lake county. Company operates through a 1,200′ shaft.

Equipment: includes a steam hoist and 15-drill compressor.

Operated during part of 1920 and 1921.

GARFIELD MINING CO. — COLORADO

Offices: Garfield, Colo., and 503 K. of P. Bldg., Indianapolis, Ind.

Officers: C. O. Patten, pres.; Walter Johnson, v. p.; Fletcher Johnson sec.-treas., with C. A. Chambers, C. W. Means, E. J. Chambers, and John Harcourt, directors. E. W. Fisher, mgr.

Inc. April 1, 1918, in Colorado. **Cap.** $10,000; 1 cent par; 775,000 issued.

Property: 19 claims, 17 patented, in Chaffee county. Mine has a 10′ vein, dipping at 70°, said to be in limestone and to carry 20% zinc. Some orebodies carry gold, silver, lead and copper. Reserves are given as 1,000,000 tons.

Development: by tunnels, 1,000′ and 2,000′ long, and 6,000′ of workings. Greatest depth is 1,600′.

Company has expended $20,000 on development, and received $10,000 from sale of ore. Plan installing a 50-ton concentrator and flotation mill. A shaft to connect upper and lower tunnels was being sunk at last reports.

Production: total output 900 tons, average grade $20 per ton. Prior to present company's purchase, the property was idle for 12 years. Management is developing property, shipping only easily mined ore.

Operated and produced during 1919, but idle 1921.

GAUNTLET GOLD MINING CO. — COLORADO

Office: 512 Boston Bldg., Denver, Colo.

Property: the Gauntlet gold-silver mine at Central City, Gilpin county.

Operated but made no shipments during 1919 and 1920.

GEM CONSOLIDATED MINES CO. — COLORADO

Out of business. See **Gem Mng. Co.**, also Vol. XIV.

GEM MINING CO. — COLORADO

Office: 711 Symes Bldg., Denver, Colo. **Mine address:** Idaho Springs, Colo.

Officers: J. Foster Symes, pres.-treas.; Hon. W. E. Renshaw, v. p.-gen. mgr.; Sir H. M. Pellett, chairman of board; Ivor O. Wingren, sec.; Louis

S. Noble, advisory engr.; R. B. Lamb, cons. engr.; B. W. W. McDougall, gen. supt.; G. C. Cochrane, mine supt.

Inc. July, 1920, in Colorado. Is a consolidation of the Idaho Mining, Reduction & Trans. Co., the holdings of the Consolidated Franklin Mines Co. the Newhouse, or Argo tunnel, and the Gem Consolidated.

Property: the Gem group, the Freighters Friend group, including Amy C and Washington mines, and the Franklin and Silver Age mine. Also the Newhouse, or Argo Tunnel and the Newton mill. All in Idaho Springs district, Clear Creek county. Owns all holdings of Argo Red. & Ore Purch. Co. The Gem and Silver Age mines were held by Willard Elliott, trustee.

Development: by several shafts and extensive openings from tunnels. In December, 1920, a drift on 600′ level of the Freighters Friend, to connect with the Silver Age, had opened 5′ of good ore. Proposed to sink a 3-compartment shaft 1,000′ from the Freighter to the Argo tunnel, and get under this new shoot.

Equipment: includes the Argo 100-ton custom mill at the portal of the Newhouse, or Argo tunnel. It employs stamps, tables, tube-mills, and flotation machines. At the Idaho property: includes 650 h. p. hydroelectric power plant, 500 h. p. steam-electric plant hoist, compressor, and the Newton 20-stamp mill and flotation plant. Newton mill operated 3 shifts continuously.

Operated and produced during 1920-21 mill treating 50 tons daily, yielding 6 cars of concentrate per month. In winter of 1920-21 company spent $130,000 in new equipment and mine development, employing 80, taking out ore from three mines and connecting up all mines with the Newhouse tunnel. Mill remodelled 1921 to handle 200 tons daily; a reduction plant and smelter are to be erected.

During year 1921, management recovered the Mazda oreshoot beyond the fault. The new company will greatly stimulate and benefit mining at and near Idaho Springs.

GENERAL CHEMICAL CO. **COLORADO**

Address: Denver Reduction Works, Osage & West Bayaud St., Denver, Colo. **New York office:** 25 Broad St.

Works acquired in December, 1919, from the Western Chemical Mfg. Co. General Chemical is probably the most important factor in the chemical industry of the United States. It specializes in the manufacture of acids, and in this connection owns or controls pyrite mines to supply the raw material for the making of sulphuric acid.

GENERAL MINES CO. **COLORADO**

Office: 515 Jacobson Bldg., Denver, Colo.

Property: the Jason manganese mine at Leadville, Lake county. Work was suspended during 1919 . Idle 1921.

GEORGETOWN TUNNEL TRANSPORTATION CO. **COLORADO**

Office: Transportation Bldg., 608 South Dearborn St., Chicago, Ill. **Operating office:** Georgetown, Clear Creek Co., Colo.

Officers: E. H. Pratt, chrm.-v. p., Chicago; C. G. Breitenbach, pres.-treas.-gen. mgr.; C. A. Basse, sec.; J. H Robeson, cons. engr., Denver, with M. B. Dittenhoefer, L. F. Shane and C. G. Earnest, directors.

Inc. 1910, in Colorado. **Cap.** $5,000,000; divided into $3,000,000 common; $2,000,000 6% cum. pfd., of which $543,470 is issued; par $5; fully paid. Annual meeting 2nd Thursday in August.

General balance sheet July 31, 1920, shows assets: property and equipment, $5,262,401; supplies, $3,000; ore and concentrate in transit, $2,656; deferred debits, $10,155. Liabilities include: cash overdraft, $22,466; accounts payable, $1,670; current, $382; preferred stock, $543,470; common, $3,000,000. Earned surplus was $1,511.

Company has under construction a deep tunnel providing drainage and ore transportation to 76 mining companies for period of 30 years and will own all hitherto undiscovered veins.

Property: company owns the following properties free from debt or mortgages and all patented: Georgetown tunnel, right-of-way, 3,000′ wide and

16,000′ long; Bard Creek, U. S. water rights; Century Pipe-Line & Power Plant; Royal Tunnel mill site; Royal mining claims; Georgetown tunnel sites No. 1, 2, and 3; Hildebrand mill site; the Chicago, Mayfield and Clara B., lode mining claims; one-sixth interest in the Cliff mining claim; and 76 thirty-year contracts with mining companies, switching yards, etc.

Development: on Jan. 1, 1921, tunnel was 3,000′ long, and will, when completed, be 16,000′ long.

Equipment: power-plant, 4-drill air compressor, and 50-ton mill erected early in 1920.

No ore was produced in 1919, but new mill was operating 1920.

GERMANIA MINE — **COLORADO**

Address: Ralph David, of Murphy, Vaughn & David, Breckenridge, Colo.

Property: the Germania silver-gold mine on Little mountain, near Breckenridge, Summit county. Operated by lessees in 1920, who shipped ore to the smelter at Leadville.

GIANT-ECLIPSE CONSOLIDATED MINES CO. — **COLORADO**

Address: P. O. Box 488, Salida, Chaffee county, Colo. Clyde H. Jay, pres. and gen. mgr.; F. L. Ream, sec.-treas.

Inc. Sept. 21, 1909, in Colorado. **Cap.** $800,000; $10 par; 72,000 issued. Annual meeting third Friday in January.

Property: 11 claims, in Monarch district, Chaffee county, near Garfield, shows contact deposits of lead-iron, copper, and zinc between granite, limestone and quartzite. Deposit runs N.-S. and dips at 45°. Orebody developed for 50 to 150′ width, 1,400′ length and 1,400′ depth, claimed to carry 12 to 18% zinc, 3 to 25% lead, 1 to 3 oz. silver and 80¢ to several dollars per ton in gold. Zinc occurs in ore and as clean zinc carbonate. Mine has tunnels aggregating several thousand feet. Company claims to have developed 10,000 tons of low grade zinc ore and a large body of limestone.

Equipment: includes electric hoist, new compressor, etc. Installed also, 1920, two trams, one aerial for ore, the other, 800′ long, for lime rock, to carry from mine direct to railroad cars.

Production: $1,000,000 production since 1878; 1500 tons zinc carbonate carrying $20 to $40 per ton, shipped from July, 1916, to March, 1920. Company made large shipments of limestone to sugar mills and ore smelters in 1920.

GIBSON HILL MINING CO. — **COLORADO**

Dead. See Vol. XIV.

GILPADO MINING CO. — **COLORADO**

Office: 512 Equitable Bldg., Denver, Colo. **Mine address:** Harry T. Willis, supt., Central City, Gilpin county, Colo.

Officers: Forbes Rickard, pres.; Armory Eliot, v. p.; S. May, Jr., sec. treas., with H. Coonley, and A. N. Burbank, directors.

Inc. 1909, in Colorado. **Cap.** originally $250,000, increased to $500,000; $1 par; all outstanding.

Property: the Powers-Chase mine, 5 patented claims, about 20 acres, in Central City district, said to show a fissure vein in granitoid gneiss. Ore is a silver-bearing copper sulphide, with some gold occurring in shoots 18″ to 24″ thick, and said to assay 1½ to 4 oz. gold and 13 oz. silver per ton.

Development: by a 570′ shaft and about 5,000′ of workings.

Equipment: includes a compressor and steam hoist.

In October, 1916, company resumed work, unwatering the Running lode mine below Blackhawk. In 1918, $15,000 was spent on development. Mine was operated and produced during 1919 and part of 1920.

GILPIN-EUREKA MINES CO. — **COLORADO**

Address: Mr. Athanson, mgr., Central City, Gilpin Co., Colo. Is a reorganization of the Gilpin-Eureka Mining & Milling Co. E. L. Clark, gen. mgr., and N. E. Isbell, cons. metallurgist.

Property: claims in Prosser gulch, Gilpin county, considered to be well situated. Ore carries gold, silver, and lead.

Development: by main shaft 720′ deep sunk 1921 to 1,000′ to connect with

the Newhouse tunnel. This will drain the workings and allow ore to be hauled out that way. The bottom level is said to be in ore all the way.

Equipment: includes mill with concentrators, motor driven. Mill moved to Eureka gulch, 1921 and increased to 40 stamps, ore hauled by aerial tram. Electric pumps installed 1921.

GILPIN GIANT MINES **COLORADO**

Address: G. A. Bierbaum, Gilpin, Colo.

Property: the 55 claims, mill, and all other equipment of the bankrupt Fifty Gold Mines Corporation in Gilpin county. Mines include the Gregory and Bobtail, near Black Hawk, which were to be unwatered and the mill overhauled in 1919. Apparently, however, no work was done in that or the following year.

GILPIN MILLING & REDUCTION CO **COLORADO**

Mail returned 1921 from former address: Central City, Gilpin county, Colo.

Officers: V. R. Jones, pres.; E. E. Jones, sec.; L. H. Guthrie, treas.

Inc. Nov., 1919, in Colorado.

Property: 5-acre millsite, water-right on North creek, and the 100-ton remodeled Hidden Treasure mill at Black Hawk. A patented process of the American Continuous Retort Co., claimed to extract all metals, no matter how refractory the ore, was to be used.

GILPIN MINES & REDUCTION CO. **COLORADO**

Dormant. See Vol. XIV.

GILPIN-ORION GOLD MINING CO. **COLORADO**

Dead. See **Combination M. & M. Co.**

GILPIN TUNGSTEN PRODUCTION CO. **COLORADO**

Mail unclaimed in April, 1920 at former address: 1712 Champa St., Denver. C. M. Kittredge, mgr.

Cap. 1,000,000 shares, 800,000 unissued.

Property: the Empress claims in Idaho Springs district, Clear Creek county, and Sternberger tract in Gilpin county.

The Empress is opened by a 500′ tunnel to depth of 300′, showing good gold-silver-copper ore. Near the Sternberger the company has claims that contain silver and tungsten ore.

No recent information. No work done at either mine during 1919.

GILT EDGE MINES & SMELTING CO. **COLORADO**

Office: 935 Equitable Bldg., Denver, Colo.

Officers: Henry I. Seemann, pres.-gen. mgr., Box 1375, Denver, Colo.; Wm. H. Warinner, v. p.; A. W. Craig, sec.-treas., with E. M. Kirton, directors.

Inc. July 24, 1913, in Colorado. **Cap.** $1,500,000, to be increased later to $2,500,000; $1 par; outstanding, March 15, 1919, 1,011,253 shares. Annual meeting, fourth Thursday in July.

Property: 46 claims, about 300 acres, mostly patented, in Lincoln mining district, Clear Creek county.

Ore: gold-silver-copper in fissure veins in schist and porphyry, said to assay from $9 to $200 per ton. The Gilt Edge mine is said to have produced some rich gold ore.

Development: the Aurora tunnel driven at a depth of 1,000′; 500′ long in Dec., 1918. Total underground workings, 2,000′.

Output said to assay over $200 per ton. Not operated during 1920.

GLACIER MINE **COLORADO**

Address: C. S. Barnes & Co., Monte Vista, Colo.

Mine at Platoro, Conejos county, was under development in 1920.

GLADSTONE MINES CO. **COLORADO**

Address: Box 128, Buena Vista, Colo.

Property: the Gladstone gold-silver mine near Buena Vista, Chaffee county. Operated during 1920.

GLOBE SMELTER **COLORADO**

Property acquired by the American Smelting & Refining Co. From the Globe Smelting & Refining Co.

Office: 120 Broadway, New York. **Operating address:** F. C. Gilbert, mgr., Denver, Colo. **Works address:** W. F. de Groot, supt., Globe Plant, Denver, Colo. The old lead smelter has been dismantled, but company operates an arsenic refinery. Cadmium also is produced.

GLOBE SMELTING & REFINING CO. COLORADO

Presumably dead. See **Globe Smelter** and **A. S. & R. Co.**

GNOME MINE COLORADO

Address: Izard Lease, Box 606, Leadville, Lake Co., Colo.

Operated during 1920.

GNOME MINING CO. COLORADO

Address: Arthur W. Johnston, mgr., Eureka, Colo.

Property: the Columbus gold-silver mine at Animas Forks, near Silverton, San Juan county.

Development: by a 1,500′ crosscut tunnel, intersecting the vein at depth of 700′. In one place vein was 30′ wide, assaying $20 per ton. Rich ore was being opened during 1920.

GOLCONDA MINES CONSOLIDATED, INC. COLORADO

Address: 403 Merchants Bank Bldg., Indianapolis, Ind. **Mine address:** B. C. Essig, mgr., Lake City, Colo.

Property: the Golconda gold-silver mine at Lake City, Hinsdale county, containing the Dewey Ingersoll and Goldman veins.

Development: by 1,500′ tunnel, under Gravel mountain, cutting the main vein at 1,000′ from portal. Ore runs over $100 in gold and silver.

Equipment: includes buildings, compressor, ore-bins, etc. A mill is to be built 1921-22. Is the leading producer of Lake City district.

GOLD ANCHOR MINING & MILLING CO. COLORADO

Address: 527 E. & C. Bldg., Denver, Colo.

Property: the Johnny Bull gold-silver-copper mine near Rico, Dolores county.

Idle 1920 but operated and shipped ore 1919.

GOLD BELT MINING CO. COLORADO

Out of business. A. B. Scott, sec., 427 Ernest & Cranmer Bldg., Denver, Colo. See Vol. XIV.

GOLD BOND CONSOLIDATED MINES CO. COLORADO

Office: 226 Temple Court Bldg., Denver, Colo.

Officers: G. A. Hummer, pres.; S. R. Herber, v. p.; C. R. Slusser, sec.-treas., with I. W. Herber and Dr. Geo. L. Dewey, directors.

Inc. 1900, in Colorado. **Cap.** $1,350,000; shares $1 par; outstanding, 1,255,000 shares.

Gross production to 1919 said to be $110,000. Company office transfers stock. Listed on Colorado Springs Exchange. Last shareholders' meeting held in 1900. No sale of stock since 1916.

Property: 4 patented claims, 18 acres, on S. W. slope of Gold hill, Cripple creek, Teller county.

Ore: gold in fissure veins in granite, said to average $5 to $32.50 per ton, with 1918 shipments of $18 ore.

Development: 400′ vertical shaft with over 2,500′ workings. Worked by Mollie O'Bryan, 1921 shipping $19.60 ore.

GOLD BOND EXPLORATION CO. COLORADO

Dead. See Vol. XIV.

GOLD CAMP SYNDICATE COLORADO

Mail returned 1921 from former address: W. Y. Seaman, 1842 Stout St., Denver, Colo.

Property: 16 acres, said to be favorably situated at Cripple Creek, Teller county, but the method of raising money by boom literature, memberships ($35 per membership, three for $100), and shares of an adjoining property, were not conducive of confidence. In July, 1917 property was transferred to a trustee, then to a new company, the **Victory Gold Mining Co.**, which see.

GOLD COIN MINING & LEASING CO. COLORADO

Office: Colorado Springs, Colo.

Officers: H. E. Woods, pres.; F. M. Woods, secretary.

Cap. $1,000,000; $1 par.

Property: 280 acres in Greeley district, Weld county, through exchange for Gold Coin property at Victor, Teller county. Company also reported to own 66,667 shares in the California Southern Oil Fields Co., which owns fields in Wyoming, Arizona, and California; 80% of stock of Crown Point Gold Mng. Co.; and a large number of shares in Lexington Arizona Mining Co.

The Crown Point Gold Mining Co. was operating a lease on the 1,000' level of the Gold Coin shaft, but shut-down in Dec., 1920.

GOLD CROWN MINING CO. COLORADO

Address: J. C. Ingersoll, mgr., Ouray, Colo. B. G. Brinkman, owner of mine, Lafayette Bank, St. Louis, Mo.

Property: 45 claims, 40 patented, 450 acres, at Ouray, Ouray county, being worked under option.

Ore: is a mixture of quartz, calcite and ferro-manganese silicates, carrying iron pyrite with gold and copper, mainly as chalcopyrite.

Development: by 1,400' shaft with 4,000' of workings.

Equipment: company's 300-ton mill was burned down June 21, 1921.

GOLD CUP MINING CO. COLORADO

Described in Vol. XIV. Succeeded by **Little Kingdom Mines & Land Co.**, which see.

GOLD DOLLAR CONSOLIDATED MINING CO. COLORADO

Stockholders voted to dissolve, in April, 1919, their interests to be conserved by surrender of old stock for shares in the **New Gold Dollar Mining Co.**, on payment of one cent a share.

Dividends: paid to 1919, $1,000,000; last dividend, $12,500, paid Dec. 1, 1912. Company's indebtedness in 1919 was $16,310.

GOLDEN AGE MINING & RED. CO. COLORADO

Probably dead. No news since 1918, when company was sending ore to the Standard mill at Springdale, Colo.

GOLDEN CALF MINING CO. COLORADO

Address: Room 24, State Capital, Denver, Colo.

Property: the Golden Calf gold-silver mine at Twin Lakes, Chaffee county.

Operated and produced ore during 1919 and 1920.

GOLDEN CONSOLIDATED MINES CO. COLORADO

Address: 1816 California St., Denver, Colo.

Officers: R. R. Moodie, pres.-treas.; C. L. Carter, v. p.; N. M. Abbott, sec.; G. N. Green, asst. sec;; with G. W. Mitchell, directors.

Inc. in Colorado. **Cap.** $75,000; 1¢ par.

Property: the former holdings of the Allerton Mining Co. in Gladstone district, a 75% interest in the Emerson, and full ownership of the Bohemian Girl, Taft, King George, Commonwealth No. 1 Tornado, Commander and West Point claims in Boulder county; also a 50% interest in 5 claims and ownership of about 20 claims and tunnel-sites in the Empire, or Iowa district of Clear Creek county, 3 miles W. of Idaho Springs. Several claims were patented in 1919. Work was resumed during 1921 and new silver-lead orebody cut on Joe and John group.

GOLDEN CRESCENT MINE COLORADO

Address: Frank L. Branham, Blackhawk, Gilpin Co., Colo., who operated the mine near Central City, in 1920.

GOLDEN CYCLE MINING & REDUCTION CO. COLORADO

Office: Colorado City, El Paso county, Colo.

Officers: A. E. Carlton, pres.; E. P. Shove, v. p.; Bulkeley Wells, sec.; L. G. Carlton, treas.; with Spencer Penrose, Richard Roelofs, and H. McGarry, directors.

Inc. 1909, in West Virginia. **Cap.** $1,500,000; $1 par; all issued. No

bonded indebtedness or preferred stock. Listed on Colorado Springs Exchange.

Balance sheet for year ended Dec. 31, 1920, shows; current assets, $645,249 and accounts payable $158,724, compared with $905,484 assets and $271,221 liabilities in 1919.

Dividends: to January, 1921, total, $9,513,330. The rate was 36% per annum, but was reduced to 24% or 8c. per share in 1921.

Property: 1,515,000 shares, or 1/3 interest, of United Gold Mines Co. and entire stock of Pikes Peak Cons. Fuel Co., operating coal mine with 15 million tons of coal, near Colorado Springs. Also reduction works at Colorado City in which all the high grade ores of the Cripple Creek district, Teller county, are treated. Plant includes rolls, roasting furnaces and cyanide equipment. An attempt was made to treat ore from Leadville, but was unsuccessful.

Golden Cycle mine was sold to the Vindicator Cons. Gold Mining Co. for $1,300,000.

Net earnings of mill have been as follows: $571,108 in 1909; $687,689 in 1910; $571,047 in 1911; $670,333 in 1912; $583,292 in 1913; $672,191 in 1914; $682,990 in 1915; $643,004 in 1916; $576,440 in 1917; $504,277 in 1918.

The coal mines bring in an additional $100,000 per annum.

GOLDEN EAGLE MINING ASSOC'N. — COLORADO

Address: 814 Central Savings Bldg., Denver, Colorado.

Property: the Rose Hardy and Cameron mines at Cripple Creek, Teller county, operated during 1920.

GOLDEN EDGE MINES SYNDICATE — COLORADO

Office: 436 First National Bank Bldg., Denver, Colo. **Mine address:** Idaho Springs, Colo.

Property: the Golden Edge silver mine at Idaho Springs, Clear Creek county, opened by a 900' tunnel. Operated part of 1919, but shipped no ore.

GOLDEN EMPIRE MINING CO. — COLORADO

Address: Empire, Colo.

Officers: B. F. Richards, pres.; G. W. Kinsey, v. p.; E. D. Payne, sec.-treas.-gen. mgr.; with W. W. Kinsey and J. W. Thayer, directors. Is a reorganization of an Arizona corporation, with Colorado holding company.

Cap. $3,000,000; $1 par; changed 1921 from $300,000; 10¢ par. Transfer office: Empire, Colo. Annual meeting, first Thursday in October.

Report for year 1920 shows: balance forward, $826; receipts from stock sales, $18,255; loans, $4,000; ore sold, $117; total $23,299. Expenses were $23,160.

Property: the Harrison, Denver City group, Denver City and Tennessee units, 31 claims, in 6 groups, in the Upper Union district, Clear Creek county. Also 3 millsites and waterrights.

Company has a 10-year lease on the mine of the Tennessee M. & M. Co., with an additional 10-year privilege, and was planning in 1919 to secure the Marshall-Russell Tunnel group.

Mines produce principally copper-iron sulphides, but the Denver City group yielded lead, silver, gold, and zinc ore in 1919.

Development: by the 3,000' Arvada tunnel, the Marshall-Russell 7,400' crosscut, and various shorter tunnels. One in the Harrison is 300'; in the Denver City, 4, totaling 1,250'; in the Tennessee, 4, totaling 3,000'; in the Union, one of 400'; in the Conqueror, one of 800'. All are said to be in ore. Workings aggregate over 4 miles.

Ore reserves were estimated to be 20,000 tons.

Equipment: includes a compressor, with electric and gasoline power and 3 mills.

Property large and company's plans ambitious; ore is good, but company needs capital to operate on larger and more economical scale.

GOLDEN FLEECE MINING & MILLING CO. COLORADO

Office: 601 Foster Bldg., Denver, Colo. **Mine address:** Lake City, Colo.

Property: the Golden Fleece gold-silver mine at Lake City, Hinsdale county.

Operated mine and mill during 1919 and part of 1920.

GOLDEN MINE ORE CHANNEL CO. COLORADO

Address: Boulder, Colo.

Reported operating at South end of Boulder Belt and that Diamond drill had cut 6′ of $12.80 ore.

GOLDEN TRIANGLE MINING CO. COLORADO

Dead. See Vol. XIV.

GOLD GLEN MINING, MILLING & TUNNEL CO. COLORADO

Address: Idaho Springs, Colo.

Property: the Gold Glen gold-silver mine near Idaho Springs, Clear Creek county.

Idle 1920, but operated part of 1919.

GOLD HILL MINING CO. COLORADO

Office: Boulder, Colo.

Officers: W. A. Jackson, pres.; U. S. De Moulin, v. p.; J. M. Page, sec.; W. W. Pollock, treas., with A. W. Glessener, G. W. Meser, C. A. Neal and W. H. Pruyn, directors.

Inc. in Colorado. **Cap.**, $2,000,000; $1 par; 1,000,000 issued Bonds authorized, $150,000; outstanding in 1917, $83,000.

Property: 74 claims, 43 patented, in Gold Hill and Central districts, Boulder county, said to show gold-silver ore in a fissure vein in granite. Reported 4,000 tons ore reserves.

Development: by 4,660′ of tunnels and total of 25,000′ underground work to depth of 875′.

Equipment: includes 100-ton cyanide mill and 7 drill compressor.

Mine and mill idle for several years.

GOLD HILL UNITED MINES CO. COLORADO

Dead, or dormant, mail sent to Bailey Bldg., 1218 Chestnut St., Philadelphia, Pa. is not answered.

Inc. June 1, 1910, in Delaware, **Cap.** $2,000,000; shares $1 par. Registrar & Transfer Co., New York, transfer agent. Listed on New York Curb.

Property: in the Kerber Creek, Manitou and Hull districts, Saguache county. Doing assessment work only, at last accounts.

GOLD KING EXTENSION MINES CO. COLORADO

Offices: Silverton, Colo.; and 504 Bank Block, Denver, Colo. Is a reorganization of New Gold King Mines.

Officers: John M. Kelly, pres.; J. N. Nicholson and R. G. Gentry, v. p's.; G. W. Kinney treas. G. T. Hoffman, sec.; W. Z. Kinney, mgr.

Cap. 2,500,000 shares, changed Aug., 1921 from 1,250,000 shares. Bonds authorized, $250,000.

Property: Gold King group at Gladstone, San Juan county, about 150 acres, and six other claims, totaling 55 acres, between the Gold King group and Sunnyside mine. Company also purchased the Gold King mill and tramway.

Geology: fissure veins in andesite carrying irregular stringers of lead-copper ore with gold and silver values. Gold occurs free in white quartz associated with iron pyrite, galena, or blende.

Development: by 700′ shaft and 3,000′ tunnel. In July, 1920, the West vein was reported to be 75′ wide, and was being opened on the 700′ level.

Equipment: compressor, tramway, 80-stamp and flotation mill. The Gladstone-Silverton railroad was purchased in 1920.

Production: mine credited with $6,081,279 net from 1895 to 1919, of which $1,750,000 was paid in dividends. Mill operated 1919 and 1920, ship-

ping concentrates to Leadville. Mine formerly leased (1920) to Southwestern Leasing Co.

GOLD KING MINING CO. COLORADO

Mine leased. See **El Paso Gold King** mine.

Company inactive. Fully described in Vol. XII.

In December, 1920, H. S. Hadley of the University of Colorado started suit against the company for $30,000, alleging failure to pay him 15,000 shares for legal services.

GOLD QUEEN MINING CO. COLORADO

Idle. Considered a wild cat of the worst type. Claims on Barren mountain (so called for good cause), Chaffee county. For further information, see Vol. XII.

GOLD SOVEREIGN MINING & TUNNEL CO. COLORADO

Mine operated by Evan J. Williams, Cripple Creek, in 1920. **Offices:** 223 Burns Bldg., Colorado Springs, and Cripple Creek, Colo.

Officers: Jas. F. Burns, pres.-treas.; John T. Hawkins, v. p.-sec., with Daniel Thatcher, and A. Feringher, directors. C. G. Jackson, supt.

Charter renewed Oct. 31, 1915. **Cap.** $2,000,000; $1 par; in treasury Jan. 1, 1917, 195,228 shares; cash, $8,471. Listed on Colorado Springs Exchange.

Dividends: $32,559, last dividend of $5,000 paid in 1912.

Property: Gold Sovereign and J. G. Blaine claims, 7.2 acres, patented, on Bull hill (Sec 20), Cripple Creek district, Teller county, adjoining the Cresson. Management believes that rich Cresson veins extend into Gold Sovereign ground. Shoots reported as 3' wide and assaying $50 per ton in gold said to be disclosed on the 15th level.

Development: by 1,350' shaft, to be sunk an additional 200'.

Mine was operated during 1919 and 1920. In December, 1920, the **Edna Forest M. & M. Co.**, which see, had secured a lease on part of the Gold Sovereign mine, below the 10th (1,000') level.

GOLD WAVE MINE COLORADO

Address: A. E. Chapman, who operated the mine at Alma, Park county, in 1920.

GOOD HOPE MINING & REDUCTION CO. COLORADO

Address: Dr. Louis Weiss, Iola, Gunnison county, Colo. **Mine address:** Vulcan, Colo. J. M. McDougal, secretary.

Inc. in Wyoming. **Cap.** $50,000; par $1.

Property the Good Hope gold-silver mine, 4 claims, 70 acres, at Vulcan, Gunnison county.

Development: 700' shaft blocking out 100,000 tons of pyritic ore, containing low copper and gold values. This ore is treated in matting furnace.

Production: to date., $200,000 smelter returns. Operated part of 1919 and shipped ore. Idle 1921.

GOOD MORNING GOLD MINING & INVEST. CO. COLORADO

Presumably dead. See Vol. XIV.

GOVERNOR MINE COLORADO

Address: Boyce Bros., Breckenridge, Colo.

Property: about 7 miles south of Breckenridge, Summit county. Mine is said to have produced rich silver ore in the 80's. A winze sunk from main tunnel shows a vein of sulphide ore carrying gold, silver and zinc.

Operated part of 1919, but shipped no ore.

GRAND COUNTY MINE COLORADO

Address: Donald Syndicate, E. & C. Bldg., Denver, Colo., which operated this mine at Caribou, Boulder county, in 1920.

GRAND UNION MINE COLORADO

Address: S. R. Turney & Co., Lamar, Colo. Mine at Rollinsville, Gilpin county, was worked in 1920.

GRANITE GOLD MINING CO. COLORADO

Address: Box 22, Colorado Springs, or Cripple Creek, Colo.

Officers: C. M. MacNeill, pres.; C. C. Hamlin, v. p.-treas.-gen mgr.; Spencer Penrose, sec.; with Michael Finnerty, E. P. Shove, and C. L. Tutt, directors. M. A. McLeod, supt.; C. B. Garnett, asst. sec.

Inc. 1905, in Wyoming. **Cap.** $1,750,000; $1 par; outstanding, $1,650,000; stock transferred at company's office. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, 4th Monday in April, at Cheyenne, Wyo. Stock has been very closely held, but was listed in Colorado Springs Exchange in July, 1915.

Owns all the stock, excepting 3 shares, of the Little Montana Mining Co. Those portions of the Granite Gold property lying within the City of Victor were incorporated as a separate company, the Little Montana Mining Co. Stock of the Mohican G. Mng. Co. was purchased in 1916 for $22,580.

The 1920 report of the company shows a loss of $24,674 incurred by 1919 operations, but income from ore sales, etc., was $56,187 and mine expense, $28,123, with general expenses of $16,760 and depreciation charges of $35,977.

Financial Statement—Years ending Dec. 31:

Assets.

Year	Property	Invests.	Little Mont. a/c	Current	Deficit	Total
1920.....	$1,267,124	$152,117	$52,814	$91,396	$94,703	$1,658,154
1919.....	$1,292,314	154,237	48,962	71,471	92,285	1,659,269
1918.....	1,328,458	149,997	44,948	46,872	71,625	1,658,260

Current Liabilities for 1919 were $9,269, compared with $8,260 in 1918

Income Account

Year	Total	Expenses	Oper. Profit	Dividends	Depreciation
1920.....	$40,880	$32,282	$8,598	.....	$14,870
1919.....	$56,187	40,870	15,317	.....	35,977
1918.....	227,332	178,882	48,450	33,000	94,433
1917.....	411,253	284,875	126,378	49,500	129,999

Dividends: 26% to end of 1918; none since, with total of $369,000. Paid capital distribution of 3 cents per share ($9,500) on Feb. 10, 1921, after which cash and Liberty bonds amounted to $40,000.

Property: the Dillon mine, 11 claims, 40.5 acres, patented, in the Cripple Creek district Teller county. In 1914, to avoid apex litigation, the Dead Pine claim owned by the Raynor Gold Mining Co., was bought for $87,500. The main production is now from this company's ground. Granite Gold also operates the Bonanza fraction of the United Gold Mines Co., through the Dillon shaft. (For geology of the Cripple Creek district, see U. S. G. S. Prof. Paper 54).

Development: by shafts with several miles of workings. The Dillon or main working shaft is 1,750′ deep, the Gold Coin shaft, 1,300′ deep (worked out and dismantled in 1920). The Roosevelt tunnel drains the Granite Gold ground and deeper development will be possible. A new vein known as the Campbell was developed from the Coin shaft and opened up on Coin levels 10, 11, 12 and 13; company reports fair ore. There is about 550′ of unprospected ground between the bottom of the Dillon shaft and the Roosevelt tunnel level. Upper levels of the various properties are operated under lease (15 sets of lessees in 1920); lower levels are worked by company.

Equipment: mines are well equipped; an electric hoisting plant good for 2,000′ is installed at the Dillon shaft.

Production: total up to 1918 about $15,182,989. Ore production was 34,427 tons in 1916; 43,204 in 1917; 30,211 in 1918; 12,410 in 1919. In part of 1920, the monthly output was 1,000 tons of $10 to $60 ore by lessees, and 100

tons of $40 to $60 ore by company from the Bonanza mine. In 1921 about 1,000 tons a month was mined from the 5, 14,16 and 17 levels.

GRANITE HILL MINING & MILLING CO. COLORADO

Out of business and in hands of receiver. **Address:** Wm. Lloyd, sec., Box 178, Colorado Springs, Colo.

Property: the Granite Hill mine in the Cripple Creek district, Teller county.

GRANITE TUNNEL CO. COLORADO

Dead. See Vol. XIV.

GREAT WESTERN MINE COLORADO

Armstrong and Vanetta lessees. Mine near Lake George, Park county, Colorado.

Property: shows vein with gold-copper ore, developed by 218' vertical shaft, 800' of crosscuts and drifts. Equipped with steam power and air-compressor. Small shipments of sulphide ore have been made in past. Nothing done in 1918-1921.

GREAT WEST MINES SYNDICATE COLORADO

Address: Ward, Colo.

Property: the Kansas City gold-silver mine at Ward, Boulder county.

Company contemplated erecting a custom mill, using flotation, in 1919. Operated part of 1919, but shipped no ore.

GREENBACK MINING CO. COLORADO

Dead. Property owned by Western Chemical Co., which does no mining. **Address:** 700 Franklin St., Denver, but mine shut down 1921.

GREEN RIVER MINING CO. COLORADO

Address: C. E. Jury, mgr., Green River, Wyoming.

Officers: C. E. Ellison, pres.; A. J. Davis, sec.; Thos. Cook, treas.

Inc. in Wyoming. **Cap.** $50,000; par $1; $20,000 issued.

Property: the Wyoming gold-silver mine, 4 claims, 34 acres, at Empire, Clear Creek county, shows 8' quartz vein with streaks of very high grade gold-silver ore.

Development: by 800' crosscut tunnel to cut vein at 1,000' with back of 500'.

Operated part of 1919, but shipped no ore.

GRIFFIN MINING CO. COLORADO

Address: Box 910, Leadville, Lake Co., Colo. Operated the Griffin mine at Leadville, 1920.

GROUND HOG T. & M. CO. COLORADO

Address: California Bldg., Denver, Colo. Mine operated 1920 by G. E. Olmstead of Redcliff, Colo.

Property: the Ground Hog gold-silver mine near Redcliff, Eagle county.

GUADALOUPE MINING CO. COLORADO

Address: T. J. York, Ouray, Ouray Co., Colo.

Property: the Guadaloupe mine at Ironton, near Ouray, said to show high grade gold-copper ore. Developed by tunnel and equipped with compressor. Worked and shipments made in 1919 and 1920.

GUNNISON COPPER CO. COLORADO

Address: Gunnison, Colo. John Robinson, mgr.

Property: at Whitepine, near Gunnison. Reported to have cut low-grade copper ore in new work in crosscut tunnel. Worked in 1919-20, but shipped no ore.

GUNNISON MINE COLORADO

Address: Fred H. Brown, Gunnison, Colo., who did development work at mine in 1920.

GUSTON MINE COLORADO

Owned by **Congress Copper Mines Co.**, which see.

H. A. C. TUNNEL & MINING CO. COLORADO

Address: Ouray, Colo.

Property: the H. A. C. gold-silver mine at Ouray, Ouray county. Operated part of 1919, but shipped no ore.

HAHNEWALD LEASING CO. COLORADO

Address: care Gold Sovereign mine, Cripple Creek, Colo.

In 1918, reported to have operating lease on the Gold Sovereign mine, of Gold Sovereign Mine & Tunnel Co., Bull hill, Cripple Creek, Teller county.

HAHN'S PEAK GOLD MINING & MILLING CO. COLORADO

Office: Room 3, Algoma Bldg., Oshkosh, Wis. Mine at Columbine Hahn's Peak P. O., Routt Co., Colo.

Officers: H. O. Granberg, pres.; C. A. Spencer, v. p.; Chas. Olsen, supt.; E. E. Meeleus, sec.-treas., with Dr. H. A. Wolter, M. A. Rasmussen, and W. E. Brown, directors.

Inc. Jan. 29, 1905, in Colorado. **Cap.** $1,250,000 increased from $1,000,000; $1 par; assessable; on Aug. 19, 1919, 996,257 shares outstanding.

Receipts for year ended December 31, 1918, were $1,559, compared with $17,000 in 1917.

Property: the Royal Flush mine, 25 claims, 248 acres, patented. **Development:** by 406′ incline shaft and 950′ tunnel on Royal Flush claim, said to cut 5 veins; also the 2,100′ Conundrum tunnel 430′ lower, cutting 12 veins, whose values are in gold and silver. Underground workings total 15,000′. Vein is in porphyry and has a 70° dip.

Reported on by Arthur Lakes, Etienne Ritter, H. C. Beeler and others.

Equipment: includes gasoline engines, compressor, air drills, blower and 400-ton concentrating mill. Experiments with oil flotation process said to be favorable. About $20,000 spent in 1920 on development work in mine and plant. Plan to connect mill and mine by rail, the locomotive to run into the mine for 1,540′. Ore shipped averages $61 per ton.

HAMLET MINING & MILLING CO. COLORADO

Address: Al Kolz, Silverton, Colo

Officers: J. S. Tucker, pres.; H. W. Fox, cons. engr.

Bonds: $150,000 issued in 1911.

Property: 19 claims, about 200 acres, known as the Hamlet mine, 8 miles from Silverton, in the Howardsville district, San Juan county.

Development: by tunnels, longest known as Mill tunnel, 500′ below 5th level of old mine workings, connected by raises with tunnel.

Ore: a complex mixture of copper-lead and zinc sulphides carrying good gold and some silver.

Equipment: includes steam power plant, compressor and conical mill with flotation unit, rebuilt 1917.

Company operations suspended, but mine and mill operated by Al Kolz during part of 1920.

HAMPTON CONSOLIDATED MINES CO. COLORADO

Either dead or dormant. Property operated by the **Amherst Mining Co.**, which see in this volume.

HANNA MINING & MILLING CO. COLORADO

Dead.; see Vol. XIV.

HARPER-LARSON DEVELOPMENT CO. COLORADO

Name changed, 1917, to Calliope Cons. M. Co., which see.

HARRISON DUMP MINE COLORADO

Address: Mark Papovich & Co., 414 W. Elm St., Leadville, Lake Co., Colo., which operated this property in 1920.

HEADLIGHT GOLD MINING & MILLING CO. COLORADO

Office: 2019 Elm St., Cincinnati, Ohio.

Property: the Headlight mine at Iola, near Spencer, Gunnison county. Ore carries gold, silver and copper.

Operated and produced during 1919 and 1920.

HECK GOLD MINING & LEASING CO. COLORADO

Mine address: C. B. Heckler, Cripple Creek, Colo.

Officers: Alfred Steele, pres.; with S. A. Gaston, Francis P. Haynes and Walter C. Cockran, directors.

Inc. 1921, in Colo. **Cap.** $300,000.

Property: a lease on the Empire State property. Developing on third and bottom levels to prospect Maloney vein.

HENRIETTA COPPER MINING CO. COLORADO

Address: 1816 California St., Denver, Colo. Mine address: E. W. Walter, mgr., Silverton, Colo.

Officers: E. R. Moodie, pres.; N. M. Abbott, sec.-treas.

Inc. April, 1916. **Cap.** $3,000,000; $1 par. Last annual meeting held May 23, 1921. Stock sold at 15¢, 1920.

Company took over the holdings of the Henrietta M. & M. Co., formerly owned by the San Juan S. & R.

Property: about 6 miles N. of Silverton, in Prospect Gulch, Red Mountain, San Juan county.

Development: by over 6,250' of workings. The main, or No. 7 tunnel is 2,200' long, and shows auriferous and argentiferous copper ore. Work started May, 1917. Reserves said to be 300,000 tons above No. 7 level.

First shipments were made in October, 1918. Operated and shipped ore carrying 16½% copper, 10 oz silver and a little gold in 1919 and 1920.

HENRIETTA MINING & MILLING CO. COLORADO

Dead. See **Henrietta Copper Mining Co.**, and Vol. X.

HENRIETTA OR MAID MINE COLORADO

Address: Cramer & Co., 121 S. Toledo Ave., Leadville, Lake Co., Colo., who operated mine in 1920.

HENRY ADNEY GOLD MINING CO. COLORADO

A close corporation operating the Henry Adney mine, Cripple Creek.

HIBBS ORE CO., J. GILLINGHAM COLORADO

Office: Central Savings Bank Bldg., Denver, Colo.

Property: the Argo, Emmet, and Good Friday fluorspar mines at Sugar Loaf, and the Golden Age and Lehman mills at Jamestown, Boulder county, formerly worked by the Colorado Pitchblende M. Co.

HIDDEN TREASURE GROUP (LAKE CITY) COLORADO

See **McCarthy Hidden Treasure Mng. Corp.**, in this book.

HIDDEN TREASURE MINING CO. COLORADO

Address: Benedict Crowell, pres., Cleveland, Ohio. **Mine address:** E. R. Bauer, mgr., Ouray, Colo.

Inc. 1920, in Colorado.

Property: the Hidden Treasure mine near the Camp Bird in Ouray county. Ore carries lead, silver and zinc. At the end of 1920 the tunnel was to be extended 3,000' Machinery from the Silver Mountain mine at Ironton was purchased and installed 1921 and a contract let for 1,000' of tunnel work. A mill was erected in the autumn of 1921 containing jigs, Huntington mill, tables and flotation plant. Property formerly owned by Thos. F. Walsh of Camp Bird fame.

HIGHLAND MARY LEASING CO. COLORADO

Address: Silverton, Colo.

Property: the Highland Mary mine near Silverton, San Juan county. Ore carries gold, silver, and lead.

Operated 1919 and 1920 and ore shipped.

HIGHLAND MARY MINES CO. COLORADO

Dead. Succeeded by Silver Canyon Mining Co., and succeeded in turn by **Highland Mary Leasing Co.**

HIGHLAND MINING & MILLING CO. COLORADO

Address: Leadville, Colo.

Property: the Burns shaft and gold-silver mine in Leadville district, Lake county.

Operated but shipped no ore, 1919. Idle in 1920-21.

HILL TOP SILVER MINING CO. COLORADO

Office: 1229 Foster Bldg., Denver, Colo. **Mine address:** S. P. Doran, supt., Fairplay, Colo.

Officers: Geo. C. Manly, pres.; G. L. Felt, v. p.-treas.-gen. mgr.; Geo. L. Nve, sec., with W. H. Coolidge and Francis E. Young, of Boston, directors.

Inc. Feb. 17, 1917, in Colo. **Cap.** $1,000,000; par $1; 900,000 issued. No bonds.

Property: a lease and bond on the Hill Top mine of the Sun-Moon Leasing Co., 36 patented claims, 302 acres, near Fairplay, Alma district, Park county. Replacement deposits along fissure in limestone show ore that assays 12 oz. silver per ton and 19.5% lead. Company formerly operated 60 acres on Seaton mountain, Clear Creek and Gilpin counties.

Development: by 500′ shaft and over 4,000′ of underground workings. Reserves are estimated at 240,000 tons, valued at $30 per ton net. One orebody is 300′ long, 12′ wide, and over 50′ high on the 540′ level.

Equipment: steam hoist and 2½ mile tram, etc.

Production: to date, $5,000,000. Shipments made during 1920 were from 10 to 25 tons daily.

Mine shut down November, 1921.

HINSDALE TUNNEL & REDUCTION CO. **COLORADO**

Dead; see Vol. XIV.

HIREEN MINING & LEASING CO. **COLORADO**

Address: 720 Majestic Bldg., Denver, Colo. **Mine address:** Lake mine, Idaho Springs, Colo.

Property: the Lake mine and No. 2 Tunnel gold-silver-lead-copper claims near Idaho Springs, Clear Creek county.

Operating and producing 1919, 1920, and 1921, ore going to Hudson mill.

HOCK HOCKING MINING CO. **..COLORADO**

Office: 509 Exchange Bldg., Denver, Colo.

Property: the Hock Hocking mine at Alma, Park county. Ore carries gold, silver and lead.

Operated and shipped ore in 1919 and 1920.

HOCKMAROOKUS MINING CO. **COLORADO**

Address: Breckenridge, Summit Co., Colo., or Denver, Colo.

Took over the Bethune group, including the Blind Tom and Baltimore mines and the Mineral Point tunnel in 1921. The tunnel on the main Dillon-Montezuma highway, is to drain and undercut the rich silver-lead orebodies of the above named mines.

HOLLINGSWORTH MINING CO. **COLORADO**

Address: 1220 Hippee Bldg., Des Moines, Iowa.

Property: the Smuggler silver-lead-zinc mine at Silver Plume, Clear Creek county.

Operated and shipped ore, 1919.

HOME INVESTMENT CO. **COLORADO**

Address: care E. F. Mull, Lawrence, Kans. Operated the Cleveland mine at Lake City, Hinsdale county in 1920.

HONDO GOLD MINING & MILLING CO. **COLORADO**

Dead. Shares of Hondo Oil & Gas Co. offered stockholders October, 1917. Company dissolved Jan., 1918. Formerly operated under bond and lease mine of Keystone Gold Mng. Co.

HONEST DOLLAR MINING & MILLING CO. **COLORADO**

Mail returned 1921 from former mine office: Gibson Hill, Breckenridge, Colo. See Vol. XIV.

HOOSAC TUNNEL & MINING CO. **COLORADO**

Reorganized, 1916, as **New Life Tunnel & Mining Co.**, which see. Company was in hands of receivers for years.

HOPE MINING, MILLING & LEASING CO. **COLORADO**

Address: Aspen, Colo.

Officers: Chas. O'Kane, pres.; J. W. Hetherly, v. p.; H. W. Clark, sec.; J. B. Stitzer, treas.

Inc. 1910, in Colo. Capital increased from 100,000 to 150,000 shares in 1917.

Property: the Hope tunnel and 400 acres, including the Little Annie mine, in the Roaring Fork district, Pitkin county. Galena ore carries silver and zinc, with considerable barite.

Several of the company's claims have been leased to others on a royalty basis. Examined by Geo. W. Tower, Jr., and Fred W. Foote.

Development: by the 1½ mile Hope tunnel, driven through limestone and quartzite to reach the Little Annie porphyry-lime contact. Nine years have been devoted to the advancement of this adit. It is to connect with the Last Dollar incline.

In December, 1920, a narrow streak was cut that widened to several feet, assaying 71 oz. silver and 29% lead and early 1921, six inches of nearly pure native silver was cut in the tunnel at 2,500' below the surface. The vein is 12" to 24" wide and averages 174 oz. silver for 6" and 1,047 oz. for 12 inches across. A carload of ore shipped in August, netted $1,288.

Equipment: includes electric power and complete mining plant for extensive operations.

HOPEWELL MINE — **COLORADO**

Address: McGruder and Hunter, Crested Butte, Colo., who continued development of this gold-silver mine near Crested Butte, Gunnison county, in 1920, but made no shipments.

HORSE MOUNTAIN MINING & MILLING CORP. — **COLORADO**

Address: J. O. Kempf, pres., Eagle, Eagle county, Colo.

Inc. in May, 1919.

Property: the Lady Bell group of 22 claims in the Fulford district, 7 miles from Eagle, on which silver ore was discovered in 1913, and from which about 175 cars of ore were shipped up to 1916. A mill was to be erected.

Operated and shipments made in 1919 and 1920.

HORSFAL MINE — **COLORADO**

Address: Chas. Gustafson, Boulder, Colo. Walter McCaslin, Longmont, Colo., owner. Chas. P. Oliver, supt.

Mine was a big producer from 1859-87, and was reopened in 1917. Late in 1918 shaft was sunk from 300' to 550'. Ore reported to carry gold, with a little silver and some lead. 10 men employed at last report.

Equipment: includes electric hoist. A flotation mill is planned.

Operated in 1920.

H. S. M. I. MINING CO. — **COLORADO**

Address: Crested Butte, Colo.

Property: a gold-silver mine at Crested Butte, Gunnison county. Operated, but made no shipments during 1919.

HUBERT MINING & LEASING CO. — **COLORADO**

Address: Box 1799, Denver, Colo.

Property: the Hubert mine on Bald mountain, Gilpin county. Ore carries gold, silver, lead and zinc.

Operated and produced during 1919.

HUDSON MILLING CO. — **COLORADO**

Office: 204 Mack Bldg., Denver, Colo. Mill address: Jas. A. Townsend, mgr., Idaho Springs, Colo.

Officers: M. A. Rowen, pres., Longmont, Calif.; A. H. Roller, v. p., 438 Equitable Bldg., Denver, Colo.; F. M. McCartney, sec.-treas.

Inc. in Colo. **Cap.** $75,000; par $1; issued $66,000.

Operates a 125-ton custom milling plant at Idaho Springs, Clear Creek county, including 3 unit Brown flotation mill.

HUGHES CONSOLIDATED MINING CO. — **COLORADO**

Address: Russell Gulch, Gilpin county. Owns the Lillian gold-silver-copper mine at Russell Gulch, under development, but not producing in 1920. See **Frontenac Leasing** and **Old Town** companies, operating in same district.

HUMBOLDT MINES CO. — **COLORADO**

Subsidiary of **Metals Exploration Co.**, which see.

Address: Telluride, Colo.

Officers: Bulkeley Wells, pres.-gen. mgr.; Thos. J. Regan, sec.-treas., 120 Broadway, New York. H. G. Palsgrove, supt.

Inc. 1915, in Colorado. **Cap.** $500,000; $100 par; outstanding, $382,000.

Property: 25 patented claims, 180 acres, in Mt. Sneffels mining district, Ouray county.

Ore: gold, silver, lead and iron, in a 2′ quartz fissure vein in andesite with N. W.-S. E. strike and dip of 76°.

Development: by 680′ vertical Humboldt shaft with 7 levels and the mile-long Sheridan tunnel connecting with lowest level of the Humboldt shaft. Greatest depth of workings, 840′.

Equipment: includes a 50-h. p. electric hoist, compressor and a tramway.

Production: started January 1, 1916. In 1916, 47,900 tons; 1917, 47,060 tons; 1918, 36,300 tons. Ore is milled by Smuggler Union Mining Co.

HUMBOLDT MINING & MILLING CO., THE **COLORADO**

Address: 324 S. Union Ave., Pueblo, Colo. **Mine address:** Ward, Colo.

Officers: C. J .Walter, pres.; Austin G. Marsh, v. p., Pueblo; E. R. Fisher, sec.-treas., Pueblo, with J. H. Harrison and Wheeler Dan, directors.

Inc. 1919, in Colo. **Cap.** $250,000; $1 par; 100,000 treasury shares.

Property: 6 patented claims in Ward district, Boulder county, includes the Texas claim owned outright, and 5 claims held under 8 year bond for $25,000, expiring 1925. Main workings are E. of Grand View mine.

Development: by 350′ inclined shaft on vein with 700′ drift west on 100′ level, and at 250′ depth a west level 450′ long north of vein. East of shaft the ore shoot has been mined out to surface.

A vein running N. 65° W. is traceable 6,000′ through four claims. This vein, in granite, varies from a few inches to 3′ thick, and carries gold-silver tellurides in a quartz, pyrite and chalcopyrite vein filling. Vein dips 70° N. and shows banded ore in shoots. On 100′ level a shoot 43′ long averaging 18″ thick assayed $4 gold, $1 silver and a little copper. Four shoots, with a total length of 141′ average 1.73′ thick. East shoot 30′ long and 18″ thick averages $20.25, balance $6 to $9 per ton. West shoot 118′ long, not sampled, but first 15′ said to average $54.14. If ore extends 100′ up and 50′ down there is 3,375 tons in mine.

Operated 1919 by Humboldt Leasing Co., and during 1920 by the company itself.

HUNTER CREEK LEASING CO. **COLORADO**

Address: Aspen, Colo.

Operated the Hunter Creek mill at Aspen, Pitkin county, during 1920.

HURON GOLD ORES CO. **COLORADO**

Address: 404 Cooper Bldg., Denver, Colo. Operated the Huron gold mine at Eldora, Boulder county, during 1920.

HURRICANE LEASING CO. **COLORADO**

Address: R. O. Mevers, mgr., Aspen, Colo.

Officers: A. G. Prev, chrm.; J. L. Adams, sec.-treas., with R. O. Meyers, directors.

Inc. 1920, in Colorado as a partnership, monthly assessments covering current expenditures.

Gross earnings for 1920 were $1,930, including $1,665 from ore sales. Operations cost $11,000.

Property: 20 claims, 18 patented, 200 acres, in the Highland district, Pitkin county, near Aspen. Ore occurs in a fault fissure in limestone and shale, dipping 65° N. W., and pitching N. 30° W. Ore found in kidneys consists of sulphides with silver, copper and lead.

Development: by 560′ tunnel, reaching a depth of 280′ and 2,000′ of workings. A crosscut tunnel is to be driven 150′ below the present workings.

Production: in 1920 was 14 tons of $170 per ton ore, from a flat orebody in the Etcetera mine on Castle creek.

HURRICANE MINING & MILLING CO. **COLORADO**

Address: A. G. Prev, mgr., Denver, Colo.

Officers: above with J. L. Adams, sec.-treas. and R. O. Mevers, directors.

Inc. 1916, in Colo. **Cap.** $1,000,000; par $1; 600,000 issued; no bonds. Earnings for 1920 were $2,750 from ores sold; expenses, $1,000.

Property: under lease to, and operated by, Hurricane Leasing Co., which see, consists of 13 claims, 10 patented, 110 acres, 4 miles S. of Aspen. Operated continuously since 1916.

IBEX MINE LEASES COLORADO

The following leasers and leasing companies were operating at the Ibex mine in 1920. Kyle Lease No. 1, C. & G. Lease, both at 329 W. 8th St., Leadville: Burton & Co., 509 E. 5th St., Leadville.

IBEX MINING CO. COLORADO

Office: 929 Equitable Bldg., Denver. **Mine office:** Leadville, Colo.

Officers: A. V. Hunter, pres.-treas.; John A. Ewing, v. p.; Chas. Cavender, sec.; J. F. Campion, mgr., with Gerald Huges, F. L. Smith, J. C. Mitchell and J. I. Brown, directors. Geo. Becker, supt.

Inc. March, 1891, in Colorado. **Cap.** $100,000; $1 par; all issued. Annual meeting, first Monday in June. Company is operated as a close corporation.

Property: the Ibex mine, 10 claims, patented, 52 acres, on Breece hill, Leadville, Lake county, includes the Little Johnny claim, which has produced about $25,000,000 worth of ore. Ore occurs in blanket deposits carrying silver, lead, copper and zinc. Bodies of contact metamorphic ore encountered at depth were low-grade and not valuable. Vein structure is very complicated, owing to faulting.

Development: by 4 vertical shafts to depth of 1,250'. On the 900' level an ore-shoot, opened for 2,000', is reported to be 70' wide and 55' high and to run from 0.80 to 1.30 oz. gold per ton. Reported to have a zinc content of 23%. In 1918, a body of zinc carbonate ore was discovered on the fourth level. A 4" streak of extraordinarily rich gold ore was cut in the No. 7 Ibex shaft in 1920.

Equipment: includes 18 machine-drills, breaking about 350 tons of ore per day. Mine is worked by lessees, employing 100 men jointly. Operations were normal in 1918, and presumably so throughout 1919. No production figures are available.

IDAHO BRIDE MINING & MILLING CO. COLORADO

Inactive and probably dead. Fully described in Vol. XIV, of this book.

IDAHO MINING, REDUCTION & TRANS. CO. COLORADO

Property acquired in November, 1920, by the **Gem Mining Co.**, which see.

IMOGENE MINE COLORADO

Address: Lundberg & Wilflev Lease, Ouray, Colo. Mine operated 1920.

IMPERIAL CONSOLIDATED MINING CO. COLORADO

Mail returned 1921 from former office: 725 Colorado Bldg., Denver, Colo. **Mine office:** Georgetown, Clear Creek county, Colo. Edw. J. Wilcox, pres.-mgr.; Henry Butler, supt.

Inc. as a reconstruction of the Waldorf Cons. Mining Co. Is a Lawsonized corporation.

Property: 600 acres, patented, including the Waldorf and Tobin mines, in the East Argentine district, shows the Commonwealth fissure vein with 3' paystreak of goldbearing copper ore.

Development: includes the Tobin and Wilcox tunnels, with 7 miles of workings. A 3' vein of high-grade copper was intersected, April, 1915, at depth of 500'.

Equipment: includes a 125-ton mill at the portal of the Wilcox tunnel. After an idleness of several years, operations were resumed in 1915. Reported in 1918, that the mill capacity was to be doubled.

A 42-ton trial shipment said to have averaged 10% copper, 8% lead, 1.53 oz. gold and 66 oz. silver per ton. No reports obtainable direct from company.

In Sept., 1919, Thomas W. Lawson, of Boston, Mass., was boosting this property, which is reputed to have yielded millions of dollars when silver was 50 cents an ounce. A one-mile drainage tunnel was driven, opening some of the deposits at a depth of 1,000'. The main deposits are said to

have been hardly scratched, which seems strange, if true, because mine is said to have had an output of several millions before it shut down. In the profuse literature put out, about this company, capitalization, officers, detail of mine development and sampling, are omitted—preventing an estimate of the "Moral risk" in buying shares.

INDEX MINE COLORADO

Address: Lamphere & Schneider, lessees, Cripple Creek, Teller Co., Colo., who mined ore in 1920.

INDIANA-COLORADO MINING & MILLING CO. COLORADO

Address: Lake City, Colo.

Property: Golconda mine, in Henson Creek district, Hinsdale county, 3 miles from Lake City. Ore contains gold and silver, and a new orebody carrying $200 to $600 ore was cut 1920.

A 200-ton mill was in process of erection, 1921.

INGALLS LEASING CO. COLORADO

Defunct. See Vol. XIV.

INTERSTATE METALS CO. COLORADO

Address: 514 Denham Bldg., Denver, Colo.

Property: the Richmond gold-silver mine at Salina, Boulder county. Operated during 1919, but made no shipments.

IOWA TIGER MINING CO. COLORADO

Name changed in Nov., 1919, to **Southwestern Mining Co.**, which see.

IRON KING MINE COLORADO

Address: Carlson Bros., Empire, Clear Creek Co., Colo., who operated this mine in 1920.

IRON MASK MINE COLORADO

Address: Ostrum & Tillet, lessees, Breckenridge, Colo.

Property: on Shock hill, near Breckenridge, Summit county, developed by tunnel opening lead-carbonate ore.

IRON SILVER MINING CO. COLORADO

Offices: 11 Waverly Place, New York City; 615 Stevens Bldg., Detroit, Mich. **Mine address:** Leadville, Lake Co., Colo.

Officers: W. R. Cobb, pres.; Henry G. Stevens, v. p.; Homer A. Hoit, sec.; Fremont Woodruff, treas.; with Bruce G. Broad, R. H. Webber, Isaac J. Meyer, Eber W. Cottrell, H. C. DuVal, and Chas. E. Hilton, trustees. Geo. O. Argall, gen. mgr.; Philip Argall & Sons, cons. engrs.

Inc. March, 1880, in New York. **Cap.** $2,500,000; $5 par; reduced from $10,000,000 at $20 par in March, 1919. Stock listed on N. Y. Stock Exchange and the Detroit Exchange. Farmers Loan & Trust Co., New York, registrar. Company transfers its owns shares. Annual meeting 3rd Tuesday in March.

Net earnings were $267,034 in 1904; $515,127 in 1906; $65,366 in 1907; $6,960 in 1908; $183,121 in 1909; $138,308 in 1910; $187,639 in 1911; $274,322 in 1912; $123,927 in 1913; $174,629 in 1914; $184,199 in 1915; $210,595 in 1916; $41,574 in 1917, and $186,143 in 1918.

In 1919 there was a loss of $8,933, after allowing for depreciation, and in 1920, a deficit of $7,243. Current assets (cash) at end of 1919 were $303,364; and liabilities, $100; in 1920, cash amounted to $293,013.

Dividends: $400,000 in 1906; $300,000 in 1907; none in 1908; $50,000 in 1909; $200,000 in 1910; $100,000 in 1911; $200,000 in 1912; $200,000 in 1913; $100,000 in 1914, 1915, 1916 and 1917; $50,000 in 1918; $50,000 in 1919, on account of reduction in capital. The grand total is $5,500,000.

Property: about 650 acres, including the Mover and Tucson (worked out) and Blind Tom mines, on Iron hill, about 2 miles E. of Leadville. Also controls through stock ownership the **Nisi Prius Cons. Mining Co.** (q. v.); also a 5/8 interest in the **Proserpine** and **Cumberland Lode** mining claims, which secured for the Iron Silver 9.9 acres, adjoining the company's property on the N. W. During 1917, company took a 5-year lease on the Alleghany group, consisting of about 19 acres, adjoining property on N. and located on trend of Mikado fault.

To drain and develop an old area in the Graham Park basin of Leadville

the company erected in 1916 a plant costing $500,000 at the Mikado shaft. This shaft was widened and sunk to 1,135′ in 1917. Two 1,000-gal. per minute pumps were installed.

Development: in all mines, 6,380′ in 1915; 6,830′ in 1916; 7,626′ in 1917; 6,381′ in 1918; 2,660′ in 1919; 1,056′ in 1920. No discoveries of ore were made in 1920.

In 1918, company reopened the old Pyrenees shaft on the Pyrenees claim, southwest of the Mikado, in which it owns an interest, besides having a long-term lease on the property. The Pyrenees shaft has been enlarged to 3 compartments, and re-timbered to 1,200′ and will hereafter be the main shaft. When finished, the levels will connect with the Marian workings. This project was taken up owing to difficulty and expense of keeping the Mikado, and also to develop the southern end of property.

In 1920 lessees mined 20,067 tons of ore netting $117,953 from which company received $16,249, compared with 26,567 tons of ore in 1919.

The varied character of the ores of this property is shown by the 1920 production (by lessees), amounting to 11,985 tons of iron pyrite, 2,073 tons of iron oxide, 755 tons of zinc carbonate, 60 tons of lead carbonate, 2,844 tons of zinc sulphide, and 2,320 tons of zinc-lead sulphide ore. In former years, the mines yielded these same ores together with manganese ore, a varied product whose total metal content is shown below:—

Recent production: of the mines as a whole:

	Copper lb	Gold oz.	Silver oz.	Lead lb	Zinc lb	Iron lb
1918.....	902	402.04	163,809	2,661,131	21,847,947	6,446,825
1917.....	26,914	689.25	163,493	1,893,020	13,342,256	5,956,671
1916.....	1,420,713	134.5	336,277	2,401,089	12,994,318	5,597,605
1915.....	33,694	575.	136,674	4,205,616	16,674,848	2,957,235
1914.....	12,751	923.1	327,976	10,608,734	17,396,362	5,247,433
1913.....	7,230	509.	391,603	12,105,921	25,658,913	2,745,511
1912.....	58,543	323.92	470,403	12,874,099	21,601,428	2,816,079

Property is well equipped and well managed.

Owing to the low price of zinc coupled with a flooding of the mines, the company closed down its mines in April, 1919, and the only recent work has been done by lessees.

ISABELLA LEASING CO. **COLORADO**

Address: R. M. Carson, pres.; Henry Christensen, supt., Independence, Teller Co., Colo.

Inc. in Oct. 1919. **Cap.** $25,000; $1 par; to be subscribed for by shareholders of the Isabella Mines Co. The money will be used to develop the Isabella Mines Co.'s Bull hill estate under a 5-year lease, with a 3-year extension privilege. Royalties will be on a sliding-scale from 8 to 30%.

Property: a lease on the Isabella mine below the 1,100′ level. Company sank Empire shaft 230′ (to 1,335′) and opened level and crosscuts to tap downward extension of the Fackerel-Canon and Maloney ore shoots. Subleasers mined shipping ore throughout 1920. Work was to be started on the 13th level to cut several producing veins at depth. In December, 1919, this level had been unwatered and crosscutting started.

By May, 1920, the Larson vein had been cut midway between the Lee and Empire shafts. Work is now through the latter opening. Extensive work under way in 1921.

ISABELLA MINES CO. **COLORADO**

Office: Box 1404, Cripple Creek, Colo. R. J. Huff, sec.-treas. **Mine office:** Independence, Colo.

Officers: E. E. Quentin, pres.; R. M. Carson, v. p.; C. G. Mitchell, mgr., with H. S. Lunt and J. H. Nicholls, directors. Frank K. Gunn, supt.

Inc. 1903, in Wyoming. **Cap.** $3,000,000; $1 par; 2,528,331 outstanding.

Stock listed on Colorado Springs Exchange. Colorado Title & Trust Co., registrar. Annual meeting 1st Monday in February, at Cheyenne, Wyo. In Oct., 1919, a controlling interest was taken in the **Isabella Leasing Co.**, which see.

An initial dividend, 1%, or $25,283, was paid in 1916. Deficit in 1917 amounted to $20,303.

Property: 116 claims, patented, about 118 acres, in N. E. ¼ of Sec. 20 and N. W. ¼ of Sec. 21 on Bull hill, Cripple Creek district, Teller county. Lands show typical Cripple Creek veins in breccia, carrying ore with gold and some silver.

Development: by 2 vertical shafts, the Lee, 1,274′ destroyed by fire in 1920, and the Empire, 1,500′. During 1917, 10,169′ of development work was done, compared with 18,587′ in 1916. The Buena Vista vein was cut in December, 1917, on No. 16 level. The winze sunk below the 1,250′ level of the Lee shaft is 250′ deep, and drifts have been run on the East Victor vein.

Equipment: Includes a 100-ton concentrating mill, entirely remodeled in 1915, to use the cyanide process with sand leaching pump, furnace, boiler, etc. This plant recovers 76% from $3 ore.

Recent production has been as follows:

	Tons Mine ore	Tons Dump ore	Total tonnage	Gross Value
1917	9,151	658	9,809	$192,924
1916	18,752	625	19,377	412,962
1915	23,861	837	24,698	507,791
1914	15,706	2,040	17,746	345,819
1913	11,385	6,903	18,288	243,251

Of the 1917 output, 15 sets of lessees mined 8,334 tons, worth $144,129. Late in 1918, lessees Beebe & Nelson reported opening a rich vein of rusty gold and sylvanite near the surface. In 1919, lessees were mining upwards of 400 tons monthly. There were 10 lots of lessees in 1920.

Total production to date estimated at $8,812,000. Company is one of the oldest in the Cripple Creek district, and is operated successfully along conservative lines.

JAPAN-FLORA MINES & TUNNEL CO. **COLORADO**

Property bought in by bondholders at sheriff's sale on Nov. 22, 1919, for $251,200, the amount of the outstanding bonds. See Vol. XIV for further details of previous operations. Stock worthless.

JASON MINE **COLORADO**

Address: W. J. Davis, Leadville, Colo.

Property: 4 claims, 40 acres, on Poverty Flats in N. E. part of Leadville, Lake county. Is a manganese mine, reopened 1920.

In 1918, lessees shipped $10,000 worth of ore from a 14′ vein on 180′ level to the Colorado Fuel & Iron Co., Pueblo, Colo., to be used as flux. Ore is reported to have assayed 3 oz. silver, 26% iron, 30% manganese. There are two deposits of manganese ore under development on the 250′ level: one 22 by 17′, and the other 16′ by 11′, said to carry 34% manganese and 5% silica.

JEAN MINE **COLORADO**

Address: G. H. Hagar & Co., 1224 Hancock St., Denver, Colo. This mine, at Empire, Clear Creek county, was operated in 1920, but none of its gold-silver-lead ore was shipped.

JENNIE SAMPLE CONSOLIDATED MINING CO. **COLORADO**

Idle. **Office:** 800 Exchange Natl. Bank Bldg., Colorado Springs, Colo. **Officers:** Daniel Thatcher, pres.; J. F. Underwood, sec.-treas.; L. G. Carlton, gen. mgr.

Inc. in Wyoming. **Cap.** $25,000; 1c par; 1,668,885 shares issued. Stock listed on the Colorado Springs Stock Exchange. Company has no debts, all

taxes have been paid, and a small reserve was reported in treasury, May, 1919.

Property: 5 patented claims, 31 acres, on S. slope of Raven hill, in Cripple Creek district, shows fissure veins with streaks of gold. Developed by shafts and drifts to depth of 1,100'. Equipped with hoist, drills and steam power. Mine worked by lessees.

JERRY JOHNSON GOLD MINING CO. COLORADO

Addresses: 822 E. & C. Bldg., Denver, Colo.; and F. H. Denman, mgr., Cripple Creek, Colo.

Inc. 1902, in Wyoming. **Cap.** $250,000; 10c par; all issued; has paid $187,500 in dividends to date. Last payment of $5 per 1,000 shares in Nov., 1914. Stock listed on the Colorado Springs Exchange. Company derives income from royalties on leasing operations.

Property: 35 claims patented, in Cripple Creek district, Teller county, shows gold-silver ore in contact veins. Developed by 975' vertical shaft to depth of 850'. The mine is being worked from surface to the 650' level by Frank Caley, and below the 650' level by F. H. Denman, former superintendent of Cripple Creek Deep Leasing Co., which had operated under this lease 1915 to 1918. In 1920, F. G. Horn, lessee, opened 8 oz. ore on No. 6 level and in 1921 shipments continued to Golden Cycle mill.

Equipment: includes steam power, 8 drills, concentrator and 75-ton cyanide mill, erected in 1915 by Frank Caley. Total output to 1917, $1,783,120. During 1918, lessees found ore averaging $30 per ton.

JESSIE MINE COLORADO

Address: G. F. Roth, mgr., Gold Run, Breckenridge, Summit county, Colo. J. C. Warnecke, supt.

Property: mine was said to be a big producer of gold in former years. Is operated under bond and lease. Equipment includes a 40-stamp amalgamation mill.

Operated during 1920, shipping zinc and lead concentrate from the mill connected with the mine.

JEWELL MINES & RED. CO. COLORADO

Dead. Described in Vol. XIV. Succeeded by **Pandora M. & M. Co.**, which see.

JOE DANDY LEASING CO. COLORADO

Dead. See Vol. XIV. Property operated by **Eclipse Leasing Co.**, which see.

JOHN DOYLE MINING & MILLING CO. COLORADO

Address: Rico, Dolores county, Colo.

Inc. 1919, in Colorado.

Property: the Iron copper-silver mine near Rico. Development is by tunnels and in 1920, some rich ore was being mined. Operated in 1921 also

JOHNSTON MINE COLORADO

Address: O'Neill, Bull & Martin, Redvale, Montrose Co., Colo., who operated this carnotite (uranium, vanadium) deposit in 1920.

JONATHAN MINE COLORADO

Address: John Donald, Ouray, Colo., who operated this gold-silver mine, but shipped no ore during 1920.

JO REYNOLDS MNG., MLG., DEV., TUN. & TRANS. CO. COLO.

Address: Idaho Springs, Colo.

Property: the Jo Reynolds gold-silver-lead-zinc mine at Lawson, Clear Creek county.

Operated 1919 and shipped some ore. Idle 1921.

JOSEPHINE MINE COLORADO

Address: Stella M. Stephens, Georgetown, Colo. Link Stephens, supt.

Property: the Josephine mine, in Grizzly gulch, near Silver Plume, Clear Creek county. Ore is said to carry gold, silver, lead, copper and zinc.

Development: by shaft and tunnel. Work was under way in Dec., 1920.

JULIA MINING CO. COLORADO

Probably dead. Last address: Clarence Jarbeau, mgr., Leadville, Colo.

Property: the Home Extension and Cloud City mines in the Down Town area of Leadville. Daily shipments in 1917 averaged 75 tons of manganese-iron-silver ore. No recent report received.

JULY BIRD MINE COLORADO

Address: L. H. Dodson, Boulder, Colo. Mine is a gold-silver property near Salina, Boulder county; was operated in 1919, but shut down in 1920.

JUMBO MINING CO. COLORADO

Address: Mayday, via Durango, Colo.

Property: several claims, including the Jumbo silver mine in the California district of La Plata county, near Mayday.

Development: by tunnel being extended 500′ in 1920. A 12 to 24″ vein has been opened, and a raise shows 800 oz. ore. Seventy oz. silver ore was shipped, 1919-20, and shipments began again in March, 1921.

JUNE BUG MINE COLORADO

Address: Boyce Bros., Breckenridge, Summit Co., Colo. Operated under lease and option since 1918. Mine produced several small shipments of rich silver-lead ore, during 1919, 1920 and 1921, returns varying between 100 and 300 oz. silver and 15 to 30% lead.

KANAWHA GOLD MINING CO. COLORADO

Address: Leadville, Colo.

Property: the Kanawha mine in Leadville district, Lake county. Ore carries gold, silver and copper.

Operated part of 1919 and shipped ore.

K AND K METAL MINING CO. COLORADO

Address: 136 E. 7th St., Leadville, Lake Co., Colo. Operated the K and K tunnel at Leadville in 1920-21.

KAPEGI LEASING CO. COLORADO

Probably dead. See Vol. XIV.

KAPI MINING & MILLING CO. COLORADO

Probably dead. Mail returned 1921 from former office: Bonanza, Saguache county, Colo. See Vol. XIV.

KATINKA GOLD MINING CO. COLORADO

Out of business. See Vol. XIV.

KATINKA MINING CO. COLORADO

Address: Georgetown, Clear Creek Co., Colo.

Property: the Katinka gold-silver mine at Georgetown. Operated part of 1919, but shipped no ore. Idle 1920.

KAVERGNE MINING & MILLING CO. COLORADO

Address: Idaho Springs, Colo.

Property: the Kavergne gold mine on Albro mountain, near Idaho Springs, Clear Creek county.

Development: by 2 tunnels, the upper being over 800′ long, cutting the Golden Cycle vein at a depth of 600′. Connection was made with a 325′ shaft for better ventilation. The lower tunnel was to be extended 235′ in 1920. Milling ore assays $15 per ton.

Equipment: includes water power and a flotation mill.

KENNEBEC MINE COLORADO

Address: Kennebec Lease, Leadville, Colo., which was operative in 1920.

KENNEDY GOLD MINING & MILLING CO. COLORADO

Address: Georgetown, Clear Creek county, Colo. David Kennedy, mgr., at last accounts.

Property: the Centennial mine, 640 acres, shows cupriferous gold and silver ores in 30″ paystreak, assaying up to 24% copper, 5 to 50 oz. silver and 3 to 5 oz. gold per ton. Probably idle.

KEYSTONE CONS. MINES CO. COLORADO

Address: 1444 Goodfellow Ave., St. Louis, Mo.

Officers: J. F. Doepke, pres.-treas.; A. T. Latta, sec.

Inc. October, 1919, in Wyoming. Succeeds Backoff Leasing Co.

Property: lease and bond on the Bonanza King mine of the Midget Cons. Gold Mining Co. at Cripple Creek. Operated 1920 and 1921.

KEYSTONE CONSOLIDATED M. & M. CO. **COLORADO**

Company dead; but Keystone mine and mill, using flotation, operated 1920. See Vol. XIV for former operations.

KEYSTONE METALS CO. **COLORADO**

Address: H. M. Armstrong, mgr., Polar Mesa, via Grand Junction, Colo.

Property: a carnotite, uranium mine.

KING SOLOMON MINING CO. **COLORADO**

Address: 256 Mining Exch. Bldg., Denver, Colo. Mine office: Frisco, Summit, Co., Colo.

Officers: F. C. Dinsmore, pres.-gen. mgr.; S. H. Alexander, v. p.; C. W. Rowe, sec.-treas., with Q. A. Kelley, H. J. Theobald, J. R. Anders, and C. J. O'Connor, directors.

Inc. September, 1920, in South Dakota. **Cap.** $500,000; $1 par.

Property: 64 quartz claims about 250 acres of placer claims, in the Ten-Mile district, Frisco, Summit county, shows fissure veins in granite, carrying auriferous and argentiferous copper and lead ores.

Development: by a 5,200′ tunnel with 5,000′ of drifts. Company is working the Eleven vein, 3,700′ from portal of the tunnel, said to carry gold, silver, and lead. Steady shipments were made from this vein. Company suspended operations in Fall of 1918 owing to labor conditions, but planned extending tunnel to No. 12 vein in 1919. In 1920, a lessee opened rich ore on No. 11 vein and, in extending a tunnel, cut 18 to 30″ of rich silver-copper ore. Mine reopened by company May, 1921, and 4′ of silver-lead ore was uncovered on the Wheel of Fortune, besides an 18′ body of manganese ore on another claim.

Equipment: includes a 160-h. p. steam and 115-h. p. electric plant, with an 8-drill compressor. Management plans to erect a mill when development warrants. Colorado & Southern R. R. runs by the property.

KISHMAN LEASING CO. **COLORADO**

Out of business in May, 1916. Fully described, Vol. XII.

KITTIE LANE GOLD MINING CO., THE **COLORADO**

Address: Transfer office, 507 Exchange Bank Bldg., Colorado Springs, Colo.

Officers: Marx Lorig, pres.; B. F. Webster, v. p.; Arthur Cornforth, sec.-treas.

Inc. in 1912. . **Cap** 2,000,000 shares; par 1c; 265,000 shares in treasury. On Jan. 1, 1919, company had $240 in cash, a certificate of deposit for $1,000, and bills receivable, $516. Stock listed on Colorado Springs Exchange.

Property: about 30 acres on Raven hill, adjoining the Elkton, at Cripple Creek, includes the Nil Desperandum, Rhinocerous, Kittie Lane, and Sitting Bull No. 1 and 2 claims. The Kittie Lane has been leased. Company inactive.

KITTIMAC MINES CO. **COLORADO**

Address: Herbert E. Curran, receiver of company, Room 44, Capital Bldg., Denver, Colo. Company went bangrupt 1917. See Vol. XIV.

Mine in Minnie Gulch, San Juan county, reopened 1921, under H. G. Briant, superintendent, financed by Pittsburg capital.

KOKOMO MINING CO. **COLORADO**

Address: Stilwell Connor, lessee, Kokomo, Colo.

Property: the Pearl group on Chalk mountain, near Buffers, Summit county, owned by the Pearl Cons. M. Co. Ore carries silver, gold, and lead. **Development:** by tunnel. Nine feet of ore had been opened late in 1921, some of it rich in silver. A mill is contemplated.

KOKOMO-RECEN MINING & DREDGING CORPN. **COLORADO**

Address: 5205 West Lake St., Chicago, Ill.

Mine address: Paul Mauver, Kokomo, Colo.

Officers: Harold Pillinger, pres., Herman Frank, v. p.; Louis G. Kohler, sec.; J. C. Hollister, treas., all of Chicago; with Henry A. Recen of Kokomo, directors.

Inc. 1920, in Delaware. **Cap.** $2,500,000; par $1. Kohler & Co., 5205 West Lake St., Chicago, fiscal agents, offered stock at 50c. in March, 1921.

Company is a consolidation of the National Molybdenum Co. and National Mining & Development Co., and is to pay off $40,000 bond issue of the National Molybdenum Co.

Property: 42 lode and 5 placer claims, 5 groups: (1) Molybdenum claims, 206 acres, near Winfield, Chaffee county; (2) Big Chicago group, Iowa gulch, near Leadville, Lake county, (3) McNulty gulch placer, Ten mile, Summit county; (4) a 5-year lease on the Silver Queen group of the Mutual Co-operative M. Co., near Kokomo, Summit county; (5) Herculean Bar placer at Kokomo.

The Molybdenite mine has an 186′ tunnel and ore is said to be "fully one-half mile wide and a mile long," which is interesting if true. The Big Chicago tunnel, 1,175′ long, must go 275′ more to cut vein 625′ below surface.

The Silver Queen and Hyman mines were producing in 1921.

KOMAT MINING CO. **COLORADO**

Dead or dormant. **Address:** Cripple Creek, Colo. Math Korf, gen. mgr.

Was reported to be operating the Victor mine under lease from the Smith and Moffat Mines Co., owners. Property developed by shaft, 1,000′ deep. Shipped $14 ore in 1918, and produced 400 tons averaging $12 in January, 1919.

LACKAWANNA MINING & REDUCTION CO. **COLORADO**

Dead. Succeeded by D. L. & W. Mng. & Red. Co., also dead. See Vol. XIV.

LAKE GEORGE DEVELOPMENT CO. **COLORADO**

Dead. Former office: 22 E. Columbia St., Colorado Springs, Colo. A. J. Kiser, sec.-treas. Property sold in 1917 and company in receiver's hands. Fully described, Vol. XII.

LAKE SUPERIOR OPHIR MINING CO. **COLORADO**

Dead. See Vol. XIV.

LAMAR MINE **COLORADO**

Address: W. J. Sullivan, Eldora, Boulder county, Colo., who operated this gold-silver- tungsten property in 1920.

LA PLAISANCE MINING & MILLING CO. **COLORADO**

Dead. See Vol. XIV for description.

LA PLATA MINE **COLORADO**

Address: Nord Lease, 192 S. Toledo Ave., Leadville, Colo. This silver-lead property at Leadville was operated, and ore shipped in 1920.

LARIMORE MINING & MILLING CO. **COLORADO**

Address: 1547 Clarkson St., Denver, Colo. Operated the Bonanza mine at Eldora, Boulder county, Colo., throughout 1920, but made no shipments.

LA SAL COPPER-SILVER MINING CO. **COLORADO**

Succeeded by **Michigan-Colorado Mining Co.**; bankrupt, but described herein.

LAST DOLLAR GOLD MINING CO. **COLORADO**

Dead. Described in Volume XIV. Mine operated by the **Modoc Cons. M. Co.**, which see.

LAST QUARTER MINING CO. **COLORADO**

Address: Silver Cliff, Colo.

Property: the Last Quarter silver mine at Silver Cliff, Coster county. Operated part of 1919 and shipped ore.

LAURA DUNMORE MINING & MILLING CO. **COLORADO**

Address: Ourav, or Red Mountain, Colo.

Property: the Laura Dunmore mine, adjoining the Yankee Girl, in Red

Mountain district, near Ouray. Is an old mine reopened in 1920, and equipped with machinery, 1921. Early in 1921 a new chimney, 30′ across, containing very high grade tetrahedrite ore was opened.

LAURA LEE MINING & MILLING CO. **COLORADO**

Out of business in 1918. See Volume XIII for a sample of advertising literature.

LEADVILLE & MOSQUITO RANGE MNG. & MLG. CO. **COLO.**

Office: Geo. J. Ermlich, pres., 1727 Champa St., Denver, Colo.

Inc. in Arizona. **Cap.** $5,000,000; $1 par. Owns all stock of Colorado company of same name capitalized at $50,000.

Property: the Walter Scott property, located 1½ miles from Wortmans, and 11 miles N. E. of Leadville, on west side of Mosquito range, Lake county.

Development: by long crosscut tunnel, on which work has been prosecuted for several years. Some work was done in 1920.

LEADVILLE BASIN MINES CO. **COLORADO**

Dead. See Vol. XIV.

LEADVILLE LEASING CORPORATION **COLORADO**

Address: Albert R. Bailey, Leadville, Colo.

Inc. February, 1920, in Colorado.

Property: 4 claims on Breece, Carbonate, and Idaho Park hills, Leadville district, Lake county, includes the O'Donovan-Rossa, once a silver-lead producer, but closed since 1907. Some of the claims can be worked through the Yak tunnel.

LEADVILLE MINE DEVELOPMENT CO. **COLORADO**

Address: John Cortellini, mgr., Leadville, Colo.

Directors: Jesse F. McDonald, John Cortellini, E. D. Dickerman, W. M. Harvey and J. W. Clark.

Inc. 1920, in Colo. **Cap.** $150,000; par $10.

Company is a reorganization of the Prospect Mountain M. & E. Co., and is backed by influential Leadville residents and the Chamber of Commerce. It was organized to drive a 7,000′ tunnel through Canterbury hill, towards Big Evans gulch, to crosscut veins and dikes believed to extend from Fryer hill.

Property: consists of 465 acres on the west and south slopes of Prospect mountain (which will eventually be served) and of Canterbury hill. The first objective of the tunnel is the Roseville shaft, reached at depth of 225′, followed by the Minneapolis shaft, 508′; Canterbury hill, 1,100′; Canterbury shaft, 700′ and Big Evans gulch, 600′. The "basins" beyond are drained by the Yak tunnel, but could also be reached by the new tunnel, 200′ deeper. Although organized in 1919, the previous company in addition to financial difficulties, had trouble in getting a dumping site, but has secured one from the Leadville Land & Water Co. This also includes a tunnel right-of-way.

This is another project, the fourth in the past 6 years, to revive Leadville by draining a large area of old workings, and to prospect virgin ground. Work was started early in 1921.

LEADVILLE ZINC CO. **COLORADO**

Consolidated with Western Zinc Conc. Co. to form **Western Zinc Oxide Co.**, which see.

LE BRUN LEASING SYNDICATE **COLORADO**

Address: L. F. Le Brun, Cripple Creek, Colo.

Property: a lease till November, 1924, on the South Burns mine of the **Acacia Gold M. Co.** and a lease till October, 1924, on the adjoining Pharmacist mine, on Bull Hill, Cripple Creek district, Teller county, owned by the **Pharmacist Gold Mng. Co.** The properties are described under those titles. Operations 1920 and 1921 successful, good ore being mined and shipped.

LEGAL TENDER EXPLORATION MINES CO. COLORADO

Address: Ouray, Colo.

Property: the Legal Tender gold-silver mine at Ouray, Ouray county. Operated in 1920, but shipped no ore.

LELAND MINING & DEVELOPING CO. COLORADO

Dead. See Vol. XIV.

LEWIS MINE CO. COLORADO

Property at Telluride, San Miguel county. Under lease to Lewis Mng. & Leasing Co., which see.

LEWIS MINING & LEASING CO. COLORADO

Address: Telluride, San Miguel county, Colo. H. G. McClain, gen. supt.

Property: a long-term lease on the Lewis mine, Bridal Veil basin, Telluride, idle since 1912. Mine has fissure veins with shoots of complex lead-zinc-copper ores.

Development: by 500′ shaft, and equipped with flotation mill. Pumps installed and mine unwatered in 1918. Idle 1919-21.

LEWIS MOUNTAIN MINING & MILLING CO COLORADO

Office: 223 Symes Bldg., Denver Colo.

Officers: H. Perini, pres.; J. Orocchi, v. p.; T. R. Lilyard, sec.; C. M. Berkey, treas.; R. McCausland, mgr.

Inc. 1916, in Colo. **Cap.** $1,000,000; $1 par; 600,000 shares outstanding.

Property: 18 claims, 7 patented, in Lewis mountain, 3 miles north of La Plata, La Plata county, includes the Parole, Ten Broeck, Highland and Sylvan mines, showing gold and silver telluride in quartz vein in diorite and limestone, averaging $27 per ton.

Development: by 400′ and new 4,000′ tunnel. Has over 5,000′ of workings, greatest depth being 1,700′. Company has driven its crosscut tunnel 4,000′.

Equipment: includes compressor and drills. An aerial tram and 50-ton mill are planned for 1922.

Production: to early 1919, 800 tons averaging about $60 per ton, and operations continued since. By November, 1920, 5′ of $12 to $25 gold-silver ore had been opened on the same orebody shown in upper tunnel 800′ above.

LEXINGTON GOLD MINING CORPORATION COLORADO

Dead, and property sold August, 1919, to **El Paso Extension Corporation,** which see.

LIBERTY BELL GOLD MINING CO. COLORADO

In liquidation.

Office: 131 State St., Boston, Mass. **Mine office:** A. J. Weinig, supt., Telluride, San Miguel Co., Colo.

Officers: Arthur Winslow, pres.; J. J. Cairnes, v. p.; Henry L. Rand, sec.-treas., with Herbert Kean, and Geo. R. Fearing, Jr., directors. Charles A. Chase, mgr.; H. G. McClain, supt.

Inc. in Missouri. **Cap.** $700,000; $5 par; $667,800 outstanding.

Dividends: in 1915 amounted to 16%: in 1916, 28%; 1917, 34%; 1918, 58%; 1919, 18%; 1920, 8%; totaling $2,767,803

Property: the Liberty Bell mine at Telluride, shows gold and silver-bearing quartz in a fissure vein averaging 3′ to 4′ in width. The main orebody runs N. W.-S. E. and dips 57° W. For geology of the district, see U. S. G. S. Geologic Folio No. 57.

Development: by 2,600′ tunnel and 1,000′ raise from tunnel level to abandoned upper workings. Ore is mined by open stopes on stulls or by shrinkage stoping. All openings amount to about 16 miles.

Equipment: includes hoist of 50 tons hourly capacity, electric power, duplex compressor, Imperial compressor, 1.5 miles tram, a 500-ton concentrator and cyanide mill with flotation units.

Extraction averaged 96%, and total cost per ton amounted to $8.97 in 1918

Production:

	Tons Ore Treated	Oz. Silver Produced	Oz. Gold Produced
1920	56,100	140,375	18,303
1919	110,700	131,067	39,298
1918	90,700	198,591	46,861
1917	143,100	261,294	31,170
1916	165,300	256,711	30,580
1915	173,700	314,432	24,054
1914	173,840	315,919	33,150
1913	179,216	288,602	36,693
1912	175,340	313,845	48,993

Ore extracted from mine amounts to about 2,311,412 tons. Reserves are estimated at 100,000 tons. Total production since 1899 said to be $15,585,109.

Company closed down for good in August, 1921 and mine equipment offered for sale.

LIBERTY GOLD MINING & MILLING CO. **COLORADO**

Mail returned from former address: 508 Mining Exchange Bldg., Denver, Colo.

Property: the Brittle Silver gold-silver mine at Sherrod, Gunnison county. Operated part of 1919, but made no shipments.

LIBERTY LEASING & MILLING CO. **COLORADO**

Absorbed by **Monte Cristo Mines Co.**, which see.

Address: Frank Peabody, gen. supt., Breckenridge, Colo.

LIBERTY MINE **COLORADO**

Address: J. M. Dismant, Redcliff, Colo. This gold-silver mine near Red cliff, Eagle county, was under development, but no ore shipped in 1920.

LIBERTY MINE (BONANZA) **COLORADO**

Address: Bulkeley Wells, agent, 201-14th St., Denver, Colo. **Mine:** at Bonanza, Saguache county, a silver-lead-zinc property that was producing ore in 1920.

LIBERTY MINING CO. **COLORADO**

Address: 418 Barclay Block, 18th and Larimore Sts., Denver, Colo.

Operated the Monarch silver-lead mine near Empire, Clear Creek county, but made no shipments in 1920.

LIBERTY MINING & REDUCTON CO. **COLORADO**

Address: 202 Masonic Bldg., Denver, Colo. **Mine address:** Montezuma, Colo. Controlled by The Dorr Co., of Denver. Owen Johnson, mgr.

Property: the Pennsylvania and Liberty mines, at Montezuma, Summit county. Output is a silver-lead ore which yields 20 tons concentrate daily. Operated and produced steadily in 1921.

Company has a concentrator with flotation equipment, operating 3 shifts daily, the concentrate being hauled to Keystone for shipment to the A. V. smelter at Leadville.

LIDA MINE **COLORADO**

Address: Henry Schuch & Co., 700 Harrison Ave., Leadville, Colo.

Property: the Lida silver-lead mine near Leadville, Lake county. Operated 1919 and 1920, but shipped no ore.

LILLIAN MINING CO. **COLORADO**

Address: Timothy Riley, or Riley & Murcay, lessors, Leadville, Colo.

Officers: J. Clarence Hersey, mgr.

Property: on Printer Boy Hill, between Iowa Gulch and head of Cali-

fornia Gulch, Lake county, developed by a tunnel, ½ mile long and much drifting. Ore carries gold, silver, lead and zinc.

At the end of 1920, a raise from the 500′ point of the Nellie S tunnel revealed a large body of carbonate ore, averaging 35% zinc. At 700′ in, another raise opened ore.

LINCOLN GROUP MINES CO. **COLORADO**

Offices: 505-509 Denham Bldg., Denver, Colo.; and Idaho Springs, Colo.

Officers: H. A. Wimbush, pres.; Peyton Hugh, v. p.; H. G. Wimbush, treas.; R. R. Moodie sec., with Harry J. Newton, directors.

Inc. 1914, in Arizona.

Property: the Lincoln mine, 10 claims, at Idaho Springs, Clear Creek county, said to carry streaks of ore assaying 7.8 oz. gold and 8.1 oz.silver per ton. Development by tunnels, crosscuts and drifts. Rumored in 1919 that control was sold to a syndicate headed by B. F. Zalinger of New York and B. F. Francis.

Operated and shipments made in 1920.

LINCOLN MINES & REDUCTION CO. **COLORADO**

Address: F. G. Gasche, mgr., Cripple Creek, Colo. Thos. Cavanaugh, supt. **Office:** 10 S. La Salle St., Chicago, Ill.

Officers: Jos. Ballin, pres.; F. A. Altmeyer, v. p.; C. A. Grieb, sec.-treas.

Inc. in Colorado. **Cap.** $1,000,000. A close corporation. Operates under a lease from **Rex Gold Mining & Milling Co.**

Property: a lease and bond on 35 acres including the Lincoln No. 2, Ironclad, and Magma Charta claims, in Cripple Creek district, Teller county. Ore carries 54% manganese.

Equipment: includes 30-drill compressor, 1,500 k. w. electric power, machine shops and cyanide plant. A 100-ton mill was erected in 1919, using the Gasche process, and is reported operating at full capacity (March, 1921).

Is a successful mining venture.

LINCOLN SILVER MINES CO. **COLORADO**

Address: V. C. Alderson, Colo. School of Mines, Golden, Colo.

Inc. 1920. **Cap.** $2,000,000.

Property: the Victoria silver mine near Salina, Boulder county. In May, 1920, a tunnel was to be driven to drain the mine to a depth of 400′, also to sink the shaft a further 200′.

LITTLE FOUR LEASING CO. **COLORADO**

Address: care **Gem Mining Co.,** Idaho Springs, Clear Creek Co., Colo. Has lease on part of Gem mine.

LITTLE GIANT GOLD MINING & MILLING CO. **COLORADO**

Address: Lawson, Colo.

Officers: F. L. Collom, pres.; F. F. Chady, v. p.; H. E. Minier, sec.-treas.-mgr.; F. P. Koontz, supt., with R. L. Dear, F. S. Armstrong and D. J. Donnelly, directors.

Inc. in Colorado. **Cap.** $500,000; $2 par.

Property: 58 patented claims, 350 acres, in Downieville mining district, Clear Creek county, shows gold-silver-lead ores in quartz veins, running E. W. with dip 60°. Country rock is granite.

Development: to depth of 900′ by 2 tunnels, 3,500′ and 1,000′ long.

Equipment: includes steam hoist, compressor, drills and concentration mill, with ball and tube mills, 3 tables and six cell flotation plant.

The Little Giant is credited with a past production of $4,000,000.

Company leased the Tabor property in 1921 to John Smith, who drove crosscut to tap St. James vein.

LITTLE JONNIE MINE **COLORADO**

Address: C. & C. Lease, Leadville, Colo.

Property: a famous gold-silver mine near Leadville, Lake county. Some

very rich ore is frequently extracted. Mining is done through shafts and work is done by lessees. High grade gold ore was cut at 750′ depth in 1920.

LITTLE JONNIE MINING & MILLING CO. **COLORADO**

Address: Salina, Colo. Company owns the Little Jonnie gold-silver mine and mill at Salina, Boulder county. Operated but made no shipments in 1920.

LITTLE KINGDOM LAND & MINES CO. **COLORADO**

Office: 50 Congress St., Boston, Mass. **Mine address:** H. J. Stahl, supt., Central City, Colorado.

Officers: H. L. Winchester, pres.; W. D. Drake, v. p.; H. K. Dean, sec.-treas., with Gardner Bates, L. M. Forbes, and Seth Martin, directors.

Inc. December, 1916, in Colorado. **Cap.** $500,000; $1 par; $490,000 outstanding. No funded debt. Transfer agent, Commonwealth Trust Co., Boston; registrar, Equitable Trust Co., Boston. Listed on Boston Curb. Annual meeting, 3rd Tuesday in December.

Property: the Gold Cup and adjacent mines, 15 claims, 7 patented, 150 acres, in Quartz Valley district, Gilpin county, one mile from Central City. Mine shows several fissure veins in porphyry, with N. dip and E.-W. course. Ore occurs in shoots, 2 to 6′ thick, averaging 2 oz. gold per ton with lead and copper, giving a total value of $76 per ton.

Development: includes main working shaft, 300′ deep, with three 100′ shafts and 4,000′ of drifts, with excellent ore showings.

Equipment: steam hoist, electric compressor and air drills, ore house and electric power throughout.

Property still in development stage and with nominal output.

LITTLE KINGDOM MINING CO. **COLORADO**

Probably dead. See Vol. XIV for description.

LITTLE MONTANA MINING CO. **COLORADO**

Office: Colorado Springs Colo.

Officers: C. M. MacNeil, pres.; C. C. Hamlin, v. p.; C. B. Garnett, sec.

Inc. 1912, in Wyoming. **Cap.** $150,000; $1 par.

All stock owned by Granite Gold Mng. Co., which company operated mine. No production since 1917.

LITTLE NATION MINING CO. **COLORADO**

Office: 423 Reserve Bank Bldg., Kansas City, Mo. **Mine Address:** C. N. Holman, supt., Howardsville, Colo.

Officers: E. A. McNeer, pres.; R. B. Crandall, v. p.; Hugh R. Ennis, sec.-treas., with F. G. Crandall and F. B. Platt, directors.

Inc. May 9, 1918, in Missouri. **Cap.** $400,000; par $1; issued 120,000; no bonds. Annual meeting, second Tuesday in May. Income in 1920, $2,006.30, including $1,779 from ore sold.

Property: Little National mine, 10 claims, 4 patented, 129 acres at Howardsville, San Juan county. A quartz vein in latite running S. 40° E., carries sulphide ore containing lead and copper with silver and gold values. Orebody 3′ x 12′ x 100′-150′ is opened by 2,320′ of work in 3 tunnels, deepest with 650′ back.

Company developing mine, only ore extracted being incidental to work. Eleven carloads of $48 ore shipped, mostly silver-lead ore, copper being sorted out. Reserves stated to be 253,000 tons.

Equipment: includes Gardner 250 cu. ft. electric driven compressor, etc.

Operated and shipped ore during 1919 and 1920. Plans mill. Company also developing adjacent Royal Charter group.

LITTLE RIECHE MINE **COLORADO**

Address: M. J. Brady, lessee, Box 685, Leadville, Lake Co., Colo., who did development work, but shipped no ore from this mine in 1920.

LITTLE VINNIE MINE **COLORADO**

Address: George Peschel, Box 52, Leadville, Lake Co., Colo. Mine at Leadville operated and auriferous silver-lead ore shipped under lease during 1920.

LIZARD HEAD MINING CO. **COLORADO**

Address: Telluride, San Miguel Co., Colo. Operated a mine at Telluride, during 1920, but shipped no ore.

LOGAN METALS CO. **COLORADO**

Address: Box 333, Boulder, Colo. **Mine Address:** Crisman, Colo.

Officers: J. R. Wolff, pres.; S. H. Blakesley, v. p.; W. T. McGinnis, sec.; F. W. Kohler, treas.

Inc. 1918, in Colorado. **Cap.** $200,000, shares $1 par; outstanding 140,000 shares. A close corporation.

Property: the Logan mine, 12 patented claims, about 50 acres at Crisman, Boulder county, has gold, silver, and tungsten in fissure veins in granite. Main course is N.-S., with 25° dip N. E.

Development: by 4 tunnels totaling two miles. Greatest depth is 700'.

Equipment: includes hoist, compressor, pump, and electric power. Mine worked mainly by lessees. Active during 1919.

LONDON GOLD MINES CO. **COLORADO**

Office: Mining Exchange Bldg., Colorado Springs, Colo. **Mine address:** Alma, Colo.

Inc. 1921, in Colo. **Cap.** $100,000; par $10. Company takes over holdings of London Mines & Milling Co., controlled by the Story, Jewett and Packard estates.

Property: The London mine on London Mtn., 7 miles W. of Alma and about the same distance from Leadville, opened in 1875, is an old-time producer.

Mine has fissure veins in gray and white porphyry. The main London vein averages 18" thick, runs N. 37° W., with dip of 65° W., while the McDonald, a parallel fissure is 16" thick. Assays reported to average 4 oz. gold, 4 oz. silver, 8% lead. The London vein has been the principal producer in the past.

Development: by 2 adits, one 300' below the other, opening the London vein for 2,980', with backs of 150' to 650'. Company is driving a tunnel to cut vein system, 780' below present workings, giving new stoping ground, 780' high and 2 miles long. Machine-drills are used. Company planning a 200 ton mill.

Company was the largest producer in Park county during 1919 and 1920.

LONE TREE GOLD MINES CORP. **COLORADO**

Address: 950 Logan St., Denver Colo.

Operated and shipped silver-zinc-lead ore in 1920 from the Lone Tree mine at Idaho Springs, Clear Creek county.

LORD BYRON MINING & MILLING CO. **COLORADO**

Address: Idaho Springs, Colo.

Operated and shipped argentiferous zinc-lead ore in 1920 from the Lord Byron mine near Idaho Springs, Clear Creek county.

LOST DUTCHMAN MINING & MILLING CO. **COLORADO**

Address: Rowena, Colo.

Company did development work only during 1920 on its property, the Lost Dutchman gold-silver mine near Rowena, Boulder county.

LOUISIANA-COLORADO MINING CO. **COLORADO**

Office: 521 Denham Bldg., Denver, Colo. **Mine address:** Alma, Park Co., Colo. A. E. Moynahan, supt.

Officers: A. J. Trone, pres.; E. A. Ritter, v. p.; A. J. Brand, sec.-treas., with Eugene Constantin, J. W. Lepine, W. H. Price, and Dr. T. Stark, directors.

Property: the Dolly Varden mine, about 18 claims, 150 acres, on Mt. Bross, Alma; also reported to have purchased the Moose properties adjoining the Dolly Varden on the N., from estate of Ludlow Patton, N. Y., consisting of 19 claims, 300 acres. The rocks are lime and porphyry; veins are 20 to 40" wide, and contain galena and antimonial silver. The first carloads

of concentrates were said to have returned 0.02 gold, 177 oz. silver, and 4½% lead.

Development: by tunnel and drifts, 2,000′ long.

Equipment: includes an 8,000′ aerial tramway, taking ore from mine to its flotation mill on Platte river, 1½ miles N. of Alma. In September, 1919, the mill was treating 150 tons of dump ore daily, producing 200 oz. silver and 40% lead concentrate. There were 40 men employed. Late in 1920 some rich silver ore had been opened. Reported shipping ore and concentrate in October, 1921.

LOYAL MINING & MILLING CO. **COLORADO**

Address: T. P. Mitchell, Ouray, Colo. E. G. Holden, supt. **Inc.** 1920 in Colorado.

Property: the Mickey Breen mine in Poughkeepsie gulch, Ouray county, near Ouray.

Company financed in 1920; a power line ordered and new mill to be erected.

LUCKY BOY MINING CO. **COLORADO**

Dead. Mail returned from former office: Jamestown, Colo. See description in Vol. XIV.

LUCKY GIRL MINES CO. OF COLORADO. **COLORADO**

Probably dead. Last address: 1214 Elizabeth St., Denver, Colo. See Vol. XIV for description.

LUCKY TWENTY MINING CO. **COLORADO**

Address: James Lannon, mgr., Ouray, Colo.

Property: a lease and bond on the Guadaloupe silver- gold mine at Ironton, Ouray county. Operations resumed October, 1921. Company to drive a 1,600′ crosscut tunnel to get 600′ below the old workings.

LUEMA MINING CO. **COLORADO**

Dead. No news since 1917. Described in Vol. XIV. of this book. Former address: Leadville, Colo. Warren F. Page, mgr.

MAGNOLIA CONSOLIDATED GOLD MINES CO. **COLORADO**

Address: I. F. Baxter, sec., Room 650, Omaha Natl. Bank Bldg., Omaha, Nebraska.

Inc. in Nebraska. **Cap.** $1,000,000; $1 par; 850,000 issued.

Property: 6 patented claims and a millsite on Magnolia mountain, Boulder county. A prospect, idle several years.

MALLISA MINE **COLORADO**

Chas. Campbell, lessee, Creede, Colo.

Property: at Creede, Mineral county, operated during part of 1920.

MAMMOTH DEVELOPMENT CO. **COLORADO**

Address: 1216 - 17th St., Denver, Colo.

Property: Illinois mine at Tolland, Gilpin county. Ore contains gold and silver. Operated part of 1920.

MAMMOTH MINING & DEVELOPMENT CO. **COLORADO**

Address: Room 111, 519 Main St., Cincinnati, Ohio.

Property: the Homestake silver mine at Creede, Mineral county. Operated part of 1919, but shipped no ore.

MANITOBA LEASING CO. **COLORADO**

Address: Creede, Colo.

Property: the Manitoba silver mine at Creede, Mineral county. Operated and produced during 1919-1920.

MARIE MINING CO. **COLORADO**

Idle and probably dead. See Vol. XIV.

MARION MINES & MILLS CO. **COLORADO**

Office: 850 Equitable Bldg., Denver, Colo. **Mine office:** Rye, Colo.

Officers: Henry E. McElwain, pres.; with John H. McElwain, S. McElwain, Frank Bulkley and Clarence A. Brandenburg, Denver, directors. Jos. Giedlartz, sec.-treas.

Cap. $300,000, increased from $200,000, fully paid by $100,000 cash,

balance in property. Outstanding debts, Feb., 1917, $118,389. No financial information received since.

Property: the Greenhorn group, 19 claims, 6 patented, together with one millsite, total 65 acres; also 120 acres held by location, making 185 acres mineral land in the Hardscrabble district, Custer county.

Development: by tunnel showing a vein of zinciferous copper and lead ore with small gold and silver values. Has water power, compressor and 100-ton concentrating mill. Erected a 100-ton flotation plant to treat tailings in 1915.

Idle several years.

MARLIN MNG., MLG. & POWER CO. COLORADO

Address: J. W. Thomas, supt., Montezuma, Colo.

Property: the Marlin gold-silver mine at Montezuma, Summit county. Operated during part of 1919, and work reported resumed late in 1921.

MARMATITE MINING & LEASING CO. COLORADO

Address: H. M. Fields, pres., Rico, Colo. E. H. Snyder, mgr.

Property: a lease on the Blackhawk mine, owned by the Rico-Argentine Co., also on the Pro Patria mine of the Syndicate M. & M. Co., and the Silver Swan mine. The Enterprise vein of the Silver Swan is being opened. Ore contains gold, lead, zinc, and silver. Reported shipping at rate of two cars per day in 1919, to the Durango smelter. Operations were curtailed during 1920 on account of the apex suit started by the Rico Cons. M. Co. This was settled in Jan., 1921, Marmatite paying $7,346 and Rico Argentine, $29,946, representing net value of 5,000 tons of ore extracted from Rico Cons. ground.

Company controls the Marmatite M. Co., which operates the Emma gold-silver mine at Dunton.

MARSHALL & RUSSELL GOLD M. M. & T. CO. COLORADO

Out of Business. See Vol. XII.

MARTIN MINING AND POWER CO. COLORADO

Fully described in Volume XIV. Holdings acquired, October, 1920, by **Treasure Mountain Mines, Inc.,** which see.

MARYANA MINING & LEASING CO. COLORADO

Mail returned unclaimed, July, 1919, from former address, Cripple Creek, Colo. Probably dead.

Inc. in 1914. Company had a lease on the Mary McKinney mine from the 8th level down.

MARY FLORENCE MNG., MLG. & LEASING CO. COLORADO

Address: 758 Corona St. Denver, Colo.

Property: gold-silver claims at Parshall, Grand county. Operated during 1919, but made no shipments.

MARYLAND MINES & RED. CO. COLORADO

Address: 1143 Larimer St., Denver, Colo. Mine address: Rollinsville, Colo.

Officers: W. N. MacPhail, pres.; J. Miller, v. p.; H. F. Christensen, sec.-treas.

Property: Maryland group of 22 acres in South Boulder district, Gilpin county. Ore reported to average $12 per ton in gold and copper.

MARY McKINNEY MINING CO. COLORADO

Address: Colorado Springs, or Box 1346, Cripple Creek, Colo.

Officers: Chas. Castello pres., gen. mgr.; Daniel Thatcher, v. p.; John L. Nichols, sec.-treas.; with J. H. Nichols, and W. H. Spurgeon, directors.

Inc. March 30, 1892, in Colorado; renewed March, 1912. **Cap.** $1,500,000; shares $1 par; outstanding June, 1918, $1,409,252. Transfer office: Colorado Title & Trust Co., Colorado Springs. Annual meeting, 2nd Monday in February. Listed on Colorado Springs Exchange.

Income Account—years ended December 31:

	Ore Sales	Oper., etc. Expenses	Net Earnings	Other Income	Paid Lessees	Taxes (a)	Balance for year
1920	$51,546	$27,059	$24,487	$3,532	$25,358	$3,846	*$1,185
1919	80,601	44,202	36,399	2,639	38,242	1,856	1,060
1918	98,307	61,728	36,579	4,444	42,362	2,892	*4,231
1917	107,151	109,805	(loss) 2,654	1,528	32,525	8,166	*41,817
1916	228,346	173,333	55,013	4,698	50,689	8,147	875

* Deficit. (a) legal expenses.

Dividends: to 1919, $1,182,398; last paid Oct. 26, 1916, $13,093.

Property: 22 patented claims on W. slope of Raven Hill, at Cripple Creek, Teller county. First claim was located in 1891. In 1906, the property of the Anaconda Gold Mining Co. was purchased.

Ore: gold in LeClair and Mary McKinney quartz veins in phonolite. Ores carry tellurides in fluorite, quartz and altered wall rock. (For geology of the Cripple Creek district, see U. S. G. S., Prof. Paper No. 54.)

Development: by shafts to the 1,300′ level. Total underground workings, about 17 miles. In 1919, 3,636′ of new work was done, compared with 6,713′ in 1918 and 6,488′ in 1917..

Mine was examined Dec., 1916, by J. T. Milliken and L. S. Noble, who recommended that No. 9 and 10 levels be extended N. to the West vein, until they reach its intersection with No. 5 vein. The latter vein and others are then to be explored. Junctions in upper levels showed good shoots. Lessees opened 5′ of 4 oz. ore on No. 9 level in 1920.

Equipment: includes two plants, with 100-h. p. electric hoist, 200-h. p. electric compressor, boiler-plant, machine-shop, etc.

Property is well managed, and a policy of extensive exploration will be commenced as soon as mine supplies drop to a reasonable price. Management reported 18 sets of lessees at work in July, 1921, all shipping ore.

Production: total to end of 1919 was $9,247,900.

Year	Co. ore, tons	Value	Lease ore, tons	Value
1920		$	3,433	$51,546
1919	298	2,153	5,148	76,002
1918	1,086	10,294	6,549	88,012
1917	2,962	40,560	4,960	66,591

MARY MURPHY GOLD MINING CO. COLORADO

Offices: 414 Boston Bldg., Denver, and Romeley, Chaffee county, Colo.

Officers: Geo. E. Collins, pres.-gen. mgr.; Louis F. Eppich, v. p.; H. W. Robinson, sec.; M. Nelson, treas., with Arthur Ponsford, directors. W. F. de Camp, mine supt., H. L. King, mill supt., at last accounts.

Inc. May 20, 1909, in Colorado. **Cap.** $1,850,000; $5 par; 1,838,100 outstanding January 1, 1920. Bonds authorized, $350,000, 6%; $169,000 outstanding in Jan., 1920. Majority of stock and bonds are said to be held in England. Stock transferred at company's office. Continental Trust Co., Denver, registrar. Annual meeting second Monday in March.

During 1919 there was a loss of $45,379, thus increasing the debit balance to $118,794. At beginning of 1920, current assets were $105,754, and liabilities, $82,289. Reserves were $128,765. No printed reports were issued for 1919 or 1920. Company received $10,135 as royalty from lessees in 1920. No dividends since 1916, when 1½% was paid.

Property: 42 claims, mostly patented, 350 acres in Chalk Creek district, Chaffee county.

The Yankee Girl, Genesee-Vanderbilt and Robinson mines in the Red Mountain district, Ouray county were acquired in 1917, and a 50-ton mill built at the Genesee. The mines contain complex silver ores in vertical

chimney deposits. Development is in progress by the Red Mountain Mines Co., a subsidiary, which see.

Ore: contains gold, zinc, lead, silver and copper, in order of value, in a complex network of nearly vertical fissure veins in quartz-monzonite; the Mary Murphy is the main vein. Veins vary in width from 6" to 12', and contain shoots and irregular lenses of ore. average assay of milling ore: 0.2 oz. gold; 2.7 oz. silver; 4.4% lead; 7.9% zinc; 0.5% copper.

Development: by tunnels with a shaft connecting the tunnel levels: length of principal tunnels, No. 7, 750'; No. 14, 1,500'; Golf, 4,350'. Total workings over 9 miles with greatest depth, 1,975'.

Equipment: includes small hoist, 3 air-compressors, 2 aerial tramways and 175-ton concentrating mill, with flotation units and a 25-ton electrostatic separation plant for the zinc-iron middlings.

Recent production; largely by lessees:

	Crude & Concts., tons	Total gross Value	Cost Smelt	Cost Freight	Umpire Charges	Net Yield
1919.....	2,308	100,213	$11,576	$11,676	$77.75	$76,882
1920.....	2,294	71,632	22,295	9,296	144.00	38,896

The Mary Murphy mine has seen its best days. At the beginning of 1917 available ore was estimated as 8,000 tons, and 6,000 tons in the Iron Chest mine. Much of the ground being then mined would not pay under normal metal prices. See Vol. XIV of this book for early history, etc.

Company suspended operations during 1919. Ore is being extracted by tributers in the upper levels and shipped to the A. S. & R. Co. at Leadville.

Bulkeley Wells and associates have a lease and option on the property and did some developing work in the lower levels in 1920.

MARY NEVIN GOLD MINING CO. **COLORADO**

Mail returned unclaimed. April 15, 1919, from Cripple Creek, Colo.

Officers: H. J. Gehm, Pres.-treas.; R. S. Ellison, v. p. and sec.

Cap. $1,500,000; $1 par. In treasury. Jan. 1, 1916, 38,000 shares. Listed on Colorado Springs Stock Exchange.

Property: the Mary Nevin and Hibernia patented claims, 10 acres, on Rosebud hill.

Development: by a 385' shaft on the Hibernia claim, a 200' shaft on the Mary Nevin claim and some drifting. Property was operated through the Henry Adney shaft. Probably idle.

MASCOTTE TUNNEL & MINING CO. **COLORADO**

Address: W. F. Kendrick, mgr., Coronado Bldg., Denver, Colo. Carl A. Mohr, supt., Alma, Colo.

Officers: W. F. Kendrick, pres.-treas.; S. T. Kendrick, v. p.; E. M. Tressler, sec., with Robt. Hutchinson, directors.

Inc. November, 1921, in Colo **Cap.** 5,000,000 shares; no par value; 3,400,000 shares issued.

Property: 32 claims, 11 patented, 600 acres, at Alma, Park county. Ore occurs in contact deposits and fissure veins, containing gold, copper, silver and lead.

Development: by 1,400' tunnel, which is being extended. Equipped with electric power. A concentrating mill is planned.

MASTER KEY MINING CO. **COLORADO**

Office: 1460 Fillmore St., Denver Colo. **Mine Office:** Columbine, Colo.

Officers: J. A. Leslie, pres.-gen. mgr.; H. S. Holcomb, sec.-treas.

Inc. January, 1919, in Colorado **Cap.** $250,000; $1 par.

Property: 26 claims and mill site, about 560 acres, in Columbia basin, Hahn's Peak district, Routt county, 32 miles N. of Steamboat Springs. Ground contains contact and cross fissure veins in limestone and quartzite, yielding gold, silver, and lead. The average value is $15 to $21 per ton, mainly in precious metals.

Development: by two shafts, 70′ and 110′ deep, tunnels and underground workings, 380′. Planned exploratory drilling in 1921.

MATCHLESS MINING CO. COLORADO

Address: C. L. Gaskins, Box 46, Leadville, Colo.

Property: the Matchless, on Fryer hill, near Leadville, Lake county. In 1917 the old shaft was re-timbered throughout its 246′ depth, and deepened through quartzite and porphyry. A diamond-drill was used for exploration, as it was believed that white limestone exists under the porphyry, forming the sulphide zone. A vigorous development policy is being pursued. High-grade gold-silver ore was reported opened in 1919, also early in 1920.

MATRIX MINES CO. COLORADO

Address: Lawson, Colo.

Property: 16 claims, including the Prince Albert, on Columbia mountain, opposite Lawson. An 18″ vein of rich silver ore was mined in 1919, but work ceased during that year.

MATTERHHORN MINING & MILLING CO. COLORADO

Address: Park J. Dills, mgr., Ames, Colo.

Officers Frank J. Weber, pres.; Leo. R. Grinnell, v. p.; Park J. Dills, sec.-treas.-mgr., with A. W. Strehlow, R. G. Schuffenhauer, Henry Popper and Wm. C. Walrath, directors.

Inc. 1910, in Colorado, **Cap.** $1,250,000; $1 par; $1,000,000 shares outstanding. Operating expenses for 1920 were $39,000, leaving a balance of $2,754.

Property: the Matterhorn mine 19 claims, 9 patented, 250 acres, in Trout Lake and Iron Springs districts, near Ames, San Miguel county. Ore occurs in a fissure vein in diorite-monzonite, averaging $14 per ton in gold, silver, lead and copper.

Development: by tunnels to depth of 1,200′ with 15,840′ of workings. Reserves estimated to be 10,000 tons blocked out. Shipping ore said to average 128 oz. silver per ton and 2.35% copper. Development only being done.

Equipment: includes compressor, electric and water power, 40-ton mill and 6 flotation units being installed.

MATTIE B. MINING CO. COLORADO

Inc. in Colorado. **Cap.** $100,000; $1 par. Stock offered at 50c in 1917.

Property: Bob Cat group, 20 acres in Cleora mining district east of Salida, Chaffee county. Reported to have cut copper ore 300′ from portal of tunnel, said to be 18 to 30′ thick.

MAXINE ELLIOTT MINE COLORADO

Address: H. H. McFann, 637 Mayo Bldg., Tulsa, Okla.

Property: a silver mine at Westcliffe, Custer county. Operated during part of 1920.

MAY DAY MINE COLORADO

Address: C. W. Leschen, Dumont, Colo.

Property: near Dumont, Clear Creek county. Ore contains gold and silver. Operated during part of 1920.

MAYFLOWER LEASING CO. COLORADO

Created work in 1919. See Vol. XIV.

McCARTHY-HIDDEN TREASURE MINING CORP. COLORADO

Address: T. A. O'Brien, supt., Lake City, Colo.

Property: the Oriental mine, formerly known as the Hidden Treasure, in Gunnison county. Developed by 3,700′ crosscut tunnel and several thousand feet of workings on seven levels. The vein is 30″ wide. Concentrates said to assay $90 in silver, lead, and gold.

Equipment: aerial tram 3,800′ long, mill and flotation unit, water and steam power with combined capacity of 1,000 h. p., and compressor.

McINTYRE MINING CO. COLORADO

Address: John W. Prout, mgr., 300 Sugar Bdg., Denver, Colo.

Property: the Puzzle mine at Rico, Dolores county credited with past production of silver ore worth $300,000.

Development: by 135′ shaft with 2,637′ of workings. Present owners have not shipped any ore, but have been looking for a vein lost 30 years ago. This was found, 4½ to 5′ wide, but after driving 400′ no commercial ore was developed.

In 1918-1919, company raised 132′ on the vein, then drove a 190′ adit from the surface to connect with top of the raise and to find the lost orebody. Diamond-drilling was to be done in 1920.

MEDITERRANEAN MINE **COLORADO**

Address: Robt. L. Pellet, Rico, Colo.

Property: near Rico, Dolores county. Ore contains gold and silver. Was operated during part of 1920.

MELVILLE LEASING CO. **COLORADO**

Address: Silverton, Colo.

Property: the Iowa mine at Silverton, San Juan county. Ore carries gold, silver and lead.

Operated and produced during 1919.

MELVINA MINE **COLORADO**

Address: J. H. Holmes & Co., 2031-12th St., Boulder, Colo.

Property: between Wall St. and Gold Run gulch at Salina, Boulder county. The mine, idle since 1907, was unwatered late in 1917. Equipment includes a 50 h. p. electric hoist. Ore carries gold and is high-grade. Presumably developing.

MEMPHIS & IDAHO SPRINGS GOLD M. & M. CO. **COLORADO**

Idle. Mine near Idaho Springs, Clear Creek Co., Colo. J. J. Williams, pres.; Wm. M. Slack, sec.-treas.; at last accounts.

Inc. in Colorado. **Cap.** $1,500,000; $1 par; non-assessable.

Property: 14 claims, patented, shows veins with lead, copper and zinc sulphides. Mine developed by shafts of 125′, 250′ and 460′ and tapped at depth of 2,350′ by the Newhouse tunnel.

Equipment: includes 22-h. p. electric hoist and air compressor. Was leased to John Kuykendall of Denver, in 1915. No recent returns.

METALS EXPLORATION CO., THE **COLORADO**

See under this title in U. S. section of this book.

METALS MINING & LEASING CO. **COLORADO**

W. J. Baker, mgr., Idaho Springs, Colo.

Inc. 1916, in Colo. **Cap.** $25,000.

Property: Jenny Lind group, near Idaho Springs, Clear Creek county. The Big Five tunnel cuts the claim at depth of 2,000′. Was operating, 1920, but no shipments made.

METALS TUNNEL CO., THE **COLORADO**

Office: 2555 West 37th Ave., Denver Colo.

Officers: F. E. Holmes, pres.; J. J. Brown, v. p.; H. G. Fowler, sec.-treas. and mgr., with R. A. Haynes, directors.

Inc. April, 1915, in Arizona. **Cap.** $150,000; 10c par; 970,000 outstanding in 1921. Annual meeting, first Tuesday after first Monday in June, at Phoenix, Ariz. A vigorous share-selling campaign was under way in May, 1920 and continued throughout 1921. Stock offered at 75c.

Property: 71 claims, 160 acres, and a mill-site, aggregating 525 acres, situated about 7 miles S. W. of Idaho Springs, Clear Creek county; also 20 lode claims and a 200 acre tunnel site, 4 miles from Georgetown.

Development: by Tunnel and numerous prospect workings. Company is driving a crosscut tunnel to cut several known veins. Tunnel can be used for transportation, and was being advanced on contract. The main tunnel is in 3,080′ and the Denver tunnel, 1,800′.

Equipment: includes power-plant, and compressor with 6 drills.

The secretary states "in regard to the formation, everything continues favorable, the dip and pitch are right, there is a good amount of moisture, and I know we are justified in looking for important developments. . . ."

Operated part of 1919, but shipped no ore.

MICHIGAN-COLORADO COPPER CO. **COLORADO**

Office: 1312 Penobscot Bldg., Detroit, Mich.

Company is in U. S. Court in Denver, Colo. as bankruptcy proceedings were begun 1920 by original owners.

Officers. A. C. Carton, pres.; E. V. Laud, sec.-treas.; with G. F. Galloway, C. Holmes, H. Behrendt, P. W. Klintworth, and G. N. McBride, directors. Jesse F. Boyd, mgr.

Cap. $5,000,000; $1 par; 1,000,000 shares are treasury stock.

Property: 12 claims and 3 mill-sites, patented, 150 acres, at Cashin, Montrose county. Company, in 1918, bought out the La Sal Copper-Silver Mining Co., which was a reorganization of the Consolidated La Sal Mining & Smelting Co., which succeeded the La Sal Copper Mining Co. Property includes the Cashin mine, which had been idle for many years, but was being developed during 1919. In August, 1919, company acquired an interest in the LockerBrewer copper mine, near Monticello.

Geology: there are three fault-fissures at the Cashin, the Red Chief, Horseshoe, and Maude veins—varying from a few inches to 12', composed of sandstone or fault breccia showing copper carbonates, sulphides, and native copper, with silver as sulphides and native silver. Assays average 6% copper and 1.7 oz. silver per ton.

Development: by tunnel 1,540' long. Early in 1920 it was planned to erect a power plant and 100-ton mill. Mine shut down 1921.

U. S. are olders petitioned for receivership, alleging that company was insolvent and that they had bought shares through misrepresentation. This was a scandalous promotion put out by a broker, who is said to have sold 1,000,000 shares at $1.50 per share, his salesman getting 75c a share as commission, the balance was to pay for property and its development. State Securities Commission ordered half the capital stock put in escrow, but 2,000,000 out of 3,000,000 shares is said to have been put where it would do the most good.

MICHIGAN MINE **COLORADO**

Address: W. E. Bowden, 431 W. 4th St., Leadville, Colo.

Property: a group of 11 claims, near Kokomo, Summit county, formerly operated by Michigan M. & M. Co., reopened and under development in 1921.

MICHIGAN MINING & MILLING CO. **COLORADO**

Bankrupt. Assets sold at receiver's sale, and bought in by Edward Moir, the previous president.

Office: Foster Bldg., Denver, Colo. See Vol. XIII, also Michigan Mine, in this volume.

MID-COLORADO MINES CO. **COLORADO**

Address: Georgetown, Colo.

Officers: Abraham Plank, pres., Wooster, Ohio; O. H. Kniffen, v. p.; L. A. Lang, sec., Denver; I. E. O'Hail, treas., Wooster, with Geo. B. McFadden, directors.

Inc. March, 1915, in Colorado. **Cap.** $600,000; $1 par; 400,000 outstanding. Annual meeting, second Tuesday in July.

Property: 13 claims, 11 patented, on Republican mountain, ½ mile W. of Georgetown, Clear Creek county, including the Mineral Chief mine, was purchased in 1915.

Ore: gold, silver, lead, zinc in fissure vein in porphyry, said to assay 60 oz. gold, 16 oz. silver, 18% lead, 7% zinc.

Development: by 7 shafts ranging in depth from 140' to 1,100', with total workings of 1½ miles.

Ore reserves: said to be 50,000 tons.

Equipment: includes electric power 50-ton mill equipped with crusher, rolls, jigs, tables and flotation plant.

Production: previous to 1915 said to be 190,000 tons. No recent information received.

MIDGET CONSOLIDATED GOLD MINING CO. COLORADO

Office: Cripple Creek, Colo.

Officers: J. F. Doepke, pres.-mgr.; J. H. Heckemey, v. p.; A. T. Labba, sec.-treas.

Cap.: $1,000,000; $1 par.

Property: about 27 acres on Gold hill, Cripple Creek, Teller county. Leases property to other operators, the Bonanza King being leased to the Keystone Development Co.

Development: by 800′ shaft. Reserves said to be 150,000 tons low-grade ore on dump and 100,000 tons of low-grade ore exposed by mine development.

MIDLAND CHIEF MINES CO. COLORADO

Mail returned from last address: F. J. Woodward, gen. mgr., Colorado Bldg., Denver, Colo.

Inc. in Massachusetts. **Cap.** $250,000; $5 par; 12,000 shares in treasury.

Property: 11 claims, 50 acres, on Democrat Mountain, Georgetown. Clear Creek county,; also a 50-ton mill. Two ore-shoots have been opened, one 125′ long and 4′ wide, with 400′ back; the second on No. 6 level, is 4′ wide and 450′ long.

Production: in 1917 was 700 tons returning about $5,000.

MIDNIGHT MINING CO. COLORADO

Address: Aspen, Colo.

Property: the Midnight mine at Aspen, Pitkin county. Ore carries silver, lead, and copper. Examined in 1920 by Stuart Croasdale of Pittsburgh, Pa.

Operated part of 1919, but shipped no ore. In 1920, company was driving a tunnel jointly with the Contact M. Co.

MIDWEST METAL MINING & HOLDING CO. COLORADO

Presumably out of existence. Described in Volume XIV.

MIDWEST MINING & MILLING CO. COLORADO

Address: 2354 Elm St., Denver, Colo. Mine address: Blackhawk, Colo.

Officers: Nels G. Olsen, pres.; Jas. Westman, v. p.; Robt. E. Wolt, sec.-treas.

Cap. $500,000; $1 par; 225,000 shares issued.

Dividends: No. 4 and 5 were paid early in 1921.

Property: 28 claims, includes the Alaska, Cyclops, and Peru, near Blackhawk, Gilpin county, and the Iron City mill at Blackhawk. Ore contains gold, silver, lead.

Development: by tunnels and shaft. In December., 1920, a 300′ crosscut tunnel was started at the Cyclops to meet the Silent Friend shaft at a depth of 400′. The crosscut will also drain the mine.

Equipment: includes hoist, compressor and the Iron City 75-ton mill employing flotation. Concentrates reported to average $125-150 per ton.

MILLASIER MINES CORPORATION COLORADO

Owns and operates the Clyde mine on Battle mountain, Cripple Creek, Teller county. Chas. Fish, supt.

Is a close corporation composed of Michigan men. Developed by shaft to 1,400′ level.

MILLER GOLD MINING & MILLING CO. COLORADO

Address: Mrs. M. Miller, mgr., Twin Lakes, Lake county, Colo. J. G. Buehler, pres.

Development: by 1,200′ tunnel. Company has a 100-ton mill and was to erect a compressor plant at last accounts. The plants and upper workings of the mine were leased to the Mt. Champion Company in September, 1919. Developing in 1920.

MILL GULCH MINING CO. COLORADO

Address: C. F. Flon, sec., 1018 E. Boulder St., Colorado Springs, Colo.

Inc. 1910, in Colorado. **Cap.** $1,000,000; $1 par.

Property: on 31-Mile Mountain, 5 miles S. of Guffey, Park county.

Development: work has been done intermittently since organization. A 220' shaft was deepened to 320' in 1919, opening ore that assays 8½% copper, 13 oz. silver, and some gold.

Equipment: steam power, pump, hoist, smithy, and all necessaries.

Operated part of 1920, but no shipments in 1919 or 1920.

MINERAL PARK MILLING & REDUCTION CO. **COLORADO**

Address: 618 Kittredge Bldg., Denver, Colo.

Property: Silver Siding group, at Ward, Boulder county. Ore contains gold and silver. Developing.

MINERAL POINT TUNNEL & MINING CO. **COLORADO**

Address: 1451 Court Place, Denver, Colo.

Stock offered at $1 per share, April, 1921.

Property: 6 claims, 2 mill sites and a tunnel site, in Beaver Dam district, Summit county, 6 miles E. of Dillon. Ore contains silver, lead and some gold.

Development: by long adit being driven at depth of 600' to drain mine and facilitate transportation of ore.

MINERALS CORPORATION **COLORADO**

Address: Montezuma, Colo.

Property: Morning Star silver-lead mine at Montezuma, Summit county. Developing.

MINERALS RECOVERY CO. **COLORADO**

Office: Denver, Colo.

Officers: W. A. J. Bell, pres.; Chas. R. Enos, sec.

Company purchased plant of the National Radium Institute at Denver, in 1919.

MINING DEVELOPMENT CO. **COLORADO**

Office: 2030 Land Title Bldg., Philadelphia, Pa.

Officers: L. H. Taylor, Jr., pres.; F. M. Kurie, v. p.; P. W. Meyers, sec.-treas. with Percival Chrystie and John F. Anderson, directors.

Inc. Jan., 1915, in Delaware **Cap.** $100,000; $10 par; 6,000 shares outstanding. Annual meeting third Tuesday in January. Is a close corporation

Property: consists of leases on certain blocks of the Stratton Cripple Creek Mining and Development Co. (Stratton Estate), on Bull Hill, Cripple Creek, Teller county. The ground carries the Eagle vein and the Basket & Lace vein with other parallel N.-S. veins, also the Eagle cross vein running N. E.-S. W.

Equipment: includes complete hoisting plant. Operations are conducted through the Star of Bethlehem shaft, 300' deep and also through the main Eagles shaft 1,500' deep. In the Eagles shaft the Stratton Company operates the hoist.

Operations were begun March, 1919. The ore, shipped to the Eagle Ore Co., at Victor, averaged $30 per ton.

MINNEHAHA MINING & MILLING CO. **COLORADO**

Address: George Bibb, mgr. Silverton, Colo.

Officers: J. J. McFeely, pres.-treas.; A. V. Dawson, v. p.; C. L. Beard, sec.

Inc. in 1918, in New York with capital of $100,000, to operate the Minnehaha group, at Ross Basin, Gladstone, San Juan county. The claims have never been worked to any extent.

MISER GOLD MINING & MILLING CO. **COLORADO**

Address: 909 Equitable Bldg., Denver, Colo.

Property: the Miser gold-silver mine at Platoro, Rio Grande county.

Operated part of 1919, but shipped no ore.

MISSOURI LEASING CO. **COLORADO**

Address: Breckenridge, Colo.

Property: Missouri silver-lead mine, at Breckenridge, Summit county. Operating, but no details available.

MISSOURI MINE COLORADO

Address: C. M. Snyder, Cassello, Colo.

Property: at Cassello, Park county. Ore contains silver and copper.

M. & M. MINE COLORADO

Address: T. E. Ryan Co., St. Charles, Ill.

Property: a gold-silver-lead mine at Idaho Springs, Clear Creek county, operated during early part of 1920.

MODOC CONSOLIDATED MINES CO. COLORADO

Office: 837 Symes Bldg., Denver, Colo.

Officers: E. D. Avery, pres.; A. H. Frankenberg, v. p.-mgr.; M. A. Skinner, sec.; Thomas Annear, treas.; with T. F. Daly, and A. S. Rundall, directors.

Annual report for fiscal year ending May 31, 1921 shows gross receipts from ore sales, $257,886; net operating earnings, $19,882. Stock offered at 18-25c. in 1921.

Property: a group of 4 claims including the Last Dollar in Cripple Creek district, Teller county, credited with past production of about $2,000,000 since 1892. Bought by T. M. Pettigrew and others of Denver, late in 1916.

Development: by 1,500′ main shaft and extensive openings on the 900, 1,000, 1,100, 1,200, 1,300, 1,400 and 1,500′ levels. During 1920, the total new work was 2,200′.

Equipment: complete with 250-h. p. electric hoist, erected in December, 1920.

Production: at the rate of 150 tons per day in 1921.

MODOC MINING & MILLING CO. COLORADO

Property operated by **Modoc Cons. Mines Co.**, which see.

MOFFAT TUNNEL & TRANSPORTATION CO. COLORADO

Address: care War Eagle Consolidated Mines Co., Cripple Creek, Colo.

Property: the Moffat or Ophelia tunnel which is to serve as a public transportation outlet from Raven Hill properties at Cripple Creek, Teller county, owners of which have deeded right-of-way through them. A drift, driven from the Blue Flag Company's 1,150′ level connects with the tunnel to perfect ventilation.

MOJAVE TUNGSTEN CO. COLORADO

Address: N. H. Brown, supt., Boulder Falls, Boulder county, Colo.

Company and holdings described under same title in California.

MOLLIE GROVES MINING & MILLING CO. COLORADO

Property: near Parshall, Grand county, was not regarded favorably by the late Horace J. Stevens, owing to company's alleged preposterous claims. Letters neither answered nor returned. Fully described Vol. XI, Copper Handbook.

MOLLY B. MINING & MILLING CO. COLORADO

Mine address: Breckenridge, Colo.

Property: in Yuba Dam Flats, ½ mile north of Breckenridge, Summit county, includes Fox Lake, Como, and Breckenridge veins. Company reported driving three headings into a blanket formation of copper ore containing gold, silver, and bismuth.

Equipment: includes compressor. Operated during part of 1919 and 1920.

MOLYBDENUM PRODUCTS CORP. COLORADO

Address: Climax, Summit Co., Colo.

Company assets taken over in 1919 by the **Climax-Molybdenum Co.**, which see.

Property: located on Bartlett mountain, Buffers Spur, a mile south of Climax, Lake county, adjoins property of Climax Molybdenum Co. Company built a 250-ton mill.

A foreclosure of mortgage was made Dec., 1921 in favor of E. J. Longyear for $87,686 due, and the Court ordered the sale of company's prop-

erty, viz. the Lake Placer and Denver No. 2 Lode claim and all buildings, improvements and tram line, also the Dow Placer and Wolf lode claim and the entire mill and plant. This sale was advertised for Dec., 6, 1921.

MONO MINES CO. **COLORADO**

Address: 404-1st Natl. Bank Bldg., Denver, Colo.

Property: Griffith gold-silver-lead mine at Georgetown, Clear Creek county. Operated during early part of 1920.

MONON MINING CO. **COLORADO**

Office: Creede, Colo.

Officers: G. C. Manley, pres.; A. Drumm, v. p.; T. H. Thomas, sec.-treas.

Property: the Monon group, 3 miles north of Creede, Mineral county. Was first worked in 1891, but has been idle many years. In 1919, was operated by lessees who shipped 100 cars of silver bearing ore, reported to have returned $173,440.

MONTE CRISTO MINES CO. **COLORADO**

Successor to Liberty Leasing & Milling Co.

Frank Peabody, gen. supt., Breckenridge, Colo.

Inc. in Colorado.

Property: Monte Cristo and Fredonia groups in the upper Blue River region, near Breckenridge, Summit county. Ore, containing silver and lead, occurs in a vein, 4-6' wide. Comtemplates erecting a new mill and extensive development work.

MONTEZUMA CONSOLIDATED SILVER MINES CO. COLORADO

Office: 801 Magee Bldg., Pittsburgh, Pa.

Directors: Joseph Giediartz, F. C. Ewing, C. A. Brandenburg, J. F. Haggerty, V. C. Miller, M. Winter, and W. F. Galbraith. H. T. Porter, sec.-treas.; T. R. Hunt, supt.

Inc. July, 1919, in Colorado. **Cap.** $2,000,000; $1 par; 700,000 outstanding. Annual meeting, second Tuesday in February.

Property: 77 claims, 10 patented, including the St. Johns, Morework, and Philadelphia mines, at Montezuma, Summit county. A fissure vein lies in granite and porphyry. Orebody is 400 to 700' long and in places 13' wide. Its course is N. E.-S. W., and dip 40 to 72°. Ore is a sulphide, averaging 11 oz. silver, 9% lead, and 15% zinc.

Development: about 900' of workings. Mine is entered through tunnels of adjoining properties.

Equipment: includes 3-drill compressor and lease on a 100-ton mill, which is equipped with a flotation unit.

Company started operations late in 1919, and no production figures are as yet available. In 1920, the **Morework Mine (q. v.)** was reported under lease.

MONTEZUMA MINES & MILLS CO. **COLORADO**

Office: I. A. West, sec., 621 Equitable Bldg., Denver, Colo.

Officers: H. H. McCulloch, pres.-treas.; H. F. Baker, v. p.

Inc. in Colo. **Cap.** $1,000,000; $1 par.

Property: 22 claims, 12 patented, and 29 patented mill-sites, covering 215 acres, in Snake River district, Summit county. Operations suspended in 1917, due to lack of funds. Company's indebtedness was reported as $31,409. Late in 1918 a mortgage was foreclosed and by July, 1919, property had passed out of company's hands. The sale did not pay all debts, preventing dissolution of corporation.

MONTEZUMA SILVER-LEAD MINES, LTD. **COLORADO**

See St. Johns Mines (Colorado), Ltd.

Address: Equitable Bldg., Denver, Colo. **Office:** 38 Broad St. House, London, E. C. 2, England.

Directors: G. A. Williamson, Chairman; H. Weld-Blundell; M. M. Dewar, G. O. Shepherd.

Inc. May, 1917. **Cap.** £75,000, divided into 34,500 shares of 10% cumulative preferred at £1 par, and 170,000 shares of ordinary at 5s. par. Out-

standing, 22,500 preferred shares and 142,000 ordinary shares, both fully paid.

Property: the St. Johns group of silver-lead mines, 1½ miles south of Montezuma, Summit county. This property was purchased from the St. Johns mines, Ltd. for £55,000. The bulk of the ore is of milling grade, averaging about £5 per ton in value.

Property now operated by **Montezuma Cons. Silver Mines Co.**, which see.

MOONLIGHT-GOLD MINING CO. **COLORADO**

Address: Hildreth Frost, Cripple Creek, Colo.

Inc. 1920, in Colorado.

Property: 23 acres, viz: the International, Clara D., Lexington, and Rittenhouse claims on Gold Hill, Cripple Creek district, Teller county, said to show good gold ore, and to have a large tonnage of low-grade ore exposed.

Development: by 750′ Rittenhouse shaft.

Equipment: electric hoist, compressor, etc., erected late in 1920.

Reported to have transferred its property to the **El Paso Ex. Gold Mng. Corp.** in Jan., 1921.

MOORE MINING & MILLING CO. **COLORADO**

Described in Volume XIV.

MOOSE GOLD MINING CO. **COLORADO**

Address: Apt. 24, No. 1221 Sherman St., Denver, Colo.

Property: a gold mine at Cripple Creek, Teller county.

MOOSE MINES **COLORADO**

Reported owned by **Louisiana-Colorado Mining Co.**, which see.

Property: at Alma, Park county, was sold in 1909 by the Patton estate, to H. W. Scott, who formed a company, which failed.

MOREWORK MINE **COLORADO**

Address: c/o Lawver & Fiedler, East Canton, Ohio.

Property: silver-zinc group at Montezuma, Summit county, reported to be part of holdings of **Montezuma Cons. S. M. Co.**, which see. Was operated during early part of 1920, but shipped no ore.

MORNING GLORY MINE **COLORADO**

Address: c/o Barth & Ritchey, Sawpit, Colo.

Property: in San Miguel county, near Redvale. Ore contains carnotite. Operated during part of 1920, but shipped no ore.

MORNING GLORY MINE **COLORADO**

Address: Jas. and A. B. Harbaugh, owners, Pitkin, Teller county, Colo.

Property: 12 claims, 120 acres, at the head of North fork of Quartz Creek, said to show a number of veins from 4′ to 35′ in width, developed by tunnels.

Operated by lessees at last reports.

MORNING STAR MINE **COLORADO**

Address: W. W. Gunter, Eldora, Colo.

Property: a gold-silver group at Eldora, Boulder county. Operated during part of 1920.

MOSQUITO GULCH SILVER MINES CO. **COLORADO**

Presumably out of business. Fully described in Volume XIV.

MOUNTAIN FLOWER GOLD M., MLLG. & P. CO. **COLORADO**

Office: 502 Corby-Forsee Bldg., St. Joseph, Mo.

Officers: C. J. Griswold, pres.; J. R. Jennings, v. p.; T. G. Sorter, sec.-treas.

Inc. 1907, in Arizona. **Cap.** $2,000,000; $1 par; $1,384,000 outstanding, March, 1919.

Property: Mountain Flower group, 6 claims; Delta group, 10 claims; 2 mill sites and Delta tunnel site, 200 acres, at Deep creek, upper San Miguel district, San Miguel county, said to show a quartz vein in diorite and porphyry. Ore contains gold, silver, zinc, and lead.

Development: by 1,133' tunnel. Company reports 3 veins in Delta group and four in the Mountain Flower group.

No record of recent development work or production.

MOUNTAIN KING MINING CO. **COLORADO**

Address: 8 S. 40th St., Philadelphia Pa.

Property: the Mountain King gold-silver mine at Ironton, Ouray, county. Operated part of 1919, but shipped no ore.

MOUNTAIN STATES POWER & MINING CO. **COLORADO**

Address: D. A. Knight, mgr., Idaho Springs, Colo.

Inc. in Colorado. **Cap.** $5,000,000; $1 par. Security Transfer & Registrar Co., transfer agent. Listed on N. Y. Curb in April, 1920.

Property: the Mattie gold-silver mine. 2½ miles W. of Idaho Springs, Clear Creek county, also the silver King claims near Georgetown, worked 17 years ago for gold, silver and copper.

Development: by tunnels. Reserves estimated to be 200,000 tons of $10. ore.

Equipment: water power, compressor and mill.

Operated part of year, but no shipments reported.

MOUNTAIN TOP MINING CO. **COLORADO**

Address: Ouray, Colo.

Officers: Windsor Morris, pres.-treas.; G. H. Beebe, v. p.-gen. mgr.; W. E. Hopton, sec., with E. C. L. Bartow, Carl Larger, I. N. Beeler and Harry J. Hamlin, directors.

Inc. Aug. 11, 1911, in Colorado. **Cap.** $750,000; $1 par; $500,000 issued. Bonds authorized, $250,000; $146,000 issued.

Property: 13 claims, 10 patented, in Mt. Sneffels district, Ouray county, 6 claims covering 9,000' along the N. extension of the Smuggler-Union vein.

Geology: fissure-vein in andesite, showing ore with galena and gray copper, and carrying gold, silver, lead, and copper. Shoot is from 6 to 36" wide and 500' long. Mill ore reported to assay $30, and shipping ore over $200 net per ton.

Development: by crosscut tunnel 2,500' long, with total of over 9,000' of workings, to depth of 1,000'. A faulted vein, containing high grade silver-lead ore, was picked up again in 1920.

Ore reserves: given as 30,000 tons.

Equipment: includes compressor, 2,300' tram and 50-ton mill employing 2 pneumatic flotation units. Plant is unique in that ore-treatment is all done underground in order to prevent snow-slides damaging mill. Extraction is 89%. All machinery is motor-driven. This plant was described by W. F. Wilcox in the "Scientific American" of December 13, 1919.

Mine was the principal producer of the county in 1919, and shipped regularly during 1920 and 1921. Fifty men employed by company and by lessees.

MT. CHAMPION MINING CO. **COLORADO**

Address: 55 Congress St., Boston, Mass., or Box 910 Leadville, Colo.

Officers: C. Q. Adams, pres.; W. E. McKee, sec.; H. A. Wentworth, treas.; all of Boston. **Mine address:** Lucien W. Smith, mgr., Littleton, Colo. Company is a close corporation, incorporated in Maine, 1910.

Property: 12 patented, several unpatented claims, in Lackawanna and Half Moon gulches, near Leadville, Lake county, and 2 miles from Malta, the railway and loading station. The Colorado Power Co's transmission-line connects with mine and mill. The Ozark mine is under lease to company and possibilities are considered good.

Geology: ore zone is a granite intrusion in gneiss, accompanied by an alaskite dike with several branches passing through the granite, the latter being mineralized and faulted. Ore contains gold, a little silver, and an occasional shoot carrying some copper and lead. About 30% of the gold is amenable to amalgamation. Values are mainly in the sulphides, which assay up to $200 per ton. Mill ore averages $8.42, other ore, $75.25. Concentrates, after amalgamation, said to run $80 to $125 per ton.

Development: by tunnels, mostly in ore. Total workings, 10,000'
Equipment: 1,000 cu. ft. compressor, 6,600' aerial tram, and 75-ton mill, using breaker, Hardinge and tube-mills, and concentrators.

On account of abnormal conditions mine was closed in 1918. Company plans a new mill employing cyanidation, meanwhile leasing the mill, tram, and upper workings of the Miller Mining Co.

MT. HAYDEN MINING & MILLING CO. COLORADO

Address: Ouray, Colo.
Property: the Thistledown mine in the Ouray district. Ore carries gold, silver, and lead.

Operated part of year, but shipped no ore.

MT. KELSO MINING CO. COLORADO

Office: 703 E. & C. Bldg., Denver, Colo. **Mine address:** c/o Jeffrey & Decker, lessees, Silver Plume, Colo. J. A. Marsh, pres.
Cap. $600,000; shares $1 par.
Property: 5 claims on Kelso mountain, Clear Creek county, and a one-fourth interest in the Tiger and Grafton claims. Ore contains gold, silver, lead. Operated part of year only.

MT. MARIE GOLD MINING & LEASING CO. COLORADO

Address: Cripple Creek, Teller Co., Colo.
Property: a lease on part of the South Burns gold mine at Cripple Creek, owned by **Acacia Gold Mng. Co.** Operated during part of 1920.

MT. PLEASANT MINING CO. COLORADO

Address: c/o Fillius, Fillius & Winters, E. & C. Bldg., Denver, Colo.
Property: a gold-silver mine at Dunton, Dolores county.

Exploration underway in 1920 and 1921, but no production reported.

MUDSILL GOLD-SILVER MINES CO. COLORADO

Mine office: R. G. Mullen, pres., Alma, Colo.
Inc. in Colorado. **Cap.** $400,000; 25c par; 1,000,000 in treasury.
Property: Mudsill group of 260 acres, in Sacramento district, near Alma, Park county, on London fault, which traverses the ground.

Up to 1893, property had produced in excess of $2,000,000. Adjoins the London mine with $20,000,000 production.

Company operating early in 1919. No recent information.

MUTUAL CO-OPERATIVE MINING CO. COLORADO

Offices: 206 Masonic Temple, Denver, Colo., and 507 First National Bank Bldg., Cheyenne, Wyoming.
Officers: H. R. Steele, pres.; Hammond Matthews, v. p.; G. P. Howard, sec.-treas.; with H. F. Fisher and J. H. Edwards, directors.
Inc. 1912, in Wyoming. **Cap.** $2,500,000; $1 par; in treasury, March 1, 1921, 215,390 shares.
Property: 10 claims in Gold Hill district, Boulder county, including the Hoodoo claim, 2¼ miles from Salina; also owns a 5/6 interest in the Silver Queen group, 5 patented claims, 4 location lode claims and a mill site, at Kokomo, Summit county.
Development: at the Silver Queen, by 415' tunnel, 300' winze and drifts. The property in Boulder county has been idle since 1918.
Production: smelter shipments from Silver Queen amounted to 129,000 oz. of silver up to Nov. 1, 1920. Mine leased to **Kokomo-Recen M. & D. Co.** to November, 1925 on a 15-20% royalty basis.

The new management has paid off all obligations of the former Frank E. Wire regime.

NATIONAL FINANCE AND HOLDING CO. COLORADO

Address: G. E. Bolander, supt., Blackhawk, Colo.
Inc. in Ohio.
Property: reported to have taken over the Hinsdale county holdings of the **Colorado & Connecticut Gold Mining Co.**, which see; also the Coeur d'Alene mine. The latter is said to have produced $150,000, years ago. It has a 400' shaft, which was being repaired in December, 1920.

NATIONAL MINING & DEVELOPMENT CO. COLORADO

Address: Paul Maurer, mgr., Kokomo, Colo.

Property: Golden Queen group and Hercules placer at Kokomo, Summit county, also several claims held under lease and bond, near Leadville, Lake county.

Development: by tunnels. The Kokomo holdings were reported under development early in 1921.

NATIONAL RADIUM INSTITUTE COLORADO

Out of business. Property sold in 1919, to the **Minerals Recovery Co.**, which see.

NATIONAL RADIUM PRODUCTS CO. COLORADO

Out of business. Taken over by **Uranium Chemical Co.**, which see.

NATIONAL VANADIUM PRODUCTS CO. COLORADO

Address: R. W. Russell, sec., Pittsburgh, Pa.

Is a holding company, owning all the stock of the **Pittsburgh Radium Co.**, which see.

NATURE PRODUCTS REFINING CO. COLORADO

Address: Cotopaxi, Colo.

Property: Cotopaxi mine and mill at Cotopaxi, Fremont county. Ore contains silver, lead, copper and zinc.

NEATH MINE COLORADO

Address: Nathan Shapiro & Co., Idaho Springs, Colo.

Property: at Empire, Clear Creek county. Ore contains gold, silver, copper. Operated during part of 1920.

NEDERLAND-BEAVER TUNGSTEN MINING CO. COLORADO

Probably defunct. See Vol. XIV.

NEKON LEASING & DEVELOPMENT CO. COLORADO

Address: Empire, Colo.

Property: Bay State Tunnel mine on Silver Mountain, near Empire, Clear Creek county. Ore contains gold, silver and copper.

NEODESHA MINE COLORADO

Address: Sam Fellin & Co., Ouray, Colo.

Property: a silver mine near Ouray, Ouray county.

NEW ENGLAND EXPLORATION CO. (THE) COLORADO

Office: 14 Ashburton Place, Boston Mass. Controls the Smuggler Union Mining Co., Colo., which see.

Officers: Bulkeley Wells, pres.; T. E. Sherwin, sec.-treas.

Inc. 1898, in Maine. **Cap** $2,000,000; shares $100 par; outstanding $1,875,700. Annual meeting first Wednesday in June, at Portland, Me.

Stock transferred at company's office.

NEW ERA MINES COLORADO

Office: 31 State St., Boston, Mass. **Mine Office:** Idaho Springs, Clear Creek county, Colo.

Officers: Benj. A. Howland, pres.; E. M. Sanger, sec.; Robt. H. McLaughlin, treas.; W. A. Gilman, mgr.

Inc. Nov. 8, 1915, in Maine. **Cap.** $500,000; $1 par; 100,000 shares held in trust for treasury. Stock listed on Boston Curb. Paul Revere Trust Co., Boston, transfer agent. Annual meeting, second Monday in January.

Property: 15 claims, 3 patented, about 75 acres, and a mill site, 5½ miles from Idaho Springs, formerly owned by the Trail Mining Co., and worked during 1913-14 by the Calumet-Corbin Mining Co.

Ore: consists of a mixture of course galena, chalcopyrite and pyrite, containing gold and silver, with a quartz gangue and much siderite. Gray copper is abundant, while zinc blende is occasionally found. Five veins have been developed, with main workings on the Great Western and New Era veins. Selected smelting ore averaged from $50 to $60 per ton, mainly in gold and lead.

Mine is said to have the extension of the Lamartine and Oneida veins, and is credited with a lead and gold-silver production of 2,361,000 lb. and $750,000 respectively.

Developed by over 4,000′ of tunnels, crosscuts and shafts and equipped with concentrating mill. Operated by lessees in recent years.

Property reported on by Forbes Rickard.

NEW GOLD DOLLAR MINING CO. **COLORADO**

Mine office: Cripple Creek, Colo.

Directors: A. E. Carlton, Colorado Springs, R. J. Gaffney, and E. E. Quentin, Denver.

Inc. in 1919 **Cap.** $150,000; 5¢ par. Is a reorganization of Gold Dollar Consolidated Mining Co.

Property: 62 acres, patented, being part of the Arequa townsite, on eastern slope of Beacon hill, Cripple Creek district, Teller county. Gold ore occurs in vein 2 to 4′ wide, said to average $20 per ton. Property was purchased at Sheriff's sale in 1919 by the judgment creditor, First National Bank of Cripple Creek, and deeded by the Bank to present company.

Development: 1,050′ Mabel M. and Union shafts, from which considerable drifting and crosscutting has been done.

NEW GOLD KING MINES **COLORADO**

See **Gold King Extension Mines Co.**

NEWHOUSE TUNNEL CO. **COLORADO**

See **Argo Mining and Tunnel Co.**

NEW LIFE TUNNEL & MINING CO. **COLORADO**

Address: Idaho Springs, Colo.

Officers: William Darroch, pres.; E. D. Quigley, v. p.; H. A. Reinhart, sec.- treas.

Inc. in 1916 as a reorganization of the Hoosac Tunnel & Mng. Co., which company was in receiver's hands for many years. **Cap.** 1,000,000 shares; 425,000 issued; assessable; two assessments levied to date.

Property: the Hoosac mine, 1 unpatented and 4 patented claims, 20 acres, in Spanish Bar district, Clear Creek county, about 1½ miles west of Idaho Springs.

Ore: is quartz impregnated with iron and copper pyrite, and also some lead and zinc. It requires milling and concentration, as the gold and silver are closely associated with the pyrite. Veins vary from 6″ to 4′ in width, about ¼ being of high-grade material, the balance milling ore.

Development: by 200′ incline said to show a vein carrying $10-$14 ore. Main working is the Hoosac tunnel which has been driven 1,015′ on the Rising Sun vein. There are a few stopes, crosscuts and a 60′ winze all said to show ore.

Equipment: includes compressor, drills, 10-stamp mill, classifier, and 3 Wilfley tables, flotation, regrind and ball mills.

Company is also developing the Smuggler mine at Rollinsville, Gilpin county.

Management seems to be earnestly trying to rehabilitate company, but appears to need more capital to put mine on a paying basis. No work has been done since Feb., 1921, on this account.

NEWMAN-LOOMIS CONC. MINES MNG'T CO. **COLORADO**

Address: Redcliff, Colorado.

Operates the Pine Martin concentrating mill at Redcliff, Eagle county.

NEWMAN MINING MILLING & LEASING CO. **COLORADO**

Office: Aspen, Pitkin county, Colo.

Officers: H. G. Koch, pres.; W. K. Hanson, sec.-treas.; H. C. Watson, gen. mgr.

Reported early in 1919 to have paid a dividend of $12,500, or 25% on the $50,000 capital originally invested.

Property: the Newman silver-lead mine at Aspen, Pitkin county.

Development: by 5,500′ main tunnel from which 3 inclined raises, 150, 200, and 900′, have been driven to cut the ore.

Producing in 1919 and 1920.

NEW MARIAN CONSOLIDATED MINING CO. **COLORADO**

Company dissolved and property taken over by **Iron Silver Mining Co.** of Leadville, Colo. See Vol XII for description of mine.

NEW MONARCH MINING CO. **COLORADO**

Address: Henry Schuck, lessee, Leadville, Colo. Edw. G. Kelly, supt.

Property: the New Monarch mine on Breece hill, Leadville, Lake county, carrying lead and zinc sulphides. Developed by shafts and crosscuts. A crosscut to the N. E. has been driven in virgin ground from the bottom of the Monarch shaft.

Equipment: includes hoists, pumps, electric power compressor, etc. Operated by lessees since 1914 and producing 500 tons of ore per month.

The Cleveland and twelve additional claims were reported sold in August, 1921, at sheriff's sale to satisfy a judgment held by the First Trust & Sav. Co., and bought in by the plaintiff for $72,396.

NEWSBOY MINING & MILLING CO. **COLORADO**

Address: Ridgway, Colo. Mine operated by Nick Hutter & Co., Ouray, Colo., in 1920.

Property: the Newsboy Mine near Ouray, Ouray county, shows gold, silver and zinc.

NEW YORK MINE **COLORADO**

Address: Morgan & Sloan, lessees, Creede, Mineral Co., Colo.

Property: at Creede, shows gold-silver-lead ore. Developing.

NIL DESPERANDUM MINES CO. **COLORADO**

Office: 15 Citizens National Bank Bldg., Boulder, Colo. A. B. Kamp & Co., successors to the C. W. Savery Securities Co. of Denham Bldg., Denver, is fiscal agent.

Officers: M. S. Brandt, pres.-mgr.; B. S. Sim, sec.-treas.; with T. F. Sotham, directors.

Inc. 1916, in Colorado. **Cap.** $300,000; 10c par; increased Nov., 1919 to $500,000; $1 par. A combination offer of 200 Nil Desperandum shares with 2,500 shares of 3 oil companies, for $15 a month for 10 months, was made by the fiscal agent in December, 1920. Stock offered at 30c. a share in 1921.

Property: the Interocean, Monongahela, Osceola, White Crow, and American claims at Sunshine, Boulder county. Company reports vein to be 5 to 15' wide, about 4 miles long, averaging $42 gold, 1 to 5 oz. silver, with some vanadium.

Development: 350' Nil Desperandum shaft, and 600' Interocean shaft; workings total over 5 miles.

Company has been reopening these old mines which will be operated through the American shaft, 525' deep. The Interocean group is credited with production of $2,000,000; the Nil Desperandum with over $100,000. The Interocean is being developed by the Inter Ocean Leasing Co., on a royalty basis.

In December, 1920, the manager estimated that there was enough ore to supply a 100-ton mill for about 10 years; also that the milling ore already broken, on dumps or in stopes, has a net value greater that the entire capitalization at par. Reserves are given as 200,000 tons in the mines and 200,000 tons on dumps.

NIMROD MINE. **COLORADO**

Address: Freund & Hunter, Cassells, Colo.

Property: a gold-silver mine at Grant, Clear Creek county, operated during part of 1920, but no shipments reported.

NISI PRIUS CONSOLIDATED MINING CO. **COLORADO**

Controlled through stock ownership by **Iron Silver Mining Co.**

Address: 615 Stevens Bldg., Detroit, Mich., or 11 Waverly Place, New York

Officers: J. B. Grant, pres.; J. A. Ewing, v. p.; Fremont Woodruff, sec.; G. O. Argall, treas.

Cash surplus at end of 1919 was $5,600.

Property: at Leadville, Lake county, worked by two sets of lessees in 1916, 1917, and 1918 and one set in 1919.

During 1918, a new body of lead-silver ore was opened that was 8′ wide by 15′ long, the ore assaying 15% lead and 11 oz. silver per ton. During 1919 an old shaft was deepened 125′, and was being sunk further in 1920.

Production: in 1918, was 1,569 tons of manganese ore, 169 tons iron and 117 tons lead carbonate ore, with a total value of $15,029 compared with 3,202 tons, 952 tons, and 24 tons, $21,999, respectively, in 1917.

NORTH BOULDER CREEK MINING CO. **COLORADO**

Address: Nederland, Boulder Co., Colo. J. A. F. Duricher-Stone, mgr.; J. W. Pherson, supt.

Property: the Blue Bird at Nederland. Developing a vein said to contain high grade silver-lead ore.

Equipment: includes 50-ton flotation mill.

NORTH PARK MINING & MILLING CO. **COLORADO**

Address: Walden, Colo.

Property: the North Park gold-silver mine at Walden, Jackson county. Operated part of 1919, but shipped no ore.

OAKLAND MINING, MILLING & LEASING CO. **COLORADO**

Address: Aspen, Colo.

Property: the Oakland silver-lead mine at Aspen, Pitkin county. Operated part of 1919, but shipped no ore.

OCEAN WAVE MINING CO. **COLORADO**

Address: Matt. Edwards, supt., Victor, Teller Co., Colo. C. H. Hurst, pres., Springfield, Ill.

Cap. $100,000. Controlled by Eastern parties.

Operating under long-term lease the Ocean Wave and Little Mary claims on Battle mountain, Cripple Creek, owned by Portland Gold Mining Co.

Development: by 400′ shaft. Mine said to have vein 4′ wide seamed with streaks of gold-bearing quartz. The ground has been sub-leased, but company operations were resumed late in 1919. Two oz. gold ore was shipped during 1920 .

OCEAN WAVE MINING & REDUCTION CO. **COLORADO**

Office: 830 Equitable Bldg., Denver, Colo.

Property: the Ocean Wave gold-silver mine at Lake City, Hinsdale county.

Operated part of 1919, but made no production.

OHIO AND COLORADO SMELTING & REFINING CO. **COLO.**

Dead; see Vol. XIV for description. Was a subsidiary of Am. Metal Co. Company dissolved and plant sold. See **Salida Smelter** under Colorado.

OHIO ZINC CO. **COLORADO**

Address: Canon City, Colo.

Company operates a zinc oxide plant at Canon City, Freemont county.

OLD HUNDRED MINING CO. **COLORADO**

Property inactive for several years prior to 1918; enquiries through various channels have been fruitless. Company probably defunct. See Vol. XIII.

OLD TOWN M. M. & TRANSPORTATION CO. **COLORADO**

Address: Idaho Springs, Colo.

Officers: Wm. L. Bush, pres.; Geo. K. Kimball, sec.-treas-mgr., with J. M. Freeman, J. Ramsey Speer and J. B. Phillips, directors.

Inc. 1911 in Colorado. **Cap.** $1,000,000; $1 par; 738,302 outstanding. Annual meeting, first Monday in February. Company succeeded the Old Town Cons. Mining Co., which itself was successor of the Old Town Mining & Milling Co., both defunct. Property bought in at sheriff's sale for $60,000 in 1910 and reorganized under present name. Dividends since 1911 amount to $59,826.

Property: 22 patented claims in Russell gulch district, Gilpin county, including the Becky Sharp mine. Ground contains the Old Town vein, showing a paysteak of 4′ average width, with gold and silver-bearing copper ore.

Development: by 2,205' incline shaft with 4,326' tunnel; over 5 miles of workings.

Equipment: includes hoist, pump, steam and electric power and air compressor.

Production: total to September, 1920, $328,514.

In December, 1919, the mine was taken over by A. R. Clark and others of Colorado Springs under bond and lease; G. K. Kimball in charge. Production in 1920 amounted to $9,497.

OLLIE REED NO. 2 MINE COLORADO

Address Frank E. Barry & Co., 704 E. 6th St., Leadville, Colo.

Property: at Leadville, Lake county. Ore contains gold, silver, lead and zinc. Production figures are not available.

ONEIDA-STAGG MINING & MILLING CO. COLORADO

Address: H. T. Rogers, mgr., Idaho Springs, Colo.

Inc. 1914, as a consolidation of the Oneida and Stagg Mining companies. Mine at Freeland, 5 miles from Idaho Springs, Clear Creek county.

No recent returns. See Volume XIV.

ONONDAGA MINES CO. COLORADO

Office: 717 Onondaga Bank Bldg., Syracuse, N. Y. Edward S. Wiard, agent, 409 Boston Bldg., Denver, Colo.

Property: two groups of claims, about 700 acres, 130 patented, on Griffith mountain, near Georgetown, Clear Creek county. The main group covers the N. E. end of the Comet-Retna vein and the other group the approach to the Comet vein, known as the Doric tunnel. Ore is galena, free from zinc, with copper pyrites and some gray copper. The veins vary from 5-20' in width, with solid streaks up to 36" in width, said to run from $40-$125 per ton.

Development: the mine has been opened to a depth ranging from 1,800-3,000', with three levels above the Capital tunnel level.

Equipment: includes compressor, hoist and power plant. Mine has been closed down since 1919, owing to high cost of development work.

ONTARIO MINE COLORADO

Address: Lively, Stewart & Young, Empire, Colo.

Property: a gold-silver group at Empire, Clear Creek county. Operated during part of 1920.

ONTARIO TIGER & GREEN MTN. LEASING CO. COLORADO

Presumably defunct. See Vol. XIV.

OPHIR CONSOLIDATED CO. COLORADO

Frank E. Trumble, supt.

John M. Whitehead, Janesville, Wis., chairman bondholders' committee; other committeemen are: John R. Evans, Oshkosh, Wis.; Wm. Smith, La Crosse, and Wm. Voss, Watertown, Wis.

Property: 50 odd claims, including the Ophir gold mine, near Telluride, San Miguel county, adjoining the Carribean mine on the east, and the Butterfly mine on the west. The Ophir was first opened about 20 years ago, but was idle 10 years, until present holders started operations.

Development: includes a 2,500' tunnel and considerable work on several levels. Near the tunnel end an 800' raise connects with the 6th level of the old workings. Recent work has opened up considerable milling ore.

OPHIR GOLD MINES, MILLING & POWER CO. COLORADO

Succeeded Oct., 1915, by **Ophir Range Gold Mining Co.**, which see.

OPHIR GOLD MINES & REDUCTION CO. COLORADO

Address: J. M. Belisle, mgr., Ophir, Colo.

Inc. Aug., 1916, in Colorado. **Cap.** $250,000; 10c par. One million shares paid for property.

Property: the New Dominion and April Fool mine at Ames, San Miguel county, said to show ore in upper workings carrying gold and silver, with lead, copper, and zinc at depth.

Development: by 985' tunnel and 1,100' crosscut tunnel. By Sept., 1919,

after doing 2,500' of driving, a shoot of milling ore had been developed. Over $30,000 has been spent in development work. Management planned to erect a flotation plant.

Operated part of 1919, but shipped no ore.

OPHIR LOOP MINES CO. COLORADO

Address: Ames, Colo.

Property: Silver Bell mine at Ames, San Miguel county. Ore contains gold, silver, lead and copper.

Development: by 1,800' main crosscut.

OPHIR RANGE GOLD MINING CO. COLORADO

Letter returned in 1917, from Ophir, San Miguel county, Colo., and mine probably closed down.

Company acquired the holdings of the Ophir Gold Mines, Milling & Power Co., Oct., 1915. See Volume XIV.

OPPORTUNITY CONS. GOLD MINING CO. COLORADO

Presumably out of business. See Volume XIV.

ORANGE COUNTY INVESTMENT CO. COLORADO

Office: First Natl. Bank Bldg., Denver, Colo.

Property: the White Cloud gold-silver mine at Ironton, Ouray county. Operated part of 1919, but shipped no ore.

O'REILLY GOLD MINING CO. COLORADO

Reorganized as the Marie Mining Co., which is idle.

ORE PRODUCTS CORPORATION COLORADO

Successor to Chemical Products Co.

Address: 126 State St., Albany, N. Y.

Operates a carnotite reduction plant at Denver, Colo.

ORIENT MINE COLORADO

Address: J. Gilligan, Mineral Hot Springs, Saguache Co., Colo.

Property: an iron mine at Mineral Hot Springs, operated during part of 1920.

ORIENT SILVER-LEAD MINE COLORADO

Address: Nelson & Combs, Lawson, Clear Creek Co., Colo. Operated during part of 1920.

ORIZABA MINES CO. COLORADO

Address: 312 - 17th St., Denver, Colo.

Property: at Parshall, Grand county. Ore contains gold and copper. Under develoment.

ORPHAN BOY MINE COLORADO

Address: E. P. Young & Co., Alma, Colo.

Property: at Alma, Park county, contains gold, silver, copper and zinc values. Operated during part of 1920.

O. S. LEASING CO. COLORADO

Address: Durango, Colo.

Property: the Shenandoah gold-silver mine at Howardsville, San Juan county.

Operated and shipped ore in 1919.

OSTON LEASING CO. COLORADO

Frank Crawford, supt. Company has leased the Howard dump of the Mary McKinney Mining Co., and is reported shipping ore.

OURAY CONS. MINING & REDUCTION CO. COLORADO

See Vol. XIV. Declared bankrupt, August, 1921. K. Macdermid, pres., Colorado Springs, Colo., at last account.

OURAY SMELTING & REFINING CO. COLORADO

Office: Hayden Bldg., Ouray, Colo. Thos. Grieve, pres.; C. H. Newbury, v. p.; Thos. B. Crawford,, treas.

Inc. in Colorado. **Cap.** $1,500,000, increased from $750,000; $1 par; divided into $1,000,000 com. and 500,000 pfd. shares. Company is a reorganization of the Brown Mountain Smelting Co.

t **Property:** 435 acres, patented, on the Uncompahgre river, 4 miles from Ouray, Ouray county.

Development: by 250′ shaft and over 3,500′ of tunnel and drift work. The company being without funds in 1914, the mine was closed down, but was reopened in 1917-18. No work done since 1919. The 450-ton smelter at Ouray, is idle, and in need of financial assistance. A Federal road is building between Ouray and Silverton, making the smelter accessible to the Red Mtn. district.

OURAY UNION MINING & MILLING CO. **COLORADO**

Address: C. M. Doty, mgr.-sec., York, Neb.

C. R. Wilfley, supt., Ouray, Colo.

Inc. in Colorado.

Property: Bright Diamond mine, under 9-year lease and bond to **Welch-Worland Mines Syndicate**, which see.

PACKARD POWER & MINING CO. **COLORADO**

Address: N. Nelson, mgr., Edwards, Colo.; or W. M. Elwell, Wedgewood Bldg., Toledo, Ohio.

Officers: C. M. Harpst, pres.; E. C. Showman, v. p.; W. M. Elwell, sec.-treas., with F. B. Conkle, S. Conkle, Wm. Vail, O. Davis and C. R. Campbell, directors.

Inc. in Colo. **Cap.** $500,000; $1 par; 400,000 shares outstanding.

Property: the Packard group, 6 claims, 1 patented, 12 miles from Edwards, Eagle county. Ore occurs in an almost perpendicular fissure vein, containing gold, lead and silver.

Development: by tunnel, 1,000′ long, July, 1921.

Controlled by same interests as **East Lake M. & M. Co.**

PALISADE COPPER CO. **COLORADO**

Geo. Leece, mgr., East Argentine, via Georgetown, Clear Creek Co., Colo

Astley Atkins, pres., 31 State St., Boston, Mass.

Property: a group of claims near East Argentine, said to contain a 12″ vein of high grade gold-silver bearing ore. Developing.

PANDORA MINING & MILLING CO. **COLORADO**

Address: 737 First Natl. Bank Bldg., Denver, Colo.

Succeeded the Jewell Mines & Reduction Co.

Property: the Francis and Pandora mines and mill site, 7 miles E. of Pitkin, in Monach (Garfield) district, Gunnison county, said to carry 8 fissure veins.

Development: by 1,800′ tunnel.

Equipment: included air-compressor, machine-drills, water power. Oxidized silver-lead ore shipped 1918.

Operated the Francis mine in 1920.

PARAGON MINING CO. **COLORADO**

Address: Henry C. Demming, gen. mgr., 15 N 3rd St., Harrisburg, Pa. Is successor of Tirbircio Gold Mining Co.

Property: 400 acres of lode and placer claims near La Plata, La Plata county, is developed by 1, 500′ of adits.

Equipment: includes rock crusher, electrical plant, a 50-stamp and a 10-stamp mill. Company has been inactive since 1917.

PARKER GROUP OF MINES **COLORADO**

Address: John H. Meager, owner, Silverton, San Juan county, Colo.

Property: 5 claims, about 2 miles N. E. of Silverton, said to show a fissure vein in andesite-lime-porphyry formation, traceable at surface for several thousand feet. The ore is a sulphide, containing copper, silver, gold, iron, and molybdenum.

Development: by several tunnels and crosscuts. A prospect.

PARK TUNNEL MINING & MILLING CO. **COLORADO**

Address: John Cortellini, Aspen, Colo.

Officers: Robert Shaw, pres.; John Cortellini, v. p.; F. M. Yates, sec.-

treas., with W. H. Cornwall, Ed. Turner, W. R. Fantz, and H O. Halleck, directors.

Inc. 1917, in Colorado. **Cap.** $150,000; $1 par.

Property: 21 claims patented, about 180 acres, in Tourtelotte Park, 2 miles south of Aspen, Pitkin county, partly owned and partly held under lease. Although the properties were worked for many years but little mining has been done in this particular section for nearly 25 years. The Camp Bird, Iowa Chief, Edison, and Best Friend claims, on which the company has leases, are reported to have produced $645,000.

Workings are on fault-contact and recent workings are in brown limestone lying E. of porphyry and W. of the dolomite-blue limestone contact.

Development: by the main or Park tunnel, 3,000′ long, and the Jenny Lind tunnel, 2,000′ long and 200′ above the former. The heading of the Park is in the Celeste claim, and is at a vertical depth of 700′. The Jenny Lind orebody is 10′ wide, with a 4 to 10″ streak assaying 90 to 150 oz. silver per ton. Prospects are considered bright.

PASSIFLORA MINING & MILLING CO. COLORADO

Address: Westcliffe, Custer county, Colo.

Property: in White Hills district, produces iron-copper-lead sulphide, and is developed by 330′ shaft.

Six sets of lessees are at work, and company reports shipments of about 100 tons per week during part of the year.

PATTERSON-BRADLEY LEASING CO. COLORADO

Address: H. MacDonald, mgr., c/o State Bank, Cripple Creek, Colo.

Property: a lease on part of the South Burns gold mine of the Acacia Gold Mng. Co., at Cripple Creek, Colo.

PAYMASTER MINES CO. COLORADO

Office: 417 Cooper Bldg., Denver, Colo. **Mine address:** J. B. Fowler, Curay, Colo.

Property: a lease on the Paymaster silver-lead mine near Ouray, Ouray county. Development is by tunnel and shaft. A good ore shoot was opened in 1920.

PAY ROCK SILVER MINES CO. COLORADO

Address: Silver Plume, Clear Creek county, Colo. E. L. N. Foster, mgr.

Mine idle since 1892; was discovered 1872 and is reported to have produced $2,000,000 worth of silver-lead and zinc ore.

Development: by a series of tunnels, connected by a 700′ winze.

Present company working since Sept., 1917, principally cleaning and retimbering the old workings. A small production reported in 1918-19.

PEARL CONSOLIDATED MINING CO. COLORADO

Mine is operated by the **Kokomo M. Co.**, which see.

PEERLESS CONSOLIDATED COPPER CO. ..COLORADO

Offices: 804 Symes Bldg., Denver, Colo.

Officers: W. B. Thomas, pres.; Chas. McFadden, v. p.; F. B. Tiffany, sec.-treas.

Inc. 1917, in Colorado. **Cap.** $50,000; 1c par.

Property: the Peerless copper mine, 60 acres and tunnel-site, totaling 205 acres, in Spruce Creek district, near Hillside, Custer county.

Development: by 2,800′ tunnel; deepest workings are 1,000′.

Equipment: includes compressor, blacksmith shop, etc. Company has expended over $40,000 on development work.

PEERLESS MINING & MILLING CO. COLORADO

Address: Salida, Chaffee county, Colo. H. F. Schnelker, pres.-gen.-mgr.; I. W. Haight, sec.-treas., at last accounts.

Inc. Nov., 1904, in Colorado. **Cap.** $500,000; $1 par.

Property: the North Pole group, 6 claims, 70 acres, with 10 acres timbered, on Cyclone mountain, in the Monarch district, 16 miles west of Salida,

showing several fissure veins in granite. Veins have auriferous and argentiferous lead and copper sulphides, with lead predominating.

Development: by 1,600' crosscut tunnel and a 65' shaft sunk on the vein. Presumably idle.

PELICAN MINING & MILLING CORPORATION COLORADO

Presumably defunct. See Vol. XIV.

PEMBROKE MINING & MILLING CO. COLORADO

Last address: C. G. Seamans, sec.-treas., 34 Seneca St., Hornell, New York. Mail returned marked "moved, left no address."

Inc. in Colorado. Shares are $1 par; 100,000 were offered at 20 cents each in 1920.

Property: the Gold King group of 4 lode claims and 1 placer claim, 72 acres of "choice mineral land" on the N. W. slope of Lincoln mountain, Grand Island district, Boulder county, on the main line of the C. & W. R. R. Ore carries gold, silver, lead and copper. Examined by T. H. Kane and E. C. Lindeman of Denver.

Development: by 300' tunnel and 134' double-compartment shaft.

Equipment: includes steam power, hoist, compressor, shops, etc. Was presumably a "stock jobbing" proposition.

PENNSYLVANIA MNG., POWER & REDUCTION CO. COLORADO

G. L. Levi, Philadelphia, Pa., v. p.-sec.; Leopold Sternberger, mgr., Lyndhurst Apts. D., 16th & Green Sts., Philadelphia, Pa.

Inc. 1910 in Colorado. **Cap.** $2,500,000; 600,000 shares in the treasury. Is a close corporation, owned by Leopold Sternberger and Estate of Samuel Sternberger. Owns entire stock issue of the Fall River Hydro Electric Power Co.; also the Lotus group of mines and property formerly held by Lucania Tunnels & Mines Co.

Property: lies between Fall river and Central City, Clear Creek and Gilpin counties and includes the Pennsylvania group, 374 patented claims, including several mill sites and placers, covering about 2,500 acres. Shows fissure veins with complex lead-zinc-copper ore, containing silver and gold, also uranium, molybdenum and tungsten.

Development: by shafts and adits, about 8 miles in all; including the 6,400' Lucania tunnel.

Equipment: includes steam and water-power plants, air compressors. Several of the mines have been good producers in the past.

PENNSYLVANIA MOLYBDENUM MINES CO. COLORADO

Address: Pitkin, Colo.

Officers: M. Dembinski, pres.; G. A. Farmer, v. p.; J. A. Sloan, sec.; S. G. Fetherman, mgr.

Inc. 1916, in Colorado. **Cap.** $100,000; 10c. par; all outstanding.

Property: 14 claims 150 acres, including the Bon Ton mine in Quartz Creek district, near Gold Hill, 9 miles N. of Pitkin, Gunnison county. Ground shows fissure vein 5 to 6' wide, producing gold, silver, copper, and molybdenum, assaying $25 molybdenum and $5 gold, silver, and copper per ton.

Development: by 1,500' tunnel, and total of 2,800' of workings.

Equipment: compressor, 50-ton concentrator, and steam power. Company started operations in March, 1919, and has since opened some high-grade gold-silver ore. Shipments were made during that year.

PERIGO MINES COLORADO

See Volume XIV.

PERSHING GROUP COLORADO

Address: John McKenzie, Villa Grove, Colo.

Property: a zinc mine at Villa Grove, Saguache county.

PERSISTENT MLG., LEASING & MNG. CO. COLORADO

Address: 1331 Lawrence St., Denver, Colo.

Property: the Morgan mine at Montezuma, Summit county. Ore carries gold, silver and lead.

Operated and produced during 1919 and 1920.

PHARMACIST GOLD MINING CO. COLORADO

Address: L. G. Carlton, Cripple Creek, Colo. Property leased for 5 years from October, 1920, to the **Le Brun Leasing Syndicate,** which see.

Officers: L. G. Carlton, pres.; Thos. J. Ward, v. p.; V. H. Mann, sec.-treas.

Inc. Jan. 3, 1912, in Wyoming. **Cap.** $15,000; shares 1c par. In treasury Jan. 1, 1917, 55,000 shares and $4.37 cash. Stock listed on Colorado Springs Exchange. Exchange Registry & Guarantee Co., Colorado Springs, Colo., transfer office. Paid dividends to Feb., 1910, $7,500; none since.

Property: 10 patented claims on Bull Hill, Cripple Creek district, Teller county, is one of the oldest mines of the district.

PHILADELPHIA MINES CO. COLORADO

Letters returned in 1920 marked "Defunct". See Volume XIV for description of company and holdings.

PHILADELPHIA MINES LEASING CO. COLORADO

Operated the property of the Philadelphia Mines Co., now defunct.

PILGRIM GOLD, SILVER & COPPER M. & M. CO. COLORADO

Address: O. L. Gage, mgr.

Cap. $350,000, par $1. Listed on Boston Curb. Old South Trust Co., Boston, registrar.

Reported to have bought the Two Forty group, in Russell district, near Central City, Gilpin county.

Development: by 1,000′ tunnel and 320′ shaft.

Equipment: includes a 10-stamp mill with flotation unit. A compressor was to be added.

PILOT MINE COLORADO

Address: Robb, O'Brien & Thomson, lessees, Kokomo, Colo.

Property: a silver mine at Kokomo, Summit county.

PINE MARTIN MINING CO. COLORADO

Office: 948 Gas and Electric Bldg., Denver, Colo.

Officers: A. C. McCall, pres.-supt.; B. F. Bachman, v.-p.; Wm. G. Krape, sec.-treas.-mgr. with John Eversen, directors

Inc. March 27, 1915, in South Dakota. **Cap.** $250,000; 10c par; 2,223,325 shares issued. Annual meeting, first Wednesday in March. From Dec. 1, 1917, to Nov. 1, 1918, receipts were $1,953; expenses, $1,823.

Property: 10 patented claims, about 50 acres, held under bond and lease, at Red Cliff, Eagle county, said to show a blanket quartz vein in porphyry-granite formation, carrying gold and silver. The orebody strikes N. and is almost flat.

Development: by 8,000′ of old workings, mainly tunnels. Management estimated 300,000 tons of ore developed and on dumps. Company built 100-ton amalgamation-concentration and flotation mill in 1916; also a dam with 2,000′ pipe-line supplying mill with its own power. Started operations August, 1917.

During 1918 company acquired the Ground Hog dump, reputed the largest and richest in the district, and this is now going to the mill.

PINGREY MINES & ORE REDUCTION CO. COLORADO

Address: 322 Century Bldg., Denver, Colo.

Property: 3 separate groups of claims, including the Rare Metal on Bartlett mountain, near Climax, Lake county. Three prospect tunnels develop molybdenite ore averaging 1% MoO_3, which experiments show will make 1 ton of 95% concentrate from 100 tons of ore.

Company was to put up a 500-ton mill near Climax, but its erection is said to have been held up by litigation.

Operated part of 1919, but shipped no ore.

PIONEER CONSOLIDATED MINES CO. COLORADO

Address: Georgetown, Colo.

Property: the Waldorf gold-silver-lead-copper mine, near Georgetown, Clear Creek county.

Operated part of 1919 and shipped ore.

PIONEER MNG., MILLING, POWER & TUNNEL CO. **COLORADO**

Presumably defunct. See Volume XIV. for description of company and its holdings.

POCAHONTAS-HUMBOLDT MINES CO. **COLORADO**

H. M. Williamson, mgr., Rosita, Colo.

Property: in Rosita district, Custer county, developed by 480' shaft. Is an old-time producer being reopened in 1921.

POLONIA LEASING CO. **COLORADO**

Address: Rosita, Colorado.

Property: the Polonia silver mine at Rosita, Custer county. Operated part of 1919 and 1920, but shipped no ore.

PONSARDIN MINE **COLORADO**

Address: W E. Bowden, mgr., Leadville, Colo.

Property on Yankee Hill near Leadville, Lake county. Ore contains zinc, lead and silver.

Surface equipment was burned in Aug., 1920, but was to be rebuilt and shipments started.

PONY EXPRESS MINING CO. **COLORADO**

Address: Ouray, Colo.

Property: Pony Express mine, Ouray, Ouray county. Ore contains gold, silver and lead. Company also operates the Gold Crown flotation mill, at Ouray.

POORMAN MINE **COLORADO**

Address: Wm. Laffea, Star Route, Boulder, Colo.

Property: a gold-silver mine at Boulder, operated during part of 1920.

POOR MAN MINING CO. **COLORADO**

Presumably idle since 1918. See Volume XIV for further information.

PORTLAND GOLD MINING CO. **COLORADO**

Office: 310 Mining Exchange Bldg., Colorado Springs, Colo. **Mine address:** Victor, Colo.

Officers: Irving Howbert, chairman; Frank G. Peck, pres.; Dr. D. H. Rice, v. p.; Thos. F. Burns, sec.-treas.- purch. agent, with Jos. W. Ady, directors. Geo. M. Taylor, gen. mgr.; Fred Jones, mine supt.; Thos. B. Crowe, mill supt. at Victor; Perry G. Harrison, cons. engr.

Inc. originally in 1894, in Iowa, but re-incorporated Dec., 1905, in Wyoming. **Cap.** $3,000,000; $1 par; all issued. Colorado Title & Trust Co., registrar. Stock transferred at company's office. Listed on Colorado Springs Exchange. Annual meeting, third Monday in February, at Cheyenne, Wyo.

Comparative General Balance Sheet:
Assets—January 1st—

	Property	Equip.	Supplies	Sec't' Ins. Furn., etc.	Current	Total
1921....	$2,601,600	$181,682	$193,687	$116,614	$ 94,686	$3,188,271
1920....	3,362,598		190,530	113,311	167,462	3,833,911
1919....	3,471,894	220,382	215,632	78,158	180,335	4,166,401
1918....	3,744,477	211,608	256,938	85,452	338,483	4,636,958
1917....	3,782,639	193,284	287,970	74,841	460,867	4,799,601
1916....	3,823,771	165,915	189,522	68,628	564.303	4,812,139
1915....	3,717,408	184,509	141,702	40,344	592,883	4,678,846

Liabilities—

	Cap. Stock	Current	Surplus	Total
1921	$3,000,000	$ 5,834	$ 182,437	$3,188,271
1920	3,000,000	14,379	819,532	3,833,911
1919	3,000,000	14,053	1,152,348	4,166,401
1918	3,000,000	13,478	1,623,481	4,636,958
1917	3,000,000	14,157	1,785,444	4,799,601
1916	3,000,000	8,695	1,803,444	4,812,139
1915	3,000,000	14,968	1,661,878	4,678,846

Comparative Profit and Loss Account, on Jan. 1st.:

	Net. Optg. Profit	Total	Balance prev. yr.	Deduct's Deprec.	Divid's	Balance
1921	$76,540	$526,128(b)	$819,532	$.....	$195,000	$182,437
1920	222,807	233,446	1,152,349	320,980	240,000	819,532
1919	196,596	212,733(a)	1,623,481	383,865	300,000	1,152,349
1918	663,254	663,998	1,785,444	465,962	360,000	1,623,481
1917	768,810	772,571	1,803,444	370,571	420,000	1,785,444
1916	798,460	799,739	1,661,878	298,172	360,000	1,803,444
1915	590,594	591,046	1,767,789	336,957	360,000	1,661,878

(a) Net loss to surplus, $171,132. (b) Net loss to surplus, $442,094.

Dividends: 16% per year, paid quarterly, from Jan. 15, 1907, to and including January 15, 1909; April 15, 1909, 3%; July 15 and October 15, 1909; 2% each; 1910, 1911, 1912, 8% each; 1913, 10%; 1914, 12%; 1915, 12%; 1916, 14%; 1917, 12½%; 1918, 10%; 1919, 8%; 1920, 6½%. Total dividends to Dec. 31, 1920 were $11,692,080. In December, dividends were discontinued until conditions improve.

Property: the Portland and Independence mines, 253 acres, in Cripple Creek district, Teller county, carrying gold ore in quartz veins. The Independence mine and mill, comprising 110 acres on Battle Mountain, were purchased from the Stratton-Independence, Ltd., a British corporation, in July, 1915, for $325,000. The Independence mine has over 17 miles of workings and is credited with a gross production to July, 1915, of $23,621,728. The Portland has over 64 miles of workings. For geology of the district, see U. S. G. S. Prof. Paper, No. 54; also Vindicator Cons. G. M. Co.

Development: the Portland mine has been continuously worked for 27 years. New work in 1920 was 4,880′, compared with 5,990′ in 1919.

Mine has 2 shafts, No. 2 shaft being 2,477′ deep. The Roosevelt tunnel drains the mine, and a branch from the Roosevelt tunnel connects with Portland shaft No. 2. Company's share of cost of the Roosevelt tunnel and the lateral to its own shaft is $144,591. In February, 1921, rich ore was opened on the 24th level of No. 2 shaft. The 2 pumps on No. 24 level are lifting 600 g. p. m. The new level opened 1921 is 150′ below the 21st level and 2,283′ below the surface. There is no diminution of values on 19, 20 or 21st levels, on the northerly 1,200′ of the great vein system. The No. 2 vein at the tunnel-level has been opened for 1,200′, all in ore.

Equipment: includes the Independence mill at Victor, Colo., which can treat 1,400 tons of ore daily. Since the mill was acquired in July, 1915, it has been completely remodeled and is now an up-to-date cyanide plant. Flotation was tried, but was discarded. High-grade ore is sent to the Golden Cycle mill.

Chilean-mill practice at the Portland mill was described by L. W. Lennox in Bull. 153, September, 1919, of the A. I. M. & M. E. The primary grinders consist of six 6′ Chilean mills, taking as feed the product from two 20 by 72″ Garfield type rolls. Secondary grinding on the classified sand from the mills is done by six 6 by 6′ ball mills. These discharge to Akins classifiers, which return the sand in closed circuit. The mills were put in

as the result of 8 years' experience on Cripple Creek ores at the Victor plant. Fine grinding costs for 1918 were 30.82 cents per ton, for 441,435 tons treated.

Production: years ending Dec. 31:

Year	Tons	Gold	Year	Tons	Gold
1920.....	31,425	$ 867,381	1915.....	72,192	$1,710,277
1919.....	45,416	1,173,615	1914.....	62,997	1,467,005
1918.....	53,887	1,120,851	1913.....	53,245	1,380,713
1917.....	86,668	1,768,971	1912.....	44,562	987,416
1916.....	96,045	2,236,842			

The total to end of 1919 was $50,592,638 from 4,322,441 tons of ore from the Portland mine only.

Management estimates from 12 to 15 million tons of low-grade ore in the mines and on dumps.

Company has a co-operative insurance fund and maintains a hospital at Victor, jointly with the Vindicator company, for the benefit of the employees The management is excellent, and the outlook is still promising for many years of profitable operations.

POTOSI-CARIBOU MINING CO. **COLORADO**

Address J. G. Clark, mgr., Boulder, Colo.

Officers: J. A. F. Durocher-Stone, pres.; Wm. Kline, v. p.; J. E. Riva, treas.; R. J. Faulkingham, sec., with J. G. Clark and R. S. McKiernaw, directors.

Inc. 1921, in Colorado. **Cap.** $500,000.

Property: a group of claims, including the Potosi, Idaho, Silver Point, Virginia and Maine, in Grand Island (Caribou) district, Boulder county. Ore contains gold and silver. The Potosi mine was operated by lessees part of 1920. The group as a whole now being developed.

POWERS LEASING CO. **COLORADO**

Address: Silver Plume, Clear Creek Co., Colo.

Property: Everett gold-silver-lead mine, operated during part of 1920.

POWERS MINING, MILLING & LEASING CO. **COLORADO**

Address: Robert Wilkinson, mgr., Central City, Colo.

Property: company has a lease on the Powers mine in Russell district, Gilpin county, said to contain copper-gold-silver bearing ore.

Operated part of 1919, but shipped no ore.

POZO GILPIN MINING CO. **COLORADO**

Probably defunct. See Vol. XIV.

PRECIOUS METALS CORPORATION **COLORADO**

Idle since November, 1914. See Volume XIV for organization, history and property of company.

PRICE MINE **COLORADO**

Address: Detwiler Bros., Breckenridge, Colo.

Property: a gold-silver-lead mine at Breckenridge, Summit county. Operated during part of 1920.

PRIDE OF ASPEN MINE **COLORADO**

Address: F. M. Yates, Aspen, Colo.

Property: a silver-lead mine at Aspen, Pitkin county. Operated during part of 1920.

PRIDE OF CRIPPLE CREEK MINING CO. **COLORADO**

Address: W. H. Trask, gen. mgr., Denver, Colo.

Company has leased its Pride of Cripple Creek mine, on Ironclad hill, Cripple Creek district, Teller county, to Edwin Gaylord. Mine is near the Jerry Johnson, Forest Queen and W. H. P. mines.

PRIDE OF THE WEST MINING CO. **COLORADO**

Address: A. W. Harrison, mgr., Silverton, San Juan county, Colo.

Property: the Pride of the West and Green Mountain mines, in Cun-

ningham gulch, 6 miles from Silverton. **Development:** by a 1,500′ tunnel. At 600′ a raise was driven to the surface and is said to have cut rich ore. In July, 1920, a contract was let for 800′ of new work.

Equipment: includes an old mill,, remodeled to include flotation.

PRIMOS CHEMICAL CO. COLORADO

Address: 1429 Walnut St., Philadelphia, Pa.

Fully described in Volume XIV. Assets including mining property sold to Vanadium Corporation of America in 1920, but company maintains its corporate identity. See **Primos Co.**

Officers: Gideon Boericke, pres.; Harold Boericke, sec.; John Boericke, treas.

Established 1888.

PRIMOS COMPANY, THE COLORADO

Address: 1421 Walnut St., Philadelphia, Pa.

The Primos Company is successor to the Primos Exploration Co. and is the parent company to the Primos Chemical Co. The Philadelphia Exploration Co. is also a subsidiary of the Primos Co. and was until recently doing exploration work in Plumas county, Calif. Reported Jan. 1921, that the Primos Co. and its subsidiaries, are not engaged in active mining operations.

PRIZE MINING CO. COLORADO

Address: O. Barlow Willmarth, gen. mgr., Montrose, Colo.

Officers: W. H. Gibson, pres. M. J. Katz, sec.; A. S. Schafer, treas.; with De Witt C. Cohen, H. F. Dawes, Fred Rothchild, Edward Schafer and Henry Sidenberg, directors.

Inc. in New Jersey. **Cap.** $250,000; $1 par; all issued. Annual meeting, April 25th, at Jersey City.

Property: 9 claims, 6 patented, 15 acres in Gilpin county. Claims show a 4′ N. E.-S. W. fissure vein in granite. Ore is a sulphide containing gold and silver. Examined by E. E. Chase.

Development: by 1,500′ shaft with 6,000′ of workings.

Equipment: 37-h. p. electric hoist. No operating figures available.

PRINCETON MINING & REDUCTION CO. COLORADO

Address: c/o P. D. McNay, Silver City, Iowa.

Property: Alice silver-lead mine at Whitepine, Gunnison county. Operated during part of 1920.

PROGRESS MINING & MILLING CO. COLORADO

Idle several years. Fully described in Volume XIV. Formerly held property at Guyot Hill, Leadville, leased to **Katinka Gold Mining Co.**

PROSPECT MOUNTAIN M. & EX. CO. COLORADO

Fully described in Volume XIV. Property acquired in 1920 by the **Leadville Mine Development Co.**, which see.

PRUSSIAN MINE COLORADO

Address: S. A. Tarbet & Co., lessees, Rowena, Boulder Co., Colo.

Property: a gold-silver-lead-zinc group, equipped with 50-ton mill and flotation unit.

PUEBLO LEAD SMELTER COLORADO

Is owned by the American Smelting & Refining Co.

Office: 120 Broadway, New York. **Operating address:** F. C. Gilbert, mgr., Denver, Colo. **Works address:** F. G. Hill, supt., Pueblo, Colo.

Has an annual capacity of 380,000 tons. See **Blende Smelter.**

PULASKI MINING CO. COLORADO

Address: Alma, Colorado.

Property: Brownlow group in Mosquito gulch, adjoining the Black Hawk, at Alma, Park county.

Development: by 1,400′ tunnel (July, 1921) said to cut several veins, 4-24′ wide, containing gold, silver, lead, zinc and copper.

Equipment: installing a 50-ton mill.

PUMPKIN MINE — **COLORADO**

Address: Rupert Nelson, Lawson, Colo.

Property: a silver-lead mine at Lawson, Clear Creek county. Operated during part of 1920.

PURSEY CHESTER MINES CO. — **COLORADO**

Address: 2540 Market St., Denver, Colo.

Property: Pursey Chester and Poorman groups, at Redcliff, Eagle county. Ore contains gold, silver, copper.

PUZZLE LEASING CO. — **COLORADO**

Probably dead. See Volume XIV.

PYRAMID MINING CO. — **COLORADO**

Address: Silverton, Colo.

Property: the Pyramid gold-silver mine at Silverton, San Juan county. Operated part of 1919, but shipped no ore. Idle in 1920-21.

QUANDRY MINES CO. — **COLORADO**

Address: 613 Kittredge Bldg., Denver, Colo.

Property: the Woodrow Wilson silver mine near Breckenridge, Summit county.

Operated and produced, during part of 1919 and 1920.

QUARTZ HILL CONSOLIDATED MINES, INC. — **COLORADO**

Address: Idaho Springs, Clear Creek Co., Colo.

Property: Kansas Ophir mine at Central City, Gilpin county. Worked for gold, silver and copper during part of 1920.

QUEEN GOLD MINING CO. — **COLORADO**

Address: John Tait Milliken, pres.-gen. mgr., Colorado Springs, Colo. Controlled by I. T. Milliken Estate, Natl. Bank of Commerce, St. Louis, Mo.

Property: 90 patented acres on Butte mountain and Raven hill, including Eclipse mine, between the Elkton and Cresson mines, at Cripple Creek, Teller county, formerly owned by El Oro Mng. & Dev. Co., and purchased by present company in 1915. Mine is said to show 2 parallel veins, carrying $15 gold ore.

Development: by 1,000′ shaft, with levels every 100′. Equipped with machine drills, hoist, pumps and electric power. Shipped 2 cars of milling ore daily during part of 1916. Idle several years.

QUEEN MINING CO. — **COLORADO**

Address: Ohio City, Colo.

Property: the Queen gold-silver mine at Ohio City, Gunnison county. Operated and produced during 1919. Idle in 1920-21.

QUEEN MINING & MILLING CO. — **COLORADO**

Address: Alma, Colo.

Property: May Queen gold-silver mine at Alma, Park county. Operated during part of 1920, but shipped no ore.

QUERIDA GOLD MINES CO. — **COLORADO**

Address: H. S. Thayer, mgr., 310 Exchange National Bank Bldg., Colorado Springs, Colo. **Mine address:** G. H. Scibird, supt., Silver Cliff, Colo.

Officers: H. S. Thayer, pres.-treas.; W. L. Strachan, v. p.; B. A. Parsons, sec.; with E. W. Scowden, directors.

Inc. 1918, in Colo. **Cap.** $2,500,000; $5 par; $1,029,000 outstanding. Expended $76,075 in development and construction during 1920.

Property: 12 claims, 8 patented, 70 acres, includes the Bassick and Maine No. 2 gold-silver mines, at Querida near Silver Cliff, Custer county, held under 20-year lease from the Bassick M. & R. Co. The Bassick was worked continuously 1877 to 1914. Ore occurs as sulphide in a volcanic throat in andesitic agglomerate; that developed 1921 said to average $13.51 per ton.

Development: by 1,850′ shaft and about 8,000′ of workings. Ore deposit an unique one described in many text books on mining geology.

Equipment: includes 500-cu. ft. compressor, steam hoist, 100-ton concentrator with one 12-cell M. S. flotation unit. The mine is credited with

total production under former ownership of 3,500,000 tons. Reserves estimated 1921, to be 350,000 tons of $11.60 ore. Company plans completing mine equipment and development of larger ore reserves.

QUINTET MINING CO. COLORADO

Described in Volume XIV. Property now owned by **Wabash Mines & Power Co.**, which see.

RADIANT MINING & REDUCTION CO. COLORADO

Address: H. M. Kingsley, Silverton, Colo.

Officers: H. M. Kingsley, pres.; A. B. McClave, treas.; O. L. Keen, sec.

Property: a lease on the 27-claim group of the Ruby Mining Co., located at Red Mountain in a northern part of San Juan county, comprising 450 acres. Mine reported to have considerable high-grade silver ore. Some ore was being developed and shipped in September, 1919, but no definite information procurable concerning production.

Equipment: includes a 50-ton mill.

RADIUM COMPANY OF AMERICA COLORADO

Property: at Tidwell, 15 miles from Green river in Paradox Valley district, Montrose county, comprises a number of claims covering carnotite-bearing sandstone cut by quartz stringers. Carload shipments carried 2.24% uranium oxide and 3.87% vanadic acid. Described in U. S. Geol. Survey Bull. 530-K, p. 163.

RADIUM COMPANY OF COLORADO, THE COLORADO

Company is subsidiary of the **Metals Exploration Co.**

Main office: 1429—18th St., Denver Colo. **Branch offices:** 50 Union Square, New York; 108 North State St., Chicago; London; Paris. Works address: Denver, Colo. **Mine addresses:** Naturita and Grand Junction, Colo. Mines at Roc Creek, Long Park, Hydraulic and Gateway, Colo.

Officers: Bulkeley Wells, pres.-managing director; Warren F. Bleecker, v. p.; W. A. Schlesinger, v. p.; J. W. Thorne, sec.-treas.; C. A. Broughton, asst. sec.-treas.

Directors: H. Carey Morgan, Victor C. Thorne, Bulkeley Wells, K. L. Kithil, W. A. Schlesinger, W. V. Hodges, Fred G. Farish and Crawford Hill.

The Radium Company of Colorado is a merger, made in 1921 of the **Carnonite Products Co.**, and the **Radium Company of Colorado, Inc.** The Radium Co. of Colorado, Inc., was originally incorporated 1915, as the Schlesinger Radium Co. The Carnotite Products Co. was the successor of the Tungsten Products Co.

Inc. 1921 in Colorado. **Cap.** $1,200,000 pfd. stock and 20,000 shares common stock of no par value.

Properties: 80 mining claims, in part in Paradox district, in part in Roc Creek district, Montrose county; also Gateway district, Mesa county. Contains sandstone blanket formations in horizontal beds, the ore being disseminated in pockets and layers in the sandstone. An exception to this general rule are the Roc Creek claims where the ore occurs in a fissure-like formation. The ore mined is carnotite carrying from 2% to 5% uranium oxide, from 1% to 9% vanadium oxide and from 2 to 10 milligrams of radium per ton of ore.

Development: is shallow, as ores lie close to surface; it comprises surface cuts, under-ground stopes, tunnels, shafts and inclines. In late years new methods for prospecting slightly deeper ores have been used. The jackhammer is used in prospecting to a depth of 40 feet and diamond drilling is used where the depth is 60 to 80 feet. This exploratory drilling has proven up new orebodies at unsuspected places.

Company is also opening and exploring valuable deposits near Tyrone, New Mexico.

Equipment: grinding and sampling works and chemical reduction plant at Denver. Five buildings are used to house the chemical plant. During 1920, new laboratories were equipped in up-to-date fashion and all labor-

atories and offices at Denver are housed in a three-story building in the down-town district.

Production: 1,000 to 1,200 tons of carnotite ore per year, averaging $300 to $500 per ton in 1919. Modern methods have made it possible to obtain over 90% recovery of the metals contained at a cost of approximately $80 per milligram radium element. Both uranium and radium are recovered as a by-product and are sold as sodium uranate and uranium oxide, also, iron vanadate containing 40% V_2O_5.

The Gold Light Manufacturing Company which makes luminous materials is a subsidiary of the company.

Company employs 300 men and pay roll is over $60,000 monthly.

RADIUM LUMINOUS MATERIAL CO. **COLORADO**

Address: Naturita, Colo.

Property: the Long Park, Yellow Bird, Cripple Creek and other carnotite claims in Paradox valley, Montrose county. Mine was operated part of 1919.

RADIUM ORE SAMPLING CO. **COLORADO**

Address: O. Barlow Willmarth, gen.-mgr., Montrose, Montrose county, Colorado.

Company owns custom sampler completed in winter of 1918 and costing $15,000, to sample all kinds of rare ores, such as vanadium, tungsten, etc., and concentrates. Company does not assay, purchase, or deal in ores. Up to January, 1921, the plant had handled 120 cars of radium-bearing ore.

RAINBOW MINE **COLORADO**

Address: Edwards & Butler, Alma, Colo.

Property: a gold-silver mine at Alma, Park county. Operated during part of 1920.

RAMONA MILLS CO. **COLORADO**

Address: A. D. Aitken, Colorado Springs, Colo.

Directors: W. C. Robinson, A. D. Aitken, C. H. Dudley, C. C. Hamlin and F. A. Mangold.

Inc. 1921, in Colo. **Cap.** $100,000.

Property: Ramona mine on Bull hill, Cripple Creek district. Teller county. Operated by lessees.

RANDOLPH GOLD MINING, MILLING & TUNNEL CO. **COLO.**

Office: 214 Boston Bldg., Denver, Colo.

Officers: W. A. Snyder, pres.; T. P. Fahey, v. p.; J. H. Goodknight, sec.; W. C. Danks, treas.

Inc.: 1918, in Colorado. **Cap.** $1,000,000; shares $1 par; 525,000 outstanding. Bonds authorized, $100,000; $70,000 issued.

Property: the Gold dirt mines on Cavode mountain, Empire, Clear Creek county, consisting of 45 patented lode claims and 3 placers, 430 acres in all. Mine formerly owned by the Empire Tunnel Co., had been shut down for years because of litigation. Property bought in at trustee's sale. Ore contains gold, silver and copper.

Development: by two tunnels 2,700' and 4,000' long, greatest depth 600'. Past production of mine is said to be $1,000,000. Present owners claim 1,730,000 tons blocked out that will average $6.35 per ton. The Empire company received royalties from lessees amounting to $7,690, $22,270 and $30,000, respectively, in the last three years of operation.

Recent work (1920-'21), in the Empress tunnel has been preparatory to operation on a large scale. A mill with concentration, flotation and amalgamation units is planned.

Equipment: includes compressor, transformer, and concentrating mill.

RARA AVIS MINING ASSOCIATION **COLORADO**

Address: 814 Central Savings Bank Bldg., Denver, Colo.

Property: a lease on the Rara Avis Silver-lead mine in Eureka gulch, near Central City, Gilpin county.

Development: by 550' shaft and 600' tunnel. An old producer, reopened in 1920.

RARE METALS ORE CO. **COLORADO**

Office: 603 Symes Bldg., Denver, Colo.

Officers: G. S. Wood, pres.; Nelson Franklin, v. p.-mgr.; Geo. A. Stahl, sec.; A, F. Zang, treas.; S. B. Tyler, supt.

Inc. March, 1916, in Colorado. **Cap.** $100,000; $1 par.

Owns a 75-ton custom tungsten mill at Rollinsville, Gilpin county, on the D. & S. L. R. R., 4 miles from Nederland, equipped with crusher, rolls, ball mills, jigs, Wilfley and Deister tables, classifiers, and Callow tanks. The concentrates produced averaged 60% tungstic acid. Shut down since 1919, owing to condition of tungsten market.

RAVEN & BEACON HILL GOLD MINING CO. **COLORADO**

Office: 309 Exchange Bank Bldg., Colorado Springs.

Officers: W. W. Price, pres.; John T. Hawkins, v. p.; W. B. Price, sec.

Cap. $170,000; shares 10¢; in treasury Jan. 1, 1917, 328,000 shares stock and $4,500 in cash. Listed on the Colorado Springs Exchange.

Property: 17 acres of the Arequa townsite and 7 acres of the Cameron townsite, at Cripple Creek, Teller county, crosscut by the Roosevelt tunnel. Developed by 554′ shaft. The mine has been blocked out for leasing; the Elkton Cons. M. & M. Co. operates Blocks 1 and 2 from the Roosevelt level of the Elkton shaft.

Gross production to date, $85,691; none in recent years.

RAWLEY MINING CO. **COLORADO**

The charter of the Rawley Mining Co. expired by limitation in 1921. The bond issue of $500,000 on the property is in process of foreclosure and the mine is passing into the hands of a new group, represented by Lewis Sanders, 480 Lexington Avenue, New York City. This group is not yet ready to announce its final plans.

Mine address: Bonanza, Saguache Co., Colo.

Inc. 1901, in Colo. **Cap.** $2,500,000; $1 par; 1,903,679 shares outstanding; 28,487 shares sold for $155 the lot at public auction in New York on Dec. 31, 1920. Annual meeting, third Monday in January.

Property: 64 claims, 400 acres, show fissure veins in andesite, running N.-S., nearly vertical and about 6½′ in width. Veins carry argentiferous galena, bornite, and chalcopyrite, in a heavy sulphide smelting ore.

Development: mine is 1,200′ deep, with 10 levels and a total of 15,000′ of workings. Reserves estimated at 90,000 tons, that will assay 8.89 oz. silver per ton; 2.36% copper, 8.92% lead, 80¢ gold; and 190,000 tons additional on same ore-shoot. Ore from all levels is handled downward through a 3-compartment shaft to a crosscut tunnel 6,235′ long, and connecting with 1,200′ level.

Equipment: includes 20-mile power line, 2,100 cu. ft. compressor, 3-ton locomotives. The Salida smelter is owned by the same interests.

RAYMOND CONSOLIDATED MINES CO. **COLORADO**

Address: Dexter T. Sapp, pres., Gunnison, Colo.

Property: about 600 acres, includes the Raymond mine in Gold Creek district, about 5 miles N. of Ohio City, Gunnison county, said to have 2 ore-bearing veins.

Development: by 2700′ tunnel and drifts.

Equipment: includes compressor, steam plant, and concentrating mill. Has been idle for years.

READY CASH MINING & MILLING CO. **COLORADO**

Company operated a mill at Robinson, Lake county, in 1918-19. In addition to handling its own ores, company purchased zinc-lead-iron ore suited to its system of concentration.

RED BIRD MINE **COLORADO**

Address: John R. Sapp, Almont, Colo.

Property: a gold-silver mine at Almont, Gunnison county. Operated during part of 1920, but no shipments reported.

RED CLIFF MINING & MILLING CO. **COLORADO**

Address: J. Ham Lewis, mgr., Redcliff, Colo.

Property: 7 lode claims, 2 miles from Redcliff, Eagle county. Ore carries gold and silver. Examined by Forbes Rickard in 1911, who gave a conservative report.

Development: by 3 miles of tunnels and drifts.

Equipment: during 1920 a complete surface plant was purchased and a 100-ton mill was to be ready early in 1921. The "Eng. & Mng. Jour." of Oct. 30, 1920 considers the exaggerated statements issued by the management for stock selling purposes, "a particularly vicious example of questionable promotion practices".

REDICK MINING CO., O. C. — **COLORADO**

Office: 250 Omaha National Bank, Omaha, Nebraska.

Property: the Bryan mine at Blackhawk, Gilpin county. Ore carries gold, silver, and lead.

Operated and produced during 1919 and 1920.

RED LION MINE — **COLORADO**

Address: Dissman & Morrell, lessees, Alma, Colo.

Property: a silver mine at Alma, Park county, operated during part of 1920.

RED MOUNTAIN MINES CO. — **COLORADO**

Address: George E. Collins, mgr., 307 Boston Bldg., Denver, Colo.

Officers: Bulkeley Wells, pres.; Geo. E. Collins, v. p.; Harry W. Robinson, sec.

Property: includes the Yankee Girl, Genesee-Vanderbilt, Robinson and Joker tunnel properties at Red mountain, near Ironton, Ouray county.

Development: by the main or Joker adit, 4,950′ long and the 4,500′ Genesee Vanderbilt adit. The shafts are Genesee, surface to adit, 450′; Vanderbilt, below adit, 600′; Yankee Girl, from surface, 1,050′; Robinson, from surface, 700′. Equipped with small testing mill.

Properties had been idle many years, but are said to have produced copper, lead, silver, and other metals, of a total value of $12,000,000.

Small shipments being made.

RED MOUNTAIN SILVER MINES CO. — **COLORADO**

Address: J. L. Cusick, mgr., Silverton, Colo.

Property: at Silverton, San Juan county.

RED STONE GOLD MINING CO. — **COLORADO**

Address: M. Justus, sec., Physician Bldg, Ft. Collins, Colorado.

Inc. March, 1909, in Colorado. **Cap.** $300,000; $1 par; 217,653 outstanding. Annual meeting held on March 1st.

Property: 4 claims and a lease on another claim, 100 acres altogether, 10 miles S. W. of Ft. Collins and ½ mile from Masonville, Larimer county. Claims carry a quartz vein in granitic schist, the vein running N. E. and dipping 85° and containing gold, silver, and copper ore.

Development: by 240′ of workings including 40′ shaft and 200′ tunnel.

Presumably idle for several years.

REGINA MINE — **COLORADO**

A gold-silver mine at Empire, Clear Creek county. Operated during part of 1920 by F. E. Bender, San Diego, Calif.

REPUBLICAN MINES CO., THE COLORADO — **COLORADO**

Address: Carl J. Sigfrid, Ouray, Ouray county, Colo.

Address: I. A. West, sec.-treas., 514 Equitable Bldg., Denver, Colo. G. W. Teagarden, mgr.

Property: in Griffith district, near Georgetown, Clear Creek county. Ore occurs in fissure veins, said to contain high grade silver values.

Development: by 350′ main crosscut tunnel and drifts.

REQUA-SAVAGE MINES CO. — **COLORADO**

Formerly the Requa-Savage Gold Mining Co.

Address: A. Schumacher, sec., c/o. Keystone Market, Colorado Springs, Colo.

Idle. Fully described in Volume XIV.

Stock listed on Colo. Springs Exchange, ½¢ bid, 1¢ asked, Jan., 1922.

RESERVE MINING CO. **COLORADO**

Office: 840 Gas & Electric Bldg., Denver, Col.

Property: the Hoil gold-silver mine at Alma, Park county. Operated part of 1919; idle in 1920-21.

RESOLUTE MINING CO. **COLORADO**

Address: J. A. Houghton, pres., 54 De Menil Bldg., St. Louis, Mo. **Mine address:** Rico, Dolores county, Colo.

Property: Telegraph, Newman and Expectation groups, near Rico. Idle several years.

REVA GOLD MINING CO. **COLORADO**

Address: 935 Foster Bldg., Denver; or G. R. Calhoun, supt., Cripple Creek, Colo.

Property: operating under lease, the Rose Nicol mine of Rose Nicol Gold Mining Co., Battle mountain, Cripple Creek, Teller county.

Development: by 1,200′ shaft and several thousand feet of workings. Ore has been opened on No. 6 and 7 levels, at 800′ and 1,000′ below the surface, respectively, and on Roosevelt tunnel-level about 2,100′ below the collar of shaft. In 1920, ore opened on No. 10 level yielded $25 to $71 per ton.

Equipment: includes aerial tram extending from mine to Midland Ry. terminal. Ore is treated at the Golden Cycle mill at Colorado Springs.

REVENUE TUNNEL MINES CO. **COLORADO**

Address: Carl J. Sigfrid, Ouray, Ouray county, Colo.

Property: controlled by the Reynolds Estate of Denver. Includes the Cumberland, Revenue-Virginius, and Wheel of Fortune mines. Extensive development work was done in 1918, and the Cumberland mine shipped silver-lead ore. The Revenue-Virginius is credited with a total production of $26,000,000. The Wheel of Fortune mine, located in 1875, has been worked for varying periods and is to be operated with the Revenue.

REVILS MINING & INVESTMENT CO. **COLORADO**

Idle since 1918.

Address: Silver Cliff, Custer county, Colo.

Property: the **Hornsilver Consolidated** mine just E. of Silver Cliff in the Hardscrabble district, operated under bond and lease. Ore carries silver and manganese.

REX GOLD MINING & MILLING CO. **COLORADO**

Properties are leased to **Lincoln Mines & Reduction Co.**, which see.

Address: Cripple Creek, Teller county, Colo.

REY SILVER MINES CO. **COLORADO**

Idle in 1920-'21. **Address:** Fairplay, Park Co., Colo. Mine at Alma, Sacramento district, reported to have opened a 12 to 15′ silver vein, assaying $50 per ton in 1919. The ore is believed to be on the London contact, which underlies several properties in that section. There were 31 sets of lessees working on the London.

RICHMOND HILL MINING, MILLING & LEASING CO. **COLO.**

Address: Aspen, Pitkin county, Colo.

Officers: W. H. Cornwall, pres.; C. E. Doolittle, v. p.; F. M. Yates, sec.-treas., with Jos. Mellor and A. Johnson, directors.

Property: company has a lease and option on the Little Annie silver-lead mine and mill at Aspen. Dump was said to contain 5,000 tons of payable ore, besides 4,000 tons of ore broken in the mine. Operated part of 1919 and shipped products to smelter. The mill was enlarged to 80 tons per day during 1920.

RICO ARGENTINE MINING CO. **COLORADO**

Office: Mackintosh Block, Salt Lake City, Utah. **Mine address:** J. M. Stempfel, supt., Rico, Dolores Co., Colo.

Officers: F. W. Price, pres.; A. E. Rykert, v. p.; J. H. Woodmansee, sec.-treas.; with S. A. King, J. E. McKnight, N. S. Nielson and J. E. Frick, directors.

Inc. 1912, in Utah. **Cap.** $100,000; 10¢ par; 963,136 issued; assessable; assessment No. 10 of 1c. per share levied March 26, 1921. Company is its

own transfer agent and registrar. Listed on Salt Lake Exchange.

Property: the Blackhawk and Argentine groups, 21 claims, 145 acres, mostly patented, adjoining the Rico-Wellington Mining Co. property.

Geology: alternating strata of limestone and sandstone, dipping at angle of about 30° and cut by almost vertical fissures of great extent and persistence. Where these fissures cross the soluble limestone they contain flat replacement deposits of sulphide ores, carrying copper, zinc, and lead, with gold and silver values. The ore shoots or bedded deposits are from 3-30′ thick. These fissures and the limestone are identical both in character and occurrence with those which are producing in the Rico-Wellington property. In the apex suit with the Rico Consolidated, the Rico Argentine held that the Blackhawk fissure was the source of the enrichment of the beds that had been followed into the disputed ground, in other words, it was the master vein. Judge Searcy decided January, 1921, that the ore-beds were formed by E.-W. fissures rather than by the Blackhawk. This reverses the generally accepted local theory.

Development: by a new tunnel, 200′ lower than former workings, that drained the main shoot through to a connection with upper workings. In 1918, it was reported that bismuth was appearing in some of the ore. A tunnel was driven 700′ in the ground in dispute with the Rico Cons. and opened silver-lead-copper shipping ore.

Production: for 1917, $100,000; the net smelter returns of which were $88,837. Of this, $47,576 was for ore shipped by company and $41,261, shipped by lessees. On January 1, 1919, company operations were suspended until September, but lessees continued shipping at rate of 1,000 tons per month.

Late in 1918 the Rico Consolidated M. Co. brought suit against the Rico Argentine Co. and Marmatite Leasing Co. over apex rights for wrongful extraction of 15,000 tons of ore, worth $900,000. In October, 1920, the plaintiff agreed to modify the amount, provided the ore had been mined in good faith. Judgment was rendered in Jan., 1921, against the Rico Argentine, which had to pay $29,946, and the Marmatite, $7,346. This represents 5,000 tons of $740 ore, net value.

All operations suspended, pending final decision of appeal.

RICO CONSOLIDATED MINES CO. **COLORADO**

Owned by Knight interests of Provo, Utah. **Mine address: Rico,** Dolores Co., Colo. Stock listed on Salt Lake City Exchange.

Property: adjoining the Rico Argentine on the N. E., is said to show a vein of copper-silver-lead ore 35′ wide in the upper workings. For geology see the Rico Argentine.

Development: by tunnel over 300′ long. Shipments have been made, but no figures are available.

Company brought suit in 1918 against the Marmatite Leasing and the Rico Argentine companies, alleging that they had trespassed on the Allegheny lode. Company claims that 15,000 tons of ore valued at $60 per ton, amounting to $900,000 had been shipped. This was modified in Oct., 1920, to $37,000, provided that the ore had been extracted in good faith. In Jan., 1921, judgment was rendered in favor of the Rico Consolidated for $37,000, the net value of 5,000 tons.

RICO MINING CO. **COLORADO**

Reorganized as Syndicate Mining & Milling Co., which see.

RICO-WELLINGTON MINING CO. **COLORADO**

Address: 11 Knight Block, Provo, Utah.

Officers: O. Raymond Knight, pres.; Chas. Read, v. p.; R. E. Allen, sec.-treas.; R. L. Anderberg, asst. sec.-treas.; H. R. Trenholm, gen. mgr. Directors: O. Raymond Knight, J. W. Knight, Chas. Read, K. S. Jordan, W. L. Mangum, R. E. Allen, H. R. Trenholm, Albert Lofquist, supt.

Inc. August, 1911, in Utah. **Cap.** $1,000,000; $1 par; assessable; 51% of stock owned by Knight Investment Co. Listed on Salt Lake Exchange.

Since the property was taken over by its present owners it has earned

over $500,000, has invested $50,000 in a mill and expended $100,000 in development work. The debt of $150,000 advanced for this equipment and work was paid off in 1916. Early in 1921, company owed the bank $80,000, and an assessment of 10¢ a share was levied.

Dividends: on April 25, 1917, No. 1 of 1½¢ per share was paid, and a total of 8½c. in that year; $39,000 paid to date.

Property: the Wellington mine, at Rico, Dolores county, which contains ore-shoots formed by replacement and contact metamorphism in the limestone beds of the middle member of the Hermosa formation. In 1914 a flat deposit of zinc-lead ore was cut. It lies parallel to the Blackhawk fault. To the north the orebody is cut off by a cross fault parallel to the Nellie Bly fault, the orebody north of the fault being 170′ below. Across the Blackhawk fault a copper deposit, replacing limestone and broken by several faults, has been opened, the ore carrying good values in copper and silver.

Development: by the Mountain Spring tunnel and about 22,000′ of work, said to expose large amounts of lead-zinc and copper ore. Exploration is devoted to the Blackhawk and Iron veins, two great ore-bearing fissures, traversing the property N. W. and S. E. In these the ore makes in lime beds that look almost like coal deposits, and as many as 5 and 6 beds, one above the other, have been opened.

In 1921, ore as mined was 30′ wide, 6′ high and of unknown extent on its strike. Shipments averaged 18 oz. silver per ton, and 7% lead. The high grade ore mined in 1920 was faulted. The large body of pyrite ore is mined and sold as flux.

Equipment: includes a compressor and 2,500′ tram to the Rio Grande railroad, handling 50 tons of ore per hour at a cost of 23¢ per ton. The 100-ton mill formerly belonging to the Pro Patria Co. and leased for 5 years, was remodeled at a cost of nearly $30,000. A tube-mill, 5 Deister tables, 6 Callow tanks, 2 Callow screens and electrical equipment were installed in 1918.

Production: for 1917, 424 tons of copper ore, 1,826 tons of lead-zinc, 709 tons iron sulphide, and 1,687 tons lead-silver, all dry weights, net value, $105,589. No work was reported for 1918, but company was operating in 1919 and 1920, shipping lead carbonate and pyrite.

RILLA MINING CO. **COLORADO**

Mail returned unclaimed and company presumably out of business. Described in Volume XIV.

RITO SECO GOLD MINE **COLORADO**

Fifty-one per cent. of stock owned by **Assets Realizing Mines Corp.** of California, which see.

Address: 811 Merchants National Bank Bldg., Los Angeles, Calif.

Property: about 800 acres, patented, near San Luis, in Costilla county.

Development: shafts, tunnels, crosscuts and drifts, claimed to have proved 5,900,000 tons of ore, which will be mined by steam shovel and treated in a flotation plant, to have a capacity of 1,250 tons daily.

Idle, owing to high costs.

RITTENHOUSE MINE **COLORADO**

Address: P. O. Box 36, Colorado Springs, Colo. A gold mine in Cripple Creek district, Teller county operated during part of 1920.

RIVER SMELTING & REFINING CO. **COLORADO**

Affiliated with National Lead Co.

Works address: H. H. Utley, mgr. and ore purchaser, Florence, Colo.; Louis V. Emanuel, supt.

Office: 722 Chestnut St., St. Louis, Mo.

Officers: Edw. J. Cornish, pres.; J. A. Caselton, sec.-treas.

Organized about 1913 jointly by National Lead and Stone & Webster, of Boston.

Operates a custom zinc smelter for treatment of complex Colorado ores, carrying zinc, lead, silver, gold and copper. Ores are reduced in a reverberatory furnace after partial desulphurization. Its products are zinc-

lead white (leaded zinc oxide) and copper matte, containing silver, gold and some lead. An electrolytic plant at Keokuk, Iowa, has been abandoned and dismantled.

RIVER VIEW LEASING CO. **COLORADO**

Address: Creede, Mineral Co., Colo.

Property: River View silver mine at Creede, operated during part of 1920.

ROANOKE MINING & MILLING CO. **COLORADO**

Office: 221 Foster Bldg., Denver, Colo.

Officers: E. LeN. Foster, pres.-treas.; F. G. Warden, v. p.; W. C. Johnston, sec.

Inc. in Colorado. **Cap.** $100,000; 10¢ par; all outstanding.

Property: 11 patented claims, in Clear Creek county, showing gold, silver, bismuth, and lead ore in a fissure vein in granite. Ore is a sulphide almost 2′ wide, and runs N. 60° E.; said to assay 10 to 2,000 oz. silver, 30% lead, and 0.2 oz. gold per ton.

Development: by tunnel 900′ long, and total of 3,000′ of workings.

Reopened after 20 years, and company plans driving a crosscut tunnel to intersect vein at 400′ depth. Operated part of 1919 and 1920.

ROCHESTER MINING & MILLING CO. **COLORADO**

Address: Russell Gulch, Colo.

Property: the Rochester gold-silver mine at Russel Gulch, Gilpin county. Operated part of 1919 and 1920.

ROCKY MOUNTAIN GOLDFIELD MINING CO. **COLORADO**

Mail returned unclaimed from St. Elmo, and company presumably defunct. Described in Volume. XIV.

ROOSEVELT MINES & ELECTRIC CO. **COLORADO**

Office: Pitkin, Colorado.

Officers: L. H. Becker, pres.; R. B. Anderson, v. p.; A. P. Nelson, sec.-treas.-mgr.; with M. Woolley, F. R. Hansen, M. J. Ostergard, O. J. Watson, L. S. Kraft and W. J. Hurd, directors.

Inc. Feb. 3, 1920, in Colo. **Cap.** $5,000,000; $1 par; 3,700,000 issued. Annual meeting second Tuesday in August.

Property: 98 lode claims, 4 placer claims, 3 mill sites, total acreage about 1,200 acres, in Box Canon and Quartz Creek districts of Gunnison county. (Major part of property bought at foreclosure sale of the Brant Independent Mining Co., now defunct, includes 5 mines, the Camp Bird, I. X. L., Gold Ridge, Midnight and Roosevelt, opened up and proven by 400′ Camp Bird shaft and 1,200′ of drifting; 140′ Midnight shaft; 60′ I. X. L. shaft and 90′ crosscut; Gold Ridge tunnel, which follows the vein for 130′; and shafts and exploration tunnels at the Roosevelt. Ore occurs in quartz veins imbedded in mica schist, diorite and granite; values said to average $20 gold per ton and about 8% copper.

Development: mainly by crosscut tunnel which will drain the entire district and open up the company's mines at depths from 700 to 1,200′; tunnel in 2,500′, February, 1921. Portal of tunnel 900′ from the D. & R. G. Ry.; switch from main line installed.

Equipment: 400 h. p. hydro-electric plant, power transmitted to Camp Bird and other mines; 4-drill air compressor, machine drills and usual buildings, all lighted and heated electrically and with running water. Property is heavily timbered and Quartz Creek runs through it.

ROOSEVELT MINING & MILLING CO. **COLORADO**

Address: Nathan Shapiro, mgr., Alice, Colo.

Property: the Reynolds, Kaminky, Walder, Log Cabin, and Ottawa gold claims at Alice, near Idaho Springs, Clear Creek county.

Equipment: steam power, compressor, ¾ mile tram, 15-stamp mill, etc.

Mine and mill operated part of 1919 and 1920, and shipments made. Actively engaged in 1921.

ROSE NICOL GOLD MINING CO. **COLORADO**

Office: 315 Exchange National Bank Bldg., Colorado Springs, Colo.

Officers: L. L. Aitken, pres.; Ira Harris, v. p.; A. D. Aitken, sec.-treas.; with R. H. Forbes, directors.

Inc. in Colorado. **Cap.** $1,500,000; $1 par; all outstanding. Colorado Title & Trust Co., Colorado Springs, registrar. Expenses in 1918 were $1,033.

Property: 11 acres on Battle mountain, between the Portland, U. G. M., and Cresson mines, Cripple Creek, Teller county. Property was reported leased in 1917 to the Camp Bird Mining, Leasing & Power Co., now presumably defunct. The lease on the Rose Nicol mine of the company was transferred to the Reva Gold Mining Co., which see.

ROSITA MINING & MILLING CO. **COLORADO**

Address: Florence, Colo.

Property: Maverick gold mine at Rosita, Custer county, operated during part of 1920.

ROSS MINING & MILLING CO. **COLORADO**

Idle many years.

Office: Ross Bldg., Waynesburg, Pa. Mines at Silverton, San Juan county. Company sub-leased the Champion mine, which it controls, in 1918, to Cassagranda & Co. The company has had much financial trouble, like its predecessors and collateral relatives in a chain of promotions, all fully described, Vol. XI, Copper Handbook.

ROYAL GEM MINING CO. **COLORADO**

Formerly operated near Caribou, Boulder county. No recent information. See Volume XIV.

ROYAL TIGER MINING CO. **COLORADO**

Address: J. A. Traylor, mgr.; Frank R. Wicks, gen. supt., Tiger, Colo.

Cap. 1,000,000 shares; 1¢ par; 600,000 shares outstanding.

Property: company owns and operates the Royal Tiger mine, formerly known as the I. X. L. mine, the Cashier group, and a group of placer claims, covering 2,000 acres and extending 3½ miles S. W. from Tiger to the property of the Wellington Mines Co. at French gulch, Summit county. Ore occurs in a mineralized zone of intrusive porphyry, 200′ wide, carrying low grade lead, zinc, gold, and silver.

Equipment: includes a 50-ton mill. A 500-ton mill is under construction.

RUBY CONS. SILVER MINES CO. **COLORADO**

Address: c/o Albert Sutcliffe & Co., 262 Washington St., Boston, Mass.

Property: the Ruby Consolidated No. 7, a gold-silver mine at Crested Butte, Gunnison county, operated during part of 1920.

RUBY MINING & MILLING CO. **COLORADO**

Dead. See Volume XIV.

RUSSIA MINE **COLORADO**

A gold-silver-zinc property at Alma, Park county, operated by Lincoln Consolidation Partnership.

RUTTILLA-BROWN LEASING CO. **COLORADO**

Syndicate has a lease on the **Carbonero** mine, which see.

SACO DE ORO MINING & MILLING CO. **COLORADO**

Address: Barrick-Dollison Co., fiscal agents, 511 Mack Bldg., Denver, Colo. Chas. E. Barrick, pres.-gen. mgr., Apex, Colo. W. S. Barrick, supt.

Cap. $20,000; in 1918 an offering of 50,000 shares was made at 10¢ each. Advertised at 25 cents late in 1920.

Property: 31 claims, near Apex, Gilpin county, said to show fissure veins carrying gold, silver and lead ore. Examined in 1920 by C. H. Kinney of Des Moines, Iowa.

Development: the 1,000′ Barrick tunnel, which was expected to cut ore 400′ below the Rochester shaft.

Equipment: compressor, hoist and electric plant were added in 1919.

It is hoped that the mine will warrant its name. Those interested seem highly optimistic.

SAGUACHE EAGLE MINING CO. **COLORADO**

Address: 1940 Broadway, Denver, Colo.

Property: Eagle mine and mill at Villagrove, Saguache county. Ore contains gold, silver, lead and zinc.

ST. CLOUD MINE — **COLORADO**

Address: Droesbaugh & Conner, Montezuma, Colo.

Property: a silver-lead mine at Montezuma, Summit county, operated during part of 1920.

ST. ELMO MINING CO. — **COLORADO**

Address: Montezuma, Summit Co., Colo.

Property: a gold-silver-lead mine at Montezuma. Not producing.

ST. GEORGE MINE, INC. — **COLORADO**

Address: Theo. R. Heinrichs, mgr., Flagg Bldg., Yonkers, N. Y. Mine address: Georgetown, Colo.

Officers: Theo. R. Heinrichs, pres.; Wm. E. Handy, v. p.; Geo. B. Kearns, sec.; A. E. Sheridan, treas., with W. G. Briggs, directors.

Inc. 1916, in So. Dakota. **Cap.** $50,000; $1 par; 3,938 shares in treasury.

Property: 12 claims, 120 acres, including the St. George gold-silver mine at Georgetown, Clear Creek county. Ore occurs in a fissure vein in granite, containing gold, silver, lead and zinc values.

Development: by 2,200′ tunnel.

Equipment: includes compressor and 900′ aerial tram connecting with railroad. A 40-ton mill is planned.

ST. JOHN MINES (COLORADO), LTD. — **COLORADO**

Address: Edwin H. Platt, mgr., Equitable Bldg., Denver, Colo. M. F. Bremer, sec., 38 Broad St. House, London, E. C. 2, Eng. **Directors:** Geo. A. Williamson, chairman; J. O. Shepherd, Chas. P. Winterton, M. M. Dewar.

Inc. Feb. 13, 1913. **Cap.** £75,000; 5s. par; all issued and fully paid.

During 1917 the company's property was sold to the Montezuma Silver-Lead Mines, Ltd., for £55,000, out of which the mortgage debt was discharged. The corporation is now a holding company, whose chief asset is 40,000 ordinary shares of the Montezuma S.-L. Mines, Ltd. See **Montezuma Cons. Silver Mines Co.**, also full description in Volume XIV.

ST. LOUIS COLORADO MINING CO. — **COLORADO**

Probably defunct. Described in Volume XIV.

ST. PAUL MINING & REDUCTION CO. — **COLORADO**

Address: Frank L. Ross, Gas & Electric Bldg., Denver, Colo. Norwood Johnson, pres. and treas.; J. B. Ross, v. p. and gen. mgr.; Frank L. Ross, sec.

Inc. March 1908, in Colorado. **Cap.** $100,000; shares $1 par.

Property: the St. Paul group, in the Red Mountain district, San Juan county, an old mine, that formerly shipped some ore netting $1,000 per carload.

Development: by 300′ shaft, with levels at 200′ and 300′, developing small but rich ore shoots, said by former management to carry 8% copper, 10% lead, 10% zinc, 5 to 10 oz. silver, and 1 oz. gold per ton. Since 1914 the mine has been worked by lessees. Equipped with an electric hoist. Operated part of 1919, and shipped ore.

SALIDA SMELTER — **COLORADO**

The smelter at Salida, formerly the property of Ohio & Colorado Smelting & Refining Corp., was shut down in February, 1920. The mortgage of $1,000,000 held thereon by the American Metals Co. was foreclosed and the property bought in on July 26, 1920, at foreclosure sale for a new group, represented by Lewis Sanders, 480 Lexington Avenue, New York City. The new group is not yet ready to announce its detailed plans for the smelter.

Works: Salida, Chaffee Co., Colo.

Property: the Salida smelter, 12,000 tons monthly capacity, did a general custom business. It includes a 300-ton sintering plant, sampling mill, 4 lead blast-furnaces, 48 x 180″, handling mainly silver-lead ores. The only copper treated is that bought with lead ores, which is concentrated to 40% tenor.

SAN ANTONIO MINING CO. COLORADO
Dead. See Vol. XIII.

SAN JUAN GOLDEN FLEECE MINING SYNDICATE COLORADO
Address: 315 Kittridge Bldg., Denver, Colo.
Property: Golden Fleece group, on Treasure mountain, 18 miles N. of Silverton, San Juan county. Ore contains gold and silver. An old producer, under new management in 1921.

SAN JUAN INSPIRATION DEVELOPMENT CO. COLORADO
Officers: F. M. Ward, pres.; Jack Klepick, v. p.; E. J. Slone, sec.-treas., with A. D. Medved, and R. G. Slone, directors.
Inc. 1920, in Colo. **Cap.** $400,000.
Property: a lease on Kansas City group, in Red Mountain district, San Juan county.

SAN JUAN SILVER SYNDICATE COLORADO
Address: E. D. Van Keuren, fiscal agent, 725 Symes Bldg., Denver, Colo.
The Syndicate is considered by the promoters to be "a double-barrelled opportunity". The pre-organization offer was 2,000 units of $75 each, and every membership was to receive 500 shares in a new company to be formed, the shares to be unloaded at 30 cents a piece. This was early in 1920.
Property: the Weatherly group of 5 lode claims on Mt. Hayden, near Ouray, Ouray county. Formerly operated by a British company, reported to have spent $75,000. Examined by Kirby Thomas, Fred Carroll, and David Foerster.
Development: by 635′ tunnel, to be extended 170′. Reserves were estimated as 9,000 tons of $11 net silver ore, but 300,000 tons are probable, if the ore persists in depth.

SAN JUAN SMELTING & REFINING CO. COLORADO
Absorbed by American Smelting & Refining Co., and company dissolved. Owned the Durango (Colo.) lead and copper smelter, which see.

SANTIAGO CONS. MINING, MILLING & TUNNEL CO. COLORADO
Office: Georgetown, Clear Creek county, Colo.
Officers: Mrs. S. F. Glass, pres.-treas.; Mrs. E. J. Smith, v. p.; S. F. Glass, sec.
Inc. Feb., 1906, in Colorado. **Cap.** $600,000; $1 par; 594,101 shares outstanding.
Property: 20 claims, 13 patented, 100 acres in all, near Georgetown, Clear Creek county. Has a fissure vein, averaging 1½′ wide, carrying sulphide ore said to run 2 oz. gold, 300 oz. silver, 10% copper and 30% lead.
Development: by 600′ shaft and tunnels 200′ to 1,200′ in length, workings totalling 25,000′. In 1918, a lessee on No. 4 level mined 200 tons of ore carrying 2 oz. gold, 65 oz. silver, 9% copper, and 23% lead. On No. 7 level, an orebody about 10″ wide was opened for about 150′. Company claims to have 100,000 tons of ore in reserve, with 300 tons blocked out.
Equipment: includes electric hoist, tramway, and sampler.
Production: from January, 1911, to December, 1918, was $247,653, the average grade being about $50 per ton. Operated part of 1919 and shipped some ore. Idle in 1920-1921.

SARATOGA MINING CO. COLORADO
Address: F. L. Colby, pres.; Union Trust Bldg., Detroit, Mich. **Mine office:** Idaho Springs, Clear Creek county, Colo.
Idle several years. Described in Volume XIV.

SCEPTRE MINES & MILLS CO. COLORADO
Presumably defunct. Described in Volume XIV.

SCHLESINGER RADIUM CO. COLORADO
Name changed, early in 1919, to **Radium Co. of Colorado, Inc.**, which see.

SCHLEY MINE COLORADO
Address: C. M. Tayler, lessee, Idaho Springs, Colo.
Property: at Idaho Springs, Clear Creek county, operated during part of 1920. Ore contains gold, silver, lead.

SEATON MINING & MILLING CO. **COLORADO**

Address: Cincinnati, Ohio. H. E. Machol, supt., Idaho Springs, Colo.

Property: the old Seaton mine on Seaton Mountain, near Idaho Springs, Clear Creek county. Mine re-opened, 1916, through Argo tunnel and 650′ raise was to be put through from west drift on Seaton vein to connect with Foxhall tunnel. The Seaton vein is cut at 6,007′ from entrance to the Argo tunnel. Operated during part of 1919.

SEDALIA COPPER CO. **COLORADO**

Address: C. H. Swanton, sec., Canon City.; D. A. Freeman, pres., Boston, Mass.

Inc. 1899. **Cap.** $1,000,000; shares $10 par.

Dividends reported paid in 1900, when shares were sold at $10, declining to $1.

Property: 40 acres, patented, 7 miles from Salida, Chaffee county, shows 35′ ledge of pyritic copper-zinc ore carrying 2.75% to 12% copper, 750′ below outcrop. Upper levels show large amount of oxidized ore.

Whittemore Bros., shoe polish manufacturers, originally interested. Property formerly leased to Salida Gold & Copper Mining Co., succeeded by Shawmut Consolidated Mining Co., succeeded by Salida Copper Co., all now dead. The Shawmut Co. purchased the leaching plant and remodeled it for a 50-ton ore concentration mill.

Development: by shaft and tunnels, aggregates 4,000′. Was producing in 1918. No recent information.

SEEMANN INVESTMENT & FINANCE CO. **COLORADO**

Address: Box 1375, Denver, Colo.

Officers: Henry I. Seemann, pres.; K. R. Seemann, v. p.; W. S. Lippincott, sec.-treas.

Inc. July 12, 1904, in Colorado. **Cap.** $100,000; $100 par.

Property: company owns the following claims at Cripple Creek, Teller county: Black Crow Lode, Mayflower Lode, Pride of Grassy Lode, W. E. S., E. F. C. & Rittenhouse, the 4-11-44, Idlewild & Mexican, Dark Cloud and Nada Lodes; and in Clear Creek county; Golden Star Lode, Ace of Diamonds Lode, Deuce of Diamonds Lode, Jack of Diamonds Lode, and ½ Surprise Ext. West, Vindicator Lode.

The company is not a mining company, but wishes to lease or sell, or probably form a mining company, and turn the properties over to such company.

SENATOR HILL & OPHIR SYNDICATE **COLORADO**

Address: 535 Mack Bldg., Denver, Colo.

Property: Senator Hill and Ophir gold mines at Magnolia, Boulder county, operated during part of 1920.

SENATOR MINE **COLORADO**

Address: J. I. Molony, lessee, Box 351, Silverton, Colo.

Property: a silver-lead mine at Silverton, San Juan county, operated during part of 1920.

SENORITA MINE **COLORADO**

Address: R. E. Mevers, Ouray, Colo.

Property: a gold mine at Ouray, developed by tunnels. Operated during part of 1920.

SEVEN METALS MINING CO. **COLORADO**

Address: 233 Coronado Bldg., Denver; or Georgetown, Colo.

Officers: E. J. Wilcox, pres.-treas.; James McGee, v. p.; J. J. Webber, sec.; John Hanson, supt.

Inc. in Colo. **Cap.** $1,000,000; $1 par. Listed on Boston Curb. Old South Trust Co., Boston, transfer agent; Metropolitan Trust Co., Boston, registrar.

Property: 27 claims, in the Argentine district, Clear Creek county, embraces the Stevens group, Centennial mine, and mineral rights to the Tobin vein between the Stevens and Centennial. Ore contains silver, gold and copper.

Development: by 900′ tunnel in the Stevens; 2 tunnels in the Tobin, one 1,500′ long and 1,600′ below top of mountain, and the other 200′ long, 700′ below apex; the Centennial is developed to a depth of 1,000′.

Equipment: at Stevens includes concentrating mill, compressor, and hydro-electric power-plant.

Production: the Stevens group is credited with a production of nearly $2,000,000 worth of silver, when it was 65¢ an ounce, and the whole property is said to have produced $3,850,000.

This company has been much advertised by T. W. Lawson of Boston, who operated a pool that boosted the stock for awhile, and presumably sold out its holdings.

Operated part of 1919, but shipped no ore. There were 4 men employed part of 1920 in development work.

SEVEN THIRTY MINE — **COLORADO**

Address: John Hilton, Rollinsville, Colo.

Property: a gold-silver mine at Rollinsville, Gilpin county. Operated during part of 1920, but no shipments reported.

SEVENTY SIX MINE — **COLORADO**

Address: Leadville, Colo.

A zinc mine at Leadville, Lake county, operated by lessees.

SHAFTER MINING CO. — **COLORADO**

Office: 1 Broadway, New York. **Mine office:** Idaho Springs, Clear Creek county, Colo. M. S. Payton, pres.; Chas. D. Ross, sec.-treas.

Inc. 1880, in New York. **Cap.** $100,000; shares $100 par.

Lands show copper ores with value mainly in gold.

Development: by an 800′ shaft and a 5,500′ tunnel. Has been idle for several years.

SHAMUS O'BRIEN LEASING CO. — **COLORADO**

Address: Box 548, Leadville, Colo.

Operates a lease on the Shamus O'Brien zinc mine at Leadville, Lake county.

SHIP AHOY MINE — **COLORADO**

Address: John Peterson, Idaho Springs, Colo.

Property: at Idaho Springs, Clear Creek county, worked for gold, silver and lead.

SHIRLEY MINE — **COLORADO**

Address: Rowley & Coonan, lessees, Eldora, Colo.

Property: a gold-silver mine at Eldora, Boulder county, operated during part of 1920.

SILL MINE — **COLORADO**

Address: Finnerty & Margowski, 321 Boston Bldg., Denver, Colo.

Property: at Grant, Clear Creek county, shows gold-silver bearing ore. Operated during part of 1920, but no shipments made.

SILVER CANYON MINING CO. — **COLORADO**

Former office: 928 Foster Bldg., Denver, Colo. **Mine address:** Ames, San Miguel Co., Colo.

Operated the Shamus O'Brien group during part of 1919, but shipped no ore; idle 1920. Earlier operations and organization described in Vol. XIV of this work.

SILVER CITY MINING CO. — **COLORADO**

Presumably out of existence. See Volume XIV.

SILVER DAY MINING CO. — **COLORADO**

Address: 1215 Pearl St., Boulder, Colo.

Officers: F. P. Ball, pres.; G. W. Hobson, v. p.; H. C. Meade, sec.-treas.; S. H. Corfield, mgr., Boulder, Colo.

Inc. 1920, in Colorado. **Cap.** $200,000; $1 par.

Property: 4 claims, 25 acres, in the Caribou district, Boulder county. Outcrops are said to show good gold-silver ore and a shaft was being sunk at last accounts.

SILVER GEM MINING CO. **COLORADO**

Address: J. B. Donald, mgr., 329 U. S. Natl. Bank Bldg., Denver, Colo. W. H. Stephens, supt., Silver Plume, Colo.

Directors: J. B. Donald, pres.-treas.; Thomas Donald, v. p.; R. M. Layton, sec.

Inc. 1918, in Colorado. **Cap.** $500,000; increased to $750,000; $1 par; 450,000 shares issued.

Property: 15 claims, 10 patented, 75 acres, includes Silver Horn mine, on Ute Creek, 6 miles from Idaho Springs, Clear Creek county. Ore occurs in fissure veins in granite, said to contain gold, silver, copper, lead and zinc.

Development: by shaft to depth of 207′ and tunnels, with 1,500′ of workings. Company also has a lease on the Gold Belt, or Silver Plume group of 7 claims developed by 2,200′ tunnel.

Stock offered at $1 per share in 1921 to provide necessary funds for further development.

SILVER GLANCE MINING CO. **COLORADO**

Address: Louis Sigmund, pres., Coaldale, Fremont county, Colo.

Inc. 1919 in Colorado.

Property: 4 gold-silver claims at Coaldale, from which shipments have been made from time to time.

SILVER GULCH MINING & MILLING CO. **COLORADO**

Office: 1023 St. Paul Ave., Milwaukee, Wis. **Mine office:** Dunton, Colo

Officers: C. H. Koenig, pres.; Robert Rom, sec.-treas.; with Henry Indra and Matt. Jacobsen, directors. E. C. Koenig, supt.

Cap. $250,000; shares 10¢ par.

Property: the Rosebud mine, 7 claims, in the Lone Cone district, Dolores county. Mine shows a fissure vein, about 4′ wide, in sandstone, containing gold, silver, copper and lead sulphides. Course runs N. E.-S. W. with dip of 95°. The main product is silver.

Development: by about 900′ of tunnels, blocking out 1,000 tons of ore.

Equipment: includes a 50-ton flotation mill.

Operated part of 1919 and 1920, and shipped ore.

SILVER KING LEASING CO. **COLORADO**

Address: Creede, Colo.

Property: the Silver King mine at Creede, Mineral county. Operated part of 1919 and 1920.

SILVER KING MINE **COLORADO**

Address: Henry Bolthoff, 1807 Emerson St., Denver, Colo.

Property: Silver King mine and mill at Dumont, Clear Creek county. Ore contains gold, silver, lead. No shipments made in 1920.

SILVER LAKE MINES **COLORADO**

Owned by American Sm. & Ref. Co. R. P. Raynolds,, supt., care A. S. & R. Co., Durango, Colo.

Property: 143 patented claims in the Animas mining district, Silverton, San Juan county.

Ore: carries gold, silver, lead, copper, and zinc in fissure veins in andesite. Veins dip 70°, and have an E.-W. strike. Ore reported to occur in shoots from 1x20′ to 8x1,200′, and said to assay 0.20 oz. gold; 6 oz. silver; 2.5% lead; 1% copper; 3.5% zinc.

Development: by tunnels, the two longest 12,000 and 7,500′; greatest depth of workings 1,700′ below surface; total workings, 165,000′.

Equipment: includes 2 air-compressors, aerial tram, and a 450-ton mill equipped with flotation plant.

Mine has been worked by lessees since 1911; the Erma Leasing Co. was operating in 1921.

SILVER LEASERS ASSOCIATION **COLORADO**

Address: 411 Boston Bldg., Denver, Colo.

Property: a lease on the O'Donovan Rossa silver-lead mine at Leadville, Lake county. Operating in 1920, but no shipments made.

SILVER LEDGE LEASING CO. **COLORADO**

Address: Silverton, Colo.

Property: the Silver Ledge mine near Silverton, San Juan county. Ore carries gold, silver and lead.

Operated and produced during 1919.

SILVER LINK MINE **COLORADO**

Address: F. O. Seaberg, Ouray, Colo.

Property: a gold-silver group at Ouray, operated during part of 1920.

SILVERMANE MINES CO. **COLORADO**

Address: Lake City, Colo. R. A. Ralph, supt.

Inc. in 1919; a close corporation.

Property: 14 claims, patented, including the Lillie mine, 7 miles west of Lake City, Hinsdale county, shows gold, silver, copper, and lead ore in a fissure in rhyolitic and andesitic breccia. There are 3 pay-shoots, one 250′ long, and two each 100′ long. Orebody is from 9″ to 4′ wide. Ore assays 25 to 100 oz. silver, 20% lead, 3% copper and 0.1 oz. gold per ton.

Development: by tunnels, 1,140′ and 200′ long; also 4,030′ of workings. The inclined shaft is 620′ deep and connects with the tunnel.

Company said to have been recovering old workings and blocking out new ore. Operated part of 1919 and shipped ore.

SILVER MINES CO. OF AMERICA **COLORADO**

Office: 801 Magee Bldg., Pittsburgh, Pa. Stuart Croasdale, managing director, 730 Symes Bldg., Denver, Colo. **Mine address:** J. T. Boyd, gen. mgr., Aspen, Colo.

Officers: P. S. Chambers, pres., Stuart Croasdale, v. p., with W. B. Hammond, Edwin N. Ohl, J. W. Johnston and H. E. McLain, directors.

Inc. Nov. 29, 1920, in Delaware. **Cap.** $1,600,000; $1 par; 900,000 shares in treasury, November, 1921. Pittsburg Trust Co., registrar and transfer agent. Earnings for 7 weeks, Aug. and Sept. 1921, $15,242.

Property: company controls a consolidation of mines tributary to the Cowenhoven 3 mile tunnel at Aspen, Pitkin county, which drains mines to depth of 1,500′. Also has producing mines on Aspen Mtn.

Development: by shafts and 2¾ miles of tunnels to depth of 3,500′. Ore carries silver and lead, on contact between limestone beds. About 1,000,000 tons said to exist above water level.

Equipment: 250-ton Hunter mill, to be changed to 500-ton in 1922. Hydro-electric power runs plant.

Production: to start Nov. 1921.

SILVER MINING & REDUCTION CO. **COLORADO**

Idle. **Address:** care J. L. McLean, 10 State St., Boston. See Volume XIV. for full details.

Company inactive for some years. Operations of its subsidiary, the Colorado Concentrating Co., at the Pingrey mill at Leadville, unsuccessful, bond and lease was dropped.

SILVER MOUNTAIN MINES CO. **COLORADO**

Address: 50 Broad St., New York City.

Property: Kentucky Giant and Indiana groups at Ouray. Ore contains gold and silver. Closed down in 1920.

SILVER MOUNTAIN MINING CO. **COLORADO**

Address: 421 East 18th Ave., Denver, Colo. A. B. Kamp & Co., (late C. W. Savery Securities Co.), fiscal agent and promoter.

Officers: C. W. Savery, pres.; Eugene Perley, v. p.-mine mgr.; D. C. Stratton, sec.-treas.

Inc. in Colorado. **Cap.** $2,500,000; $1 par; transferred at main office.

Property: owns outright the Galena claim, and the Brooklyn group of patented claims; also has bond and lease on the Black Jack, Linden Castle, and Wheeler Tunnel all situated on Silver mountain, near Blackhawk, Gilpin county.

Development: 260′ Black Jack shaft and considerable drifting. Ores contain gold, silver, and lead. Developing two veins, the Wheeler tunnel is

said to show 2' of ore running $12-$22 in W. face, and 14' of $50 ore in E. face; Black Jack vein, opened on 260' level shows a 4' width with streaks of high grade. Last shipment to smelter reported to have netted $1,685. Shipping at rate of one car every ninety days.

Promotion methods and publicity campaign unfavorably regarded.

SILVER PAINT MINES CO. **COLORADO**

Office: 1037 First National Bank Bldg., Denver, Colo. **Mine address:** Harry E. Larson, supt., Box 548, Ouray, Colo.

Officers: A. E. Bundsen, pres.-treas.; H. E. Larson, v. p.; P. R. Anderson, sec.

Inc. February, 1918, in Colorado. **Cap.** $50,000; $1 par.

Property: a bond and lease on three claims, 2 patented, 40 acres, in Uncompahgre district, Ouray county, said to show gold, silver, copper, iron, zinc and lead in pink quartzite, that dips at 30°. Orebody is 2'-4' wide and is said to assay $1.60 gold, 10-400 oz. silver, 14% copper, 5% zinc, 6% lead, 14% iron.

Development: three tunnels, 160' 135' and 140' long. Equipped with 550' tramway. Mine idle for 30 years before work was started by the present company. Inactive, 1920-'21.

SILVER PLUME CONSOLIDATED MINING CO. **COLORADO**

Offices: C. D. Davis, Silver Plume, Colo.; and 1221 Foster Bldg., Denver, Colo.

Cap. $3,000,000; $1 par; in treasury 1,470,000 shares. Transf. office at Registrar & Transfer Co., Equitable Bldg., New York.

Property: 12 claims, 249 acres, grouped as (1) the Buxton, ten claims on Brown mountain, two miles west of Silver Plume, Clear Creek county, consolidated by tunnel claim and covering area of 3,000 by 5,000'. (2) the Lone Wolf mine, two claims, on Republican mountain, at Silver Plume; (3) the Snowdrift dump, adjoining Lone Wolf mine.

Geology: claims show pre-Cambrian granite and granite-gneiss intersected by porphyry dikes. Blende and galena, with some pyrite, are the principal minerals in silver-lead deposits. Both the galena and blende are argentiferous, but silver exists mainly as polybasite, tetrahedrite, cyrargyrite, and ruby silver, in a gangue of crystalline quartz with calcite and brown carbonates of iron and lime.

Development: by a main tunnel, 1,400' in length, cutting 8 veins.

Equipment: includes 75-ton Burleigh mill, compressor and ½ mile aerial tram, completed in 1920.

Reported shipping 1,000 tons per day in June, 1921.

SILVER PLUME MINES CO. **COLORADO**

Successor to Cole Mining Co.

Address: G. L. Cole, pres.-mgr., Springfield, Mo.

Property: 80 patented claims, 6 mill sites, 250 acres, includes the Dives-Pelican and Seven-Thirty mines, near Georgetown, Clear Creek county. Ore contains silver-lead.

Equipment: 200-ton mill, electrically equipped.

SILVER SCREEN MINING & MILLING CO. **COLORADO**

Office: Room 509, Guardian Life Bldg., 50 Union Square, New York. **Mine address:** D. A. Ferguson, supt., Ouray, Colo.

Officers: Louis Weiler, pres.; Stewart P. Foltz, v. p.; J. H. Ehlers, sec.-treas.

Inc. 1920, in Colo. **Cap.** $1,500,000; $1 par; 400,000 shares issued.

Property: 30 claims, 35 patented, about 500 acres, in San Juan and Ouray counties. Ore contains gold, silver, copper and lead, averaging $25 per ton.

Development: by shafts to depth of 200' and tunnels, with about 3,250' of workings.

Equipment: includes compressor and pump. A 100-ton concentrator is planned.

Production: suspended in 1917; only development work done in 1918 and 1919.

SILVERTON MINES CO. COLORADO

Address: 703 Mining Exchange Bldg., Denver, Colo.

Property: the Bandora mine at Silverton, San Juan county. Ore contains gold, silver, lead and zinc. Developing and a compressor installed in 1920.

SILVER WAVE MINE COLORADO

Address: E. W. Shrock, Alma, Colo.

Property: a silver mine at Alma, Park county. Operated during part of 1920.

SLICK BROS. MINING & MILLING CO. COLORADO

Address: B. B. Slick, Ridgeway, Colo. W. B. Slick, pres., Boise, Idaho. **Inc.** 1909, in Nevada. **Cap.** $1,500,000; $1 par.

Property: 10 claims, 100 acres, patented, on Mt. Hayden, Uncompahgre district, Ouray county, shows fissure vein in andesite. The vein runs N. E.-S. W., dips at 45°, and for 2,400′ in length shows 3′ of sulphide copper ore carrying gold-silver values, reported to average $35 per ton in all three metals. The shoot is said to show ore for 600′x600′x3′.

Development: by 3 tunnels, aggregating 1,200′ and having back of 350′. Property reported on by F. M. Kilmer, of Boston Inst. of Technology.

Company spent about $15,000 for development work during 1916-18. Plans were laid and funds reported pledged to drive a 2,300′ tunnel. No recent information.

SLIDE GOLD MINING CO. COLORADO

Out of business. See Volume XIV.

SMALLHOPES-BOREEL MINING CO. COLORADO

Presumably dead; property sold to **Empire Zinc Co.** (q. v.) in 1916.

SMITH LAWSON MINING CO. COLORADO

Address: Lawson, Colo.

Property: a lease on Platts Long mine at Lawson, Clear Creek county. Ore contains gold, silver and lead. Under development in 1920.

SMUGGLER LEASING CO., THE COLORADO

Address: C. E. Anderson, Aspen, Colo.

Officers: D. M. Hyman, pres.; Mark Hyman, v. p.-treas.; J. L. Tilton, sec., with A. B. Simon, E. M. Rogers, Edw. Kuhn and W. P. Arms, directors.

Inc. May, 1911, in Maine. **Cap.** $500,000; $1 par; all issued.

Property: the Smuggler mine at Aspen, Pitkin county, shows contact deposit in lime and shale, containing silver, lead and zinc ores.

Development: by 5,000′ and 15,000′ tunnels, and 1,000′ shaft; ground opened to 1,800′ depth.

Equipment: includes 2,250-h. p. electric plant, hoist, compressor, and 500-ton concentrating mill.

Water is troublesome, 3,500 to 4,000 gallons per minute being pumped. A fire in the lower workings hindered work during 1919. Producing in 1920-'21.

SMUGGLER MINE COLORADO

Address: Stewart-Marshall Corp., 409 Jackson Bldg., Denver, Colo. **Mine address:** Silver Plume, Clear Creek Co., Colo.

Ore contains lead, zinc and silver. The high-grade smelting ore is shipped to Georgetown sampler. The milling ore is shipped to the Hudson mill at Idaho Springs, where it is concentrated 5 tons to one, giving, it is said, a product carrying 50% zinc, 60% lead and 150 oz. silver per ton. Operated during part of 1920.

SMUGGLER MINE & MILLING CO. COLORADO

Mine office: Lyons, Boulder county, Colo.

Officers: C. F. Leetes, Fredonia, Kan., pres.; G. M. Maupin, v. p.; G. R. Prunty, sec.-treas; T. W. Clements, gen. mgr., with G. P. Farmer, A. R. Elder and W. B. Scruggs, directors.

Cap. $500,000.

Property: the Smuggler mine at Balarat, 8 miles S. W. of Lyons and three miles N. of Jamestown in Boulder county. Mine contains gold and silver tellurides. One ore-shoot reported producing commercial ore averaging $200 per ton. Past production is said to be $1,500,000.

Equipment: new compressor and drills have been installed lately and a 100-ton mill is planned.

SMUGGLER UNION MINING CO. (THE) COLORADO

Controlled by the **New England Exploration Co.** (which see), 14 Ashburton Place, Boston, Mass.

Officers: 201—14th St., Denver, Colo., and Telluride, Colo.

Officers: Bulkeley Wells, pres.-gen. mgr.; with R. L. Agassiz, T. L. Livermore, N. H. Stone and J. M. Crafts, directors. T. E. Sherwin, sec.-treas.; H. G. Palsgrove, mgr.; Walter J. Eaton, mine supt.

Inc. 1891, in Colorado. **Cap.** $5,000,000; all outstanding; $100 par. Bonds authorized, $250,000; outstanding, $67,500. Annual meeting in June. 14 Ashburton Place, Boston, transfer office. Financial reports not made public.

Property: 52 patented claims, about 816 acres, in San Miguel county, includes the Smuggler mine. Ore carries gold, silver, lead and iron, occurring in a true fissure quartz vein cutting andesite, tuff and rhyolite for a vertical distance of 2,000'. Vein strikes N. W.-S. E., dips 70°; average width, 2½'. For geology of the Telluride district, see U. S. G. S. Geological Folio No. 57; also see **Tomboy Gold Mines Co., Ltd.,** in this volume.

Development: by tunnels with a 280' winze from lowest tunnel, 3,700' long; main haulage level, 3,600' long; greatest depth of workings, 2,300'. Total workings aggregate 30 miles.

Equipment: includes a 50-h. p. electric hoist, 2 compressors, pumps, hydro-electric power, 800-ton stamp and concentrating mill and flotation plant. An apartment house with electric stoves, steam heat, etc. was erected for employees in 1919.

Production: 118,668 tons ore in 1912; 137,567 in 1913; 126,505 in 1914; 107,119 in 1915; 53,009 in 1916. Grade of ore, production and recovery not made public.

SNOWBOUND MINING CO. COLORADO

Address: Gold Hill, via Salina, Colo.

Property: Snowbound gold-silver mine at Gold Hill, Boulder county, operated during part of 1920.

SOCIAL SIX MINING CO. COLORADO

Address: 1439 Larimer St., Denver, Colo.

Property: the Calvin and Remington gold-silver claims near Idaho Springs, Clear Creek county.

Operated during part of 1919 and 1920.

SOUTH LONDON MINE COLORADO

Address: Johnson & Co., Alma, Colo.

Property: a gold-silver mine near Alma, Park county.

SOUTH MOYER MINE COLORADO

Address: c/o William Carson, lessee, Leadville, Colo.

Property: a silver mine at Leadville, Lake county.

SOUTHWESTERN MINING CO. COLORADO

Formerly the Iowa Tiger Mining Co., name changed November, 1919.

Address: Silverton, Colo.

Property: the Iowa and Mayflower mines in the Silverton district of San Juan county. Ore carries gold, silver, and lead. Only the Iowa gold mine is now being worked. The mill includes a flotation unit. Company has been one of the largest shippers of concentrate in the district. No figures are available.

S. P. SILVER MINING CO. COLORADO

Address: Silver Plume, Colorado.

Property: the Silver Leaf mine at Silver Plume, Clear Creek county. Ore contains gold, silver, lead. Developing 1920.

SPAR CONSOLIDATED MINING CO. COLORADO

Address: Aspen, Colo.

Property: the Spar silver-lead mine at Aspen, Pitkin county. Operated and shipped ore during 1919 and 1920.

SPECIE PAYMENT GOLD MINING CO. COLORADO

Mine purchased in June, 1917, by C. A. O'Leary & Co., of St. Paul, Minn., who organized the **Cons. Specie Payment Mng. Co.**, which see.

SPEERS MINE COLORADO

A gold mine at Blackhawk, Gilpin county, operated by lessees.

SPRINGDALE MINE COLORADO

Address: McCampbell & McLean, lessees, Russell Gulch, Colo.

Property: at Russell Gulch, Gilpin county, shows gold, silver and copper ore. Operated during part of 1920.

SPRING GULCH MINING & MILLING CO. COLORADO

Presumably defunct. See Volume XIV.

SPUR DAISY MINE COLORADO

Address: John Brohl, lessee, Central City, Colo.

Property at Central City, Gilpin county. Ore contains gold, silver, lead. Under development in 1920.

SQUARE DEAL GOLD MINING CO. COLORADO

Address: Central City, Gilpin county, Colo.

Officers (at last accounts) R. J. Foster, pres., 424 Wyoming St., Scranton, Pa.; Max Frank, v. p.; E. H. Lawall, treas., with H. K. Griffith and L. F. Hueblein, directors.

No capitalization or finanical statement received.

Property: 3 patented claims, near Central City, said to show gold, silver, copper and lead ore in quartz vein. Vein strikes E. W., dips 65° N.

Development: 850′ incline shaft, with 4 miles of workings.

No work reported in several years. See Vol. XIV for litigation with **Coloma Mng. Co.**

STANDARD CHEMICAL CO. COLORADO

Office: Naturita, Colo.

Officers: Jas. C. Gray, pres.; A. R. Raymer, v. p.; H. A. Neeb, treas.; C. H. Viol, directors.

Property: 350 claims, including the Club group, in Paradox Valley, Montrose county, 60 miles from Placerville, shows vanadium-bearing and radium-producing ores.

Company gives out no information, but is reported working at full capacity, October, 1921.

STANDARD GOLD-BEARING M. & M. CO. COLORADO

Officers: F. E. Groves, v. p. and mgr., Salida, Colo.; Hon. W. P. O'Brien, pres.; George L. Ramey, sec.; J. S. Ramey, treas.; with Jas. Zoeter, John Millner, and Dr. S. B. McFarland, directors.

Property: 8 claims, 144 acres, in Monarch district, Pass Creek, Chaffee county, shows fissure veins in granite porphyry that carry copper-lead ores. Values run $4-$16 per ton.

Development: by 900′ of tunnel work with 285′ back. Company had a mill with flotation equipment. Examinations have been made by Clyde H. Jay and J. H. Freeman. No recent report received.

STANDARD MINE COLORADO

Address: Frank Shearer, Breckenridge, Colo.

Property: at Breckenridge, Summit county, contains gold-silver-lead bearing ore. Operated during part of 1920.

STANDARD MINES DEVELOPMENT CO. COLORADO

Address: Paul Ramsey, Lake City, Colo.

Property: a lease and bond on the Little Chief silver-lead group, 3 claims, 2½ miles W. of Lake City, Hinsdale county. In December, 1920, a contract was let to extend the lower tunnel. Shipping ore mined from a shoot in the upper level, said to average 55.9 oz. silver per ton. Machinery being delivered, and a power-plant reported under construction in 1921.

STANLEY CONSOLIDATED MINES CO. COLORADO

Office: 1027 First National Bank Bldg., Denver, Colo. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers: J. P. H. Cunningham, pres.; Geo. W. Johnson, v. p.; H. J. Wolf, sec.-mgr.

The property formerly owned by this company was acquired by Cunningham, Johnson & Fisher, a co-partnership, in August, 1916, by purchase, the old Stanley Mines Co., being dissolved. The S. M. company was incorporated 1904 with $75,000 capital as successor to Consolidated Stanley Mining & Milling Co.

Property: 76 lode claims, 10 placer claims, 3 mill sites, all patented, near Idaho Springs. Veins carry gold and silver-bearing lead and copper ores.

Development: by 641′ main shaft, and 5 others from 60′ to 680′ deep; 24 crosscuts, total 1,050′; Hukill tunnel, 380′; adits and drifts, 22,790′; raises, 3,460′; winzes, 570′; a total of 30,181′. Vein area stoped is 635,000 sq. ft. Past production is $3,500,000. New company cleaned and retimbered main adit level 3,500′ long and resumed active development, November, 1918. Work was continued during part of 1919 and 1920.

STAR GROUP — **COLORADO**

Address: John M. Larson, Aspen, Colo.

Property: a gold-silver mine at Tin Cup, Gunnison county, operated during part of 1920.

STAR OF THE WEST GOLD MINING CO. — **COLORADO**

Address: Central City, Colo.

Property: Star of the West gold-silver mine at Central City, Gilpin county.

Operated part of 1919, but made no shipments. Presumably idle, 1920-21.

STARS CONSOLIDATED MINING CO. — **COLORADO**

Address: Leadville, Colo.

Property: claims on Carbonate hill, Leadville, Lake county. In 1918, company erected the first 100-ton unit system of a 300-ton mill for treatment of low-grade iron-manganese ores. Mines being worked for most part by lessees.

STAR TUNNEL & MINING CO. — **COLORADO**

Company dissolved February, 1921. Fully described in Vol. XIV.

STRATTON CRIPPLE CREEK M. & D. CO., THE — **COLORADO**

Address: Wm. Lloyd, sec., P. O. Box 178, Colorado Springs, Colo.; or F. M. Keeth, supt. Box 68, Cripple Creek, Colo.

Property: about 600 acres including the American Eagle, Abe Lincoln, Longfellow, Orpha May and other mines on Bull hill and Globe hill at Cripple Creek, Teller county, with the typical veins of the district. Company is operating the American Eagle mine and has lessees at work on other properties. In 1920, good ore was being extracted from a depth of 750′ in the American Eagle shaft.

Matoa Gold Mng. Co. is a subsidiary, and there are a half dozen or more incorporated leasing companies working on Stratton ground.

STRATTON'S INDEPENDENCE — **COLORADO**

Out of business. See Vol. XIII.

STRONG GOLD MINING CO. — **COLORADO**

Address: Owen Roberts, lessee; Box 202, Victor, Colo.

Inc. 1892, in Colo. Company is a close corporation, owned by the Giddings-Lennox interests of Colorado Springs.

Property: in the Cripple Creek district, shows a cluster of veins in granite, carrying large shoots of ore. The yield of gold per acre is said to be the richest of any mine in the district. Twelve sets of sub-lessees reported at work.

Development: by 1,800′ shaft with extensive levels and drifts. Lessees are working on every level from 300 to 1,500′ depth.

Equipment: complete for a considerable output.

Production: over $10,000,000. In 1920 the monthly output was about 600 tons of $20 ore.

SULPHIDE GROUP COLORADO

Address: Elliott & Da Lee, lessees, Redcliff, Colo.

Property: a silver mine at Redcliff, Eagle county, operated during part of 1920.

SULPHURET MINING & REDUCTION CO. COLORADO

Address: Lake City, Colo.

Officers: W. B. Thomas, pres.; W. C. Humphrey, sec.; H. G. Heath, treas.

Inc. in 1919. **Cap.** $100,000.

Property: a bond and lease on the Cora and Sulphuret silver properties 1½ miles from Lake City, owned by H. G. Heath.

Development: by 216′ shaft and tunnels. Company plans concentration plant with flotation unit. Developing in 1920, but no shipments made.

SULPHURIC MINING & REDUCTION CO. COLORADO

Address: Lake City, Colo.

Property: sulphuric silver mine at Lake City, Hinsdale county, operated during part of 1920.

SUMMIT COPPER MINING & MILLING CO. COLORADO

Offices: Ironton Colo., and Federal Reserve Bldg., St. Louis, Mo.

Officers: Frederick Kohn, pres.; R. A. Morris, sec.; G. P. Heckel, mgr.; J. F. Roper, supt.

Inc. 1915, in Colorado. **Cap.** $500,000; $1 par.

Property: 34 claims, patented, 200 acres, including Carbon Lake, Camp Roberts and Koehler groups and a 20-acre mill-site, all located in Red Mountain district of Ouray and San Juan counties. Mines said to show veins in porphyry ore carrying 12% copper, 10% lead, 10 oz. silver and about $3 gold per ton. Property was formerly owned by San Antonio Mining Co. Examined in August, 1919, by Kirby Thomas.

Development: by 37′ and 200′ shafts, the 625′, Camp Roberts tunnel and 2,800′ Koehler tunnel; driving a raise 310′ from the Koehler tunnel to the Carbon Lake workings.

Operated part of 1919, but shipped no ore.

SUMMIT METAL MINES CORPORATION COLORADO

Address: R. H. Wilson, mgr., Telluride, Colo. A. J. Weinig, supt.

Officers R. H. Wilson, pres.; D. N. Rosen, v. p.; R. L. Kryder, sec.; J. B. Merriman, treas., with R. P. Hassler, directors.

Inc. 1918, in Colo. **Cap.** $2,000,000; $1 par; 1,250,000 shares outstanding.

Property: 19 claims, 14 patented, about 225 acres, includes the Summit mine in Iron Springs district, San Miguel county. Ore occurs in quartz fissure veins in andesite and porphyry, 2″-2′ wide, containing principally gold and silver.

Development: by 3 miles of tunnels to depth of 1,400′, with estimated blocked out reserves of 70,000 tons of ore running $9-$35 per ton.

Equipment: includes 325 cu. ft. compressor, water power, 1 mile tramway and an old 100-ton concentration and cyanidation mill. The mill is being remodelled and extensive development work planned.

SUNBURST CONSOLIDATED MINES CORP'N. COLORADO

Address: c/o Tallmadge Kyner, Savoy Hotel, Denver, Colo. **Mine address:** Georgetown, Colo.

Inc. in Colorado. **Cap.** $1,000,000; $1 par. In treasury 400,000 shares. Registrars and transfer agents, U. S. Corporation Co., N. Y., and Metropolitan Trust Co., Boston, Mass.

Property: 16 patented, 3 unpatented claims and 3 patented mill sites, includes Sunburst, Astor, Stewart, Sceptre and Wolverine mines on Republican and Democrat mountains, near Georgetown, Clear Creek county.

Geology: ore carries about 10 oz. silver, 10% lead, 12% zinc, and $2.40 gold in the low-grade area, an ore from which company expects to net almost

$25 a ton. In other sections, silver is reported as running from 150 to 500 oz. per ton. Principal veins are in gneiss and pegmatite.

Development: by Sceptre tunnel, 3,200′ long; Grant, 1,000′ long, and Sunburst, 900′. A 380′ raise from Sceptre to Grant and Sunburst tunnels was completed in 1918. The main tunnel was re-timbered in 1919, and lessees opened some rich silver ore.

Equipment: includes compressor, transformer, blacksmith shop. Aerial tram, 6,935′ long connecting loading station with Col. & Southern R. R. at Georgetown, costing $25,000, was completed early in 1919.

Operated by lessees; no shipments made in 1920.

SUN-MOON LEASING CO. **COLORADO**

Fully described in Volume XIV. Mine operated by **Hill Top S. M. Co.**, which see.

SUNNYSIDE GOLD MINES CO. **COLORADO**

Defunct. Property taken over by The Sunnyside Mining & Milling Co., a subsidiary of the U. S. S. R. & M. Co.

SUNNYSIDE MINING & MILLING CO., THE **COLORADO**

Fully described under own title in Vol. XIV. Subsidiary of the **U. S. Smelting, Refining & Mining Co.**, which see.

SUNSET MILLING CO. **COLORADO**

Address: Sunset, Colo.

Property: Lalla Rookh gold-silver mine at Sunset, Boulder county, operated during part of 1920.

SUN TUNGSTEN CO. **COLORADO**

No work done since 1917. Was a G. R. Q. proposition and not favorably regarded. Described in Volume XIV.

SURETY GOLD MINING CO. **COLORADO**

Address: Idaho Springs, Colo.

Property: the Orinoco gold-silver mine at Idaho Springs, Clear Creek county.

Operated during 1919-'20, and '21.

SWARTHMORE CONSOLIDATED MINING CO. **COLORADO**

Officers: Chas. B. Galbreath, pres.; Harvey Hanes, v. p.; J. E. Carpenter, sec.; Paul Barriclow, treas., at last accounts.

Inc. July, 1907, in Colorado, as a merger of the Swarthmore Copper Co and Enterprise Mining Co. **Cap.** $3,500,000; $1 par.

Property: 17 claims, 11 patented, 60 acres, near Eldora, Boulder county, includes the Golden Fleece mine, having fissure veins in pre-Cambrian gneiss cut by dikes. Vein said to average 8′ wide and to carry a paystreak of 3 to 5% copper ore with occasional telluride of gold.

Development: by 5 shafts, deepest 403′, and by tunnels of 800′, 1,000′ and 2,000′

Equipment: includes 2 small steam plants, a 60-h. p. hoist and a 12-drill air-compressor, a small concentrator with a 50-ton chlorination plant, and 4 mine buildings.

Property leased to Consolidated Leasing Co. since 1917.

SWEET HOME MINE **COLORADO**

Address: Kasel & Bartos, lessees, Alma, Colo.

Property: at Alma, Park county, contains silver-copper-lead bearing ore. Operated during part of 1920.

SYNDICATE MINING & MILLING CO. **COLORADO**

Mine office: Rico, Dolores county, Colo. Geo. E. Hicks, supt.

Is a reorganization of the Rico Mining Co., whose property was sold October 20, 1917, to a reorganization committee and transferred to the Synd. M. & M. Co., a corporation capitalized at $500,000.

Property: 156 claims, 1,110 acres, with 20-acre mill site and 320 acres coal land, in the Pioneer district, Dolores county, includes the Group and Syndicate mines. Ore occurs in fissure veins as lime replacements. Veins are reported to vary from a few inches to 15′ in width, traceable a mile long and to be proven to a depth of 700′. In one mine the ores carry 4% copper,

10% lead, 10% zinc and 10 oz. silver, the copper ore occuring as chalcopyrite associated with pyrite, sphalerite and galena in fluoritic gangue.

Development: by tunnels, 1,000 to 3,000′ long. A crosscut tunnel was planned, 1919, to run through the group and to cut 3 veins. Equipped with 125 hydro-electric power at mine and 100-h. p. at mill. There are two 75-h. p. hoists, 2 compound air compressors, 10 air drills and 1 air electric drill; two 9 by 15″ Blake crushers, 18 Wilfley tables, etc .

Production: up to 1918 estimated at 1,200,000 lb. copper. Operated and produced during 1919. No figures available.

TALISMAN MINE **COLORADO**

Address: George Stahl, care Vindicator Consolidated G. M. Co., Independence, Teller county, Colo.

Property: about 5,000 acres directly N. of the main mineralized belt of Cripple Creek. Acting on the theory of W. H. Trask of Denver, in which he argues that below the granite overburden are valuable orebodies, diamond drilling is under way. By January 1921, the first hole on the Wild ranch was 1,357′ deep, at 1,290′ the drill entered 'dike' formation, showing fluorite, with a trace of gold. No 2 hole on the Talisman claim was 400′ deep early in 1921: at 390′ a phonolite dike, 7′ wide, was cut; is to be sunk to 800′.

TAMASOA MINE **COLORADO**

Address: Cicero Barber, Idaho Springs, Colo.

Property: at Idaho Springs, Clear Creek county, contains gold-silver-lead bearing ore. Operated during part of 1920.

TARBOX TUNNEL MINE **COLORADO**

Address: J. L. Tarbox, Clayton, Ill.

Property: at Ward, Boulder county, contains gold-silver-bearing ore.

TAYLOR MINES CO. **COLORADO**

Address: Central City, Colo.

Property: the Homer gold-silver mine, at Central City, Gilpin county. Operated during 1919 and 1920.

TAYLOR MOUNTAIN MINING CO. **COLORADO**

Address: D. E. Cook, asst. sec., Chippewa Falls, Wis. **Mine office:** Garfield, Chaffee county, Colo. W. F. Norway, pres.

Inc. Oct., 1905, in Colorado. **Cap.** $1,200,000; shares $1 par. Annual meeting, in November.

Property: the Lily mine, 7 claims, 65 acres in the Monarch district, 1½ miles from Garfield and 19 miles from Salida. The property has a nearly vertical N.-S. contact vein, between granite and limestone, carrying lead and copper ores and showing copper ore which the management estimates to average 6% copper and 2 oz. silver per ton.

Development: by a 280′ main shaft, with 4,000′ of workings.

Equipment: includes electric power with 16-h. p. hoist and 35-h. p. air compressor. Shipments made in 1918.

TEK MINING, MILLING & LEASING CO. **COLORADO**

Presumably defunct. See Volume XIV.

TELESCOPE MOUNTAIN MINING CO. **COLORADO**

Address: 32 Midland Block, Colorado Springs, Colo.

Property: the Telescope mine at Chattanooga, San Juan county. Operations started in fall of 1917, but owing to internal difficulties among the stockholders and officials, mine was closed until April, 1918. The Maude vein on property said to show ore that assays 50% lead, 8-10 oz. silver, with small gold values. Development continued during 1919.

Equipment: includes compressor and power.

TENDERFOOT HILL CONS. MNG. CO. **COLORADO-SO. DAKOTA**

Office: 317 Exchange Nat'l. Bank Bldg., Colorado Springs, Colo.

Officers: W. A. Otis, pres.; L. L. Aitken, v. p.; A. D. Aitken, sec.; Russell H. Forbes, treas.

Cap. $1,500,000; $1 par; all issued. Listed on Colorado Springs Stock Exchange. No liabilities and no production. Cash in treasury, January 1, 1919, $11,036; securities, $3,675.

Property: 61 acres on Tenderfoot hill, Cripple Creek district, Teller county, and 93 acres in the Black Hills, South Dakota.

Development: main shaft on Cripple Creek property, 511′ deep with 600′ of drifting. Black Hills property has drifts, tunnels and crosscuts totaling about 1,350′. Idle several years.

TENNESSEE MINING & MILLING CO. **COLORADO**

Office: care I. W. Thayer, sec., 715 Belmont Ave., Chicago, Ill.

Officers: I. W. Loofbourow, pres.; S. B. Anderson, v. p.; J. F. Kidnell, treas., and H. J. Fersdick, directors.

Inc. Feb. 11, 1911, in Colorado. **Cap.** $400,000; $1 par; issued 294,050. Annual meeting, August 13. Company is a reorganization of the Gold Bug Mining Co.

Property: leased to the **Golden Empire M. Co.**, which see.

TEPEE MINING & DEVELOPMENT CO. **COLORADO**

Probably dead. See Volume XIV for description.

TERRIBLE DUNDERBERG MINING & POWER CO. **COLORADO**

Company liquidated; entire assets sold to the **Denbigh Silver Lead Mines Co.**, which see.

THIRD VENTURE MINING CO. **COLORADO**

W. A. Palmer, pres.-mgr., Leadville, Lake county, Colo.

Property: the St. Louis and Colorado Prince claims, on Breece mountain, at Leadville.

Development: by 1,450′ tunnel.

Equipment: electric, with air-compressor.

Work reported resumed in September, 1921.

THOMPSON MINE **COLORADO**

Address: Dan Hill, Elkton, Colo.

Property: a gold mine at Cripple Creek, Teller county, operated during part of 1920.

THURN MINING & LEASING CO. **COLORADO**

Address: 618 Harrison Ave., Leadville, Colo.

Property: Hibschle mine at Leadville, Lake county. Ore contains silver, lead and manganese.

TIPPECANOE MINE **COLORADO**

Address: C. C. Bracken, Boulder, Colo.

Property: at Rowena, Boulder county, contains gold-silver bearing ore. Mine and mill operated during part of 1920.

TOMBOY GOLD MINES CO., LTD., THE **COLORADO**

Under management of Exploration Co., Ltd. of London.

Offices: H. F. Wreford, sec., 24 Lombard St., London, E. C. 3, England; 61 Broadway, New York; care N. S. Kelsey, gen. mgr., Telluride, Colorado.

Officers: Marquess of Ormonde, chairman; Marquis d'Hautpoul and I. H. M. Shaw, directors.

Operating staff: N. S. Kelsey, gen. mgr.; J. S. Peterson, gen. supt.; K. K. Betty, met. adviser; T. H. Stephenson, sec.; P. L. Foster, cons. engr.

Inc. June 7, 1899, in England. **Cap.** £350,000; shares £1 par; 310,000 issued.

Financial statement, years ending June 20:

Year	Revenue	Profit	Dividends	Previous Balance	Balance Forward
1921	£235,271	£2,681†	.....	£1,581**	£4,262*
1920	208,925	42,891†	.....	21,310	21,581*
1919	$861,700	$67,000	.....	$168,000	.....
1918	1,131,267	287,843	111,000	149,000	168,000
1917	1,180,000	346,000	149,000	94,560	149,000
1916	1,120,320	369,200	149,000	99,760	94,560

*Debit. **After income tax refund, £20,000. †Operating loss of £4,894, plus £37,997 for taxes and depreciation in 1920; and in 1921, depreciation, etc., of £20,687, less £18,006 operating gain.

Dividends: since 1899, to June 1918, total is 56s. per share, equal to 280%.

Property: included, July, 1915, 76 claims; others have since been added. Original holdings were the claims acquired from the old Tomboy Gold Mines Co. of W. Va., also claims carrying a parallel vein, known as the Argentine. Later the company bought the claims containing the Montana vein and its northern extension from the Nevada Tunnel Co. The Sidney-White Cloud property was acquired in 1916, for $75,000. All in San Miguel county.

Geology: the veins in the Telluride district are filled fissures, 2½′ to 4′ in width, larger lodes sometimes appearing as a number of parallel plates of filled veins separated by sheets of altered rock. Country rock is andesite, rhyolite and San Juan tuff, with underlying sedimentaries in which the existence of the veins has not been proven. Principal metallic minerals are gold, pyrite, galena, zinc blende, and chalcopyrite. Ores contain 2 to 3% sulphides, and yield about $6 in gold and a few ounces of silver per ton. For geology of the district, see U. S. G. S. Geologic Folio No. 57; also Lindgren's "Mineral Deposits."

Development: on the Tomboy and Montana properties to 2,400′ depth, and on the Argentine to 2,200′. In the Argentine lower levels is a large quantity of complex sulphide ore containing zinc, lead and copper, which will be profitable by flotation. The Montana mine is opened longitudinally by the Ophir or 1,740′ level, also 300′ beyond the boundary.

In the year 1918, 568′ of new work was done in the Argentine mine, opening a 5′ vein for 359′ on the 1,900′ level, assaying $3.62 in gold and silver, 4.5% lead, 6.89% zinc, and 0.8% copper; and for 111′ on the 2,100′ level, 4.2′ of ore, running $2.83 gold and silver, 2.13% lead, 4.42% zinc, and 0.95% copper. New work in 1919-20 covered 1,155′. The vein on the 1,750′ level is 4′ wide, assaying $2.77 gold, 4.4% lead, 6.3% zinc, and 1.5% copper. No development was done 1920-21. Reserves are estimated at 285,000 tons.

In the Montana mine, the reserves aggregate 603,000 tons. New work on the Virginius vein in 1918-19, disclosed 3′ of ore for a length of 900′, that averaged $9 in gold and silver. During 1919-20, this vein continued to reveal good ore. A typical assay is $21.32 gold and silver, 5.3% lead, 7.9% zinc and 0.5% copper, across 14 inches. Extensions in the Montana mine during the year totaled 2,208′, and in 1920-21, 1,588′. A parallel vein, opened for 200′, shows 4′ of $12 silver and 5.9% of lead ore.

The grade of ore in the Montana is somewhat lower than heretofore, due partly to the presence of waste, but it is hoped to increase the average grade by adding richer ore from the Virginius vein, in which reserves are now (1921) being developed. Fortunately the increased tonnage treated has lowered the per ton cost.

Equipment: electric power and flotation plant erected in 1919, capable of treating up to 450 tons daily.

Production: years ending June 30:

Year	Tons crushed	Total yield	Yield per ton	Cost per ton
1921.....	197,557	$876,356	$4.44	$3.98
1920.....	146,066	811,990	5.56	5.59
1919.....	155,334	864,699	5.56	5.10
1918.....	151,028	1,135,389	7.50	5.66
1917.....	148,939	1,150,611	7.72	5.57
1916.....	150,488	1,074,088	7.14	4.92

Tomboy has still a good future, especially now that flotation permits the complex ore to be treated.

TOM, DICK, AND HARRY MINING CO. **COLORADO**

Address: Room 24, State Capitol, Denver, Colo.

Property: Tom, Dick and Harry gold-silver claims at Twin Lakes, Chaffee county.

Operated during part of 1919 and 1920.

TONOPAH PLACERS CO. **COLORADO**

Controlled by the Tonopah Mining Co., Tonopah, Nev., which owns 83⅓% capital stock.

Office: Bullitt Bldg., Philadelphia, Pa. **Operating office:** Breckenridge, Colorado. J. E. Hopkins, supt.

Cap. $1,000,000; $1 par. Notes outstanding, $46,000.

Financial statement: years ending Dec. 31:

Assets.

Year	Property and plant	Current	Total
1920	$1,067,703	$135,693	$1,203,396
1919	1,079,422	154,399	1,233,821
1918	1,075,162	152,947	1,228,110
1917	1,183,426	172,410	1,355,627

Liabilities.

Year	Capital	Notes due	Current	Surplus	Total
1920	$1,000,000	$46,000	$12,117	$145,279*	$1,203,396
1919	1,000,000	56,000	78,525	99,296	1,233,821
1918	1,000,000	56,000	92,326	79,784	1,228,110
1917	1,000,000	112,000	80,001	163,626	1,355,622

*This amount plus $32,205 reserved for depletion of properties.

Income Account

Year	Revenue	Other income	Total	Expenses	Profit or loss
1920	$233,662	$3,329	$236,991	$181,008	†$55,983
1919	309,509	6,788	316,297	293,225	† 23,072
1918	282,974	10,005	292,979	332,902	39,923

Property: placer claims, 4,800 acres, near Breckenridge, Summit county, on which 3 dredges operate for about 9 months each year. Because of unprofitable ground, one dredge ceased operations in Dec., 1919; a second dredge operating on ground leased from the Long Island Mng. Co., ceased for same reason, Dec., 1920. Both will be dismantled and sold. Reported prospecting with drill late in 1921 and operating one dredge on the Blue river below Breckenridge. This enterprise is apparently about at an end.

Production:

Year	Yardage	Gold, oz.	Silver, oz.	Value per yd.,¢.
1920	1,791,143	11,009	3,026	13.0
1919	3,122,571	14,776	3,852	9.8
1918	3,267,307	13,565	3,345	8.6
1917	3,351,821	.....	.....	....

TOPEKA CONSOLIDATED MINING CO. **COLORADO**

Idle. Probably dead. Fully described in Volume XIV.

TORONTO MINING CO. **COLORADO**

Office: 401 Jacobson Bldg., Denver, Colo.

Officers: G. W. Summers, pres.-treas.; Stephen Haskins, v. p.; E. H. Summers, sec.; J. J. Elliot, supt., with F. G. Elliot, directors.

Inc. 1918, in Colorado. **Cap.** $100,000; $1 par.

Property: Congress mine, a patented lode claim, in Enterprise mining district, Gilpin county, two miles from Blackhawk. The mine was held under bond and lease to March, 1921, for $18,375. Vein is 3′ to 60′ wide, carrying iron and lead carbonates with native silver and said to average about $3 per ton in gold.

Developed by shaft, 350′ deep with about 600′ of drifts and considerable stoping.

Equipment: includes a 60-h. p. hoist.

Operated during part of 1919 and 1920.

TREASURE MOUNTAIN MINES, INC. **COLORADO**

Successor to Martin Mng. & Power Co., Inc.

Address: Samuel G. Martin, pres., Rm. 720, 67 Exchange Place, New York.

Mine address: S. Lawrence Martin, mgr., Eureka, Colo.

Officers: S. G. Martin, pres.; Willard B. Jones, v. p.; Gibson and Zahniser, directors.

Inc. 1920, in Colo. **Cap.** $600,000; $10 par; changed to $6,000,000; $1 par; 3,500,000 shares issued.

Property: 34 claims, 600 acres, 215 lots, 13 acres; other property, held by agreement and lien, option, etc., 1296 acres, located in Silverton quadrangle and Eureka mining district, San Juan county.

Geology: eruptive porphyry cut by fissure veins. Company claims to have three vein zones; first, from 20-60′ wide, carrying some native gold; second, a copper-silver vein; third, several zinc-lead-silver veins.

Development: by 15,000′ of tunnels the lower Martin Carrier tunnel at the side of the railroad track, will, according to company, cut 20 known veins within 10,000′. Management reports over 3,000,000 tons of partly developed ore, with an average gross value of $12 per ton. About $500,000 has been expended in development and exploration work, but company idle in 1921.

Equipment: plans include from 1,000 to 2,000-ton mill, water power, tram and compressor plant.

TREASURE VAULT MINE **COLORADO**

Address: W. G. Arkills, Idaho Springs, Colo.

Property: at Idaho Springs, Clear Creek county, contains gold-silver-lead bearing ore. Operated during part of 1920.

TUCKER MOUNTAIN M. & M. CO. **COLORADO**

Mail unclaimed and company probably dead. See Volume XIV.

TUNGSTEN EXPLORATION CO. **COLORADO**

Out of business. See Volume XIV.

TUNGSTEN GIRL CO. **COLORADO**

Out of business. See Vol. XIV.

TUNGSTEN METALS CORPORATION **COLORADO**

Out of business. Mail returned in 1920. See Vol. XIV.

TUNGSTEN MOUNTAIN MINES CO., THE **COLORADO**

Offices: Boulder National Bank Bldg., Boulder, Colo., and care J. D. Maxwell, Tungsten, Colo.

Officers: J. G. Clark, pres.; Thomas Leeke, v. p.; F. N. Totman, sec.-treas., with S. A. Greenwood and L. W. Means, directors.

Inc. Oct. 6, 1916, in Colorado. **Cap.** $1,250,000; $1 par; 1,049,500 issued.

Balance sheet of September 30, 1918, shows assets of $1,314,184, including mining claims and equipment, $1,268,590; mine development, $34,456; notes receivable, $10,899; cash, $434. Liabilities include surplus, $63,429; and accounts payable, $755.

Property: 42 claims, 24 patented, 360 acres, in Grand Island district, Boulder county, contains tungsten deposits in veins.

Development: to depth of 300 to 800′ by shafts, and tunnels, totaling 2,400′, but apparently nothing done during 1919 or 1920, on account of the tungsten market. Work started June, 1917. Lessees were reported producing steadily.

TUNGSTEN PRODUCTS CO., THE **COLORADO**

Reported succeeded by Carnotite Products Co., and latter absorbed by The Radium Co. of Col. (q. v.), April, 1921.

Office: Boulder, Colo. **New York office:** 43 Exchange Place. **Mines office:** H. K. Thurber, mgr., Grand Junction, Colo.

Officers: W. F. Bleecker, pres.; H. C. Morgan, v. p.; Morgan Belmont, treas.; J. H. Holmes, Jr., sec.; also directors.

Company operates a tungsten and carnotite reduction plant at Boulder, Colo.; operated 1920 and 1921 with manufacture of ferrrotungsten, tungsten powder, ferrovanadium, ferromolybdenum, radium and radium products. During 1919, the plant operated on ore from China, also made radium compound from carnotite ore.

Mining property: a large acreage of carnotite ground near Gateway, Colo. First shipment of radium bromide valued at $50,000, was made from the Boulder plant in February, 1921. On Oct. 26, 1920, about 100 carnotite bearing claims S. of Moab, Grand county, Utah, were purchased from the Kearns estate of Salt City for $150,000.

Property said to be in operation, 1921. Closely associated with **Tungsten Products Mining Co.**, which see.

TUNGSTEN PRODUCTS MINING CO. — **COLORADO**

Office: 3-8 William Block, Boulder, Colo.

Officers: W. F. Bleecker, pres.-mgr.; R. D. George, v. p.; L. C. Schultz, treas.; M. C. Goss, sec., with Harry Cassaday, directors.

Inc. in Colorado. **Cap.** $2,500,000; par $1.

Property: owns and operates Luckie 2 groups of mines, 112 acres, 9½ miles from Boulder, in Boulder Canyon, between Middle and North Boulder Creek. Ore averages 2%-6% tungsten. The Luckie 2 and Lookout are the best developed mines.

Company has an arrangement with Carnotite Products Co. (formerly the Tungsten Products Co.), whereby the Products Co. contracts to treat the Mining Company's ore at a reasonable charge, and the Mining Company has an option to purchase control of the Carnotite Products Co. at a reasonable price.

TURNER MINE — **COLORADO**

Address: Fitzmorris & Co., Idaho Springs, Colo.

Property: at Idaho Springs, Clear Creek county, contains gold-silver-lead-copper bearing ore.

TURRET MINING & MILLING CO. — **COLORADO**

Address: Salida, Colo.

Officers: R. F. Stratton, pres.; T. Richardson, v. p.-treas.; G. K. Mann, sec., with F. M. Stratton and L. S. Wade, directors.

Inc. in Colorado. **Cap.** $100,000; $1 par.

Property: the Copper King group of 4 claims in Turret district, Chaffee county, about 8 miles from Salida.

Geology: veins occur in mica-schist that alternates with black gneiss, cut by dikes of quartz porphyry. Croppings of amphibolite carry fibrous asbestos and crystallized hornblende. Average value of ore reported as, gold, $1.40, silver, $2.00 and copper, $22 per ton. Company claims 25,000 to 50,000 tons in sight.

Operated part of 1919, but shipped no ore.

TWIN PORTS & EMPIRE MINING CO. — **COLORADO**

Formerly Duluth & Empire Mining Co.

Address: Frank Brady, supt., Empire, Colo.

Officers: C. D. Pelletier, pres., Rm. 27, Wisconsin Blk., Superior, Wis. J. L. Teporter, v. p.; P. J. Borgstrom, sec.; O. G. Olsen, treas., with H. R. Corey, T. W. Leahy and Z. E. Darrow, directors.

Inc: in Colorado. **Cap.** $500,000; $1 par; 200,000 issued, 100,000 for property 100,000 for cash at par and 198,000 pooled. Bonds authorized $50,000 (for mill), convertible 1927; over $4,000 issued.

Property: 16 claims, 2 tunnel sites and 5-acre mill site, about 520 acres, in upper Union district, Clear Creek county, 8 miles W. of Idaho Springs. Company organized 9 years ago as a consolidation of 14 properties whose location, high up on a mountain side, permit working by a tunnel.

Ore: gold and complex lead zinc pyrite, also galena in the Pelletier vein.

Development: main tunnel 2,900′ with face 1,100′ below surface, exposes 15 veins. There is also 1,100′ of drifting (850′ on Columbine vein alone.) The Columbine vein with average width of 5′ carries ore assaying $2 to $20 per ton. A 500′ tunnel, 600′ above main tunnel, also exposes this vein. The Pelletier vein developed by 190′ tunnel, will be cut by new tunnel 3,400′ from portal, and 1,500′ below existing workings.

Equipment: tramway, 60-h. p. hoist, air-compressor and drill.

Operated part of 1919-20, but shipped no ore.

TYMOS MINES CO. **COLORADO**

Address: J. A. Theobald, sec., Breckenridge, Colo.

Property: claims on Shock hill, near Breckenridge, Summit county.

Develoment: by 300′ shaft, and crosscut, being driven on this level, in 240′ at end of 1920, to connect with the Brooks-Snyder property.

UILLA MINE **COLORADO**

Address: Lively & Wells, Empire, Colo.

Property: in Empire district, Clear Creek county, contains gold-silver bearing ore. Operated during part of 1920.

UNION MINING & DEVELOPMENT CO. **COLORADO**

Address: Mrs. Emerson J. Short, 1531 S. Washington, Denver, Colo.

Officers: Mrs. E. J. Short, pres.-treas.; L. A. Short Stinson, v. p.; G. J. Short, sec., with M. W. Spaulding and Mrs. Sadie R. McBride, directors.

Inc. 1903, in Colo. **Cap.** $1,250,000; $1 par; 791,000 shares outstanding.

Property: 2 patented claims, 320 acres, near Lakewood, Boulder county. Ore occurs in fissure veins in granite and limestone, containing copper, tungsten and traces of gold and silver.

Development: by 75′ shaft. **Equipment:** steam power, compressor and hoist.

A prospect. Idle since 1917.

UNION MINING & MILLING CO. **COLORADO**

See **Ouray Union M. & M. Co.**

UNITED GOLD MINES CO. **COLORADO**

Offices: Exchange Natl. Bldg. Colorado Springs, Colo. and Cripple Creek, Colo.

Officers: A. E. Carlton, pres., L. G. Carlton, v. p.-gen. mgr.; with R. Roelofs, W. D. Wright and C. S. Davis, directors. H. D. McDonald, sec.-treas.; Lynn Richmond, supt.

Inc. in Colorado. **Cap.** $5,000,000; par $1; in treasury, 9,159 shares; unissued January, 1919, 990,931 shares. Total dividends to date, $561,179; last dividend paid January, 1920, amounted to $40,000. Stock listed on Colorado Spring Stock Exchange.

Financial statement for 1920 shows receipts, $22,709; expenditures, $26,738; operating loss, $4.028.

Controls several subsidiary mining companies at Cripple Creek, Teller county, including the W. P. H., Damon and Montrose Co., Ironclad Hill, May B. Squaw Mountain, Deadwood, Wild Horse, Requa Gold Mining & Milling Co., B. H. & S. M. Co., on Bull hill. In October, 1917, the B. H. & S. Co.'s property was purchased outright for $31,642.

Development: for 1920 totaled 1156′ of which 835′ was done on company account. The feature of 1920 was the finding of rich ore at a depth of about 60′ in the Hardwood claim of the Damon group. The vein is 5′ wide and flat, averaging over $100 per ton. The Bonanza ore averaged $30.52 per ton.

Production: total for 1920 was 1,523 tons, having a gross value of $74,223. Output on company account was $41,585 and royalty received amounted to $20,489.

UNITED IMPERIAL MINING CO. **COLORADO**

Address: 233 Coronado Bldg., Denver, Colo.

Property: the Tobin and Imperial gold-silver claims at Georgetown, Clear Creek county.

Operated part of 1919 and 1920, but shipped no ore.

U. S. GOLD CORPORATION — **COLORADO**

Address: John R. Wolff, Boulder, Colo.

Officers: N. P. Garretson, Topeka, Kan., pres.; J. R. Wolff, v. p. and gen. mgr.; W. T. McGinnis, sec.-treas.; with J. W. Middlesworth, J. H. Howry, F. E. Campbell and C. N. Watts, directors.

Inc. 1903, in Colorado. **Cap.** $3,500,000; $1 par; 3,271,062 outstanding.

Property: the Klondike group, 225 acres, patented, Sphinx group, 22 mining claims, in Boulder county, and Livingston group, 50 acres. Company also owns 50,000 shares, or entire capital stock of the U. S. Reduction Co., which owns the mill. Claims show fissure veins in porphyry, carrying gold ore. Widths, 3-15', in different workings; mill feed varies from $4-$12 per ton.

Production: 34 tons of ore shipped, 1915, to Denver smelters, which netted $1,414. Company reported April 10, 1916, bullion to the amount of $15,086 shipped to U. S. Mint, Denver, and that 7 tons ore shipped to Denver smelter Feb. 9, yielded $1,974. Mill was treating up to 100 tons daily at end of 1916. During 1917 the yield was about $75,000 from 15,000 tons of ore. All work is now limited to leasing, but when conditions are more favorable, company work will be resumed on the Klondike and Sugar Loaf groups.

UNITED STATES MINING CORPORATION — **COLORADO**

W. R. Benzie, 502 Majestic Bldg., Denver, Colo.

Inc. in Colorado. **Cap.** $50,000; shares $1 par. "No individual liability." Organized to operate leases in the Cripple Creek district. Was a stockholder's mail order promotion. Probably defunct.

UNITED STATES MINING CORPORATION — **COLORADO**

Address: E. C. Condit, Silverton, Colo.

Property: the Astor, Copper Bell, Mable, and Toltec silver-lead mines in the Gladstone district, San Juan county. The Toltec has been opened by a tunnel. Work was held up for 9 years by litigation. Developing 1920-1921.

UNITED STATES RARE METALS CO. — **COLORADO**

Address Tarryall Creek, via Lake George, Park Co., Colo.

Property: 8 miles N. of Lake George, produces molybdenite.

U. S. REDUCTION & REFINING CO. — **COLORADO**

Dead since 1916. See Vol. XIV and previous volumes.

UNITED STATES ZINC CO. — **COLORADO**

Subsidiary of A. S. & R. Co., which owns all stock.

Office: 120 Broadway, New York. **Operating address:** F. C. Gilbert, mgr., Denver, Colo.

The works, known as the Blende Plant, at Pueblo, Colo., have 2,320 retorts for smelting zinc. Plant was operated at greatly reduced capacity in 1919. In Dec., 1920, company was converting the smelter into a zinc oxide plant, at a cost of $10,000 per unit.

Company also operates zinc smelters at Sand Springs and at Henryetta, Okla.

UNITED VERDE MINES — **COLORADO**

John Miner, owner, Verde Camp, via Westcliffe, Custer Co., Colo.

Property: 7 claims, about 50 acres, in Verde mining district, Custer county. Sulphide ore occurs in shoots and pockets, containing gold, silver and copper.

Development: by 500' shaft and 100' tunnel.

UNIVERSAL ORE PRODUCTION SYNDICATE — **COLORADO**

Apparently idle since 1918, and company dormant. See Volume XIV for description of holdings.

U. P. R. MILLING & MINING CO. COLORADO

Property: the Buell concentrator at Central City, Gilpin county. Mill leased 1919 to Fuller, MacCulloch Co., which see.

UP TO DATE MINING CO. COLORADO

Address: John R. Wolff, mgr., 1216 Pearl St., Boulder, Colo. A. F. Hankins, supt., Caribou, Colo.

Officers: John R. Wolff, pres.; F. W. Kohler, v. p.-treas.; W. T. McGinnis, sec., with G. A. Stephens and I. S. Blackwell, directors.

Inc. 1902, in Colorado. **Cap.** $750,000; $1 par; 12,000 shares in treasury.

Property: Eureka group, 20 claims, 2 patented, 200 acres in Grand Island district, Boulder county. Ore occurs in a fissure vein on a contact between monzonite porphyry and pyroxenite granite, containing gold, silver, copper and lead.

Develoment: by tunnels and 200′ shaft to depth of 400′, with 4,000′ of workings.

Equipment: hoist, compressor, pumps and electric power.

Production: 30,000 oz. silver to end of 1917. Only development work done in recent years. Financed by sale of treasury stock.

URANIUM CHEMICAL CO. COLORADO

Address: Grand Junction, Colo.

Property: formerly owned by the National Radium Products Co., consists of 18 claims, 360 acres, in Gateway mining district, Mesa county. Ore is a blanket deposit in sandstone yielding 1½% uranium oxide and 3% vanadium oxide. Output to 1919 was about 72,000 lb. of these metals.

Equipment: includes a 10-ton concentration mill. Reported enlarging experimental plant to 200 milligrams of radium salts per month.

UTAH-COLORADO MINING & MILLING CO. COLORADO

Office: Wm. Penn Hotel, Denver, Colo.

Officers: Chas. E. Havener, pres.; John E. Maider, treas., with Wm. A. Brumond, John W. Phares, and L. C. Withington, directors. M. C. Havener, sec.; Edward Manion, mng. engr.

Inc. January 13, 1920, in Colo. **Cap.** $1,000,000; $1 par; 666,000 shares outstanding. All the outstanding stock is owned by the **Colorado Utah Mines Holding Co.**

Property: 13 patented and 4 unpatented claims in Pleasant Valley, Gilpin and Clear Creek counties, also 5 unpatented claims in Chaffee county. Ore occurs in fissure veins carrying silver-lead and high grade uranium, said to run from $15-$75 per ton.

Development: by 4 shafts and a tunnel.

UTICA MINING & MILLING CO. COLORADO

Described in Volume XIV.

VALLEY VIEW LEASING & MINING CO. COLORADO

Address: Mr. Beselack, Ames, Colo.

Property: the San Bernardo and Valley View mines at Ames, San Miguel county. Ore carries gold, silver and lead.

Equipment: includes a 100-ton plant at Matterhorn employing crusher, ball-mills, tables and flotation..

The mill started shipping concentrate in December, 1920 and was making 8 cars of concentrate per month, May, 1921.

VANDERBELT MINE COLORADO

Address: John Paulus & Co., Montezuma, Colo.

Property: a silver-lead group at Montezuma, Summit county, operated during part of 1920.

VASCO MINING CO. COLORADO

Subsidiary of Vanadium Alloys Steel Co., Latrobe, Pa. J. A. McKenna, pres.; T. W. Conklin, v. p. and gen. mgr., Voegtle Bldg., Boulder, Colo.

Acquired property in the Nederland district in 1915, and remodeled the Boyd mill for concentration of tungsten ores which are both mined and pur-

chased. Ore is ferberite occuring in veins in pegmatite or granite, containing from 3 to 50% WO_3, and averaging 10%.

Property: includes 15 operating mines, shipping 8-10 tons concentrates weekly.

Mill equipment: crusher, rolls to ¼", trommel, jigs, stamps for jig tails, classifiers for jig hutches and battery pulp, Card and Wilfley tables, Monell slime tables, Deister slime tables, and rag tables. Three mills have been built.

The Vasco company and the Wolf Tongue Mining company were the only producers of tungsten in the United States in 1920, with a total combined output of 216 tons, containing 60% WO_3.

VERDE SILVER MINING CO. COLORADO

Address: 425 Foster Bldg., Denver, Colo.

Property: a lease on a group of silver mines, including the Gresson, May and Wedge mines, at Westcliffe, Custer county. Operated during part of 1920-'21.

VERNON MINING CO. COLORADO

Fire destroyed entire plant in June, 1919, and workings caved. Company out of business. See Volume XIV for complete description.

VICTOR GOLD MINING CO. COLORADO

Mine leased until 1925 to the **Vindicator Cons. G. M. Co.**, which see.

VICTORIA MINING CO. COLORADO

Offices: W. S. Garland, 86 Main St., Brockton, Mass., and Salina, Colo. **Mine office:** W. H. Hubbard, supt., Wall Street, Colo.

Officers W. S. Garland, pres.-treas.; John Buchanan, v. p.; F. Allen, sec., and Burton W. Neal, directors. Victor C. Alderson, Golden, Colo., cons. engr.

Inc. 1917, in Colo. **Cap.** $500,000; $1 par; 200,000 outstanding; 125,000 shares of stock held in treasury for conversion of bonds. Funded debt $125,000. Stock listed on Boston Curb. Equitable Trust Co., Boston, registrar and transfer agent.

Property: 6 patented claims, about 19 acres, at Summerville, Gold Hill district, Boulder county. Ore occurs as tetrahedrite in fissure veins in granite, said to average ½ oz. gold and 200 oz. silver per ton.

Development: 470' shaft with 6,295' of workings.

Equipment: includes electric power, compressor and hoist.

Production: to date reported to be $750,000. Developing on 400' level.

VICTOR MINE COLORADO

Address: Whitepine, Colo.

Property: at Whitepine, Gunnison county, contains silver-lead-zinc bearing ore.

VICTORY GOLD MINING CO. COLORADO

In 1918 company purchased the Smith lease on the Howard shaft of E. P. Arthur, Jr., Mgr., Cripple Creek, Colo.

the Mary McKinney mine on Raven Hill, Cripple Creek, Teller county. The Howard is credited with $2,000,000 production. Eight men at work at last accounts. (April, 1921). Shipments made to the Golden Cycle mill.

VILLAGE BELL GOLD & COPPER CO. COLORADO

Address: Cowdrey, Colo.

Property: the Village Bell mine at Cowdrey, Jackson county. Ore carries gold, silver, and copper.

Operated part of 1919, but shipped no ore. Idle, 1920-'21.

VINDICATOR CONSOLIDATED GOLD MINING CO., THE COLO.

Office: 603 Symes Bldg., Denver, Colo. **Mine address:** Independence, Colo

Officers: G. S. Wood, pres.; A. F. Zang, v. p.; P. A. Zang, treas.; G. A. Stahl, sec. and gen. mgr, with A. E. Carlton, C. Sigel, Jr., and D. W. Strickland, directors. Nelson Franklin, v. p.-mgr., Ferro-Alloy Co., Denver; W. E. Ryan, gen. supt.; W. G. Zulch, field engr.; T. H. Sheldon, purch agt.

Inc. Nov. 20, 1896, in Colorado. In November, 1916, charter was extended for 20 years. **Cap.** $1,500,000; $1 par; all issued; no bonded indebtedness. Annual meeting, second Thursday in February. International Trust Co., Denver, transfer agent and registrar. Listed on Colorado Springs Stock Exchange.

General Balance Sheet:

Assets—

	Property	Equip.	Ore Res.	Secur.	Current	Total
1920.....	$1,266,365	$500,423	$780,275	$52,935	$468,874	$3,143,873
1919.....	1,268,848	495,399	793,000	37,935	652,541	3,247,723
1918.....	1,269,613	537,641	870,129	4,935	574,928	3,257,246
1917.....	1,229,069	452,823	1,423,216	4,935	165,747	3 841,028
1916.....	2,430,491	212,694	.....	202,589	217,044	3,062,818

Liabilities—

	Capital Stock	Surplus	Res. for Dep.	Other	Total
1920.....	$1,500,000	$1,361,428	$200,932	$81,513	$3,143,873
1919.....	1,500,000	1,489,326	149 841	108,556	3,247,723
1918.....	1,500,000	1,516,955	116,378	123,913	3.257,246
1917.....	1,500,000	.....	66,552	2,274,476	3,841,028
1916.....	1,500,000	878,580	628,226	56,012	3.062,818

Other income includes credit arising from valuation of ore deposits in Vindicator, March, 1913, which in 1917 was $2,245,539, and in 1918 it is the credit less charges for subsequent depletion to December, 1918, amount being $42,317.

Comparative Income Account:

Year	Mine Receipts	Mine Expense	Operating Profit	Other Receipts	Dividends	Other Deduc.	Surplus for year
1920....	$259,736	$361,355	$69 475(d)	$6.654	$.....	$63,815(a)	$133,290(c)
1919....	681,411	437,947	168,277	18,109	60.000	278,438(a)	76,865(c)
1918....	1,167,182	631,318	535,864	8,289	60.000	605,183(a)	121.030(c)
1917....	896 621	717,775	178,846	17.503	180,000	.....	16.349
1916....	1,328,006	780,485	547,511	84,275	270,000	631,794(a)	270,000(c)
1915....	1,969,646	703,783	1,265,862	84.302	225,000	1,046,939(b)	78 225

(a) Includes depreciation and mine depletion, $631,794 in 1916, $605,183 in 1918, $115,824 in 1919.
(b) Includes notes paid, $910,000. (c) Deficit. (d) Loss.

Royalties from lessees amounted to $153,683 in 1917; $151,265 in 1918; $92,525 in 1919; $98,087 in 1920.

Dividends: 1900, 17½%; 1901, 15½%; 1902, 23%; 1903, 16%; 1904, 9%; 1905, 13%; 1906, 12%; 1907, 13%; 1908, 15%; 1909, 7½%; 1910, 1911, 1912, 1913, 12% each; 1914, 18%; 1915, 15%; 1916, 18%; 1917, 12%; 1918, 4%; 1919, 4%; 1920, 1% to Jan. 24. The total is $3,832,500. Distributions were suspended in April, 1920.

Property: the Vindicator and Golden Cycle mines at Cripple Creek, including former holdings of the Keystone M. & M. Co., the Golden Cycle mine and that of the Christmas Gold Mining Co. Company in 1918 also acquired absolute control of the Ferro Alloy Co. of Denver on payment of $100,411, covered by liquid assets, and payment to Ferro Alloy Co. stockholders of the amount of their investment plus 6% interest to be paid when realized from operations of the plant. The Deer Creek Chromite mine in Wyoming was purchased at same time and is operated by the F. A. Co.

Company investments include $10,000 in Saffordville Oil Syndicate, $30,-

000 of shares in the Western Oil Fields Corp. and $25,000 in the Lane Oil Syndicate.

Cripple Creek Property

The Cripple Creek property includes the Vindicator, Golden Cycle mine, 130 acres and a lease on the Victor mine.

Geology: the plateau on which Cripple Creek is located is mainly made up of red granite. Breaking through this is a plug of volcanic breccias and tuffs composed of phonolite, and including many granite fragments torn off and carried up from below. This volcanic core is cut by dikes and intrusive masses of syenite and phonolite, and latest of all, the basalt dikes.

The ores occur in veins which follow a system of steep fissures, the veins being mere fissures with a central film or streak of ore filling and an impregnation of the wall rock on both sides. The low-grade ores are formed by mineralization of the country rock adjacent, to such narrow seams. Most of the veins occur in sheeted zones ranging in width up to 40'.

The gold occurs chiefly as the telluride, calaverite, with but little silver but associated with it there are small quantities of iron, copper, zinc, and molybdenum suphides. The gangue is either quartz and fluorite with some carbonate or merely altered rock. The greatest horizontal extension of any pay shoot thus far opened is about 1,300'. Such pay shoots are many and usually vary from 4' to 40' in length. The vertical extension has not yet been reached in some shoots. For detailed geology, see U. S. G. S. Prof. Paper No. 54; "Nature of Ore Deposits," by Beck and Weed, or Lindgren's "Mineral Deposits."

Development: by Vindicator shaft, 1,950' deep, and Golden Cycle 2,200'; linear extent of workings, about 51 miles. Mining methods, filled stope and square set. New work amounted to 10,327' in 1917; 5,112' in 1918; 7,622' in 1919, and 5,306' in 1920. Lessees did about 20% of 1920 work.

No commercial ore was opened on No. 20 level of the Golden Cycle during 1916-17 and work was discontinued there in 1918. Mining cost $2.81 per ton hoisted. By November, 1919, the shoot on the 18th level of the Vindicator shaft had been opened for 250', showing good ore. In 1920, the Lillie vein was entered on the 1,900' level, 900' S. of the shaft. Ore is 300' long, 8 to 12' wide and high grade, but flat, lying on a dike.

Reserves are estimated at 46,440 tons which contain from 50 to 75c. per ton profit.

The Victor mine, 3,000' N. E. of the Vindicator main shaft, and the intervening ground, has been leased until 1925. The whole area is being explored by crosscuts. The Victor shaft, 1,000' deep, has produced over $3,000,000 in gold. Sub-lessees are mining continuously.

It is expected that the Cripple Creek drainage tunnel would reduce pumping costs, but as the tunnel reached the neighboring Portland property in 1918 and no improvement is apparent, the indications are that there is an impervious dike lying between Portland and Vindicator properties. The Portland company is pumping and holding the water on their property, 210' below water level of the Vindicator, but Vindicator pumps have to handle 300 gallons per minute.

Equipment: includes two hoists, Sullivan electric and Ingersoll-Sargent compressors, 3 electric triplex 175-h. p. pumps, electric locomotive on No. 17 level and steel sharpening shop on No. 16 level. Power is steam and electric. Treatment plants consist of one 300-ton washing and concentrating mill, which handled in 1916 a total of 127,947 tons of $1.68 ore at a cost of 17.4c per ton. This ore and the reject from the Golden Cycle ore house, averaging about $2 per ton, was treated in a 500-ton flotation plant started in October, 1916. Ball-mills and the Minerals Separation flotation system are employed. On $2.26 ore the recovery in January, 1917, was 84.4% and the process deemed a success. This plant reported closed late in 1919, owing to lack of sufficient suitable ore.

Production: in 1917, 252,810 tons, sorted down to 86,918 tons, yielding $1,690,340; in 1918, 283,767 tons crude ore, or 45,712 tons sorted ore, valued at $1,629,809; in 1919, 143,400 tons crude ore, yielding 19,922 tons sorted ore, valued at $718,136 gross. In 1920, 22,104 tons shipped, yielding $405,104 gross proceeds after deducting freight and treatment.

Like other Cripple Creek mines, the Vindicator has passed its zenith, although good ore will be mined for some time; the future lies in a profitable treatment of the lower-grade ores.

VINDICATOR MINES & TUNNEL CO. **COLORADO**

No recent information. See Volume XIV.

VIRGINIA MINES CO. **COLORADO**

Address: 221 Foster Bldg., Denver, Colo.

Property: Revenue mine at Grant, Clear Creek county. Ore contains gold, silver, lead and copper. Operated during part of 1920, but no shipments made.

VIVIAN NOTAWAY MINE **COLORADO**

Address: Wm. Mitchell, Central City, Colo

Property: at Central City, Gilpin county, contains gold-silver-copper bearing ore.

VULCAN MINES & SMELTER CO. **COLORADO**

Presumably out of business. Fully described in Volume XIV.

VULCAN TUNNEL SYNDICATE **COLORADO**

Address: W. L. Shull, v. p.-gen. mgr. Col. James H. Myers, pres.; Breckenridge, Colo.

Reported organized in 1921 to operate the Old Dominion gold-silver claims in Snake River mining district, near Montezuma, Summit county The Vulcan tunnel to be extended to connect with Old Dominion workings, 1922.

WABASH MINES & POWER CO. **COLORADO**

Address: Creede, Colo.

Property: the Monon silver mine at Creede, Mineral county, formerly owned by Quintet Mng. Co.

Operated and produced during 1919 and 1920.

WANAKAH MINING CO. **COLORADO**

Defunct.

Property sold at sheriff's sale during 1916 to Bright Diamond Mining & Milling co., and again sold in 1920 to **Ouray Union M. & M. Co.** The latter company was succeeded in 1921 by **Welch-Worland Mines Syndicate,** which see.

WARD GOLD COIN MINING CO. **COLORADO**

J. F. Weber, mgr., Ward, Colo.

Property: the Ward Gold Coin mine group and 2 mill sites, near Modoc Lake, Ward, Boulder county. Mine is said to show a vein 5-15′ wide carrying iron-gold-silver-lead sulphides. Developed by 218′ shaft.

WARD MINING & MILLING CO. **COLORADO**

Office: 415 Frick Bldg., Pittsburgh, Pa.

Inc. in Colorado. **Cap.** 2,000,000 shares; par 1 cent.

Property: 14 claims, at Tolland, Pine district, Gilpin county, opened by a 150′ shaft and 100′ of drifts. Ore claimed to have assayed over $100 a ton in gold and silver. Operated during 1919, but shipped no ore.

WAR EAGLE CONSOLIDATED MINES CO **COLORADO**

Address: 115 N. 3rd St., Cripple Creek, Colo.

Officers: Tully Scott, pres.; M. E. O'Bryan, sec.-treas.; with S. J. Burris, T. Annear, T. E. Munison and T. R. Countryman (cons. engr.), directors. C. Kissell, supt.

Cap. 5,000,000 shares; par value not reported; in treasury at last report 4,000,000, to be used acquiring and developing additional property. Financed by T. M. Pettigrew & Co., Denham Bldg., Denver.

Property: originally 17.3 acres, since increased to 41 acres, in Cripple

Creek district, upon which in January, 1916, there was a bond of $50,000, due in 3 years. Examined it December, 1920 by W. Dellman of Minneapolis, Minn.

Development: mainly by lessees. The Scott shaft was sunk to 500′ in the Happy Year claims and $10 to $15 ore was opened in this ground. On the 400′ level the shoot is 110′ in length. In August, 1919, an arrangement was made with the Blue Flag Gold Mining Co., whereby the properties were to be connected by means of the Moffat tunnel and by April, 1920, this connection was completed. Work was suspended during part of 1920 and 1921 on account of abnormal conditions.

WARRIOR'S MARK MINING CO. — **COLORADO**

Subsidiary of **Alpha Mines Co.** **Office:** 342 Madison Ave., New York City.

Mine address: care George Robinson, Breckenridge, Colo.

Officers: Geo. Robinson, pres.; W. A. Winn, J. D. Devoy, J. W. Hanley, J. C. May, S. Klous, M. C. Nelson, F. J. Quist, J. C. Stearns, directors.

Inc. in Colorado. **Cap.** $5,000,000; $1 par; increased from $1,000,000, March, 1920. Listed on Boston Curb.

Company organized by Samuel Klous of Boston; Mr. Geo. Robinson, treasurer of Summit county, and W. T. Keogh, former county assessor, all of whom own large interest in company.

Property: the Pioneer or Warrior's Mark mine, 18 claims, 14 patented in McBarnes district, Summit county, 7 miles from Breckenridge, Colo. Mine was formerly a producer of phenomenally rich silver ore and credited with a production of over a million dollars.

Tract contains 2 fissure veins in red sandstone, 2-12′ wide, with a chimney of high grade ore. Recent work at 68′ depth opened 14″-20″ of shipping ore. Ore streak on lower level 2′ wide of 200 oz. ore.

Development: about 5,000′, includes 3 inclined shafts, 625′, 125′ and 200′ deep. Work carried on continuously during 1919-'21, aggregated several hundred feet, mainly on a new tunnel 1,000′ long, but not yet in commercial ore, though a good vein was cut.

In Sept., 1921, the old Mark shaft 625′ deep was re-equipped and unwatered to 150′ level; a new drift on 100′ level is said to have opened up 8″-10″ of high grade silver ore in December 1921, from which shipments were made in January, 1922. Vein on second level said to be larger. A mill and flotation plant are planned for 1922.

Property may have merit, having been idle for 30 years as a result of failure of German Natl. Bank of Denver.

WASATCH-COLORADO MINING CO. — **COLORADO**

Address: F. L. Palmquist, mgr., Silver Plume, Colo.

Property: the Mendota and Frostberg mines at Silver Plume, Clear Creek county. Ore carries gold, silver, lead, and zinc. The lead ore is concentrated at company mill; zinc is shipped to local sampling plant. A 75-ton wet concentration mill was erected in 1919.

WEBER GROUP — **COLORADO**

Address: Wheeler & Logue, 634 Inca St., Denver, Colo.

Property: at Alma, Park county, contains gold-silver bearing ore. Operated during part of 1920.

WEDGE MINE — **COLORADO**

Address: Carney & Keleher, lessees, Ouray, Colo.

Property: in Bachelor district, below Ouray, said to contain high grade gold-silver bearing ore. Operated during part of 1920.

WELCH-WORLAND MINES SYNDICATE — **COLORADO**

Succeeds Ouray Union M. & M. Co.

Mine address: Edward Treweek, supt., Ouray, Colo.

Syndicate members: P. F. Welch, pres.-gen. mgr.; D. C. Worland, v. p.-assist. mgr.; L. D. Welch, treas.; L. C. Jennings, sec., with S. H. Keoghan,

J. D. Cook, F. B. Utter, and C. L. Woods. D. R. Finlayson, cons. engr.; Chas. Blaha, metal. engr.

Inc. 1921. A close corporation.

Property: a 9-year bond and lease on the Bright Diamond group, north of Ouray, originally owned by the Wanakah Mining Co., which was succeeded by Bright Diamond M. & M. Co., described in Vol. XIV. The Ouray Union M. & M. Co. acquired the mine in 1920, but lacked funds to carry on development work. Ore is an iron sulphide containing gold, copper and some silver.

Development: by tunnels with 10,000′ of workings. **Equipment:** includes electric hoist, compressor, 75-ton and 1 Ruth flotation unit. The mine is to be thoroughly prospected and the mill remodelled.

WELLER GOLD MINING CO. COLORADO

Idle and probably dead. See Vol. XIV.

WELLINGTON MINES CO. OF COLORADO COLORADO

Office: 1000 Grand Avenue Temple, Kansas City, Mo. **Mine office:** Breckenbridge, Colo.

Officers: J. W. Oldham, pres.; Clifford Histed, v. p.; C. Charpiot, sec.-treas., with Jas H. Harkless, and Frank J. Dean, directors. R. M. Henderson, gen. mgr.; W. T. Heinrichs, asst. mgr.

Inc. June 12, 1906, in Arizona. **Cap.** $10,000,000; $1 par; all outstanding. Company office in Kansas City, transfer office and registrar. Annual meeting first Monday in June The company organized in Arizona was only a holding company, property being operated by the Wellington Mines Co. of Colorado, which had a capital of $50,000. To avoid double taxation the former was dissolved and the present company reorganized Jan. 1, 1917, with a capital of $1,000,000; shares $1 par. Company has over 5,000 shareholders.

Cash on hand, Dec. 31, 1920, $395,289.

Dividends: 1915, $300,000; 1916, $600,000; 1917, $400,000; 1918, $200,000 1919, $100,000; 1920, $100,000. The total for 19 dividends is $2,050,000.

Property: 15 patented claims, 75 acres, at Breckenridge, Summit county, is said to show lead and zinc sulphide ore in a fissure vein in diorite; dip 60° S., strike N. 50° E. Pay ore occurs in shoots and is said to average 3% lead, 18% zinc, 23% iron, 15 oz. silver.

Development: by one vertical and incline shaft and several tunnels, longest 1,800′. Greatest depth of workings, 1,000′; total linear extent several miles. Orebody is mined by stulling method. In 1918, 3,340′ of work was done; in 1919, 3,782′; in 1920, 2,505′ of drifts, crosscuts and raises and 540′ of diamond drilling.

Equipment: includes double-drum electric hoist, 500 cu. ft. compressor, pumps, 1,800′ tramway, all electrically driven. There are two mills, a concentrator, and a plant for roasting and magnetic separation, with a capacity of ,2,000 tons monthly. During 1918, the transformer capacity was doubled and an electric hoist to equip ore shaft for the developing of the Siam vein was purchased.

Production: in 1918, 39,295 tons of ore carrying 25% zinc was crushed and there were produced 16,631 tons of 49.6% zinc concentrates and 184 tons of lead concentrates assaying 25.7 oz. silver and 36% lead; 2,681 tons of iron tailings from No. 2 mill was shipped to the smelter. There was 947 tons of 45.7% zinc ore sent direct to smelter.

In 1919, shipments were suspended for a large part of the year, but amounted to 6,266 tons of concentrate, assaying 50% zinc, 26.5% lead, and 23 oz. silver per ton; also 415 tons of zinc ore and 1,734 tons of pyrite. The mills treated 12,947 tons of ore. In 1920, 30,040 tons of ore were mined; the mill operating 8 months only treated 30,401 tons carrying 21.4% zinc, making 11,085 tons concentrate assaying 49.7% zinc.

Wellington Mines is now a highly profitable concern, handling a complex ore in a satisfactory manner.

WENTWORTH MINES CO. **COLORADO**

Address: Westcliffe, Custer county, Colo.

Inc. in Colorado. Cap. $500,000; $1 par.

Property: 90 acres in the Westcliffe district, adjoining the Bull-Domingo mine.

Development: by 5 shafts from 20 to 65′ deep, said to show "remarkable and unusual ore; which carries silver".

A prospect launched about mid-1919. Developing, but no shipments made.

WESTERN DEVELOPMENT CO. **COLORADO**

Office: Boatman's Bank Bldg., St. Louis, Mo., and 129 W. 8th St., Leadville, Colo.

Officers: C. J. Walker, pres.; E. T. Cash, v. p.; W. H. Mann, sec.; J. E. Allen, treas., with W. M. Edinger, directors.

Inc. March, 1913, in Maine. **Cap.** $2,250,000 common and $750,000 preferred, of which all the common and $500,000 preferred is outstanding March 1919. Dividends paid amount to $100,000.

Is a holding company, its principal assets consisting of the entire capital stock of the **Down Town Mines Co.** of Leadville, Colo., which see. Has also a stock interest in **Western Zinc Oxide Co.**

WESTERN MINING CO. **COLORADO**

Am. Sm. Sec. Co. holds a majority interests. Mines closed in December, 1918. See Vol. XIV.

WESTERN SLOPE COPPER MG. & SM. CO. **COLORADO**

Formerly operated in Unaweep district, Mesa county. Out of business, bondholders have taken over property. For description, see Vol. XII.

WESTERN TUNNEL MINING CORPORATION **COLORADO**

No recent information.

Reported to have taken over the property of the Vindicator Mines and Tunnel Co. of Idaho Springs, Colo., which see.

WESTERN ZINC CONCENTRATING CO. **COLORADO**

Dead. Now a part of the **Western Zinc Oxide Co.**, which see.

WESTERN ZINC MINING & REDUCTION CO. **COLORADO**

Presumably dead. Assets taken over by **Western Zinc Oxide Co.**, which see.

WESTERN ZINC OXIDE CO. **COLORADO**

Is a consolidation of Western Zinc Cons. Co. and Leadville Zinc Co.

Address: 139 E. 9th St., Leadville, Colo.

Officers: C. H. Collins, pres.; Jas. B. McDonald, treas.; Harry L. Noble, sec.

Organized in 1915, and purchased all assets of Western Zinc Mng. & Reduct. Co. The Downtown M. Co. and Western Devel. Co. are stockholders.

Employs the Wetherill process of producing zinc oxide by volatilization and collecting fume in flues. Improvements have been made in method of hauling residue. A new unit of 16 furnaces, with independent bag-house and embracing all recent improvements, was added in 1920. Plant is operated continuously but one-half only of the 34 furnaces was in use in 1921. Total daily capacity, 100-125 tons of ore.

WESTMORELAND MINE **COLORADO**

Address: O. E. Williams, lessee, Kokomo, Colo.

Property: a silver mine at Kokomo, Summit county, operated during part of 1920.

WEST SIDE MINING CO. **COLORADO**

Operated at Georgetown, Clear Creek county, in 1919. See Vol. XIV.

WHALE MINES LEASING & REDUCTION CO. **COLORADO**

Address: 1454 Marion St., Denver, Colo.

Property: the Whale mine at Cassells, Park county. Ore carries silver, lead, and copper. Equipped with mill.

The mill worked part of 1919 and 1920 and products were shipped to smelter.

WHEELER MINE COLORADO

Address: R. H. Baxter, Alma, Colo.

Property: near Alma, Park county, contains gold-silver-lead bearing ore. Operated during part of 1920, but no shipments reported.

WHITE CLOUD MINING & MILLING CO. COLORADO

Address: 424 Cooper Bldg., Denver, Colo. Bert Humphrey, mgr., Ouray, Colo.

Property: the Paymaster silver-lead mine near Ouray, Ouray county.

Development: by shaft and tunnel. A 42″ shoot of ore yielded 36 oz. silver per ton and 60% lead. Developing.

WHITE RAVEN MINES COLORADO

Address: L. A. Ewing & Co., Boulder, Ward Star Route, Boulder Co., Colorado.

Property: the White Raven mine and Rook mine, near Ward, Boulder county. The first, though located on the edge of the gold sulphide belt, produces silver and high-grade lead ore. The Rook mine, located a mile S. W. of Puzzler station, is a new silver-lead property.

Development: by tunnel and winze to depth of 1,000′, so that 5 distinct ore shoots have been opened, including the main chimney which has been worked from tunnel level to apex, and by winze down to the 10th level.

Equpiment: includes electric hoists and compressor; a 25-ton concentration and flotation mill was completed in 1919 and has been operated continuously since.

W. H. P. LEASING CO. COLORADO

See Volume XIV.

WICK MINES CO. COLORADO

Address: D. A. Shumock, Almont, Gunnison Co., Colo.

Property: the Doctor zinc mine in Gunnison county. A steady output was maintained during 1919 and 1920.

WIDE WEST MINING CO. COLORADO

Address 514 Equitable Bldg., Denver, Colo.

Property: 30 claims on Leavenworth mountain, between Georgetown and Silver Plume, Clear Creek county. Ore carries gold and silver.

Development: by 2,700′ tunnel, to be driven an additional 500′ to cut the veins of the Wide West group.

Equipment: includes compressor and electric power. Operated part of 1919, but shipped no ore.

WIGWAM MINING CO. COLORADO

Address: Nederland, Colorado.

Property: Wigwam silver mine at Nederland, Boulder county, operated during part of 1920.

WILD IRISHMAN MINE COLORADO

Address: W. L. Miles & Co., lessees, Salina, Colo.

Property: at Summerville, Boulder county, contains gold-silver bearing ore. Operated during part of 1920, but no shipments made.

WILSON MINE COLORADO

Address: Mrs. A. C. Wilson, 515 N. Main St., Pueblo, Colo.

Property: at Empire, Clear Creek county, contains gold-silver-lead bearing ore. Operated during part of 1920.

WIN-U-WILL MINING & MILLING CO. COLORADO

Address: 807 Central Savings Bank Bldg., Denver, Colo.

Officers: A. M. Beam, pres.; J. A. Beam, sec.; L. J. Beam, asst. sec.; Frank Potts, treas.

Inc. July 30, 1917, in Colorado. **Cap.** $50,000; $1 par.

Property: about 10 claims at Ward, Boulder county, including the Little Giant.

Development: by a 900′ shaft and 1,400′ of driving. No stoping has been done below 100′. Presumably idle.

WOLF TONGUE MINING & MILLING CO. **COLORADO**

Office: 1541 Oliver Bldg., Pittsburgh, Pa., or 1137 Pearl St., Boulder, Colo. **Mine and mill office:** Nederland, Colo. William Loach, gen. mgr.; W. T. Todd, supt.

Property: about 600 acres, including the Cold Spring and other mines in the 75-acre Beaver group, a mile south of Nederland; and the Clyde mine of the Ranch group, 3 miles N. E. The Cold Spring mine is leased to Geo. Retallack and others.

Ore: the principal ore mineral is ferberite, iron tungstate, occurring in veins, in granite or pegmatite. Orebodies are commonly in the form of small lenses a few feet in length. The Cold Spring mine has a vein showing a 6′ face of ore with 12″ ore streak containing 57% tungstic acid in a shoot 150′ long on the 300′ level. For full description of Colorado tungsten ores, see Bull 583 and 652 of U. S. Geol. Survey.

The greater part of the mining is done by lessees who are paid for shaft sinking and ship their ore to the company's mill; the company receives as royalty 25% of the net proceeds, after deducting treatment charges.

In its leasing system the company supplies lessees with hoists, shaft houses, timber, rails, piping, ore cars, etc., and loans money for development when certain work is started. Company operates a 50-ton mill. A little development was done during 1919, and work was resumed in 1920.

The Wolf Tongue and Vasco Mining companies were the only tungsten producers in the United States in 1920.

WOOD MOUNTAIN MINE **COLORADO**

Address: Osberg & Pherson, lessees, Boulder, Colo.

Property: near Wall Street, Boulder county, contains gold-silver bearing ore.

YAK MINING, MILLING & TUNNEL CO. **COLORADO**

Office: Marbridge Bldg., W. 34th St., New York. **Mine office:** Leadville, Colo.

Officers: Myron T. Herrick, pres.; Harry C. James, v. p.; Walter W. Lavis, v. p.; J. C. Mitchell, sec.-treas., Denver National Bank, Denver. J. G. Hardy, mine mgr.; E. L. Hartwell, mgr.

Cap. $1,000,000; reduced Jan. 10, 1918 to $500,000, when the company declared a distribution of liquidation capital which amounted to $500,000; shares $1 par; all outstanding and assessable.

In December, 1917, company sold an undivided half interest in the property to the American S. & R. Co. for $500,000, which, although not a lien, is to be returned to the American S. & R. Co. out of the profits of operations, after which both companies will share in the profits equally. The A. S. & R. Co. through its mining department began company operations on January 1, 1918.

Comparative balance sheet and income account of the Yak Co. for 6 years preceding 1918 may be seen in Vol. XIII.

The profit in 1918 amounted to about $200,000; in 1919, it was $81,010; in 1920, $11,206.

Dividends: quarterly, commenced March 31, 1904, and were continuous up to September 30, 1918, when the amount distributed totaled $3,497,685. Dividends were then discontinued until July 1, 1919, when 1½% was declared. The above total includes a stock dividend of 12½%, declared October 31, 1904; it also includes a distribution of liquidated capital, January 10, 1918, of $500,000.

Property: owns 250 acres and controls an additional area of 1,133 acres at Leadville. Also holds agreements covering several hundred addi-

tional acres, under which agreements company has the right to drive the Yak tunnel into such ground at its option.

The Yak tunnel is a 4-mile transportation and drainage tunnel which drains an important part of the Leadville camp, including the White Cap and Cord properties on Iron Hill. The portal of the tunnel is in California Gulch, about 1 mile from Leadville. In March, 1917, the surface track to switches, dumps, etc., was 9,100′; the main Yak tunnel, by way of Louisville and North Moyer, equipped with 30-lb. rails and trolley line for operation of 50-h. p. locomotives was 23,032′; laterals equipped with trolley line 6,207′; laterals equipped with track but not trolley line, 1,922′; csmiellaneous laterals suitable for equipment for electric locomotives, about 5,912′.

The ore developed by the tunnel is chiefly a complex sulphide containing gold, silver, lead and zinc. For geology of the Leadville district, see U. S. G. S. Bull. 320, by S. F. Emmons and J. D. Irving.

Reported in 1921, that 2.000,000 tons of low grade ore was in reserve and that milling tests for its treatment had been completed. A 100-ton mill is to be erected, 1922.

Production: of ore in tons for years ended Dec. 31:

Year	Iron Silver	Lead Zinc	Pyrite	Total
1918.....	34,152	22,653	1,802	58,607
1919.....	28,882	16,737	8,200	53,819
1920.....	10,754	21,091	3,811	35,656

YELLOW BIRD GOLD MINING CO. COLORADO

Dead. Holdings reported sold at sheriff's sale in November, 1918, to Hildreth Frost, the judgment creditor. See Volume XIV.

The Yellow Bird mine was worked by 19 sets of lessees, 1921, and mill reported to be running, 1922.

YELLOW JACKET MINES CO. COLORADO

Address: Stock Exchange Bldg., Philadelphia, Pa.

Officers: C. J. Hood, pres.; C. E. Davis, sec.-treas., with Robt. Radford and J. A. Barry, directors.

Inc. 1916, in Colo. **Cap.** $1,000,000; $1 par; 400,000 shares outstanding. Corporation Trust Co., transfer agent and registrar.

Property: 5 claims and a mill site in Uncompahgre district, Ouray county. Ore contains lead and zinc, with some gold and silver.

Development: by 550′ tunnel. A mill and power plant were reported completed in 1920.

YELLOW PINE MINES & REDUCTION CO. COLORADO

Address: Box 494, Boulder, Colo. Ralph Cotten, mgr., Boulder, Colo. Worked by lessees.

Property: the Yellow Pine gold-silver mine on Sugar Loaf Mountain, above Crisman, Boulder county. **Development:** by 6 tunnels and 5 miles of workings. Sinking under way and some rich ore has been shipped. Nineteen sets of lessees reported working, September, 1921.

YOUNGSTOWN-GILPIN MINING CO. COLORADO

Office: 1200 Mahoning Bank Bldg., Youngstown, Ohio.

Officers: Louis Liebman, pres.; Geo. J. Renner, v. p.; Donald J. Lynn, sec.; Chas. Ephraim, treas.; Geo E. Collins, mgr.

Inc. 1908, in Colorado. **Cap.** $1,500,000; $1 par. Transfer office, 120 Wick Ave., Youngstown, Ohio.

Property: 2 patented claims, about 5 acres, on Quartz hill, Gilpin county. Mine shows gold, silver and copper in quartz vein and patch deposits.

Development: by 700′ shaft and 600′ tunnel. **Equipment:** includes a compressor and 30 h. p. hoist. Idle.

CONNECTICUT

NEW HAVEN COPPER CO. **CONNECTICUT**

Inactive, and probably defunct.

Property at Seymour, Conn., shows a copper-bearing band of hornblende schist, carrying chalcopyrite with some bornite. Operations were carried on intermittently for several years, the last work being done in October, 1911. Company had power plant on the border of the Naugatuck river.

TUNGSTEN COMPANY OF AMERICA **CONNECTICUT**

Owns a tungsten property at Trumbull, Conn., long famous for its minerals. Company organized in 1916, but became involved in litigation soon afterward, and is now inactive. See Vol. XII. for description. The deposit is said to be well worth exploitation.

GEORGIA

AMERICAN MINERALS CO. **GEORGIA**

Address: 609 Provident Bank Bldg., Cincinnati, Ohio.

Owns the Shirley mine, operated by the **Shirley Mining Co.** and the Little Bob mine, leased to the **Georgia Mining Co.**, at last account

AMERICAN VENTURE & MINES CORPORATION **GEORGIA**

Property proved unprofitable and was abandoned in 1920. See Vol. XIV.

ARIZONA & GEORGIA DEVELOPMENT CO **GEORGIA**

Described in Vol. XIV. Company hopelessly insolvent and leases expired.

BARTOW MANGANESE MINING & MFG. CO. **GEORGIA**

Address: M. G. Dobbins, agent, Cartersville, Ga.

Property: 325 acres, known as Dobbins mines, 4 miles N. E. of Cartersville, Bartow county. Mine first opened 1866; has been operated by lessees at different times up to present.

Geology: the ore deposit consists of ferruginous and manganiferous nodules and masses in yellow clay, the depth of this decomposed formation depending upon the irregularities of the underlying Weisner quartzite. High grade manganese ore of pyrolusite and psilomelane formed output to 1916. Present lessee concentrating on production of manganiferous iron. See Bull. 35, Geol. Survey of Ga.

Development: by six shafts, 50', 80', 100', 106', 110' and 190' in depth and 8 cuts, 100-150' long, 50' wide and 25-30 deep. Ore produced said to average 15.84% manganese, 25.71 iron and 0.188 phosphorus.

BELL-STAR MINE **GEORGIA**

Address: J. J. Westerman, Woodstock, R-3, Ga.

Property: 3 lots, 222 acres, in Cherokee county, known as Bell-Star mine, 3.8 miles from Woodstock; shipping point, Kenshaw, 6.7 miles away.

Geology: country rock is mica gneiss, with bands of horn blende gneiss. Property has a pyrite vein, about 100' wide, containing iron, sulphur, manganese and zinc. The gossan is silicious, indicating a low-grade ore. There is a gold vein to the E. and a schistose zone belt called the Sandstone vein to the W. of the gossan, the last named worked for gold from 1846-1860. The quartz of the Sandstone vein carries magnetite and garnet; vein is opened to a depth of 900'. See Bull. 33, Geological Survey of Ga.

Mine has not been worked in many years, owing to lack of money.

Developed by 6 shafts including an incline, 200' deep, a second 200' shaft, vertical for 150'; the other 4 varying from 40' to 60' in depth. The two deeper shafts have considerable work on the vein.

CARRIBEE MINING CO. **GEORGIA**

Address: Phil Dorn, mgr., Cartersville Poor Farm, White, Ga.

Property: 320 acres, 12 miles W. of Cartersville, Bartow county, shipping point White 2¼ miles away. Mine was leased, 1918, to J. W. Brockman and Philip Dorn of Birmingham, Ala., by the Bartow County Commissioners, who are in charge.

Geology: ground shows Cambrian formations of gray quartzite, schist and gray slate, whose folds and faults are obscure. Manganese ore occurs in soft yellow clay, both as a soft, granular material and as hard concretionary masses, not over 5" in diameter. This is treated in log washers and jigs producing ore carrying 40% metallic manganese. An average sample of the ore assays 17.41 manganese, 0.40 phosphorus, 5.54 alumina, 5.60 iron and 46.58 silica. See Bull. 35, Geol. Survey of Ga.

Development: by 5 open cuts, from 60'-100' long, 20'-80' wide and 10'-30' deep.

Equipment: steam shovel, double log washer, steam engine, boiler, 600' tram, tram cars and motor-trucks. Several hundred tons of manganese ore were produced during 1917-1918.

CHEROKEE MINING CO. **GEORGIA**

Address: F. W. Padgett, mgr., Blue Ridge, Ga. E. L. Hertzog, pres., Spartanburg, S. C.

Company is a North Carolina firm, operating the McKinney property in Blue Ridge, Fannin county, since 1918. Mine was worked long ago for its brown iron ore, but present company produced manganese ore from old open cuts. Ore is gravelly, occurring in pockets and veins in clay schist and slate. The ore deposit is not believed to be over 20' in width. Several car loads of ore containing about 43% manganese were shipped in 1918 and in 1920.

CHEROKEE OCHRE CO. **GEORGIA**

Office: Cartersville, Bartow Co., Ga.; J. T. Norris, pres.-mgr.

Inc. Dec., 1904, in Georgia. **Cap.** $30,000; $100 par; all outstanding.

Property: about 170 acres, just outside Cartersville, contains yellow "Peruvian ochre," and barite in sandstone. This is reported to assay: iron peroxide, 52.53%; alumina, 11.75; silica, 10.05.

Company has 15-ton mill and flotation unit. Mine openings are 30'-40' deep.

CHESTATEE PYRITE & CHEMICAL CORPORATION **GEORGIA**

Office: Third National Bank Bldg., Atlanta, Georgia.

Officers: N. P. Pratt, treas.; G. L. Pratt, v. p.-treas.; Palmer Pratt, sec. C. E. Julihn, cons. eng.

Property: the Chestatee pyrite mine, in Lumpkin county, 6 miles E. of Dahlonega, and on S. side of the Chestatee river, on which mining was started in 1892.

Geology: mica gneiss and hornblende gneiss are cut by granite, which is also metamorphosed. The important pyrite and gold deposits of the district occur in a belt of more basic rock that lies within a mile of the granite contact. At the Chestatee mine the granite border is but a few hundred feet S. E. of the vein. The orebody has a gossan outcrop of commercial iron ore 5,800' long. This exposure runs N. 45° E., and the dip is 60° N. W. A parallel vein occurs not far away. The ore occurs as a tabular mass, showing a number of rolls or minor folds.

The ore is classed as either lump or concentrating material, according to the pyrite content. The first named occurs as lenses or shoots, is massive, and consists mainly of pyrite and a little chalcopyrite, in a gangue of quartz, garnet, and sericite. It averages 43.52% sulphur, 39.70% iron, 1.60% copper, 9.26% silica, 2.53% alumina, and 0.72% zinc. The concentrating ore is lower grade, but of similar mineralogic character.

Development: by 205' incline and main haulage-level over 1,200' long, with crosscuts to the vein every 100 feet. Reserves are estimated at 1,300,000 tons.

Equipment: electric power-plant, loading bins, crushing and sorting

plant for 800 tons of run-of-mine ore daily, and mill for concentrating 400 tons daily. The mill employs a 24 by 12" crusher set at 3", one dry trommel, washer, picking belt, lump ore being shipped at this point: crusher set at 1½", 9 mm. trommel, rolls, 2 mm. trommel, Hancock jig, tables, and storage bins for concentrates.

Production: no figures are available. In 1919, the company applied to the War Minerals Relief Commission for $900,000. Of this, $223,529 was awarded.

COGGINS & SMITH MINING CO. **GEORGIA**

Address: R. R. Smith, mgr., 391 Peachtree St., Atlanta, Ga.

Inc. March, 1918, in Georgia.

Property: covers about 77 acres, in Paulding county, 5 miles east of Dallas. Shows granite cut by a pyrite vein, 25' wide, containing gold, silver and copper values and reported to assay 42-49% sulphur, $1.43 gold per ton and 1.8% copper. Vein dips about 70° NE-SW.

Developed: by 50' shaft. **Equipment:** includes mill, pump and engine. Little work has been done since 1907.

COLLEY MINE **GEORGIA**

Property: a manganese mine about 80 acres, east of Lincolnton, owned by J. D. Colley and J. H. Boykin. Had been leased to J. R. Whitman, Healy Bldg., Atlanta. Operations ceased at close of war, late in 1918.

Is developed by small open cuts. Assays show a content of 32.8 manganese, 9.57 alumina, 3.28 iron and some barium. Production, 1918, reported as a few hundred tons of manganese ore.

ETOWAH DEVELOPMENT CO. **GEORGIA**

Address: R. S. Munford, gen. mgr., Cartersville, Barton Co., Ga.

Property: brown iron and manganese mines, embracing several thousand acres near Cartersville, and including the Iron Hill and Hebble mines.

The Etowah river runs through the land, giving a river frontage of 4 miles on the two sides, with a fall of 70', capable of developing 12,000 h. p.

Property has been worked at intervals since the early forties, but mainly for iron ore in 1918. Present company was developing iron ore at the Iron Hill mine, while lessees were mining manganese on other sections of the property. The Hebble, 2 miles E. of Cartersville, is the most important mine and is developed by 36' shaft, 150' tunnel and open cuts; was leased to J. C. Hebble and produced 45% manganese ore. See Bull. 35, p. 78, Geol. Survey of Georgia.

Equipment on property includes 4 steam shovels, 8 log washers, 3 jigs and about 4 miles standard gage railroad and locomotives.

ETOWAH MILLING & POWER CO. **GEORGIA**

Mail returned from 420 Healey Bldg., Atlanta, Ga.

Officers: J. P. Given, pres.; J. H. Simms, v. p.; C. H. Butts, sec.; D. S. Walraven, treas.

Inc. April, 1916, in Georgia. **Cap.** $500,000; $10 par; 26,496 issued. U. S. Corporation Co., New York, transfer agent and registrar.

Property: gold claims and water rights near Atlanta, Fulton county. A prospect.

EXPERT PROSPECTING & DEVELOPING CO. **GEORGIA**

See Volume XIV.

FLOWER MINING CO. **GEORGIA**

Address: John Baker, mgr., Higdons Store, Fannin county, Ga.

Property: a copper prospect on Mt. Pisgah, 1 mile of Higdons Store, secured by company in 1917. Average strike is E. with dip of 45° N., the principal ore mineral is chalcopyrite with some pyrrhotite.

Developed: by 150' tunnel, three shafts, some test pits and open cuts.

FOX & DOWLER MINE **GEORGIA**

Address: F. H. Dowler, Chattanooga, Tenn. **Mine office:** Tunnel Hill, Whitfield county, Ga.

Property: 6 lots, 730 acres, and the mineral interests on two lots, 3

miles north of Tunnel Hill, in Catoosa county. Mine had been worked about 1890 by Catoosa Mining Co., which made large open cuts and drove an adit 160' on the vein, the deepest workings being 225' below surface. See Bull. 35, Geol. Surv., Ga.

The ore deposits occur along a fault zone, in Knox dolomite, the ore showing manganese oxide, mixed with clay and chert breccia. Some shipments made in 1918 were said to be high in silica, but containing iron and manganese.

FREEMAN MINE GEORGIA

Owned by M. J. Freeman, Dallas, Texas, J. L. Smith and F. L. Smith, Cartersville, Ga.

Property: located just outside Cartersville, Bartow county, operated in 1918 by Cherokee Ochre Co.

Geology: manganese ore occurs in clay as gravel, nodules and boulders. Mine has been worked at intervals and several hundred tons have been produced. According to the Geol. Survey of Georgia (Bull. 35), the whole ore deposit will analyze silica, 71.02; alumina, 10.22; manganese, 2.40; iron, 5.15; phosphorous, 0.073%.

GEORGIA & TENNESSEE COPPER CO. GEORGIA

Controls 99.8% of the stock of the **Georgia Pyrites Co.**, which see.

GEORGIA COPPER CO. GEORGIA

Office: Washington, Ga. **Mine office:** Lincolnton, Ga.

Officers: M. N. Whittaker, pres.-gen. mgr.; Joshua A. Brown, v. p.; A. Kahr, sec.; Z. J. Ray, asst. sec.

Cap. ~1,000,000; par $1.

Property the Magruder or Seminole mine, 28 acres, held in fee simple, and mineral rights to 901 acres in Wilkes and Lincoln counties, 12 miles from Washington, and within a mile of Lovelace, on Washington and Lincolnton, R. R. which connects with Georgia R. R. Shows gray sericitic schist intruded by eruptive dikes of 2 different ages, with 6 veins in schist and between schists and eruptive rocks. Lodes have an average strike of N. 30° E., to N. 40° E., and dip of 50° to vertical, averaging 3 to 14' in width, and traceable 2,200'. The ores contain pyrite, chalcopyrite, some bornite, cuprite and melaconite, and ore estimated by company to average 7.3% copper, 32% lead, 7 oz. silver and $5 gold per ton.

The mine, opened 1852, and closed 1862, on account of American Civil War, reopened 1880-1884, as Magruder Mine and operated 1889-1906 by Seminole Mining Co., which company was succeeded by Lincoln Gold & Copper Mng. Co. The Georgia Copper Co. purchased the property in 1917. The Hanna Minerals Co., Cleveland, operated the mine under lease to September, 1919.

Development: by 4 shafts, the main one being 380' deep, the others ranging from 40'-80'; an 100' air shaft and 1,200' underground workings. New work in 1920 on the 200' level reported to have crosscut 6 veins. Closed down in spring of 1920.

Equipment: includes two 175-h. p. boilers, 2 hoists, 15 and 20-h. p., 8 air-drills, air-compressor, electric generator and 3 electric motors. During 1918-19 a 10-stamp mill with flotation unit was completed.

GEORGIA IRON & COAL CO. GEORGIA

Office: Atlanta, Ga. **Mine address:** White, Bartow Co., Ga. Joel Hurt, pres. Center of operations is Aubrey, one mile south of White.

Property: about 12,000 acres, 8 miles N.-N.E. of Cartersville. The Iron Belt R. R. owned by the company, connects the various mines with the main railroad at McCallie, 1½ miles S. W. of Aubrey. Holdings include Bishop, Peachtree, Chinnley, Moccasin and Red Mountain mines.

Geology: property shows brown iron and manganese deposits, but in 1918 manganese only was produced. Manganese properties are about 12 by 3½ miles in area. Ore is found in quartzite and limestone, and has high percentage of barium oxide. The deposit is reported to be very large, ex-

tending from Bishop mines, one mile south of Aubrey to Sugar Hill mines, six miles away. Bull. 35, Geol. Survey of Georgia.

Development: by open cuts at Stevenson, Bufford, Chumley and Aubrey tracts, each about 300′ long, 250′ wide and 70′ deep. Many shafts have been sunk, deepest 149′, and considerable tunnelling done.

Equipment: 9 steam shovels, 10 miles standard gage railroad, 2 locomotives, dump cars and 4 washeries, only one of which, the Aubrey, is in operation.

Daily output of Aubrey concentrating mill is 50 tons. Enough development has been accomplished in past to guarantee an output, at present production rate, for many years. Employed 225 men at last reports.

GEORGIA MANGANESE CO. **GEORGIA**

See Volume XIV.

GEORGIA MINING CO. **GEORGIA**

Address: 727 Union Central Bldg., Cincinnati, Ohio.

Officers: D. C. Collins, pres.; R. L. Tilton, v. p.; T. S. Doheman, sec.-treas., with M. L. Kirkpatrick and S. Hickenlooper, directors.

Inc. in April, 1917, in Kentucky. **Cap.** $7,500; $1 par; all outstanding. Bonds authorized $75,000, outstanding $71,500; interest 7%. **Dividends:** 20% in 1917 and 33⅓% in 1918.

Property: 36 acres at Copper Mine Station on Seaboard R. R., Paulding county; includes a lease on the Little Bob mine, which is owned by the American Minerals Co. Is subleased to the Hanna Minerals Co. Produces pyrite, with average composition of 40% sulphur and 2½% copper; developed by 175′ incline shaft.

Equipment: includes 500-ton mill, compressors and pumps.

Production: 9 months 1917, 7,500 tons; 9 months 1918, 7,700 tons.

GEORGIA PYRITES CO. **GEORGIA**

Controlled by **Georgia & Tennessee Copper Co.** Wm. Tudor, Temple, Ga.

Property: 400 acres, including the Tallapoosa mine, in Haralson county, 9 miles from Buchanan and same distance from Morgan. Property owned in fee simple was first opened in 1856 and developed at different times up to 1884; practically unworked from that time to 1916. (Bull 33, p. 68, of Geol. Surv. of Ga.)

Geology: main lode 180′ wide on surface has a dip of 30°. This extends 500′ with average width of 50′ workable ore. A second lode lying 250′ S. E. of main lode is said to be 10′-15′ thick, but no work has been done, though good surface assays have been reported. Outcrops traceable for 3,500′ over the tract. Pyritiferous ore occurring in a bedded-vein in chloritic schist averages 17.5% sulphur, 1.5% copper and $1 in gold and silver. About 20% of the ore is lump, averaging 47% sulphur, 3.92% copper and $2.50 in gold and silver. Treatment of the remaining 80% on Hartz jigs gave a concentrate with about a 50% sulphur content.

Development: by extensive underground workings, including 2 shafts; one 300′, the other a prospect shaft 800′ N. E. of old shaft.

Equipment: a small plant, costing $50,000.

Mine leased 1916-1919 to Arizona and Georgia Development Co., of Temple, Ga.

HAUCK MINE **GEORGIA**

Property: 28 acres owned by C. J. & R. L. Smith, of Cartersville, Ga. Was leased July, 1918, to W. O. Hauck. Located 7 miles from Cartersville, Bartow county, and 2¼ miles from the Louisville & Nashville R. R.

A vertical shaft sunk in 1918 to depth of 42′, is said to have cut 32′ of ore. Mine shows manganese oxides in yellow clay with underlying quartzite.

INTERNATIONAL ALUMINUM CO. **GEORGIA**

Address: Glen L. Williams, Nitro, near Charleston, W. Va.

Inc. 1920.

Property: an area in S. W. Georgia estimated to contain 100,000,000 tons

of kaolin, from which it is proposed to extract aluminum and numerous by-products in works at Nitro, W. Va., built by the U. S. Government in 1918. A daily output of 240 tons of metal is expected 6 months after starting.

LIBERTY PYRITES CO. GEORGIA

Address: J. F. Ryan, Healy Bldg., Atlanta, Ga., or L. S. Berg, 47 Wall St., N. Y. City. D. S. Leonard, supt., Hiram, Ga.

Property: 3 lots, 100 acres, adjoining the Shirley mine, 3 miles north of Hiram and same distance south of Dallas, Paulding county, and within a few hundred feet of switch of Southern R. R.

Developed by two shafts, 70′ and 100′ deep, put down in 1910. Ore reported as medium grade pyrite in gangue of siliceous material. Geology described in Bull. 33, Geol. Survey of Georgia.

LINCOLN GOLD & COPPER MINING CO. GEORGIA

Lincolnton, Ga. Property purchased, 1917, by Ga. Copper Co., which see.

Inc. June 11, 1906, in Oklahoma. **Cap.** $2,000,000; $1 par. Paid 1 dividend, of one-half of 1%. Was practically the successor of the Seminole Mining Co., which was a sad failure.

MARKSTEIN-DORN MINING CO. GEORGIA

Address: Phil. Dorn, mgr., Birmingham, Ala. **Mine address:** Rydal, Bartow county, Ga.

Reported to have a lease on the mineral rights on part of the property of W. B. Vaughan, White, Ga., consisting of 9 lots, 1,400 acres, in Bartow and Cherokee counties, near Pinelog Mountain, about 3 miles from Rydal on Louisville and Nashville R. R. Mine contains manganese and manganiferous iron.

Developed: by 150′ shaft, 180′ underground passages and some vertical test pits, the deepest 75′.

Equipment: includes steam shovel, concentration mill, double log washer, 35 h. p. boiler, 15 h. p. engine and jigs.

PAGA MINING CO. GEORGIA

Property abandoned in 1918. Described in Vol. XIV.

RABUN MINING & DEVELOPMENT CO. GEORGIA

Developing a prospect near Burton, in Rabun county.

REPUBLIC MINING & MANUFACTURING CO. GEORGIA

Reported operating the Sweetwater mine, two miles W. of Flint River, Sumpter county, at last accounts.

Mine contains bedded deposit of bauxite running 56.3% alumina, 11.8% silica, and 1.8% ferric oxide. Outcrops about 1,300′ long, average thickness 4′.

SHIRLEY MINING CO. GEORGIA

Address: D. C. Collins, 217 Main St., Cincinnati, Ohio.

Officers: D. C. Collins, pres.; R. L. Tilton, v. p.; T. S. Dohemann, sec.-treas., with M. L. Kirkpatrick and S. Hickenlooper, directors.

Cap. $1,500; shares $1 par.

Property: a lease on the Shirley mine, abandoned in 1919. See Vol. XIV.

SOUTHERN LEASING CO. GEORGIA

See Volume XIV.

WISCONSIN-GEORGIA COAL & IRON CO. GEORGIA

Mail returned from last address: 808 Steger Bldg., Chicago, Ill.

Officers: A. H. Kluender, pres. P. W. Butler, v. p.; E. D. Edgerton, treas.; A. E. Roberts, sec.; A. L. Roberts, mgr., with J. H. Nullamore, directors.

Inc. in Delaware. **Cap.** $800,000.

Property: about 200 acres, at Cohutta, Whitfield county, near the Georgia-Tennessee line, showing manganese and brown iron ore.

Developed by open cut 175′ long, 40′ wide and about 20-25′ deep. Some shipments have been made.

IDAHO

The great mines of the State are in the Coeur d'Alene region in Shoshone county, 90% of the gross value of the metal output coming from that county. Idaho suffered considerably during 1920-21 from labor shortage and low metal prices, though the larger part of its metal production, being derived from silver-lead ores, it was not so acutely affected as were some other states.

In actual tonnage of ore mined the Bunker Hill & Sullivan Mng. & Conc. Co. was the largest producer, Federal Mng. & Sm. Co. and Hecla Mng. Co. following in that order, but in the matter of gross value of production, the Hercules Mng. Co. was far in the lead. Dividends paid by mining companies in 1920 totaled about $4,500,000.

Idaho's output in 1921 showed a decline of about 51%, Production was $497,000 gold; 5,720,000 oz. silver; 1,436,000lb. copper; 192,000,000lb lead; no zinc. Total value approximately $15,208,000.

The following table, from the records of the State Mining Inspector, shows the metal output of Idaho over a period of years:

Metal	1920	1919	1918	1917	1916
Gold, oz...	22,917	35,000	36,308	41,326	53,079
Silver, oz..	7,617,387	5,579,056	9,572,214	12,496,017	12,205,132
Lead, lb...	277,102,608	182,341,898	290,848,425	395,883,000	366,594,000
Zinc, lb...	21,931,200	15,994,229	51,691,000	96,123,000	98,700,740
Copper, lb..	2,730,000	3,122,763	5,240,000	7,282,000	8,052,725
Total value	$38,837,708	$18,374,000	$37,320,082	$56,292,210	$49,102,693

The grand total value in 63 years is $967,357,941; and in the past 26 years, $533,382,197.

ADVANCE MINING CO. **IDAHO**

Dissolved in 1919. Fully described in Vol. XIV.

AEOLIAN COPPER CONSOLIDATED MINING CO., LTD. **IDAHO**

Idle. Described in Copper Handbook, Vol. XI.

AETNA MINING & MILLING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Jas. Murphy, pres.; O. W. Lewis, sec.-treas., with Dr. C. S. Stone, Dr. F. Leo Quiglev and C. W. Gilstrap, directors.

Cap. $150,000; shares 10¢ par; assessable. Last assessment of 1 mill, due Oct. 25, 1920.

Property: 4 claims, unpatented, 1 mile S. E. of Burke, Shoshone county, developed by 300′ tunnel. Idle since 1915.

AJAX MINING CO. **IDAHO**

Office: 714 West 14th Ave., Spokane, Wash.

Officers: F. E. Starkey, pres.; H. W. Woodward, v. p.; J. A. Havighorst, sec.-treas., with F. Moriarity, G. E. Sprague, Gus Benson, and Alva C. Bixby (mgr.), directors.

Cap. $1,000,000; $1 par; all issued; assessable. Last assessment, No. 20, of 1 cent, levied Aug. 27, 1921. Annual meeting, first Tuesday after first Monday in September.

Property: 13 patented claims, 184 acres, in Gorge gulch, near Burke, Coeur d' Alene district, adjoining the Hercules on the E., and said to cover the extension of the Hercules vein system for 1¼ miles in length. Ore contains silver and lead.

Development: by several tunnels; No. 2 tunnel is over 3,000′ in length, cutting the shoot opened in upper workings and exposing 1 to 8′ of milling ore, with a 400′ drift on a 6 to 8″ high grade streak. A 250′ shaft was sunk near the point where the vein was reached by the tunnel 650′ from the Hercules boundary. Shaft fully equipped with air-hoist, compressor, and electric

motors. A large outcrop at east end of property was opened by 1,000′ of work in 2 tunnels, and arrangements made to use the 3,500′ Oom Paul Cons. Mining Co.'s tunnel, to explore Ajax ground. Early in 1918 the heading was in 7,000′ and a 2′ vein was cut at a vertical depth of 1,200′. Owing to high mining costs, mine was closed down during much of 1918, but was reopened in 1919. During 1920, the 200′ level opened 160′ of pay ore. A winze, sunk 120′ below this level ,also opened ore.

ALAMEDA MINING CO. IDAHO

Address: Wallace, Idaho.

Officers: F. J. Finucane, pres., 323 8th St., Spokane, Wash.; Frederick Burbridge, v. p.; Chas. McKinnis, mgr.; J. A. Wayne, sec.-treas.; above, with Chas. Hussey, directors. R. R. Catching, supt.

Originally Inc. 1900 as the Alameda M. & M. Co., Ltd. Reorganized 1910 as Alameda Mng. Co. **Cap.** $1,500,000; $1 par; assessable; 14 assessments levied since 1900. Control of 800,000 shares purchased April, 1916, at 15¢ a share, by syndicate consisting of above named officers. Stock listed on Spokane and Butte exchanges.

Property: 6 claims adjoining Success mine on the E., in Nine-mile section, Coeur d'Alene district, Shoshone county. Little work was done on the property during the 5 years up to 1918, owing to litigation with the Success company. Operations of the latter company have shown that orebodies opened on the 400, 450, and 700′ levels of the Success mine extend into Alameda ground. Faces on the 400′ and 450′ levels are said to have averaged 31.7 oz. silver per ton, 31.5% lead, 21.1% zinc; and on the 700′ level, 7.5% lead, 7 oz. silver, and 25.7% zinc.

The first suit was won by the Alameda Co., which was awarded $56,070 damages. The Success Co. won on appeal, the court permitting company to follow the granite vein downward between vertical planes along the end-lines of the Granite claim beneath surface of the Cardiff, or any other claims under which this vein extended within the vertical lines named. The Alameda Co. appealed the case, but lost.

Development: by several tunnels, one being 2,500′ long. Some lead-zinc ore was found on same level as the Success main tunnel, 500′ below the upper workings on this ore-shoot.

ALBANY LEAD MINING CO. IDAHO

Address: c/o J. H. Nordquist, Eagle Bldg., Wallace, Idaho.

Officers: John Dunphy, pres.; C. W. Betts, sec.

Property: 11 claims S. E. of Burke, Coeur d'Alene region. No recent information, save that the annual meeting was held on Oct. 2, 1920.

ALCIDES MINING CO. IDAHO

Out of business. See Volume XIV.

ALHAMBRA MINING CO., LTD. IDAHO

Address: W. A. Corey, sec., Spokane, Wash.

Cap. $1,000,000; $1 par; assessable.

Property: 22 patented claims, in Yreka district, Coeur d'Alene, said to show silver-lead ores.

Development: to depth of 800′ by 6,450′ tunnel and several thousand feet of drifting.

Equipment: included compressor and 50-ton flotation plant erected late in 1917; financed by men identified with the Bunker Hill & Sullivan property.

A report in December, 1919, showed that total receipts had been $168,326, of which $165,000 was from assessments. Expenses were $146,096 for development and $16,055 for general charges.

ALICE MINING CO. IDAHO

Address: Wallace, Shoshone county, Idaho.

Officers: Walter Mackay, pres.; J. H. Foss, v. p.; J. F. McCarthy, sec.-treas.-mgr., with C. E. Bender and G. W. Ruggles, directors.

Cap. $1,000,000; $1 par; asessable.

Property: 23 patented claims, known as the Alice mine, situated between Wallace and Mullan.

Development: by 685′ shaft and 9,570′ of workings, from which 3,420 tons of silver-lead ore were shipped.

Equipment: includes a compressor and 125-ton concentrator.

Idle.

ALLIE MINING CO., LTD. IDAHO

Officers: E. C. Ross of Gilmore, Idaho, pres.-gen. mgr.; T. B. Cook, v. p.; H. R. Hyde, sec.-treas.

Inc. 1905, in Idaho. **Cap.** $300,000; $10 par.

Property: 6 claims, including the Allie mine, in the Texas district, near Gilmore, Lemhi county.

Geology: lead-silver ores occur in fissure veins in flat Devonian limestone underlain by Cambrian quartzite. The Allie vein, closely parallel to the lead veins, has gangue of iron oxide with no lead and only a trace of silver, the ore averaging 1 oz. gold and 50% iron. For geologic details see Umpleby Bull. 528, U. S. Geol. Survey, 1913, p. 107.

Development: a 4,500′ tunnel has been driven into Gilmore mountain by the Gilmore, and the Pittsburgh-Idaho companies jointly. This tunnel crosses a dozen silver-lead veins and one carrying gold ore. Development work on the Latest Out lead vein is 800′ below the outcrop. Ore reserves were claimed 1914 to be 15,000 tons, averaging $12 per ton in gold. Extensive prospecting has not yet shown any commercial silver-lead deposits, though it has opened up good gold ore.

Production: first shipment in Feb., 1914, of 26 tons of gold ore gave smelter returns of $11,060. Total production for that year was 50 tons, averaging better than $300 per ton. Idle since 1914, except for limited work done by lessees.

ALMA RAY MINING CO. IDAHO

Address: Kellogg, Idaho.

Officers: R. A. Brockman, pres.; C. C. Bloomquist, v. p.; C. B. Forbes, sec.-treas., with W. W. Papesh, Peter Engels and D. Barnhart, directors.

Cap. $375,000; 25¢ par; assessable; last assessment, 1 mill, payable July 1, 1921.

Property: 14 claims near Kellogg, Shoshone county, between the Lombardy and Teddy groups.

Development: by several tunnels. Operations resumed early in 1921, and 181′ of crosscutting said to have exposed 70′ of mineralized quartz containing lead and silver.

ALPENA COPPER MINING CO., LTD. IDAHO

Address: Gyde-Taylor Bldg., Wallace, Idaho.

Officers: C. W. Beale, pres.; A. H. Featherstone, sec.-treas.

Cap. $100,000; 10¢ par; assessable. Assessment No. 4 of 1 mill per share payable July 2, 1920.

Property: 6 claims, 2½ miles N. of Adair, in St. Joe district, shows veins containing copper ore. Mine is in an isolated region and miners are hard to get. Work suspended indefinitely in 1920.

ALPINE MINING CO. IDAHO

Address: Charles H. Treacy, mgr., Banks, Boise county, Idaho. J. McNeill and T. Harrington, supts.

Officers: Judge Charles Kerr, pres.; R. J. Colbert, sec.-treas.; with C. P. Nevin; J. I. McCarthy, and W. H. Maloney, directors.

Inc. 1919, in Idaho. **Cap.** $600,000. Capital was raised in Lexington, Kentucky.

Property: the Three Sisters claims near Banks on the Idaho Northern branch of Oregon Short Line. Ore carries silver and lead. An 8-mile road has to be constructed.

ALTA COPPER MINING CO. IDAHO

Probably dead. Fully described Volume XII.

ALTA-IDAHO GOLD & COPPER MINING CO. IDAHO

Probably dead. Fully described Volume XI.

ALTA MINING CO., LTD. IDAHO

Address: W. B. Horn, pres., Salmon, Idaho.

Cap. $500,000; $1 par.

Property: 3 claims on Jessie creek, near Salmon, Lemhi county.

Development: by tunnels totaling 1,100', revealing a considerable quantity of gold-silver-lead ore. No data procurable regarding shipments.

AMAZON-DIXIE MINING CO. IDAHO

Office: Wallace, Idaho. **Mine office:** Sildix (not a P. O.), Mont.

Consolidated 1921 with **Leslie Copper Mining Co.**, owning adjoining claims. Stock exchanged share for share.

Officers: Wesley Everett, pres.-mgr.; A. W. Ellenberger, v. p.; Herman J. Rossi, sec.-treas., with Minnie Wyman and T. Motetta, directors.

Inc. 1908, in Montana. **Cap.** $750,000; increased 1921 to $1,250,000; 50¢ par; 447,596 shares in treasury; assessable; 3¢ levied in Nov., 1919; 3¢ in Aug., 1920; 2¢ in March, 1921; 2¢ in Oct. 1921.

Operating expenses for 1920 amounted to $251,108, with a cash balance in bank, Jan. 20, 1921 of $18,136. This money was received from two assessments. (For earlier figures, see Vol. XIV.)

Property: 15 claims, in process of patenting, well timbered, at Sildix, Saltese district, Mineral county, Mont., near Lookout, just across the state border-line, including holdings formerly owned by the Leslie Copper Mining Co. Property shows a fissure vein in quartzite exposed by surface trenching for 2,000', carrying galena, chalcopyrite and lead carbonates, associated with pyrite, with value mainly in lead.

Development: by 2 tunnels, 8,000' long, the lower or main working tunnel with portal near the Northern Pacific Railway. Tunnels are connected by a 400' raise. A double compartment shaft is 1,300' deep and is to be continued another 400'. Crosscuts to north and south opened two veins, the southern one showing a body of gold-silver-lead-copper concentrating ore along a 60' drift. Early in 1921, the main work being done was extending No. 7 tunnel over 2,000' long, into the Leslie ground.

Equipment: includes compressor, hoist, pumps, a water-power plant, 20,000' sawmill. (150,000' of sawn lumber on hand". Machine-shop, smithy, carpenter shop, and other necessary mine buildings. Property is served by the Northern Pacific Railway, 160' from the mine and over a 9-mile line from the Montana Power Co. The mine is electrically equipped throughout.

AMAZON-MANHATTAN MINE IDAHO

Address: Eugene R. Day, Burke, Idaho.

Property: 6 claims N. W. of Callahan Zinc-Lead Co., Beaver Creek district, Coeur d'Alene region. Its history, which is one of continuous litigation over ownership, dates from 1912 and is given in Vol. XIV.

Development: by tunnels, the lowest, or No. 3, 2,000' long, attaining a depth of 900'. Early in 1918, a ½-mile tramway was constructed to the Ray-Jefferson company's 400-ton mill, from which 60 carloads of concentrates from Amazon-Manhattan ore were shipped in 1918.

AMBERGRIS MINES CO. IDAHO

Address: Wallace, Idaho.

Officers: Eugene R. Day, pres.; Harry L. Day, v. p.; W. B. Heitfelt, sec., with August Paulsen, W. Clayton Miller and Al. Page, directors.

Inc. June, 1916, in Idaho. **Cap.** $1,000,000; $1 par; assessable; last assessment, 2c per share, called August, 1917. Company is a reorganization of the Ambergris Mining Co., organized under laws of Washington with $3,000,000 capitalization. Stock was exchangeable at the rate of 3 shares of old for 1 share in the new company. Controlled by the Day family through Hercules Mng. Co., which holds 505,333 shares.

Property: 3 claims, patented, adjoining the Hercules at Burke, Coeur d'Alene region, developed by 200' shaft, said to show 2-3' of silver-lead ore. As a result of former litigation, company has the right to use the Hercules tunnels and the aerial tram for shipments to rail. Developing through the

No. 4 Hercules tunnel to cut the Ambergris vein. Company is not yet a big producer.

AMBRO MINING CORPORATION **IDAHO**

Address: 600 West Pratt St., Baltimore Md., or Bellevue, Blaine county, Idaho.

Officers: J. H. Mencken, pres.; J. R. Kelly, v: p.-mgr.; Christopher Schaefer, sec.-treas.

Inc. in Delaware. Cap. $1,000,000; 10c par.

Property: the Hidden Treasure and Idaho Central groups of 7 claims, 4 miles S. E. of Bellevue, and half mile from railroad between Hailey and Shoshone. Examined by Arthur Lakes, whose report is rather non-committal. Ore consists of iron oxide and galena, the latter with silver. Previous owners are reported to have extracted ore worth $150,000.

Development: by 725' tunnel and 300' crosscut, being extended in 1920, said to have opened high-grade silver-lead ore, also some copper.

During 1920 the house of Thompson & Co. of Philadelphia, which is financing this prospect, offered to sell shares at 10 cents each, for cash or in 10 installments. If cash be paid, a 25% bonus was promised.

AMERICAN COMMANDER M. & M. CO., LTD. **IDAHO**

Address: H. B. Kingsbury, mgr., Mullan, Shoshone Co., Idaho, or Box 765, Wallace, Idaho.

Officers and directors: Patrick Johns, pres.; J. A. Glowe, v. p.; Herman Marquardt, sec.-treas.; J. L. McCormick, asst. sec.-asst. treas.; H. B. Kingsbury, mgr.

Cap. $1,500,000; $1 par; 1,200,000 issued; assessable. Last assessment, of 1 cent per share, payable May 19, 1921. About 200,000 shares sold at delinquent sale on Dec. 6. Cash on hand in Jan., 1920, amounted to about $3,000.

Financial report for year ended June 30, 1921, shows total receipts, $36,832; of which $33,525 was from 3 assessments; disbursements totaled $32,363; balance, $4,469.

Property: 2 claims and 2 fractions, patented, 32½ acres, situated 1 mile N. of Mullan, and between the Gold Hunter mine and the Federal M. & S. Co's. Morning mine. Considered well located for exploration through adjoining properties. Ore carries lead and silver.

Development: by 4,500' of workings, includes 2 tunnels, No. 1, 1,200' and No. 2, 2,600' long. The tunnels are to be connected and crosscuts driven to the vein. Present work is devoted to completing a 300' crosscut tunnel to reach a high-grade silver-lead vein found in the bottom of an old 60' shaft, 493' above No. 1 tunnel.

Equipment: includes a compressor and machinery sufficient for extensive exploration. Six men were employed during the winter of 1920-21.

AMERICAN DEVELOPMENT, MNG. & REDUCT. CO. **IDAHO**

Described in Vol. XIV. Name changed to **Rescue Gold Mines Co.**, which see.

AMERICAN EAGLE MINING CO. **IDAHO**

Address: A. W. Boyd, Sandpoint, Bonner Co., Ida.

Inc. 1919, in Idaho.

Property: 7 claims, on W. side of Pend Oreille Lake and 4½ miles S. of the Armstead mine.

Development: by 1,375' of crosscuts and drifts, on a quartz vein 2-8' wide, carrying lead and silver.

AMERICAN MINING CO., LTD. **IDAHO**

Address: John Dolan, sec.-treas., Box 236, Wallace, Idaho.

Inc. Oct. 2, 1910, in Montana. **Cap.** $50,000; $1 par; assessable, issued 25,000 shares, sold at $1. Assessment of 2 mills per share levied Sept. 4, 1920.

Property: a half interest in the Blue Jacket and Queen mines in Seven Devils district, near Landore, Adams county. The Blue Jacket mine has a

400′ shaft, and the Queen has a 1,500′ tunnel; these properties said to have produced about $250,000 in ore, with smelter returns up to 47% copper.

Holdings also include a five-eighth interest in the Peacock, White Monument, a two-third interest in the Helena mines, held jointly with A. M. Holter and S. T. Houser; and a one- half interest in the Blue Jacket No. 2, Copper Queen, Norman, Legal Tender, Copper Crescent and Calumet mines, held jointly with A. C. Johnson and Amelie H. Kleinschmidt.

The Peacock mine, discovered 1869, is the most noted property and has been the largest producer in the Seven Devils district, having 1,500′ of workings, which have produced 25,000 tons of high-grade ore. Estimated to show 200,000 tons of 4½% copper ore with about $5 combined gold and silver value on dumps now. Shipments, 1903, returned 13.3, to 18.3% copper, from 3 to 5 oz. silver and $1.33 gold per ton; and 11 shipments to the Oregon Smelting & Refining Co. gave returns of 20.5 to 40.2% copper, 1.15 to 8.7 oz. silver and $1.20 to $3.40 gold per ton. Production, 1905, was 5,000 tons of ore, of about 15% copper tenor, equal to 750,000 lb. fine copper.

Company inactive since 1909, owing to litigation. The Blue Jacket mine was last operated by lessees in 1917.

See Mines Handbook, Vol. XII.

AMY-MATCHLESS MINING & MILLING CO. **IDAHO**

Address: W. A. Beach, treas., Mankato, Minn.

Offcers: Geo. Wedenmann, pres.; C. J. Holman, sec.; W. A. Beach, treas.

Inc. July, 1914, in Arizona. **Cap.** $1,250,000; $1 par; assessable.

Property: 19 claims, on Pine Creek, Coeur d'Alene, 3 miles from rail. A contact vein between quartzite and slate trends N. W., dips S. W. and is displaced 500′ by a fault. Ore carries lead and zinc.

Development: by 4,000′ tunnel and 200′ shaft. A 3′ vein, with selected ore carrying 60% lead and 12 oz. silver, was reported cut in the tunnel in 1920.

ANCHOR MINING CO. **IDAHO**

Address: Evan Evans, pres., Burke, Idaho, or J. L. Prickett, sec.-treas., Raymond Hotel, Spokane, Wash.

Cap. $1,500,000; $1 par.

Property: lead-silver bearing claims near Murray, Lalande district, Coeur d'Alene. Developed by tunnels. An ore-shoot 200′ long was opened early in 1919.

ANTIMONY-SILVER MINING CO. **IDAHO**

Defunct. See Volume XIV.

ARCO MINING & MILLING CO. **IDAHO**

Address: Angus McKellar, pres., Walker Bank Bldg., Salt Lake City. Utah.

Property: an antimony mine 18 miles S. W. of Arco, Blaine county.

Ore also carries small values in silver and gold. Vein 4′ wide, opened for 70′. A second vein cut 30′ from portal of tunnel, said to show ore in winze.

ARCTIC MINING & MILLING CO., LTD. **IDAHO**

Address: W. H. Keating, treas., Wallace, Idaho.

Cap. $1,500,000; $1 par; assessable.

Property: 5 claims on Placer creek, 6 miles S. of Wallace. Tunnels have opened lead-silver ore.

ARGENTA MINING CO., LTD. **IDAHO**

Address: C. D. Brock, Wallace, Idaho.

Officers: E. Lindsley, pres. and mgr., Missoula, Mont.; D. C. Smith, v. p.; C. D. Brock, sec.-treas., with A. L. Duncan and W. C. Richardson, directors.

Inc. Dec., 1906, in Idaho. **Cap.** $1,092,000; $1 par; assessable; all outstanding. Last assessment, ½ mill per share, payable May 30, 1921. Annual meeting, second Monday in January.

Property: 5 claims, 3 patented, 75 acres, in Hunter district, Shoshone

county claimed to show quartz fissure vein 12′ wide, carrying carbonate and oxide ore at surface and sulphide ore at depth; the surface ore consisting of iron oxide, quartz and barite, averages 2% lead and 1 oz. silver. Development by 875′ tunnel to depth of 400′. Lessees were extracting ore, at last account (1918).

ARGENTINE LEASING CO. **IDAHO**

Address: M. W. Emmett, sec.-treas., Kellogg, Ida.

Officers: Carl F. Nelson, pres.; John Stoykoff, v. p.; Steve Corrick, mgr., with Geo. Newsome, directors.

Property: a 2-year sublease from Rush J. White, on the Argentine mine, an old silver producer, 2½ miles W. of Kellogg. A strike of 100 oz. silver ore was reported in October, 1921.

ARKANSAW LEASING CORPORATION **IDAHO**

Address F. D. Smith, 217 Linden Ave., Ithaca, N. Y.

Property. the Arkansaw mine of the Seven Devils Copper Co., near Landore, Adams county. Contact deposits occur between diorite and limestone, and carry copper, silver, and gold.

Development: by tunnels 700′ and 1,200′ in length.

Idle since 1919.

ARLINGTON MINING CO. **IDAHO**

Address: Burke, Idaho.

Officers: C. T. Fisher, pres.; M. J. Mahoney, sec.-treas., with W. Fisher, Joseph Ruby and Otto Freeman, directors.

Cap. $1,500,000; $1 par; assessable.

Property: 20 claims near Mountain House, Coeur d'Alene. Ore carries lead, silver and copper.

Development: by 2,000′ of tunnels. Equipped with compressor, etc., driven by water power.

ARMSTEAD MINES INCORPORATED **IDAHO**

(Formerly the Blacktail Mining Co.)

Address: Talache, Bonner county, Idaho.

Officers: Major H. H. Armstead, pres.-mgr., Washington, D. C.; A. H. Burroughs, v. p.; Karl Jungbluth, 2nd v. p.; H. D. Kingsbury, treas.; H. L. Brown, sec., with C. C. Dula and J. Peterson, directors. Daniel G. McLachlan, supt.

Property the Keystone, or Blacktail mine, on Blacktail mountain, west side of Pend d'Oreille lake, near Talache landing. Originally owned by the Keystone Mines Corporation (See Volume XII of the Mines Handbook). Property sold by Blacktail Co. (Volney D. Williamson) for $250,000 in June, 1917, and 13½¢ per share was paid on the 1,746,440 outstanding shares of the old company.

Development: by 4,000′ Rainbow tunnel, intersecting vein at 3,500′ at a vertical depth of 1,000′; a 1,200′ raise and about 3,000′ of drifting are said to expose between 60,000 and 75,000 tons of gold-silver-copper ore, averaging $25 per ton, mainly in silver. Milling ore persists to 1,200′ vertical where the vein is up to 7′ wide. A 60° three-compartment raise at 3,800′ connects with No. 2 level 600′ above. By the end of 1919, the 700′ level had opened the vein at points 1,600′ apart. During the winter of 1920-21, exploration was done on the 800, 900 and 1,000′ levels. Workings total 15,000′. Sixty men employed, Sept., 1921.

Equipment: includes boiler, pump, hoist, compressor, and six drills. A concentrating plant is being erected.

ATLANTA MINES CO. **IDAHO**

Address: Jas. A. Dunn, 47 E. 42nd St., New York.

Controlled by the Barnsdall Corporation, which owns $1,938,300 of the stock

Officers and directors: F. H. Minard, pres.; E. O. Bartlett., v. p.; Jas. A. Dunn, sec.; J. T. Furlong, treas.

Inc. Aug., 1909, in Delaware. Cap. $2,000,000; $100 par.

Property: 11 patented and 6 unpatented claims, mill-sites, and water-rights in Boise district, Elmore county, carrying gold-silver ore.

Development: by 600′ shaft and extensive workings.

Equipment: hydro-electric plant, hoist, compressor, aerial tram, 200-ton concentrating mill and cyanide plant.

Presumably idle.

ATLANTIC MINING CO. IDAHO

Address: Herman J. Rossi, pres., or Otto A. Olsen, sec.-treas., Wallace, Idaho .

Cap. $1,000,000; $1 par.

Property: 7 claims in Beaver section of Coeur d'Alene. Assessment work only being done.

AURORA-SAMPSON MINING CO. IDAHO

Consolidated Jan. 14, 1916, with H. E. M. Mng. Co. to form the **Western Union Mining Co.,** which see.

AUXER GOLD MINES IDAHO

Address: Jas. Campbell, postmaster, Hope, Ida.

Officers: Jas. Campbell, pres.-gen. mgr.; F. O. Hagie, v. p.; M. B. Dunkle, sec.-treas., with W. W. von Canon and J. L. Breckenridge, directors.

Inc. 1920, in Idaho, **Cap.** $500,000.

Property: a group of 7 gold-silver claims, near Hope, Bonner county.

Development: by tunnel and 90′ shaft, said to show a quartz vein, 11′ wide, samples averaging $5.99 in gold.

Machinery installed in 1921 and a new tunnel started to cut the orebody at 250′ depth.

BANNER-IDAHO MINING CO. IDAHO

Address: C. J. Smith, sec., 63 Zeigler Bldg., Spokane, Wash.

Cap. $1,500,000; $1 par; assessable after all issued.

Property: 5 patented claims in Hunter section of Coeur d'Alene region. Ore carries lead and silver and is opened by 1,500′ of tunnels, etc.

No information obtainable.

BANNER MINING & MILLING CO. IDAHO

Address: Peter Steele, mgr., Silver City, Idaho.

Inc. in Idaho. **Cap.** $1,000,000; $1 par.

Property: 20 claims, at Silver City, Owyhee county, an old-time producer.

Ore: quartz, carrying gold and silver, occurs in a fissure vein.

Development: by tunnel. In 1920, the Blaine tunnel and the "28" crosscut of the Florida Mountain M. Co. were leased to permit of easier exploration. The crosscut will be extended into Banner ground.

Equipment: 4 (Nissen)-stamp mill, using pan-amalgamation and concentrators, compressor and electric power.

BASIN MINING CO. IDAHO

Address: Wallace, Idaho.

Officers: E. R. Day, pres.; J. J. Murphy, v. p.; P. Maggy, sec.-treas., with H. J. Rossi and J. J. Day, directors.

Inc. July, 1915. **Cap.** $75,000; shares 5c par. Company is a reorganization of the old Basin Mining Co., involved in litigation since 1907. Control purchased May, 1916, by the Hercules Mining Co., which bought 700,000 shares of issued and 500,000 shares treasury stock, and held 840,854 shares, at last accounts.

Property: 5 patented claims in the Burke section, south of and adjoining the Hercules mine, between the Laclede on the west and the Stanley group. It is valuable to the Hercules Co. for tunnelling from the Hummingbird and Stanley into the Hercules mine. No information obtainable.

BEAR CREEK MINING CO. IDAHO

Address: Wallace, Idaho.

Officers: L. L. Sweet, pres.; J. F. Forest, v. p.; J. F. Morton, sec.-treas., with F. C. Curran and John Noonan, directors

Inc. Aug., 1916. **Cap.** $250,000; 25c par; assessable. Last assessment of 1c. payable Sept. 17, 1921. Annual meeting third Tuesday in August. Company bought the holdings of the Oro Fino Co. at receivers sale, June, 1916, and is a reorganization of that company.

Property: 11 lead-silver claims, about 7 miles from Murray, in the Summit district, Coeur d'Alene, 3 miles from the railroad.

Development: by tunnels. Twelve feet of milling ore reported opened in a drift at 1,200' depth.

Equipment: includes a mill and flotation plant.

Production: one carload of concentrate weekly, assaying 61% lead and 6 oz. silver, was shipped during part of 1920.

BELLE OF THE WEST MINING CO. **IDAHO**

Address: G. R. Trask, pres., P. O. Bldg., Wallace, Idaho

Cap. $75,000; shares 5c par; assessable.

Property: 2 claims, adjoining the Success mine, and said to carry the western extension of the Success vein.

Development: by tunnels and crosscuts. The main vein under development contains lead, silver and chalcopyrite.

BELL MINING CO. **IDAHO**

Address: C. H. Hussey, sec., Empire State Bldg., Spokane, Wash.

Cap. $50,000; 10c par; assessable.

Property: 8 patented claims in Lalande section of Coeur d'Alene, carrying lead-silver ore, developed by over 7,000' of tunnels and other workings. Bonded to F. J. Markwell.

BELMONT-BANNER MINING CO. **IDAHO**

Office: 417 Hutton Bldg., Spokane, Wash.

Officers Conrad Wolfle, pres. and gen. mgr.; E. A. Wolfle, v. p., M. E. Poole, sec.-treas, with A. J. Davis and Gale Smith, directors.

Cap. $1,000,000; $1 par.

Property: 10 claims one fractional, near Delta and 12 miles from Wallace, Shoshone county, shows a fissure vein of 3 to 4' surface width, in quartzite, carrying silver, lead and copper. Mine has a tunnel over 500' long with a 60' winze sunk on the orebody. No recent information available.

BELMONT MINING CO., LTD. **IDAHO**

Office: F. P. Hess, sec., 415 Cedar St., Wallace, Shoshone county, Idaho. Mine in Two Mile gulch, Evolution district, 3 miles north of Osborne.

Officers: Wm. Scheave, pres.; M. E. Hess, v. p.; Frank P. Hess, sec.-treas., with Ida Scheave and H. Scheave, directors.

Inc. 1900. **Cap.** $100,000; 10c par, with 200,000 shares in treasury. Reorganized 1909, 1,000,000 shares at $1 par; assessable; placing 500,000 shares in treasury. Assessment of 5 mills per share levied Oct. 22, 1921.

Property: 12 claims, showing several contact veins in Burke and Revett quartzite. Ore is said to assay 2.5% lead, 2oz. silver, 15% manganese with only a trace of copper.

Development: by 2,600' of tunnels. No development work done in 1918-19. Representation work only in 1920-21.

BENTON MINING CO. **IDAHO**

Address: Barnard Block, Wallace, Idaho.

Officers: John Callahan, pres.-mgr.; F. P. Candee, sec.-treas.; E. G. Gnaedinger, cons. engr., with Fred Richardson and N. E. Nuzum, directors.

Cap. $1,250,000; $1 par; issued 1,165,000 shares; assessable; increased to $1,500,000 in March, 1920. Listed on Spokane Exchange. Annual meeting in April at Wallace.

Property: 6 claims on east side of Gorge gulch, adjoining the Stanley and Moonlight, near Burke, supposed to have a continuation of the Stanley vein system. **Ore:** is silver-lead-copper-antimony, occurring in fissure veins, said to assay 60% lead, up to 12% copper and 65% antimony. Lead vein

dipped out of winze at 60′ depth and at 200′ the McNeil fault was passed through. Crosscutting at this level exposed lead vein to the S. E., but main orebody is supposed to be deeper.

Development: by adits, 200′ winze from main adit level, with over 1,000′ of drifting.

BERNICE MINING CO. IDAHO

Succeeded by the **New Caledonia Cons. M. Co.**, which see.

BEST CHANCE MINING CO., LTD. IDAHO

Main office: 614 Hyde Bldg., Spokane, Wash. **Mine office:** Wallace, Shoshone county, Idaho.

Officers: Chas. H. Bell, pres.; Chas. A. Gram, sec.-treas., with J. A. Scott and Chas. Horr, directors.

Inc. March, 1909, in Idaho. **Cap.** $1,500,000; $1 par; fully paid and assessable.

Property: 12 claims in the Yreka section, Coeur d'Alene. Fissure veins, carrying lead and silver ore in Burke quartzite, are said to be 100′ wide.

Development: by 3,500′ of workings.

BETHLEHEM GOLD MINES, LTD. IDAHO

Office: Geo. H. Van Dusen, sec.-treas., 408 Sherwood Bldg., Spokane, Washington. D. B. Heil, trustee.

The former president, Harry Dudman, is charged with misusing company funds and is out on bond. A new company was to be organized by stockholders in 1921, stock to be exchanged upon payment of a 2c. assessment to meet claims of about $14,000.

Inc. in Washington and registered in Idaho. **Cap.** $1,500,000; $1 par.

Property: 7 claims on Tungsten mountain, 20 miles N. E. of Bonners Ferry in Boundary county, and 4½ miles E. of Copeland on G. N. R. R. Examined 1919 by C. A. Low. Veins are quartz fissures cutting granite. Sulphides show near surface, and include iron pyrite, chalcopyrite, galena, and sphalerite. There is also some tungsten and molybdenite.

Development: 400′ of surface trenches exposed several large veins and a number of stringers paralleling and running into the Dora vein. These were opened by tunnels, revealing fair ore in places. The main tunnel followed the Dora for over 100′, showing 2 to 7′ of ore.

BIG BALDY MINING & MILLING CO. IDAHO

Address: Jas. Petikan, pres.; G. W. Sommer, sec., Old Nat'l. Bank Bldg., Spokane, Wash.

Cap. $1,000,000; 50c. par.

Property: 21 gold quartz and 3 placer claims in Buffalo Hump district, Idaho county, so far only developed by 600′ of workings.

BIG CREEK LEASING CO. IDAHO

Address: Kellogg, Idaho.

Officers: D. W. Price, pres.; Thomas Fluke, v. p.; O. A. Larson, sec.-treas., with R. R. Price, W. A. Beaudry and Elmer Brown, directors.

Cap. $50,000; shares $10 par; all issued. Assessment of $1 per share levied Jan. 4, 1921. Annual meeting July 8.

Dividends: initial of 50c per share paid September, 1917; total is $10,000. Profit was $11,193 in 1917.

Property: a 7-year lease, to 1920, on the ground below the 500′ level of the Yankee Boy mine of the **Sunshine M. Co.**, which see.

Development: by tunnels, one 2,150′ long, opening silver-copper ore.

Production: 25 cars of ore in 1916, valued at $28,000; 2,468 tons valued at $127,298 in 1917. Shipments were made in 1919, but no recent returns received from company.

BIG CREEK MINING CO. IDAHO

Address: 513 Bank St., Wallace Idaho.

Officers: G. Scott Anderson, pres.-mgr.; W. W. Smith, sec., above with A. H. Featherstone, Irving Anderson, and C. E. McCoy, directors. Charles Couch mill supt.

Cap. $1,250,000; $1 par; assessable. Assessment of 10 mills per share levied Sept. 10, 1921.

Property: 6 claims, 1½ miles up Big Creek, near Kellogg, in the Coeur d'Alene district. Ore contains silver, lead and copper.

Development: by 3,380' crosscut tunnel with levels 200' apart, reaching maximum vertical depth of 1,100'. Two other tunnels have opened the same shoot, which can be developed 500' deeper by tunnel. Dumps contained over 4,000 tons of ore in 1920.

Equipment: includes electric power, air-compressors, 1,400' aerial tramway, drills and a 75-ton mill.

Production: from 1915 to 1917, 17 cars of 1 to 5% copper and 2 to 5% lead ore, yielding $44,010 net; and 18 cars in 1918, yielding $43,510. Shipments being made at the rate of 5 cars of concentrate per month. Twenty-five men employed.

BIG CREEK SILVER MINING CO. **IDAHO**

Address: John P. Gray, Coeur d' Alene, Idaho.

Cap. $100,000; 10c par.

Property: up Big Creek, near Kellogg. No information available.

BIG DIVIDE MINING CO., LTD. **IDAHO**

Address: Wallace, Idaho.

Officers: Alexander Murphy, pres.; F. P. Markwell, v. p.; E. H. Pattison, sec.-treas., with C. A. Markwell and J. F. Markwell, directors.

Cap. $1,500,000; $1 par; 1,241,740 issued.

Property 137 acres, a silver-lead prospect in Lalande district, Shoshone county, between the Success mine and property of Federal M. & S. C..

BIG FIVE MINING CO. **IDAHO**

Address: W. F. Sargent, sec.-treas., St. Maries, Idaho.

Cap. $2,000,000; $1 par; assessable.

Property: 40 acres in St. Maries section of Coeur d' Alene, carrying gold, copper, and lead, and opened by tunnels. Idle several years.

BIG IT MINING & MILLING CO. **IDAHO**

Address: M. L. Pratt, sec., Kellogg, Star Route, Idaho.

Officers: H. S. Davenport, pres.; F. M. Cummings, v. p.; M. L. Pratt, sec.-treas., with Jack Shiplet and J. J. Randall, directors.

Cap. $150,000; 10c. par. Annual meeting first Tuesday in June.

Property: in Pine Creek section of Coeur d'Alene. Ore said to contain lead, silver and zinc.

BITTER ROOT MOUNTAIN MINING CO. **IDAHO**

Address: 939 South Hilliard St., Spokane, Wash.

Officers: F. A. Edgerton, pres.; F. A. Noteware, sec.-treas.

Inc. 1900, in Washington. **Cap.** $75,000; 5c par; 1,200,000 issued.

Property: 3 patented claims in Hunter district, Shoshone county, developed by 1,000' of tunnels, and shaft, opening a little silver-lead ore.

BLACK BARB MINING CO. **IDAHO**

Address: Wm. H. Alexander, 469 Fifth Ave., New York, or R. Guyer, 318 Symons Bldg., Spokane, Wash. **Mine address:** Hailey, Idaho.

Officers: Raymond Guyer, pres.-mgr.; Edw. W. Van Asmus, v. p.; Wm. H. Alexander, sec.-treas., with John A. Martin, H. G. H. Tarr, Edw. W. Beattie, J. K. Powell, Nelson Macy and Theo. Van Dorn, directors.

Inc. March 21, 1917, in Idaho. **Cap.** $1,500,000; $1 par; all outstanding. Coal and Iron Nat'l. Bank, New York, registrar and transfer agent.

Property: 14 claims, 4 patented, 280 acres in Mineral Hill mining district, Blaine county. Ore contains gold, silver, lead and zinc with iron pyrite occurring in quartz fissure veins in limestone.

Development: consists of 2,700' of workings, including tunnels, 600', 200' and 300' in length. Reported 10,000 tons of ore blocked out in 1917. Some rich lead-silver ore was opened in 1918, and 1919 on the 550' level. Inactive, 1920-21.

BLACK BEAR CONSOLIDATED MINING CO., LTD. IDAHO

Reorganized as **Black Bear Mines Co.**, which see.

BLACK BEAR MINES CO. IDAHO

Formerly Black Bear Cons. M. Co., Ltd. **Office:** Wallace, Idaho.

Officers: Chris Hagan, pres.; Peter Bernier, v. p.; H. J. Arnett, sec.-treas., with R. E. Weniger, H. J. Rossi and Otto Grice, directors.

Inc. March, 1917, in Idaho. **Cap.** $400,000; 20c par; assessable; 1,007,000 issued. Assessment 1c. a share, delinquent Oct. 9, 1920.

Property: 4 patented claims and a mill site, 4½ miles N. W. of Wallace, Shoshone county. Examined by Frank J. Davey.

Geology: claims carry a fissure vein in Burke quartzite that dips 80° S., and runs N. 75° W.; in upper horizons vein carries 10% lead as carbonate, with 2 oz. silver per ton. Though narrow and poor at surface, the vein has widened to 8′ at 125′ in depth, with the content just given. In places the vein widens to 23′. At 1,180′ below the surface the vein is lean and shows evidence of extreme pressure, as shown along drifts from a 2,400′ crosscut tunnel. Raises from that level encounter concentrating ore carrying silver, lead, and zinc, a short distance upward.

Development: by 6,000′ of tunnels. No. 1 cuts vein at 500′ depth, exposing carbonate ore continuing down to bottom of 125′ winze. Main or working tunnel, 1,000′ lower, also cuts ore, the shoot being 2′-25′ thick and 300′ long. As shown in raises, the ore averages 6′ wide, and runs 2.2 oz. silver, 7.76% lead, and 16.57% zinc. The face of the workings is but 350′ from the end line of the Flynn property.

Equipment: includes electric motors, compressors, shops, etc.

Company is inactive. In June, 1921, an agreement was made with the Coeur d'Alene Syndicate whereby the later company secures access to and can operate the Flynn group and Senator Mining company holdings through the Black Bear tunnel. The consideration is reported to be $50,000 payable in cash and in stock of the Senator M. Co. on or before August 1, 1926.

BLACKBIRD COPPER & GOLD MINING CO., LTD. IDAHO

Idle. **Offices:** Du Bois, Pa.; and 807 Newhouse Bldg., Salt Lake City, Utah.

Officers: John E. DuBois, pres.; Chas. J. North, v. p.; F. O. Frick, sec.; W. H. Watt, treas. and gen. mgr.; with L. N. Morrison, directors.

Inc. in West Virginia. **Cap.** $2,000,000; $1 par. Bonds, $500,000, at 6%. Annual meeting, fourth Tuesday in January. Is a close corporation.

Property: Brown Bear mine and adjoining ground, covering 29 claims, patented, 482 acres, in the central part of the Blackbird district, Lemhi county.

Development: 3 shafts, with drifts and numerous short tunnels. Orebodies are irregular replacements along fracture zones in schist and quartzite. Property is in one of the best mineralized sections of the state and is said to show wide zones of disseminated ore carrying 2½% copper and 5 cents gold for each per cent of copper. Said to have spent $1,000,000 on exploration work and ore testing.

Company also owns 97 claims, 87 patented, adjoining the Cactus mine in the San Francisco district of Utah. This property has considerable development and was explored by diamond-drilling. Development on the 300′ level from an old shaft disclosed a vein of chalcopyrite.

BLACKHAWK MINING & DEVELOPMENT CO., LTD. IDAHO

Controlled by Federal Mining & Smelting Co.

Address: A. W. Hoover, sec., Wallace, Idaho.

Cap. $150,000; 10c par; assessable.

Property: the Blackhawk lead-zinc mine in Government gulch, Coeur d'Alene, developed by about 6,300′ of workings.

BLACK PINE MINING CO. IDAHO

Office: 926 W. Lehigh Ave., Philadelphia, Pa. **Mine office:** Elk City, Idaho.

Officers: S. J. Rieben, pres.; Louis H. Michel, v. p.; Dr. Wm. H. Kinch, treas.; R. T. Moyer, sec., with J. B. Shourds, Dr. Fred Bridgland, E. Thompson and Jas. McGrath, directors.

Inc. Feb., 1913, in Arizona. **Cap.** $1,000,000; $1 par.

Property: 41 claims, 700 acres, includes Black Pine and Crown Point mines, at Elk City, Idaho county.

Ore: carries gold and silver, in veins believed to be a continuation of the Mascot lead vein, averaging $12 per ton in gold, silver, lead and zinc.

Development: by 1,400' tunnel.

Equipment: compressor, drills, 5-stamp mill, and concentrators.

Production: 40 tons of ore daily early in 1918.

BLACK ROCK MINING CO. **IDAHO**

Address: G. W. Sommer, Old National Bank Bldg., Spokane. Wash.

Cap. $200,000; 10c par.

Property: 12 unpatented lead-silver claims 2 miles N. of Kellogg.

BLACKSTONE MINING CO. **IDAHO**

Address: J. H. Hawley, pres., Boise, Idaho.

Cap. $1,000,000; $1 par.

Property: 5 patented claims in Volcano district, carrying gold-silver-copper ore. Developed by 400' tunnel and crosscuts, said to have opened a vein 2' wide, averaging $50 per ton.

Operated by lessees since November, 1920.

BLACKTAIL MINING CO. **IDAHO**

Address: Jos. Plastino, Italian Consulate, Spokane, Wash.

Officers: Joseph Plastino, pres.; Mrs. Sosetta Plastino, sec.; Wm. Paptist, treas.

Cap. $200,000; $1 par.

Property: 6 unpatented claims, on Pend Oreille lake, near Talache, Bonner county. Ore carries copper, gold, and silver. Developed by short tunnel. Six feet of $7.60 silver ore opened in November, 1919. Plan driving a 200' tunnel.

BLAINE & EMMETT MINING CO., LTD. **IDAHO**

Address: R. W. Skeman, sec., Murray, Idaho.

Officers: M. Heblethwaite, pres.; Bert Kincaid, v. p.

Cap. $1,000,000; $1 par. Annual meeting held July 31, 1920.

Property: 4 unpatented claims near Union, Shoshone county, carrying copper, silver and lead ore. Driving a crosscut tunnel, in 600', August, 1921.

BLOYER MINING CO. **IDAHO**

Alex Bills, gen. mgr., Pierce, Idaho.

Property: 7 claims, on Poor Mans creek, 9 miles N. W. of Pierce, Clearwater county, said to show four veins carrying free milling ore with an average value of $12 per ton.

Development: by 120' crosscut tunnel and 230' of drifts. **Equipment:** includes 25-ton Chilean mill, crusher and steam-power plant.

BLUE BELL MINING CO., LTD. **IDAHO**

Address: Frank Bland, sec., Barnard Block, Wallace Ida. M. J. Weber, pres., 2732 N. San Francisco Ave., Chicago, Ill.

Cap. $1,000,000; $1 par; assessable. Last assessment, of 4 mills per share levied August 4, 1920.

Property: 11 unpatented claims near Wardner, Shoshone county, Idaho.

Development: by a 2,500' tunnel, said to have opened silver-lead ore.

Idle for several years, but worked was resumed in 1920 and a crosscut driven N. from the main tunnel.

BLUE GROUSE MINING CO. **IDAHO**

Address: Gyde-Taylor Bldg., Wallace, Idaho.

Officers: Donald A. Callahan, pres.-treas.; D. F. Stalev, v. p.; C. W. Newton, sec., with J. F. McCarthy, John Borg, and F. L. White, directors.

Company is controlled by the **Callahan Zinc-Lead Co.**, which see.

Property: Blue Grouse mine, 4 patented claims, between the Callahan

Zinc-Lead and Amazon-Manhattan properties, developed by 1,500′ of tunnels on 2 veins. Ore is lead-silver, with some zinc.

BLUE JACKET COPPER CO., LTD. IDAHO

Company has discontinued operations. Fully described Vol. XI, Copper Handbook. See American Mng. Co., Ltd.

BLUE JACKET MINING CO. IDAHO

Address: Lucile, Idaho county, Idaho.

Officers: W. B. Clark, pres., Johns Hopkins University, Baltimore, Md.; B. N. Baker, v. p., J. M. Lawford, sec.-treas., with F. T. Homer and Frank E. Johnesse, m.gr., directors

Inc. Oct. 20, 1908, in Idaho. **Cap.** $50,000; $1 par, fully paid. Annual meeting, first Monday in January. Company is a close corporation.

Property: 7 claims, patented, about 132 acres, in Crooks Corral mining district, Idaho county.

Geology: ore occurs as replacement along contact between diorite and andesite porphyry. Orebody is from 50 to 70′ wide, runs east and west, and dips at an average angle of 35°. The orebody is more or less oxidized down to the 700′ level, though the greater part of the ore in the lower levels is original sulphide and the enriched portion lies between the 1st and 4th levels.

Development: by a 300′ shaft, tunnels, crosscuts, and drifts, aggregating 3, 395′. These workings block out 33,000 tons of ore, carrying 3.7% copper, 1.5 oz. silver, and $1.80 gold per ton. Total reserves estimated at 542,000 tons. Property has no mill, hoist, or reduction plant of any kind and has been closed down since 1909 awaiting railroad transportation, which is still 40 miles away. Property is a good one and officers able and responsible.

BLUE RIBBON MINING CO. IDAHO

Address: A. Harris, sec.-treas., 601 N. Monroe St., Spokane, Wash. Geo. Goebler, pres.

Inc. 1914, in Washington. **Cap.** $150,000; 10c par.

Property: 140 acres, 5½ miles N. E. of Burke, Shoshone county, carrying lead ore.

Development: by 1,900′ tunnel gaining depth of 350′.

BLUE STAR MINING & MILLING CO., LTD. IDAHO

Address: A. C. Morbeck, sec., Kingston, Idaho.

Inc. 1909, in Idaho. **Cap.** $1,000,000; $1 par.

Property: 160 acres on Pine creek, Shoshone county, carrying silver and lead.

Development: by 500′ two-compartment shaft, and 3,000′ of workings. In 1920, the 400′ crosscut on the 500′ level was extended 150′ to reach the vein and the shaft was to be sunk 300′ deeper.

Reported in July, 1920, that T. S. Welch of Butte had secured an option on all the outstanding shares.

BLUE WING MINING CO. IDAHO

Address: Herman J. Rossi, Wallace Idaho.

Cap. $150,000; 10c par.

Property: 3 unpatented claims on Nine Mile, Shoshone county, carrying silver-lead ore. Assessment work done.

BOBBIE ANDERSON GROUP MINING CO. IDAHO

Address: Herman J. Rossi, sec., Wallace, Idaho.

Cap. $1,500,000; $1 par; assessable.

Property: 70 acres near Wardner, Shoshone county. Ore carries silver, copper, and zinc, opened by shallow shaft and short tunnel.

BOISE KING PLACERS CO. IDAHO

Defunct. Described in Volume XIV. Wm. MacLeod, Boise, Idaho, and Geo. D. Satterfield of Nebraska, former officers and large stockholders have a suit pending against the original promoter, Mrs. E. E. Stelle, alleg-

ing fraud. Mrs. Stelle foreclosed the mortgage in 1917 and now owns the property.

BOISE ROCHESTER MINE — **IDAHO**

Address: H. B. MacGowen, owner, and T. L. Chapman, mgr., Atlanta, Idaho.

Property: near Atlanta, Elmore county, formerly owned by the Boise-Rochester M. Co. Claims show a fissure vein, 3 to 12′ wide, developed by 800′ tunnel. Ore is said to average $9 per ton in gold and silver. In 1921 a new tunnel was driven to cut the vein several hundred feet deeper.

Ore is delivered to 40-stamp mill by Bleichert tram. Treatment consisted of amalgamating, concentrating and cyaniding. A new mill was contemplated in 1920.

BOISE ROCHESTER MINING CO. (INC.) — **IDAHO**

Property, sold to H. B. MacGowen. See Vol. XIII. and **Boise Rochester Mine** in this volume.

BONANZA MINING CO. — **IDAHO**

Fully described in Volume XIV.

BONNER MINING CO. — **IDAHO**

Property: Marguerite group of 11 claims, formerly owned by the Marguerite Mining Co., on Trestle creek, near Sandpoint, Bonner county. Ore contains gold, silver and lead.

Development: by 1,700′ adit. Operations resumed in 1921.

BOSS ZINC MINING CO. — **IDAHO**

Address: H. Lieb, mgr., Box 564, Wallace, Idaho. A. F. Lieb, sec.-treas.

Cap. $50,000; 5c par; assessable.

Property: 5 claims on Two-Mile creek, 2½ miles N. of Osborne, Shoshone county, carries lead, silver, zinc and some copper. After 2 years idleness the mine was reopened in Dec., 1920, and the manager reports: "over 400′ of work done to Jan. 1, 1921, with encouraging results."

BOSTON IDAHO GOLD DREDGING CO. — **IDAHO**

Address: E. Walker, sec., Idaho City, Idaho.

Property: placer ground in Boise basin, Boise county, on which a dredge was operating, but as gravel was exhausted the boat was dismantled in 1918, and moved to California.

The Gold Hill lode mine at Quartzburg was then acquired. It has been a gold producer for 54 years.

BOSTON-IDAHO MINING CO. — **IDAHO**

Office: 720 Scollay Bldg., 40 Court St., Boston, Mass. **Mine office:** Ketchum, Blaine county, Idaho.

Officers: Levi Diamond, pres.; Joseph Briggs, v. p., Winthrop, Me., M. A. Costello, sec.; E. M. Schwarzenburg, treas., with A. H. Bailey, Winthrop, Me.; David A. Calhoun, Portland, Me.; J. H. Hickey, Boston, Mass., and W. C. Smith, directors; C. Fred Howe, supt., Ketchum, Idaho.

Inc. May 28, 1907, in Maine. **Cap.** $2,500,000, in 1,000,000 common, $1 par; and 150,000 preferred, $10 par. In treasury $200,000 common, $1,300,000 preferred. **Bonded debt:** $125,000 authorized, $110,000 issued.

Property: 500 acres, 29 claims, 7 patented, 12 held by location, 8 leased and bonded; 2 mill sites at Boyle Mtn., Idaho, comprising one zinc and two lead-silver mines.

Geology: claims cover a granite-limestone contact showing fissure veins a few inches to several feet wide, cutting across the granite. Veins carry complex sulphide ores containing argentiferous galena, zinc blende and other sulphides in irregular stringers and replacements. The ore shipped is reported to show from 9% lead and 10 oz. silver to 79% lead and 36 oz. silver per ton, with 19% to 54% zinc. Over a million dollars worth of ore is reported to have been taken out by former owners.

Development: by 3,000′ tunnel work to depth of 900′

Equipment: includes 100-ton mill; an office, laboratory, 2 warehouses.

boarding house, bunk house, a 5,000′ sawmill, 2 ore houses and 8 dwellings.

BOULDER CREEK MINING CO. IDAHO

Address: E. Arthur Miller, pres., 905 Lincoln Ave., Decatur, Ill. A. Krieg, sec.-treas. and M. M. Krieg, supt., Silver City, Idaho.

Cap. $5,000; 1c. par.

Property: 8 claims, 12 miles S. of Silver City, Owyhee county. Ore carries free milling gold and silver.

Development: by 650′ tunnel and six shafts from 25 to 60′ deep. Assessment work only being done.

BOULDER CREEK MNG. & MLG. CO., LTD. IDAHO

Office: 922 Old Natl. Bank Bldg., Spokane, Wash.

Officers: Leo Greenough, pres. and mgr.; W. D. Greenough, v. p.; W. J. Beaton, sec.-treas.

Cap. $1,500,000; shares $1 par; assessable; 976,230 issued. Annual meeting, first Monday in December.

Property: 1 claim, 20 acres, about 2 miles S. of Mullan, developed by several tunnels, longest 1,200′, said to show ore assaying 10-15% lead with gold, copper and silver. Property considered promising, but has been idle for several years.

BRADY DEVELOPMENT CO. IDAHO

Address: Patrick Brady, mgr., Wallace, Idaho. J. C. Parsons, pres.; F. Cushing Moore, engr.

Property: a bond on the Olympia and Rose claims, W. of and adjoining the Green Hill-Cleveland and S. of the Tamarack & Custer, on Nine-Mile creek. Ore carries lead and silver.

Development: by a 1,450′ crosscut tunnel driven from the 1,200′ Headlight tunnel, to cut the Rose vein, attaining a depth of 1,200′. A 100′ shaft on the Rose opened lead carbonate and galena.

BRISTOL MINING CO., LTD. IDAHO

Out of business. Property sold in 1920 to the Jim Blaine Syndicate, which see.

BROWN LEASING CO. IDAHO

Absorbed, 1918, by **Kellogg United Mines Co.**, which see.

BRYAN MINING CO. IDAHO

Address: E. R. Day, Wallace, Idaho. Owned by E. R. Day and Chas. Burns.

Property: silver-lead claims on Packer Creek, 4 miles from Saltese, Montana, in East Coeur d'Alene.

Development: by 3 tunnels, 400′ and 300′ apart, connected by raises. Late in 1920, 15′ of good milling ore had been opened in the lower tunnel.

BUFFALO HUMP-CRYSTAL LAKE MINING CO. IDAHO

Address: W. B. Chandler, sec., Paulsen Bldg., Spokane, Wash.

Cap. $100,000; $1 par; assessable.

Property: a gold quartz prospect in Robbins district, Idaho county.

BUFFALO MINING CO. IDAHO

Address: Mr. Conroy, sec., Missoula, Mont.

Cap. $1,500,000; $1 par; assessable.

Property: 28 gold-silver-lead claims, partly in Shoshone county, Idaho, and partly in Mineral county, Mont. Developed by 2,400′ of tunnels.

BULLION MINING CO., LTD. IDAHO

Address: James H. Taylor, mgr., 7 Shoshone Bldg., Wallace, Idaho.

Officers: Wm. Squance, pres.; Robt. A. Marshall, v. p.; J. H. Taylor, sec.-treas.-mgr., with Frank Taylor and J. M. Klingman, directors.

Inc. 1902, in Idaho. **Cap.** $1,500,000; $1 par; all issued; assessable. Last assessment, of 1 cent a share, levied July 8, 1920. Fifteen assessments have made stock fully paid.

Property: 16 claims, 2 patented, 320 acres, in Shoshone county, near Lookout, 2 miles from the C. M. & St. P. railway, and 4 miles from Borax station, on the No. P. line, on the Idaho slope of the Bitter Root divide.

with a good wagon-road to Borax. Property has a quartz vein of 4 to 20' width, with average of 6 to 12', and nearly vertical dip, carrying shoots of copper ore, 2-4' wide, mainly chalcopyrite.

Development: by shafts and crosscut tunnels. No. 3 tunnel is now 4,000' long with 600' of drifts on a copper bearing vein.

Equipment: includes 12 h. p. hoist, Pelton wheel, 5-drill air-compressor, drills and dwellings. A 100-ton mill is contemplated.

Company is operating jointly with the Copper Chief M. & M. Co., under same management.

BUNKER HILL SMELTER **IDAHO**

Owned by **Bunker Hill & Sullivan Mng. & Conc. Co.**, which see.

Operating office: care Frank M. Smith, 1117 Paulsen Bldg., Spokane, Wash. **Works address:** Kellogg, Idaho, care M. H. Sullivan, smelter supt., R. R. Station, Bradley, Idaho.

Is a lead smelter with an annual capacity of 400,000 tons. Accepts custom ores.

BUNKER HILL & SULLIVAN M. & C. CO. **IDAHO**

Offices: 1022 Crocker Bldg., San Francisco, Cal. and Kellogg, Idaho.

Officers: F. W. Bradley, pres.; San Francisco; J. W. P. McFall, v. p.; Wm. H. Crocker, treas.; J. S. Wallace, asst.-treas.; Geo. F. Holman, sec.; G. D. Abbott, asst sec.; Stanley A. Easton, mgr.; F. M. Smith, smelter director at Spokane.

Inc. 1885, in Oregan. **Cap.** $3,270,000; all issued; $10 par. Not listed. Company is practically a close corporation. Transfer agent and registrar, asst. sec. of the company at San Francisco. Annual meeting, third Thursday in June. Bankers are The Crocker National at San Francisco and The National Park Bank of New York.

General Balance Sheet, year ending December 31:

Assets—

Year	Property & Plant	Supplies	Cash, Ore & Concts.	Invest. Reserve	Miscel.	Total
1920	$42,529,045	$704,447	$1,177,254	$1,915,995	$1,148,058	$47,474,801
1919	43,969,920	605,560	1,540,234	1,815,099	450,566	48,381,389
1918	44,933,202	710,581	1,670,573	1,615,580	526,939	49,456,875
1917	45,494,361	360,201	1,894,912	1,429,384	393,713	49,572,571
1916	46,180,979	125,976	977,395	1,029,409	226,889	48,540,648
1915	4,977,268	253,583	603,416	1,047,550	190,274	7,072,095

Re-valuation of mine increased the property account from $4,977,268 in 1915 to $46,180,979 in 1916. This was done to comply with Federal Revenue Act of September 8, 1916, and subsequent amendments, by which owners of mineral deposits are entitled to a deduction from gross income on account of depletion of natural deposits "not to exceed the market value in the mine of the product thereof, which has been mined and sold during the year, etc.," nor exceeding in the aggregate the capital originally invested, or in case of purchase prior to March 1, 1913, the fair market value as of that date.

Liabilities—

Year	Capital Stock	Surplus Account	Property Re-valuation Surplus	Miscel.	Total
1920	$3,270,000	$7,711,305	$35,760,873	$ 732,622	$47,474,801
1919	3,270,000	7,387,580	36,999,332	724,476	48,381,389
1918	3,270,000	6,789,445	38,188,589	1,208,841	49,456,875
1917	3,270,000	2,609,776	42,290,265	1,402,530	49,572,591
1916	3,270,000	2,761,946	42,290,265	218,437	48,540,648
1915	3,270,000	3,691,164		110,930	7,072,095

Income Account:

Year	Operating Revenue	Other Revenue	Oper. Ex. & Losses	Operating Profit	Dividends Paid	Balance
1920..	$7,040,868	$321,146	$4,860,811	$2,380,311	$1,962,000	$418,311
1919..	4,990,732	393,355	3,492,803	1,888,552	1,144,500	627,964
1918..	6,128,667	840,887	3,769,138	3,200,417	1,553,250	532,456
1917..	9,546,874	611,623	6,306,423	3,852,074	2,043,750	662,947
1916..	6,229,887	572,631	4,437,478	2,365,040	1,716,750	507,998
1915..	4,153,672	648,361	2,957,364	1,844,669	1,062,750	662,692

Dividends: in 1910, $3.15; in 1911, $2.65; in 1912, $2.30; in 1913, $2.50; in 1914, $3; in 1915, $3.25; in 1916, $5.25; in 1917, $6.25; in 1918, $4.75; in 1919, $3.50; in 1920, $6; in 1921, $1 to April 4. The total is $25,130,970.

Holdings: as a result of apex litigation with the Caledonia Mining Co., B. H. & S. controls that company, owning 1,308,100 shares out of 2,605,000 issued. See **Caledonia Mining Co.** B. H. & S. jointly with the Hecla Mining Co., owns the stock of the Sullivan Mining Co., which owns 1,000,000 shares of the Star Mining Co. In May, 1920, the Star Company finally won an apex suit with the Federal M. & S. Co., judgement being for over $1,000,000. Costs were advanced by the B. H. & S.

Company paid $15,000 for 7 claims in Government gulch in 1921, that were formerly owned by Western Silver Mining Co. and McElmeel estate. The Sierra Nevada is also a subsidiary of B. H. & S. Company also controls the Northwestern Lead Co. of Seattle.

Mining property: 187 patented claims, 2,920 acres, 59 claims surveyed for patent, 6 claims held by location; 2 patented mill sites and 10 held by location; 1,129 acres of patented timberland; 7 lots in the town of Kellogg; 1,183 acres of ranch land; and 24 water-rights, supplying 73,000 miner's inches of water.

Geology: the larger part of the ore is principally a replacement of the Revett quartzite, in which the replacement is closely connected with fissuring. The principal ore mineral is galena with some pyrite and zinc blende, and in places a little argentite rich in silver. The orebodies are definitely related to a persistent fissure, strike N. 45° W., dip 38° S. W., locally known as the "foot wall fissure." The zone of fissured quartzite in which the orebodies occur has a maximum width of 300'; ore is found in the hanging-wall of the fissure. The orebodies are very irregular in form and may be several hundred feet in length and depth with width in places as much as 40'. For geology of this district, see U. S. G. S. Prof. Paper 62, Geology and Ore Deposits of the Coeur d'Alene district, by F. L. Ransome and F. C. Calkins, in 1908.

Development: by tunnels and shafts. The Kellogg tunnel, 8x9', in section, and about 2 miles long, as the main working level. It is equipped with electric locomotives.

Above the tunnel the orebodies have been explored to the surface. Below the tunnel at 200' intervals are 6 working levels, No. 10, 11, 12, 13, 14, and 15.

The persistence of value and size of orebodies down to No. 16 sub-level, a mile deep, was proven by work in 1920-21, in fact, the grade of the ore is better than in 35 years.

Development work has been as follows:

Year	Feet	Cost per ft.	tons Reserves,
1920	27	$73.33	4,762,437
1919	286	31.41	5,116,938
1918	1,740	13.73	4,362,024
1917	1,524	20.06	.....
1916	3,944	9.87	.....
1915	4,783	9.32	.....
1914	2,754	10.77	.....

Ore reserves: January 1, 1921, were 4,762,437 tons, including 107,891 tons in Stemwinder, 167,918 tons in Sullivan mine and 4,486,628 in Bunker Hill mine.

Equipment: includes 3 concentrators, power-plant, water power, machine-shops, saw-mills, etc. Replacement value of surface equipment, exclusive of smelter, is placed at $2,000,000. Mill extraction is about 85% for lead and 80% for silver.

The Sweeney mill, consisting of jigs, trommels, and tables, and employing Minerals Separation flotation process, is treating 500 tons of old tailings daily.

The company has a 12-year contract, dated March 1, 1918, to sell portions of its ore, assaying between 40 and 66% lead to the A. S. & R. Co. As friction between the two companies had been constant, B. H. & S. Co. built its own smelter at Kellogg, in 1917. It has an initial daily capacity of 1,000 tons. Power is obtained from the Washington Water Power Co. of Spokane.

Production:

Year	Ore Mined, tons	Concts., tons	Lead, lb.	Silver, oz.	Cost per ton Mng.	Mlg.
1920	409,986	96,489	71,071,988	1,194,478	$3.189	$0.839
1919	393,698	82,662	65,595,917	1,102,213	2.885	0.752
1918	389,027	84,169	67,125,717	1,191,907	2.92	0.71
1917	493,030	103,982	93,992,898	1,692,765	2.38	0.60
1916	475,784	76,284	77,298,879	1,406,260	2.36	0.43
1915	452,142	59,901	74,584,741	1,298,284	1.99	.....
1914	440,819	56,163	70,663,236	1,161,324	1.98	.....
1913	436,060	59,471	71,860,773	1,227,076	2.25	.....

Production since 1886 is 9,079,597 tons of ore worth $98,350,625.21 gross. Net smelter returns were $58,346,137, of which $33,469,716 was profit, plus $3,638,288 from investments, etc., and $25,193,250 paid in dividends to end of 1920.

Cost of producing lead has been as under:

Year	Price rec'd cents per lb.	Cost per lb. cents
1920	7.9227	5.730
1918	7.375	5.340
1919	5.8774	4.940
1917	8.731	6.640
1916	6.881	5.670

The company is the world's greatest silver-lead producer and is moreover exceedingly well managed. The mine is a big one and will undoubtedly pay dividends for many years. A series of 13 articles, written by T. A. Rickard, in the 'Mining and Scientific Press' for 1920, covers every phase of the B. H. S. company's activities.

Bunker Hill Smelter.

Subsidiary of Bunker Hill & Sulivan Mining & Concentrating Co.

Address: Kellogg, Idaho. R. R. station, Bradley, Idaho.

Offices: Crocker Bldg., San Francisco; F. M. Smith, smelter director, 1117 Paulsen Bldg., Spokane, Wash.; and Kellogg, Idaho.

Officials: M. H. Sullivan, smelter supt.; J. S. Wallace, sales of pig lead.

The smelter, erected in 1917, improved and enlarged since, is near Kellogg, at Bradley railroad station. The principal supply of ore and concentrate is from the B. H. & S. mines, but custom business is done, and by 1920 the company had arranged to receive ores from British Columbia, thus competing with the Consolidated M. & S. Co., at Trail, Northport smelter, and the A. S. & R. Co.

The works consist of 4 Traylor blast furnaces, 48 by 180 inches at tuyeres 2 I.-R. turbo-blowers of 12,000 cu. ft. capacity per min. at 48 in pressure, slag settlers, 20-ton electric crane, 130 cu. ft. motor-dumping slag pots, 10-ton Baldwin-Westinghouse loco, Dwight-Lloyd sintering machines, two 50-ton drossing kettles, centrifugal pumps, two softening furnaces, 10-ton crane, Faber du Faur retort furnaces, using powdered coal, cupel furnaces, and Cottrell precipitators. The furnace charge carries 35 to 40% lead and the slag assays only 1% lead.

During 1920 the company decided to enter the zinc business and a large electrolytic plant is to be erected at Kellogg. The initial capacity will be 25 tons of spelter daily.

An interest was acquired during 1920 in the Northwest Lead Co., a lead manufacturing concern that uses B. H. & S. lead exclusively, and in 1921, company started work on its Hailey properties.

These works are in able hands, and are of great importance to the Northwest.

Sullivan Mining Company

This company's operations at the Star mine include driving an 8,000′ crosscut from the 2,000′ level of the Hecla, to cut the Star vein at the 2,250′ level of the Morning shaft. Waste will be dumped into worked out stopes of the Hecla.

The ore is a complex lead-zinc sulphide, which will yield concentrate of each metal, the zinc going to the new electrolytic plant of the B. H. & S. Co.

Hailey, Idaho Properties

Address: J. W. Gwinn, supt., Hailey, Idaho.

In October, 1921, company took over the Mayflower and Bullion mines at Hailey. These properties, idle for 25 years past, are now equipped with electric power, and will be developed and put on a producing basis in 1922. Company also has option on the **Red Elephant Cons. Mines Co.** holdings (q. v.) and the Minnie Moore.

BURKE MINING CO. — **IDAHO**

Address: J. C. Glahe, sec., Burke, Idaho.

Cap. $1,500,000; $1 par; assessable.

Property: 10 patented claims in Canyon creek, 2 miles E. of Burke, Shoshone county. Opened by 1,500′ tunnel.

BURLINGTON MINING CO. — **IDAHO**

Address: John Hall, Grinnell, Iowa.

Cap. $2,500,000; $1 par.

Property: 17 unpatented claims in Evolution section of Coeur d'Alene, Shoshone county, developed by 1,600′ of tunnels

BURNS MINING & MILLING CO. — **IDAHO**

Address: David Farmer, mgr., Nampa, Idaho.

Cap. $500,000; $1 par.

Property: 7 claims in Canyon county, carrying gold, silver, and lead. Opened by short tunnels. Idle at last accounts.

BUTTE & COEUR D'ALENE MINING CO. — **IDAHO**

Address: care Jos. Rosslow, Hyde Bldg., Spokane, Wash.

Inc: 1907. **Cap.** $1,500.000; $1 par; assessable up to 10 cents.

Officers: L. C. Lens, pres.; Peter McGregor, v. p.; Joseph Rosslow, sec.-treas.; with R. C. Dillingham and J. M. Pickrell, directors.

Property: 8 claims, 1¼ miles from Mullan, Shoshone county, adjoining the Gold Hunter mine on the east. Ore contains copper, silver, and lead.

Development: by 1,550′ tunnel, and 2-compartment winze 400′ deep, with 200′ and 400′ crosscuts at bottom.

Equipment: compressor, drills, hoist, dwellings, etc., for 35 men.

Little work done for several years past.

BUTTE & KELLOGG MINES CO. **IDAHO**

Out of existence. See Vol. XIV.

CALEDONIA DEVELOPMENT CO. **IDAHO**

Presumably out of existence. Described in Vol. XIV.

CALEDONIA MINING CO. **IDAHO**

Office: Kellogg, Idaho.

Officers: S. A. Easton, pres.-gen. mgr.; J. E. Gyde, v. p.; Lee Prather, sec.-treas., with Chas. McKinnis and J. S. Wallace, directors.

Inc. July 9, 1907, in Idaho. **Cap.** $2,605,000; $1 par; assessable; all issued. Transfer office at Wallace, Idaho. Listed on San Francisco and Butte Exchanges.

Balance sheet for year ending Dec. 31, 1920, shows cash, $1,466; accounts receivable, $21,673; Liberty bonds and treasury certificates, $325,846; current liabilities , $4,190; profit and loss surplus, $338,484.

Dividends: $130,250 in 1914; $755,450 in 1915; $911,750 in 1916; $937,800 in 1917; $885,700 in 1918; $312,600 in 1919; $208,400 in 1920. The total is $4,141,950. Present rate is 1c. per share per quarter.

Company has acquired stock control in the **Jemison Mines Co.,** which see.

Property: 8 claims adjoining property of the Bunker Hill & Sullivan M. & C. Co., at Kellogg, Idaho. The vein strikes N. 65° E. and dips 38° S. E. On the surface the shoot was 400′ long, but only 40′ at a depth of 950′. Ore carries silver, lead and copper.

Development: the workings are reached through the Kellogg tunnel of the B. H. & S. company, at a point 4,705′ from the portal. The Keating, or 1,000′ level, is 228′ above the Kellogg tunnel and is reached by skip. Crosscuts on this level are out 2,250′ N. E. The orebody was followed to within 50′ of this level, but was cut off by two faults. Most of the ore was mined between the 500 and 700′ levels. Management reported May 1, 1917, that development had failed to disclose new ore, and that the downward extension of the orebody could not be found. Further work during 1917, 1918, 1919 and 1920 failed to find new ore. It is probable that the vein is displaced laterally along the Howard fault, and that the orebody will be found with its upper portion considerably above and N. E. of the present workings. Exploration (1921) was concentrated on the 500′ level, keeping the fault in the center of the drift. If successful, work will be resumed on the 700′ and Keating levels. Unofficially, the mine is said to have a fair quantity of ore available.

The mine was idle from 1912 to July, 1914, on account of litigation with the Bunker Hill & Sullivan over apex rights. A compromise was effected whereby the capital of the Caledonia company was increased from $1,500,000 to $2,605,000, B. H. & S. taking 550,000 shares. The company is virtually a subsidiary of B. H. & S.

Equipment: includes an electric hoist, air-compressor and electric pumps. Ore is treated at the mill of the B. H. & S. Company employs about 35 men.

Production:

Year	Ore tons	Copper lb.	Lead lb.	Silver oz.	Net profits	Dividends
1914..	.....	245,610	6,599,720	537,854	$ 761,797	.....
1915..	15,005	659,660	11,142,580	1,212,730	760,324	$755,450
1916..	17,464	741,225	10,412,640	1,297,193	1,154,762	911,750
1917..	17,983	544,802	9,434,900	1,068,700	1,227,155	937,800
1918..	17,971	94,326	6,038,784	668,784	647,819	937,800
1919..	15,225	55,999	4,224,053	507,962	420,197	312,600
1920..	14,319	45	2,019,326	304,197	223,371	208,400

The cost of mining and shipping was $9.05 per ton in 1919.

Company operations for months ended September 30, 1921, yielded net profits of $53,845, the majority of the income being derived from the leavings

in worked over stopes. During this period the company mined a total of 6,963 dry tons of ore which yielded 994,095lb. of lead, 148,051 oz. of silver and 4,757 lb of copper, the gross value of which was $84,423. Mining costs amounted to $52,105, or an average of $7.48 per ton.

Surplus account totals $401,358, to be distributed to the stockholders as soon as the amount of taxes due the Government is ascertained. No new ore has been found on the property and there is no expectation of discovering any, but President Easton estimates that it will take nearly a year to work the good ore remaining in the stopes and dumps.

CALIFORNIA CONSOLIDATED MINING CO. **IDAHO**

Address: S. Severance, sec., Pittsburgh, Pa.

Cap. $1,000,000; $1 par.

Is a merger of the Pittsburgh Lead Mng. Co., and Panhandle M. & M. Co., made July, 1916.

Properties: are in Nine Mile creek section, or Placer Center district.

The **Pittsburgh property** was formerly a shipper but idle several years, comprises a small group only. **The Consolidated** consists of the Black Cloud group, 4 patented claims, idle since 1901, but owns a mill 2 miles above Wallace, leased and operated until recently by the Marsh Co.

The Panhandle group: consists of 2 patented claims on Nine Mile Creek

CALLAHAN ZINC-LEAD CO. **IDAHO**

Formerly the Cons. Interstate-Callahan Mng. Co.; name changed 1920.

Office: 61 Broadway, New York. **Mine address:** C. W. Newton, mine mgr., Interstate, Idaho.

Officers: John Borg, pres.; M. G. Rodearmel, 1st v. p.; Milie Bunnell, 2nd v. p.; with Jos. B. Cotton, A. L. Warner, S. S. Titus, J. S. Macnie, C. W. Newton, Gust Carlson, Chas. H. Borg, and D. A. Callahan, directors. J. B. Parker, met. engr.; H. T. McMeekin, sec.-treas.

Executive Committee: John Borg, M. G. Rodearmel, J. B. Cotton, Donald A. Callahan and Gust Carlson.

Inc. June 12, 1912, in Arizona as a consolidation of the Interstate Silver-Lead Mining Co. and the Callahan Mining Co. **Cap.** $5,000,000; $10 par; 437,000 shares outstanding. Listed on New York Stock Exchange. Title Guarantee & Trust Co., New York transfer agent; Registrar & Transfer Co., New York, registrar. There were 2,484 shareholders, June 30, 1921.

Range of shares in New York during 1920 was $20⅜ in January and $4 in December. A total of 24,300 shares changed hands. In 1921, the range was $7½ to $3¾, with total share sales of 336,900.

With the cancellation (see Vol. XIV) in October, 1918, of contract with the American Metal Co. for sale of company's output, arrangements were made with the Grasselli Chemical Co. of Cleveland, Ohio, for sale of its zinc until July 1, 1919. This was extended. The lead-silver ore is sold under contract to the Am. Sm. & Ref. Co. and treated at Colorado smelters.

During 1920, company purchased 51% and 80% interest in the Chicago-Boston Mng. Co. and Killbuck Mng. Co., Ltd., respectively, and in 1921 consolidated them under the name of **Galena Mng. Co.** (q. v.), which will operate as a subsidiary of Callahan.

Financial Statement—Year ending June 30, to 1916, and December 31, thereafter:

Current assets.

Year	Cash	Ore account	Other	Total	Current liabilities	Current Surplus
1920....	$29,278	$ 932	$189,381	$ 219,591	$164,818	$ 279,055*
1919....	74,909	264,156	398,888	737,954	119,324	618,630
1918....	57,855	75,762	297,393	431,011	176,458	254,553
1917....*)	252,542	253,149	160,409	666,100	114,159	551,941
1916....	143,573	596,289	101,709	841,571	34,860	806,711
1915....	316,588	784,190	50,864	1,151,642	56,780	1,094,862

*18 months. Includes stock of Killbuck and Chicago-Boston at cost.

Comparative Operating Statement—Years ending June 30, to 1916, and December 31, thereafter:

Year	Total Income	Total Expense	Oper. Profit	Prev. Surp. etc.	Divs. & other Deduc.	Current Surplus
1920..	$1,424,530	$1,158,282	$266,248	$789,692**	$776,885	$279,055
1919..	494,263	602,902	*108,639	746,175	18,907	618,630
1918..	1,228,616	968,328	260,289	556,992	562,727	254,553
1917(18mos)	4,179,932	1,854,055	2,325,876	806,711	2,580,646	551,941

*Loss. **Includes proceeds of treasury, or other, stock sales.

Dividends: initial paid April 1, 1915, amount that year being $1.50 per share; $7 in 1916; $5.50 in 1917; $1.25 in 1918; none in 1919; $2 in 1920. The total is $7,721,689, or $17.25 per share. Distributions during 1920 were paid from ore depletion reserve, and are not dividends as defined by the Income Tax laws.

The mineral holdings are a consolidation of two prospects, called the Interstate and Callahan groups, the first named developed and the Interstate vein found while Walter Harvey Weed was consulting engineer, and on whose advice the present consolidation was effected at a time when this part of the Coeur d'Alene district was regarded by many mining men as worse than unpromising. The mine has developed into one of the principal zinc-lead producers in America; in fact, the third largest, and one of the world's greatest.

Property: 79 claims, 1,250 acres, 601 patented; also the Nipsic group, 7 claims, the Blue Grouse (q.v.), 4 patented claims, together 225 acres; and a controlling interest in the Silver State Mining Co., adjoining the Interstate, all in the Coeur d'Alene district, Wallace, Shoshone county. The Amazon-Manhattan mine was relinquished in 1917, by order of the Courts on account of defective title. Little ore was found in it. In the dispute over the Virginia claim, located in 1883, Callahan was adjudged the owner in January, 1920, and now holds a 77% interest in this claim.

The holdings of the **Galena Mng. Co.** comprise the Chicago-Boston mine of 13 claims (2 patented), 280 acres, and the adjoining Killbuck group of 5 patented claims, 100 acres, 2 miles from Wallace and about 9 miles from the Callahan. See Galena Mng. Co. for other details.

Geology: the two fissure veins thus far worked in the property are the Interstate and the Callahan. The veins cut through Prichard slates, which are intruded by a monzonite porphyry dike and by small diabase dikes. The Interstate vein varies from 3-20′ in width, the Callahan from an inch to 8′. For geology of the district see U. S. G. S. Professional Paper by F. L. Ransome and F. C. Calkins in 1908; also reports of the mining industry of Idaho, by Robert N. Bell, especially that for 1918, covering general conditions.

Development: totals over 49,300′, of which 2,338′ was done in 1920. The main haulage tunnel is level No. 4, about 1,200′ below the mountain top, where an ore shoot 1,200′ long has been encountered, running from 1 to 54′ in width. This ore extends from the uppermost tunnel down, with equally good metal content on the lowest level. The 3-compartment shaft sunk from No. 4 level had reached 1,300′ in 1920. It is equipped with a 250 h. p. electric hoist, in a 40x40′ underground hoist room, and is good for a lift of 12,000 lb. at a speed of 800′ per minute from an ultimate depth of 2,000′. Exploration during these periods on the new levels has been very satisfactory. By November, 1919, a large orebody had been opened on the 600′ level assaying 31% zinc, 34% lead and 7 oz. silver per ton.

The principal work in 1920 was the sinking of shaft for 200′ and opening the 10th (1,250′) level where 2 to 5′ of good ore was followed for 100′. Early in the year, an extension of No. 5 level, 200′ below the haulage tunnel cut an orebody 22′ wide, assaying 23.7% zinc, 12.8% lead, and 4 oz.

silver per ton. This increased reserves considerably. Further work during the year showed this new shoot to maintain its high grade.

A factor aiding deep development (to 3,000', or 1,500' below No. 7 level) is the construction of the O.-W. R. & N. Ry. branch from Mullan, up to Beaver creek.

Ore reserves: on Jan. 1, 1921, about 165,000 tons of ore averaging 12½% zinc, 6½% lead and 2½ oz. silver, plus a tonnage of low grade, plus a certain amount of probable ore, and excluding outside properties.

The **Nipsic** claims are situated about a mile N. of the portal of Interstate No. 4 tunnel. The group lies between the Idora and Callahan groups on the Beaver creek side of the Nine Mile divide. The claims are crossed by two fissure veins in quartzite and slate, that average 3' in width and carry bands and shoots of lead and zinc ore, the lead ore carrying 4 oz. silver per ton to each 10% lead. The mine has been intermittently prospected since 1892, but no important orebody discovered. There are several tunnels, longest 1,200', with a total of 2,140' of workings. The group is intrinsically valuable, but has an additional value to the Callahan, as it permits much deeper tunnel work than any now existing and gives an outlet on the Beaver creek side of the mountain, with easy access to the North Fork.

In connection with this work, in 1917 a crosscut was started from Interstate No. 6 level, across the Silver State ground, and into the Nipsic, to open the latter's vein at 1,000' below the orebody indicated in the upper levels of the Nipsic. This crosscut will also develop the Silver State. By December 31, 1918, the drift was driven 2,282' to the side-line of the Nipsic and 248' into that ground. At 233' from side-line, 12" of clean ore, assaying 27% lead and 10 oz. silver, was cut. Ore carries very little zinc. Raising is under way. At a point 1,100' above, there is 120' of high-grade ore from 18 to 24" wide, so a substantial orebody may be developed. During 1920, drilling revealed a 6' vein in the Nipsic. Good progress was made in the crosscut.

The Blue Grouse property is developed by 2 tunnels, aggregating 1,500', showing 2 veins; ore is lead-silver with some zinc. Development work on the Virginia consists of 740' of tunnels, disclosing 2 to 3' of good zinc ore.

Equipment: is modern, with a view to future big development. Buildings include saw-mill, bunk and rooming-houses for 300 men. The concentrating mill was completely remodeled, 1917-18, with a capacity of 400 tons, consisting of a 75-h. p. motor blower of the Root type, two 18" elevators, 2 Janney emulsifiers, and 16 double-cell Janney mechanical air flotation machines, each driven by an 8-h. p. motor. The blower furnishes air for agitation. There are 2 sets of roughing flotation machines and one set of cleaners. The former are in parallel, each unit consisting of one emulsifier cell and 6 flotation cells, while the cleaners consist of 4 flotation machines in series.

The grinding department contains a 200-h. p. motor, a 6x10' ball-mill, 2 Akins' classifiers, two 18" elevators, and four 4" Krogh sand pumps.

A Sauerman slack-line cable excavator is used to reclaim tailings from the dump. They are dumped into a hopper, and then conveyed to the new flotation plant. In 1917, there were 225,000 tons of these, 50% being fine slime assaying 12% zinc, and 2% lead; the remainder, from jigs, are coarse, and assay 8% and 2% respectively. By 1919 the tonnage had been reduced to 125,000 tons.

During 1918 the old mill was altered to make room for 10-Deister-Overstrom and Wilfley tables; building elevator to feed tables; installing launder system and classifiers; and repairing line shafting and gearing throughout. A new set of rolls was built on concrete foundation; the trommel and jigs were repaired and duplicates built; a new 6x6' ball-mill was put in; another Oliver filter was erected; the pumping system was altered; and a

30' Dorr settler added. Both in 1919 and 1920, additional machinery was installed, including a Hardinge mill, Dorr thickener and more flotation machines.

By late 1920, zinc concentrate had improved from 48 to 53% zinc, lead being reduced to 2.7%; and lead concentrate was 58% lead and 20.3 oz. silver. The intention is to make the entire lead product by flotation, the same as with zinc.

From 350 to 375 men are normally employed.

Production: during 1919 on account of low metal prices and labor conditions, continued for 4½ months only and in 1920 for 10 months. There was no output in 1921.

	1920*	1919*	1918	1917
Ore mined, tons	172,930	67,952	85,363	240,858
Crude lead ore shipped, tons	335	634	1,634	3,469
Crude zinc ore shipped, tons	717	975	2,755	17,926
Ore milled, tons	128,781	52,526	69,002	197,388
Tailing treated, tons			84,065	
Lead conc. shipped, tons	11.635	4,722	3,518	8,944
Zinc conc. shipped, tons	28,109	14,825	40,258	74,219
Zinc content, pounds	32,956,110	16,498,285	40,891,881	89,396,127
Lead content pounds	16,000,570	7,993,664	12,098,429	24,357,826
Silver content, ounces	288,488	139.276	202,750	416.126
Gross value of all products	$1,863,988	$724,535	$1,816,444	$5,153,398
Operating costs per ton of ore mined	$6.234	$6.59		$5.901

*4½ mos. in 1919; 10 mos. in 1920.

The total production to Sept. 30, 1920, is 250,000,000 lb. zinc, 69,000,000 lb. lead and 1,200,000 oz. silver.

Management is able and progressive. With reasonable prices for spelter and silver and normal costs, Callahan should continue to make big profits on an average monthy output of 9,000,000 lb. spelter, 3,400,000 lb. lead, and 34,000 oz. silver.

Shipments were suspended on Oct. 31, 1920, but development, to a limited extent, was continued throughout 1921, including the deepening of shaft to the 11th level.

CARBONATE CENTER MINING CO. **IDAHO**

Mine office: Mullan, Shoshone county, Idaho.

Officers: Archie Gillis, pres.; John H. Foss, v. p.; John E. Sherrard, sec.-treas., with John Erickson and Hans J. Rice, directors.

Inc. 1912, as successor of Tombstone Mining Co. **Cap.** $1,500,000; $1 par. Last assessment of 2 mills per share called Nov. 24, 1920.

Property: 8 claims, near the Carney mine, on Stevens peak, south of Mullan, shows a promising vein of 8 to 15' surface width, carrying a little silver-lead ore. The mine has a 500' crosscut tunnel, with about 1,000' of workings, showing ore that has given assays up to 15% copper and 2.5 oz. silver per ton. Idle at last accounts.

CARBONATE HILL MINING CO. **IDAHO**

Absorbed by Idaho Carbonate Hill Mining Co., which see.

CARIBOU GOLD & COPPER CO., LTD. **IDAHO**

Address: A. V. Scott, sec.-treas., Idaho Falls, Idaho.

Officers: Eric H. Wakeman, pres.; with A. J. Wipperman, Wm. Arave and A. V. Scott directors.

Inc. Aug. 30, 1903, in Idaho. **Cap.** $2,500,000; $10 par; assessable; 611,000 shares issued, 189,000 in treasury. Annual meeting, 3rd Monday in February.

Property: the Monte Cristo mine, on Caribou Mountain, Bingham county. Ore carries gold and silver. On 150' level vein said to be 12' wide.

CARIBOU GOLD MINES CO. **IDAHO**

Mail returned from former address: J. P. Fanning, Pocatello, Idaho.

Cap. $10,000; shares 1c. par; all outstanding.

Propery: 13 claims and a mill-site, 2 claims and mill-site patented, in Mount Pisgah district, Bonneville county, 42 miles from Soda Springs. The mine was first operated in the early 70's, but was closed down on account of poor management, after an accredited production of $200,000 from free-milling gold ore.

Development: by tunnels and 280′ shaft.

Ore reserves: were to be 12,000 tons in 1915, averaging $6.14 gold per ton.

Equipment: 10-stamp mill, 100-h. p. engine, air-compressor, and hoist.

CARIBOU MINING CO. **IDAHO**

Address: G. R. Scott, Coeur d'Alene, Idaho.

Officers: G. R. Scott, pres.-gen. mgr.; H. Hilson, v. p.; C. O. Sowder, sec.; John W. Boothe, treas., with A. A. Crane, directors

Property: 9 miles E. of Coeur d'Alene, Kootenai county, said to have two separate orebodies, about 150′ apart.

Development: by 150′ tunnel. Driving an additional 100′ (July, 1921).

CARMAN CREEK MINING CO. **IDAHO**

Only assessment work being done. Described in Vol. XIV.

CARNEY COPPER CO., LTD. **IDAHO**

Address: C. D. Miller, Mullan, Shoshone county, Idaho.

Officers: J. L. Martin, pres.; A. P. McRae, v. p.; C. D. Miller, sec.-treas., with W. C. Richardson and Gust Almquist, directors.

Inc. 1906, in Idaho. **Cap.** $1,500,000; shares $1 par; assessable; 1,400,000 issued.

Property: 11 claims, 4 fractional, 175 acres, carrying a good water-right, north of the Reindeer, on the northern slope of Stevens peak, about 4 miles from Mullan. Vein is in quartzite.

Development: by 3 tunnels, the uppermost showing a body of chalcopyrite ore that has not been found in the lower tunnel. The upper, or No. 1 tunnel, is 450′ long, with 3 crosscuts; No. 2 tunnel, 1,500′ long has 1,300′ of crosscuts and drifts; No. 3 tunnel was 350′ long, 1917, at last accounts. There also are several open-cuts and pits, showing ore of about 3% copper tenor. Workings show up to 4′ of solid ore, carrying chalcopyrite, with some chalcocite and bornite. No. 1 tunnel shows an ore shoot up to 40′ width, and about 175′ long, averaging about 2% copper, with small values in lead and silver, with a paystreak of 6 to 18″ assaying 5 to 35% copper. Company leased upper levels in 1917, but mine was closed in 1919.

CARPIE MINING CO. **IDAHO**

Address: Cabinet, Bonner Co., Idaho.

Property: in Clark Fork section of the Pend Oreille district, ¼ mile from Cabinet.

Development: by 300′ shaft and crosscuts, said to open a 6′ vein containing copper and silver. The shaft is being continued to 500′ depth.

Equipment: includes steam power, compressor, hoist, pumps, etc.

CEDAR CREEK CONSOLIDATED MINING CO. **IDAHO**

Address: Arthur A. Diegel, Buhl, Idaho.

Officers and directors: Arthur A, Diegel, pres.-mgr.; R. E. Browne, v. p.; F. A. Eveleth, sec.-treas.

Inc. Dec. 4, 1920, in Idaho. **Cap.** $10,000; $1 par; 3,000 shares in treasury.

Property: 7 claims, 140 acres, in Sec. 9-10-16, Twp. 15, South Range 13 East B. M., Twin Falls county, 20 miles from railroad. Ore said to contain 1.15% uranium. Developed by 40′ shaft.

CEDAR CREEK MINING & DEVEL CO., LTD. **IDAHO**

Address: Wm. Becker, sec., 710 Hotel St., Wallace, Idaho.

Officers J. W. Weyer, pres.; W. C. Schwabe, v. p.; William Becker, sec.-treas.; J. M. Weyer, mgr.; with Clem Weyer, directors.

Cap. $1,000,000; $1 par; 694,317 shares issued; assessable. A 5-mill assessment was levied on Sept. 17, 1921.

Property: 19 claims and a mill site, 5 miles above Murray, in Summit section of Coeur d' Alene, Shoshone county. Ore carries lead, silver and zinc.

Development: by 3 tunnels, the lowest in about 2,500', with a total of over 5,000' of workings. After a year's suspension, due to abnormal conditions and shortage of water, work was resumed in May, 1920, and a strike of high lead-silver ore reported.

CHAMPION COPPER MINING CO. IDAHO

Probably defunct. See Vol. XIV. Property at Mullan, Idaho.

CHAMPION MINING CO. IDAHO

Idle since 1917.

Address: R. T. Badger, sec.-treas., Utah National Bank Bldg., Salt Lake City, Utah. **Mine office:** Mackay, Custer county, Idaho.

Officers: Edw R. Hall, pres.; C. T. Mixer, v. p.; with O. D. Mallory and J. E. Frick, directors. H. A. Brown, supt

Inc. 1905 in Utah. **Cap.** $100,000.

Property: 9 claims, unpatented, in the Alder Creek district, 6 miles from a railroad. Developed by tunnel, with 1,500' of workings, showing silver, lead and copper ores.

CHESTER MINING CO., LTD. IDAHO

Address: S P. Fairweather, sec., Wallace, Idaho.

Cap. $1,000,000; $1 par.

Property: 6 patented lead-silver claims in Evolution district, Shoshone county.

CHICAGO-BOSTON MINING CO. IDAHO

Fully described in Volume XIV. Consolidated in 1921 with Kill Buck Mining Co. and listed under new title, **Galena Mining Co.**

CLARENCE RAY-BUFFALO HUMP GOLD MNG. CO. IDAHO

Address: Fred Hasbrook, sec.-treas., E. 2629 First St., Spokane, Wash.

Cap. $100,000; 10c par.

Property: 8 claims in Robbins district, Idaho county, developed by tunnel.

CLARINDA COPPER MINING CO. IDAHO

President's office: 50 Broad St., New York. Compton I. White, mgr., Sandpoint, Idaho.

Officers: J. P. Delaney, pres.; E. W. Wheelan, v. p.; C. I. White, sec.-treas.; with Max Theilheimer and A. W. Bowen, directors. Delaney & Co., fiscal agents and promoters.

Inc. April 1, 1916, in Arizona. **Cap.** $1,500,000; $1 par. Stock transferred at company office. According to sworn statement of the president, revenue during the year ended June 1, 1920, was $20,821, of which $19,702 was from sales of shares. Operating expenses were $11,463,, leaving $9,358 on hand. A stockholders committee (Paul J. H. Hollberg, chairman, Belleville, N. J.), is supplying funds to complete development.

Property: 9 claims and 3 fractions, 196 acres, in Pend Oreille district, 2½ miles W. of Clark Fork, Bonner county. Examined in 1919, by J. K. Ashley, and in 1920 by C. W. Wilson.

Geology: country rock is quartzite and slate, cut by a diorite dike. Ore occurs in well defined quartz veins, containing chalcopyrite, gold, silver and lead.

Development. by 3 tunnels, a total of 2,000' of workings. No. 3 tunnel, 602' long, reported to cut 4½ ft. of $32 silver-copper-gold ore; also opened 8" of rich copper-silver ore. Work was abandoned in this tunnel "on account of the physical difficulties presented." No. 5 tunnel, 5 by 7',

was in 1,120′ July 30, 1921. This adit cut the Woodman vein, said to be 40′ wide at 450′, carrying lead and silver.

Equipment: electric power, compressor, drills, etc.

CLAYTON MINING & SMELTING CO. IDAHO

Described in Vol. XIV. Property operated by the **Idaho Mine Development Co.**, which see.

CLEAR CREEK MINING & DEVELOPMENT CO. IDAHO

Address: Wallace, Idaho.

CLEAR GRIT MINING CO. IDAHO

Address: O. W. Lewis, sec.-treas., 616 Cedar St., Wallace, Idaho. Dr. F. C. Rood, pres., Walla Walla, Wash.

Last assessment of 1½ mills per share, was paid Aug. 30, 1920.

Property: 7 claims, in Beaver district, between Delta and North Fork, Shoshone county, said to show silver-lead ore. Developing.

CLEARWATER GOLD & COPPER MINING CO. IDAHO

Officers: Samuel Seidenfeld, pres.-mgr., 1027 W. 10th Ave., Spokane, Wash.; Herman A. Bush, v. p.; J. H. Wourms, sec.-treas.

Inc. August, 1907, in Idaho. **Cap.** $2,500,000; $5 par; assessable; all outstanding.

Property: 16 claims, 13 patented, including the Cunningham group, on the north fork of the Clearwater river, 50 miles south of Wallace, Shoshone county; nearest rail point Amador, with 6 miles of wagon-road and 11 miles of trail. Property shows a vein in quartzite said to be traceable 5 miles, 1 mile on company's land, carrying oxidized ores near surface, with chalcopyrite and chalcocite at depth assaying up to 3½ copper, 60c to $1 gold, and 1½ to 2 oz. silver per ton.

Development: by 3 tunnels, lower tunnel, 1,900′ long, cutting the vein at the face 300′ below surface. Management estimated 18,000 tons of ore on dumps, June, 1915, and total reserves at 300,000 tons.

Equipment: includes hoist and air compressor.

No work done for 4 years on account of lack of transportation facilities.

CLEVELAND MINING CO. IDAHO

Address: A. F. Parker, Grangeville, Idaho.

Property: 6 patented gold-quartz claims, and 20 acres of placer ground, 3 miles W. of Grangeville and 8 miles S. of Elk City, Idaho county. A stamp mill and water supply are available. No recent returns.

CLIMAX SILVER-LEAD MINING CO. IDAHO

Address: H. V. Edwards, Jr., Wallace, Idaho.

Cap. $375,000; 25c par.

Property under lease until 1925 to the **Grand Forks Leasing Co.**, which see.

COEUR d'ALENE ANTIMONY MINING CO. IDAHO

Office: Kellogg, Idaho.

Officers: M. E. Jolley, pres.-mgr., Davenport, Wash.; Clyde R. Millard, v. p.; C. M. Powell, sec.-treas., Kellogg, Idaho.

Cap. $150,000; 10c par; assessable; 789,466 issued. An assessment of 3 mills per share was levied June 20, 1919, and another on October 30th. Annual meeting held on Jan. 17, 1921.

Property: 2 claims, including an antimony mine on Pine Creek, west of Kellogg, and about ¼ mile from Kingston station. The mine has been worked intermittently since 1885. The vein occupies a fault or shear-zone in black slates of the Prichard formation. Ore is from 1 to 5′ wide, and consists of stibnite in a gangue of quartz and slate, with some gold.

Development: by 300′ shaft and tunnels.

Equipment: 100-ton mill employing flotation.

Production: amounts to about 2,000 tons of ore containing 5000.0001b of antimony.

Property was acquired for $20,000 from A. J. Brainard of Kellogg, who

in June, 1921, secured a judgment for the unpaid balance of $6,400 and brought foreclosure proceedings; sale set aside by Court, June, 1921.

COEUR d'ALENE CHAMPION MINING CO. **IDAHO**

Address: James Keeth, sec., 311 Hyde Blk., Spokane, Wash.

Cap. $1,500,000; $1 par; assessable.

Property: 17 claims near Burke, Shoshone county, carrying lead and silver. Developed by 4,000′ of tunnels and fairly well equipped.

COEUR d'ALENE CRESCENT MINING CO. **IDAHO**

Address: F. W. Hauser, 404 Jamieson Bldg., Spokane, Wash.

Officers: L. W. Bonney, pres.; J. B. Millspaugh, v. p.; F. W. Mauser, sec.-treas.; with F. R. and G. E. Crocker, directors.

Cap. $1,250,000; $1 par; assessable; 675,000 issued.

Property: 5 unpatented claims, and mill sites, one mile N. W. of Osborne, Shoshone county. Vein is in quartzite carrying silver and lead, assaying $2.50 to $25 per ton.

Development: by 300′ shaft, and 500′ tunnel, which is being extended.

COEUR d'ALENE EMPIRE MNG. & MLG. CO. **IDAHO**

Address: A. Herman, Rookery Bldg., Spokane, Wash.

Officers: F. D. Garrett, pres.; Frank Johnson, v. p.; A. Herman, sec.-treas., with T. H. Holland, directors.

Inc. 1917, in Washington, to take over property of Coeur d'Alene M. & M. Co. **Cap.** $1,500,000; $1 par; assessable.

Property: 9 silver-lead claims near Wardner, Shoshone county.

Development: by tunnels and workings aggregating over 3,000 feet.

COEUR d'ALENE EXPLORATION CO. **IDAHO**

Address: O. A. Olsson, sec., Wallace. Idaho.

Property: 10 claims on Big creek, near Wardner, Shoshone county. A strong vein shows on the surface and carries copper and silver.

Development: by tunnels. After being idle for some time, work was to be resumed in 1921.

COEUR d'ALENE SYNDICATE **IDAHO**

Address: Rush J. White, Shoshone Bldg., Wallace, Idaho.

Seeley W. Mudd and Philip Wiseman, managers, 1210 Hollingsworth Bldg., Los Angeles, Calif.

Members of the Syndicate are D. C. Jackling, C. O. Lindberg, H. V. Winchell, S. W. Mudd and F. A. Keith.

Property: an option on 40 claims, including holdings of the Senator M. Co. and the Flynn Group M. Co. at Mullan, between the Frisco on the W. and the Star on the E. and owned by the Federal M. & S. Co. Arrangements have been made to use the Black Bear tunnel.

Development: by the Black Bear tunnel which has been extended 700′, making it 4,500′ long, attaining a depth of 2,000′. A crosscut was driven S. to the Flynn vein, and an E. drift to the Iron Silver vein. To May, 1921, the Syndicate had done 3,100′ of drifting and crosscutting. Eighteen men employed.

COLLINWOOD MINING CO. **IDAHO**

Office: 10 Gunn Block, E. 152nd St., Cleveland, Ohio. J. C. Northrup, mgr., Palouse, Wash.

Officers: F. G. Garrett, pres.; Gustav Kirchner, v. p.; E. N. Conrad, sec.-treas., with F. C. Lohiser, A. L. Cornwall, H. O. Hess and H. A. Brooks, directors.

Inc. August 29, 1917, in Ohio. Cap. $12,500; $1 par; all issued. Annual meeting first Tuesday in September.

Property: 300 acres, (the Mizpah mine), 17 miles from Harvard in Latah county, leased for 7 years (to March 1926), from **Merger Mining Co.**, which see.

COLONIAL MINING & MILLING CO. **IDAHO**

See Vol. XII for details of fake promotion.

COLUMBIA COPPER MINING CO. IDAHO

Idle. See Volume XIV.

COLUMBUS MINING CO. IDAHO

Address: Victor Carlson, supt., Gyde-Taylor Bldg., Wallace, Idaho. E. P. Gallagher, sec.-treas., Philadelphia, Pa.

Inc. in Delaware.

Property: 16 claims, in Eagle Creek district, Shoshone county, near the Jack Waite mine. Ore carries lead and silver.

Development: by tunnels, one 550′ long, with about 3,000′ of workings, reported to have cut a 4′ vein containing gold, silver and lead.

Equipment: a compressor and steam boiler installed in 1921.

COMBINATION MINE IDAHO

Now owned by **Profile Metals Co.**, which see.

COMET GOLD & COPPER MINING CO,. LTD. IDAHO

Presumably out of existence. Described in Volume XIV.

COMMONWEALTH MINING CO. IDAHO

Office: 412 Zeigler Bldg., Spokane, Wash.

Officers: Henry F. Troub, pres.; Arthur W. Davis, v. p.-treas.; Patrick J. Kelly, sec., with Geo. Bailey and Daniel Stairs, directors.

Cap. $1,500,000; $1 par. Annual meeting in January.

Property: 140 acres, on Hayden creek, 2 miles from Hayden lake, Kootenai county. Ore carries silver, lead and copper, but chiefly silver.

Development: by 585′ and 300′ shafts, 740′ tunnel, and several hundred feet of drifts. A vein, standing 90′ high and 60′ wide above the surrounding country, is traceable through three claims, engineers pronouncing it a contact fissure between quartzite and chlorite slate. In 1920, the vein was said to be 24′ wide on the 200′ level.

Equipment: 120-h. p. steam plant, 100-h. p. water heater; 2 air-compressors, hoists, pumps and drills. Operations have been conducted for 3 years with a force of from 15 to 30 men.

COMSTOCK COPPER MINING CO., LTD. IDAHO

Presumably out of existence. See Volume XIV for description.

CONSOLIDATED INTERSTATE-CALLAHAN MNG. CO. IDAHO

Name changed in 1920 to **Callahan Zinc-Lead Co.**, which see.

CONS. MASCOT MINES CORPORATION IDAHO

Mine address: David J. Cook, gen. supt., Peter, Blaine county, Idaho. Company controlled by Chas. Peter and associates of Salt Lake City.

Property: near Hailey, Idaho.

CONSTITUTION MINING & MILLING CO. IDAHO

Office: Columbia Bldg., Spokane, Wash.

Officers: Judge Geo. Turner, pres., 525 Seventh St., Spokane, Wash.; Frank H. Graves, v. p.; B. H. Kizer, sec.-treas., with Frank T. Post, Richard W. Nuzum and Thos. Thwaite, directors. Joseph Trainor, supt.

Cap. $1,500,000 increased Jan. 1916, from $1,000,000; shares $1 par; assessable; all issued.

Property: 10 claims, 8 patented, on east fork of Pine creek, 9 miles from Pine Creek siding on O. W. R. & N. R. R., Coeur d'Alene district, shows zinc-lead ore in veins 4′ to 8′ wide, in a shear-zone in Prichard slate.

Development: by adits, one at vertical depth of 150′ and the other at 400′. At 1,500′ south of the latter a 550′ crosscut tunnel cuts the vein 150′ below tunnel No. 2. This orebody is said to be several hundred feet long. A shaft, sunk at the portal of tunnel No. 2, is 200′ deep and from the bottom a 700′ drift is said to have been run on ore.

Equipment: includes hoist, compressor, 100-ton mill, sawmill, and electric motors.

Production: from Aug., 1917, to early in 1918, shipped 1,400 tons of crude ore, averaging 12% lead, 9 oz. silver, and 27% zinc; also 700 tons of 16% lead, 12 oz. silver, and 33% zinc concentrates.

Property is considered valuable, but operations have been hindered by lack of good transportation.

COOPERATIVE MILLING CO. **IDAHO**

Consolidated with **Reed Level Mining Co.**, which see.

COPPER BASIN MINE **IDAHO**

Address: H. W. Weiler or F. A. Stacy, Mackay, Idaho.

Property: 15 claims, formerly owned by Copper Basin Mining Co., 24 miles from Mackay, Custer county. Ore shipped in 1919 said to have assayed 10½% copper, 13% iron, and some silver. Transportation difficulties have been a drawback. The State Inspector of Mines reports that the deposit is encouraging.

COPPER BASIN MINING CO. **IDAHO**

Described in Volume XIII. Property passed to new ownership in May, 1919. See Copper Basin mine.

COPPER CHIEF MINING & MILLING CO. **IDAHO**

Office: care J. H. Taylor, sec., Shoshone Bldg., Wallace, Idaho.

Cap. $1,000,000; $1 par; assessable. Five mills per share levied Oct. 15, 1921.

Property: 7 claims, E. of Troy, Latah county.

Development: the Copper Chief is being developed through a crosscut tunnel driven jointly with the Bullion M. Co. This is over 4,000′ long. At a point 1,800′ from the portal, 1,000′ deep, the Copper Chief is driving W. on the vein, and the Bullion E. on the vein. The latter had opened 170′ of ore at last accounts.

COPPER GIANT MINING CO. **IDAHO**

Officers: Rev. J. G. Lake, pres., Rookery Bldg., Spokane, Wash.; Dr. M. McKinnon, sec.-treas.; with H. F. Thibadeau, Dr. H. J. Betton and P. D. Young, directors. B. Haberman, supt.

Cap. $1,500,000; $1 par; 1,100,000 issued.

Property: 5 claims and 3 fractions, 3 miles W. of Clark Fork, Bonner county. Ore is chalcopyrite, carrying some silver.

Development: by 3 tunnels aggregating over 1,500′ in length (Nov., 1918).

COPPER KING MINING & SMELTING CO. **IDAHO**

Address: H. W. Ingalls, Mullan, Idaho.

Officers: Sam. Edelstein, pres.; Dave Holzman, v. p.; Harry W. Ingalls, sec.-treas.-gen. mgr., with H. R. Schroeder, R. C. Vanderford, and John Jahde, directors.

Inc. October, 1901, in Idaho. **Cap.** $1,500,000; $1 par; assessable; all issued. Last assessment, No. 24, of 2½ mills per share. Levied June 4, 1921. Annual meeting first Wednesday in September. Company expended $30,000 in development in 1918, and on March 17, 1919 had a bank balance of $2,020.

Property: 18 claims surveyed for patent on the west fork of Deadman creek, adjoining the National mine on the west, in Shoshone county.

Development: by 2 tunnels, 1,600′ apart, which have developed a lead-silver orebody 250′ long and from 2 to 6′ wide, assaying 20% lead, 15 oz. silver, 4% zinc and 5% copper. Lower tunnel (No. 3), was driven a distance of 5,000′ at 100′ below No. 2 at a total cost of $14 per ft. Four separate orebodies have been opened on this level so far, but no extensive development has been done on any of them. About 3,000 tons of ore on dump average 4.5 oz. silver, 4% lead and 1% copper. Hand-sorted ore on dump assays 30% lead and 10 oz. silver. Three of the ore shoots average 3′ wide and 50′ long, while largest shoot is 65′ wide and 100′ long. A raise is up 100′ on the latter. In September, 1919 a 50′ vein containing irregular bunches of lead ore was reported cut on the tunnel level; and by Oct., 1920, 4′ of ore was cut on a new level, 200′ above the lower tunnel. New work in 1921 limited to diamond drilling.

Equipment: includes 1-drill Franklin air-compressor and 35 h. p. electric motor.

COPPER PRINCE CONSOLIDATED M. & M. CO. **IDAHO**

Mine 10 miles W. of Avery, Shoshone Co., Idaho.

Officers: S. B. Holbert, pres.-treas.; Samuel R. Hite, v. p., Fairmont, W. Va.; Boyd Hamilton, sec.; W. M. Ramsey, with S. C. Dooley, W. Hankins, H. C. Crampton, and J. W. Wood, directors. Frank Drummond, supt.

Inc. July 30, 1910, in Idaho. **Cap.** $4,000,000; reduced Sept., 1915, to $400,000; $1 par. Annual meeting, first Monday in September.

Property: 37 claims, unpatented, 740 acres in 2 groups on the north bank of the St. Joe river, 6 miles and 20 miles, respectively, above the head of navigation. Property includes water-rights. The Copper Prince group, formerly known as the Black Prince, has 13 claims, and the Idaho-Virginia, or Gold Ridge group, of about 24 claims, is about 6 miles east of the Copper Prince, and 3 miles from the C. M. & St. P. railway.

The Copper Prince group shows contact orebodies, between granite and Revett quartzite, of 20 to 30′ estimated average width, carrying chalcopyrite, bornite and gray copper, assaying 3 to 41% copper, and 8 to 13 oz. silver per ton. **Developed:** by 500′ of drift tunnels, driven from the sides of 2 canyons. The orebody has been traced by trenches and crosscut tunnels, on each claim, for the entire length of property, a distance of 7,800′.

The Idaho-Virginia is reported to have a 15 to 20′ contact deposit, between granite and slate, carrying galena assaying 8 to 40% lead, and 14 to 46 oz. silver. **Developed:** by 2 shafts of 50′ and 250′ depth, and 3 crosscuts, intercepting a vein said to show galena ore of good quality.

Company planned utilizing water-power from Prince creek by 6 miles of 3′ ditch and 1 mile of 3′ flume.

Equipment: includes 4 boilers, 2 hoists, 2 six-drill air-compressors, and a saw-mill. In 1916, S. B. Holbert, brought suit against company to recover $27,970 for services rendered and money advanced.

No recent information is obtainable and company presumably moribund.

COPPER QUEEN MINING & MILLING CO. **IDAHO**

See Reindeer Queen Mining Co.

COPPER QUEEN MINING & SMELTING CO. **IDAHO**

Office: 608 Lonsdale Bldg., Duluth, Minn. **Mine office:** Salmon, Lemhi county, Idaho.

Officers: Geo. H. Crosby, pres.-gen. mgr.; Emerson Hill, v. p.; A. J. McLennan, sec.-treas., with C. W. McFadden, W. M. Harrison and E. F. Clarke, directors. A. F. Bennett, supt.

Inc. June 12, 1905, in Arizona. **Cap.** $500,000; $1 par; issued, $282,000. Absorbed the Copper Queen & Crescent Mining & Smelting Co. in 1908, giving 1 share for 8.

Property: the Queen of the Hills mine, 17 claims, 320 acres, in the Eureka district, 7 miles N. W. of Salmon, is said to show 3 nearly vertical fissure veins in granite and schistose quartzite, with a generally N. E. strike. The Eva, or westernmost vein, shows an 8 to 14″ quartz band on the wall of a brecciated zone 5′ wide. The central, or Queen, and the Nellie veins show 12 lodes of granite breccia partly cemented by quartz. The ore is coarsely crystalline quartz, carrying pyrite, chalcopyrite and some galena, with $3 to $5 in gold occuring in 5 known ore-shoots, 2 in the Nellie, 2 in the Queen and 1 in the Eva vein.

Development: by shafts of 105′ and 400′ with 5 levels and by 7 tunnels, longest 450′, with 4,700′ of workings.

Equipment: includes 100-h. p. electric plant, 24-h. p. hoist, good for 700′, 5-drill air-compressor, gyratory crusher, 15 stamps, and 2 Wilfley tables. Probably idle at last accounts.

COPPER & URANIUM MINING CO. **IDAHO**

Probably dead. Described in Volume XIV.

CORBY LODE MINE — **IDAHO**

Address: J. B. Steffes, 709 Division St., Kellogg, Idaho. C. W. Simmons, v. p.

Property: 4 claims surveyed for patent, on Pine creek, Shoshone county, adjoining Federal M. & S. on west, owned by 5 people, but controlled by J. B. Steffes and wife. A quartz fissure in slate carries $7.20 gold per ton and some antimony.

Development: by 488′ tunnel, attaining depth of 400′. Examined by Oscar Hershey. A prospect.

CORONA MINING CO. — **IDAHO**

Office: 833 S. 9th St., East, Salt Lake City, Utah. **Mine Office:** Clayton, Idaho.

Officers: Horace Lewis, pres.-treas.; Clyde A. Torrey, v. p.-mgr.; J. A. Barclay, sec.

Inc. in Utah. **Cap.** $50,000; 5c par.

Property: 5 unpatented claims in the Bay Horse district, Idaho, 5 miles above Clayton, Custer county.

Development: by 200′ tunnel being driven to encounter a 4′ fissure vein in limestone with N. W.-S. E. strike and dip, 45°. Sample as reported gave 63% lead, 40 oz. silver, and $5 gold.

C. AND R. MINING CO. — **IDAHO**

Address: H. J. Rossi, sec.-treas., Wallace, Idaho.

Officers: Edwin Roberts, pres.; B. L. Collins, v. p.; with H. J. Rossi, Roy Smith, and R. F. Collins, directors.

An assessment of 5 mills per share was levied February 14, 1920.

Property: several claims in the Sunset district of Coeur d'Alene, Shoshone county, adjoining the St. James. Ore contains silver, lead and zinc.

Development: by 3 tunnels. No. 1, having a total of 335′ of work; No. 2, 2,065′; and No. 3, 2,542′. Diamond drilling amounts to 500′. This exploration cost $56,472.

Equipment: compressor, power plant, buildings, etc., representing an investment of $11,120.

Operating during 1920.

CROESUS GOLD & COPPER MINING CO. — **IDAHO**

Company dead. See **Croesus Mining Co.**

CROESUS MINING CO. — **IDAHO**

Address: F. C. Robertson, 1721 Riverside, Spokane, Wash. D. H. Palmer, 1 W. 34th St., New York, fiscal agent.

Cap. $1,000,000. An issue of $200,000 treasury stock was offered in April, 1920.

Property: the Croesus mine, 4 miles west of Hailey, Blaine county, contains a fissure vein of nearly vertical dip, in granite. Pay streaks on both walls said to carry chalcopyrite, with value mainly in gold. There also is a nearly vertical blind vein, apparently joining the main vein at depth, carrying silver-lead ore at depth of 600′.

Development: by 800′ shaft and 150′ winze below the bottom level.

Equipment: includes steam and electric power, and a 12-drill air-compressor. The 150-ton concentrator has 10 stamps, crusher, rolls, and Huntington mills.

Over $350,000 is said to have been spent on this property by Croesus G. & C. Mng. Co.

CROWN POINT LEASING CO. — **IDAHO**

Out of business after Coeur d'Alene Development Co. sold mine to Stewart Mining Co. See Vol. XIII.

CUBA MINING CO. — **IDAHO**

Address: J. Dolan, sec.-treas., 406 Bank St., Wallace, Idaho. D. L. Hoskins, pres., 335 Clay St., Portland, Ore.

Cap. $1,000,000; $1 par. Annual meeting April 20.

Property: 2 patented lead-silver claims in Nine Mile canyon. Placer Center district, about 2 miles from Wallace.

CUSTER CONSOLIDATED MINING CO. **IDAHO**

Address: Wallace, Shoshone county, Idaho.

Inc. July, 1910, in Nevada. **Cap.** $1,000,000; shares $1 par.

Property: near the Tamarack & Chesapeake mine. Stock control held by the Day Bros. Property a good one.

CUSTER SLIDE MINING & DEV. CO. **IDAHO**

Property: 700 acres in Yankee Fork district, Custer country, including the Montana and Sunbeam groups, also mill, power plant and dam of the Sunbeam Cons. Mines Co. An aerial tram connects the mine with the Sunbeam. The Montana mine was operated during 1916 and some rich gold ore is said to have been found. Mine is an old producer.

Active operations began in 1917, but were suspended in January, 1918. In March 1919, company became bankrupt, and in July, 1919, the mine was bought by G. Von Brecht and J. I. Love, of Colorado Springs for $30,000. A new company was to be formed.

CYANIDE GOLD MINING CO. **IDAHO**

Officers: 403 Sherwood Bldg., Spokane, Wash.

Officers: J. B. Ellis, pres.-mgr.; Jas. La Fountain, v. p.; Geo. Causton, sec.-treas., all of Bonners Ferry, Ida., with John Kendall and M. J. Sweeney of Spokane, directors.

Inc. 1919. **Cap.** $3,000,000; $1 par.

Property: the Buckhorn mine, formerly owned by the Deer Creek Gold Mining Co., 25 miles N. E. of Bonners Ferry, Boundary county.

Development: by 2,300′ tunnel, said to have opened a fair tonnage of ore.

Equipment: includes a 4,200′ Riblet aerial tram, 50-ton ball and cyanide mill, 20-drill compressor, etc.

DADDY MINING CO. **IDAHO**

A co-partnership, not incorporated.

Address: A. D. Coplen, 2324 Altamonte Bldg., Spokane, Wash.

Property: 25 acres, Murray district, containing a fissure vein in Prichard slate; gold value is reported to be $30 per ton.

Development: by 800′ tunnel with 4,000′ of workings.

Equipment: 10-stamp mill. Production to date is $200,000.

No recent information.

DAISY MINING CO. **IDAHO**

Address: C. D. Miller, treas., Mullan, Idaho.

Last assessment of 1 mill per share, due Jan. 10, 1921.

Property: in Freemont county, developed by tunnels.

DEER CREEK MINES CONSOLIDATED **IDAHO**

Formerly the Deer Creek M. & M. Co.

Address: E. C. Orr, sec., 114 Fifteenth St., Spokane, Wash.

Inc. in Washington. **Cap.** $1,500,000; $1 par.

Property: 17½ claims, 17 miles S. W. of Winchester, and 11 miles S. W. of Forest, the nearest P. O., in the Deer Creek district, Nez Perce county, shows orebodies 10 to 20′ wide, carrying copper ore with some gold. One vein has 4′ of chalcopyrite ore developed by a tunnel. Reported that $150,000 was spent in development and equipment, latter including 2,000′ of flume, water wheel, compressor, and 100-ton mill, employing amalgamation, gravity concentration and flotation.

DEER CREEK MINING & MILLING CO. **IDAHO**

Succeeded in 1920 by the **Deer Creek Mines Consolidated**, which see.

DE LAMAR MINING & MILLING CO. **IDAHO**

Address: H. H. Bonnel, pres.-mgr., De Lamar, Owyhee Co., Ida.

Property: a lease on 36 patented claims, 379 acres, includes the old De Lamar mine, on the W. slope of the Owyhee range, about 7 miles from Silver

City. The mine is credited with a past production of $14,000,000 in gold and silver. Ore occurs in quartz fissure veins in granite and porphyry.

Development: by tunnels, 1,000′ and 3,000′ in length, with 10,000′ of old workings.

Equipment: includes 150-ton mill and electric power. The property was reopened in 1919.

DEMMING MINES CO. IDAHO

Main office: Nampa, Idaho. **Mine address:** Demming, via Murphy, Idaho.

Officers: C. T. Payton, pres.; D .C. Montore, v. p.; W. J. Long, 2nd v p; W. L. De Remer, sec.-treas.; L. W. Mills, asst. sec., with C. C. Nelson, W. L. Kellogg and M. J. Rowland, directors.

Inc. in Idaho. **Cap.** $15,000,000; $5 par. **Bonds,** $250,000 issued.

Property: 38 claims, 600 acres, about 38 miles from Murphy, Owyhee county, shows fissure veins in granite that run N. E.-S. W. and are cut by cross fissures 5 to 12′ wide. Ore is sulphide carrying gold and silver.

Development: by tunnels and shaft. Over 6,000′ of new work done since June, 1918. Reserves in No. 1 were estimated as worth $400,000 in 1917.

Equipment: hoist, compressor, 100-ton mill using ball-mill, 6-cell Janney flotation machine, 4 Senn tables, Oliver filter, roasting furnace, cyanide plant auto-trucks, etc.

Production: several carloads of concentrates were shipped to smelters in 1918-19. Shut down in 1920, pending reconstruction.

DENVER COPPER CO. IDAHO

Inc. by H. M. Ross of Spokane, but apparently never functioned. See Vol. XIV.

DOUGHBOY MINING & LEASING CO. IDAHO

Address: F. B. Sherry, supt., or A. N. Sweet, cons. engr., Mackay, Idaho.

Property: 4 claims, 5 miles N. E. of Mackay, Custer county. Ore occurs in a 4′ contact vein in limestone and porphyry, and carries lead and silver, said to average 35% lead and 33 oz. silver per ton. Shoots appear as a succession of lenses.

Development: by a 350′ incline, with levels at 80, 170 and 350′. Each level said to be in ore. The shaft is being sunk to 500′, and raises driven from the 350′ to the 250′ level.

Equipment: includes an oil engine, compressor, hoist, shop, dwellings, etc. Shipments made to the smelter at Midvale, Utah.

DOUGLAS MINING C. IDAHO

Address: R. S. Clough, sec., Insurance Bldg., Wallace, Idaho. H. J. Rossi, v. p.

Cap. $1,200,000; $1 par; assessable; 853,500 issued. Two dividends of 1¢ each paid in 1917, and ¾¢ in January, 1918. An assessment of 2 mills was levied Dec. 30, 1920.

Property: 7 full claims on Pine creek, which were under option to the Anaconda Copper Mng. Co. until December, 1918, when it was relinquished, probably due to transportation difficulties.

Development: by 1,550′ of tunnels and several hundred feet of other work. Reserves are said to be 100,000 tons.

Production: Anaconda shipped 198 carloads of ore assaying 25% zinc, 8% lead, and 5 oz. silver per ton.

No work is being done, save to keep the plant in good order. When the Bunker Hill & Sullivan erects its zinc plants, the Douglas Co. will have a market nearby.

DREADNAUGHT MINING CO. IDAHO

Address: W. J. J. Smith, Wallace, Idaho.

Officers: M. P. Flannery, pres.; J. E. Codd, v. p.; C. P. Lindsley, sec.

Property: 7 claims near the New York and Manhattan claims of the Callahan Zinc-Lead Co., Coeur d'Alene district, Idaho.

Development: by tunnels. At depth of 730′ No. 1 shoot is 42″ wide and said to contain 10 oz. silver, 12% lead, and 4% zinc . All ore carries a little copper and gold. A shoot of fair-grade ore was opened in 1918.

DRILLING DEVELOPMENT CO. IDAHO

Address: C. W. Sherwood, mgr., Salmon, Lemhi county, Idaho.

Property: the Gold Dyke group of 18 claims, 13 miles E. of Salmon. Deposit consists of porphyry dike, estimated to contain 3,000,000 tons worth $5.50 per ton in gold and silver., with some zinc and lead. Mining is done by open-cut.

Equipment: a 200-ton cyanide mill employing the Koering process, was completed July, 1919, and was enlarged in August.

DU BOIS MINING CO. IDAHO

Address: H. H. Rhodes, Kellogg, Idaho.

Officers: H. E. Ginter, pres.; J. B. Eberhardt, sec.-treas., with J. W. Jones, Austin Blakeslee and S. J. Schreckengast, directors.

Inc. in Idaho. **Cap.** $1,000,000; $1 par.

Property: 80 acres, 2 miles E. of Kellogg, Shoshone county, carrying gold, silver, and copper, and developed by 1,500′ tunnel and 600′ shaft. There is a 10-stamp mill available. Mine has been idle for years.

DULUTH-LEMHI MINING CO. IDAHO

Company out of business. Described in Vol. XII.

DULUTH-MINNEAPOLIS MINING CO. IDAHO

Address: O. B. Wallace, mgr., IDAHO

Officers: G. W. McClelland, pres.; R. M. White, v. p.; P. M. Olsen, sec.; J. J. Ecklund, treas., with J. S. Graves, directors.

Property: on Grouse gulch, Coeur d'Alene district, Idaho.

Development: by 1,850′ of tunnels. Crosscuts said to have opened from 12 to 20′ of lead zinc ore. No recent returns. Presumably idle.

EAGAN COPPER MINING CO. IDAHO

Address: Wallace, Idaho.

Officers: Roy A. Henkle, pres.; J. T. Dickinson, v. p.; L. L. Brainard, sec.-treas., above with Tom Eagan, F. E. Rice and F. C. Blakely, directors.

Inc. 1916, in Idaho **Cap.** $125,000; 10¢ par.

Property: 2 miles from Adair in the St. Joe district, under development by Tom Eagan since 1892. Claims reported to show copper ore with considerable silver.

Development: by tunnels. New work in 1919 consisted of 510′ of drifts and crosscuts, and 190′ of raises.

EAGLE MOUNTAIN MINING CO., LTD. IDAHO

Address: W. H. Herrick, sec., Wallace, Idaho. D. A. McLeod, mgr.

An assessment of 2 mills per share was levied April 23, 1921.

Property: adjoins the Montana Standard on the Idaho-Montana divide, east of Burke.

Development: by 700′ crosscut.

EAST ALAMEDA MINING CO., LTD. IDAHO

Address: Alexander Murphy, treas.-mgr., Wallace, Shoshone county, Idaho.

Cap. $1,000,000; $1 par; 650,0000 issued; assessable.

Property: 2 claims, 1 patented. Is a lead-silver prospect adjoining the Headlight and Big Divide mines in the Coeur d'Alene region.

EAST CALEDONIA MINES CO. IDAHO

Address: Franklin Pfirman, sec., Wallace, Idaho.

Officers:. Herman J. Rossi, pres., Wallace; W. H. Nichols, v. p., Butte with W. I. Hall, Kellogg, and Franklin Pfirman, Wallace, directors.

Inc. March, 1915, in Idaho. **Cap.** $ 250,000; 25¢ par; assessable.

Property: 60 acres, including the Keating mine, at Wardner, Shoshone county, Idaho.

Development: by several tunnels and the Keating 600′ vertical shaft. The mine was worked intermittently for several years before present company acquired control. In February, 1918, the vein was cut on 600′ level, 60′ from the shaft, showing some galena.

Equipment: electric hoist, air-compressor, pump, shaft-house and blacksmith shop. Is still in the prospecting stage.

EAST HERCULES EXTENSION MINING CO. **IDAHO**

Address: W. O. Applequist, act. sec. 337 Rookery Bldg., Spokane, Wash.

Officers: J. B. Millspaugh, pres.; C. S. Crawford, v. p.; W. H. Macfarlan, sec.-treas.; W. H. Reeves, mgr., Cheney, Wash.

Inc. in Idaho. Cap. $1,500,000; $1 par; assessable; 2 mills levied, July 15, 1920.

Property: 8 claims, unpatented, 176 acres, 4 miles east of Burke, and about 2½ miles from the Hercules mine, reported to show a quartz vein carrying gold, copper, silver values.

Development: by tunnels 137′ and 500′ long, and 150′ of surface cuts. Annual assessment work only being done. Is a prospect.

EAST SNOWSTORM MINING CO. **IDAHO**

Mine near Larson, Shoshone county. A fraud order was issued, 1911, by the postal authorities against C. E. Mitchell, promoter of this company, and also against the company. The title was changed, 1911, to "The Snowstorm Deep Mines, Ltd.," which has also been branded fraudulent. Property described Vol. X, Copper Handbook.

EAST STANDARD MINING CO. **IDAHO**

Address: Joseph Matt, Burke, Idaho.

Officers: Joseph Matt, pres.; Hans Helgeson v. p.; Gus Lohoeffer, treas.; C. E. Inseip, sec., with Swan Monson, directors.

Cap. 1,000,000 shares; 710,391 shares issued. Assessable; 2 mill assessment levied.

Property: 4 fractional claims adjoining the Hecla on the west in Coeur d'Alene region.

Development: by 1,600′ tunnel and drifting which has opened 4 veins.

ECLIPSE MINING CO. **IDAHO**

Was formerly the **Lead King Mining Co.**

Address: E. W. Conrad, pres.-mgr., Eagle Block, Spokane, Wash.

Property: 13 claims, in McFarren gulch, about 1 mile south of Osborne, Shoshone county, said to carry 2 veins, one with outcrop of high-grade galena, the other showing silver-copper ore.

Development: mainly by 4 tunnels, longest 550′, with open-cuts and shallow shafts, showing silver-lead and gray copper ore, giving good assays. Mine was dormant from 1913 to April, 1918, when present company opened some ore in a tunnel.

ELDORADO MINING & SMELTING CO., LTD. **IDAHO**

Address: 301 Sixth St., Wallace, Idaho, or R. B. Lundy, mgr. G. W. Dougherty, supt.

Officers: J. C. Waddell, pres.; John Hamlin, v. p.; G. W. Dougherty sec.-treas., with M. A. Curran, and J. A. Patterson, directors.

Inc. July, 1907, in Idaho. **Cap.** $2,000,000; 10¢ par; assessable; 123,301 shares in treasury. Assessment No. 1, of ½ mill, levied Jan. 22, 1921.

Property: 4 claims, 1 patented, 75 acres, E. of Kellogg. Ore occurs in fissure vein in quartzite, said to average $19 gold, 3% copper and 3 oz. silver.

Development: by 800′ of workings to depth of 300′; includes 500′ tunnel. Operated by lessees.

ELK MINING CO. **IDAHO**

Address: John F. Carson, pres.-mgr.; Mullan, Idaho. Clara Carson, sec.

An offering of shares at 5 cents each was made in May, 1920. Assessment of 1 mill per share levied Aug. 7, 1921.

Property: 3 patented claims adjoining the You-Like claim of the Federal company's Morning mine, on Mill creek.

ELMORE COPPER CO. IDAHO

Address: W. O. Reuss, pres.-mgr., Mountain Home, Ida.

Officers: Wm. Reuss, pres.; Wm. C. Reuss, v. p.-treas.; C. W. Dingman, sec., with Frank W. Waddell and David A. Noyes, directors.

Inc. 1916, in Idaho. **Cap.** $5,000,000; $1 par; 3,894,014 shares issued.

Property: 26 claims, 520 acres, includes the Cat Creek, Camel Back and Little George groups, a townsite of 320 acres and 160 acres of timberland, in Dixie district, Elmore county, 12 miles E. of Hill City on the Oregon S. L. R. R. Reported on by Frank E. Johnesse.

Development: by 2,700′ of drifts and crosscuts, and 300′ shaft. At depth of 200′ the vein is said to be 76′ wide, and 80′ wide on the 300′ level. A triple-compartment shaft is being sunk to 500′ depth. Ore occurs in a true fissure vein in granite, containing gold-silver and copper.

Equipment: includes 50-ton mill, saw-mill, cement block plant, hoist, 4 cottages, etc.

EMPIRE COPPER CO. IDAHO

See Vol. XIV. Succeeded by Idaho Metals Co., which see.

ENTERPRISE MINING CO. IDAHO

Address: Kellogg, Idaho.

Officers: Fred F. Donaldson, pres.-mgr.; Gust Samuelson, v. p.; W. A. Tuson, sec.-treas.

Inc. June 17, 1910, in Idaho. **Cap.** $1,000,000; $1 par; assessable; 775,000 issued. A 2-mill assessment was levied on July 17, 1920.

Property: 55 acres unpatented, 2½ miles E. of Kellogg, S. side of Coeur d'Alene river. Ore consists of lead and silver in a fissure in Prichard formation. Vein is said to be 30′ wide, dipping 40°.

Development: by 1,200′ tunnel to a depth of 600′, also 1,400′ of workings. Small shipments have been made in the past to Anaconda. Nonproductive in 1919, but presumably developing, 1920-'21.

EUREKA DEVELOPMENT CO., LTD. IDAHO

Officers: W. A. Wilson, pres.-treas.; Dooley Bldg., Salt Lake City; A. C. Ellis, v. p.; Causten Browne, sec.; with Wm. Bradley, directors.

Cap. $100,000; par 50c; 50,000 shares in treasury.

Property: 11 patented claims, and 2 millsites, also a ½ interest in the Richmond claims, located in Mineral Hill district. Blaine county, 7½ miles from Hailey. Said to show a fissure zone in limestone and shale, with strike N. 40° W. and dip 70° N. E.

Ore: silver-lead, and a little copper and zinc. Reported that ore, as shipped, assayed 70 oz. silver and 50% lead.

Development: by a 425′ incline with 6 levels, and several tunnels. Idahoan claim has a 650′ shaft, 1,800′ from the incline on the Eureka claim. More than half the ground between the shafts is undeveloped, and possibility of finding new ore-shoots is said to be good.

The Eureka is said to have produced $300,000 and the Idahoan, $1,500,000.

Equipment: includes hoist, boilers, and a 75-ton mill.

Property worked by lessees, but company planning to resume development.

EUREKA MINING & MILLING CO., LTD. IDAHO

Address: A. D. Marshall, 206 Bank St., Wallace, Idaho.

Officers: W. R. Powell, pres.; C. B. Fly, v. p.; A. D. Marshall, sec.; C. A. Sterling, treas.; and J. S. Mooney, directors.

Inc. 1905, in Idaho. **Cap.** $1,000,000; $1 par.

Property: 7 claims, 1½ miles N. of Wallace, on Nine Mile creek Shoshone county, carrying lead-silver ore. Developed by tunnels, one being 1,200′ long.

Equipment: includes purchased electric power, compressor, etc.

Operated part of 1919, 1920, and 1921.

EXCELSIOR MINING CO. **IDAHO**

A Coeur d'Alene property that is presumably dead. See Vol. XIV.

FALLS CREEK MINING CO. **IDAHO**

Address: W. C. Ames, pres., or W. M. Hollenback, sec.; Sandpoint, Bonner county, Idaho.

Cap. $500,000; $1 par, assessable.

Property: 11 claims, 3 miles E. of Pend Oreille Lake, near Sandpoint. Ore carries lead, copper, and silver.

Development: by tunnels. A 50-ton mill was erected in August, 1918. Developing.

FEDERAL MINING & SMELTING CO. **IDAHO**

Officers: 120 Broadway, New York; Wallace, Idaho; and Denver, Del.

Officers: F. H. Brownell, chairman of board and pres.; H. A. Guess, v. p. and mgr. director; with E. L. Newhouse, Wm. Loeb, Jr., Chas. Earl, and Roger W. Straus, directors, J. L. Martin, sec.; A. C. Druding, treas.; Frederick Burbidge, gen. mgr.; Wallace M. Murray, supt., Mullan, Idaho.

Inc. 1903, in Delaware, (charter perpetual,) amended Aug. 22, 1903. **Cap.** authorized $20,000,000 pfd., 7% cum., and $10,000,000 com.; shares $100 par. Outstanding, $12,000,000 pfd. and $6,000,000 com. Preferred stock has no voting power except in connection with the increase of preferred stock, but is preferred as to assets. One-sixth entire capital stock said to be held by American Smelters Securities Co. Federal Guaranty Trust Co., New York, transfer office; U. S. Mortgage & Trust Co., New York, registrar. Annual meeting, second Monday in April. Listed on New York and Spokane exchanges.

Dividends, per cent:

Year	Pfd.	Com.	Year	Pfd.	Com.	Year	Pfd.	Com.
1903.....	1¾	....	1909.....	7	1½	1917.....	7	....
1904.....	7	4½	1910-11....	7	....	1918.....	7	....
1905.....	7	6(a)	1912-13....	6	....	1919.....	3¾	....
1906.....	7	6(b)	1914.....	5	....	1920.....	6	....
1907.....	7	6(c)	1915.....	4	....	1921.....	4	....
1908.....	7	...	1916.....	4¼	....			

(a) 4% extra. (b) 11% extra. (c) 8½% extra.

Accumulated dividends on the pfd. amount to 17% up to 1922. Total distributed to end of 1921 is 110¾% on pfd., and 47½% on common.

Summary of annual reports, income account:

	1920	1919	1918
Value of product	$3,259,879	$1,767,153	$2,408,867
Operating costs, etc	2,745,535	1,756,717	1,793,453
Operating profit	$514,344	$10,436	$615,414
Miscellaneous earnings	730,824	422,270	308,611
Total earnings	$1,245,168	$432,706	$924,025
Deductions	.....	.....	1,397,889*
Net credit to profit and loss	$1,245,168	$432,706	$573,864**
Less dividend on preferred	719,168	449,479	838,854
Net to surplus account for the year	526,000	.....	.....
Balance at first of year	$268,667	$285,440	$1,601,157
Balance at end of year	794,667	268,667	285,440

* Includes $347,234 for Liberty Bonds, $598,229 for purchase of property and $142,536 for Minerals Separation settlement. **Loss.

Working capital, years ending Dec. 31:

	Shares in other companies	Supplies	Accounts Receivable	Cash	Total current assets	Total current Liabilities	Excess of assets
1920....	$288,627	$286,949	$249,771	$1,455,502	$2,280,849	$212,110	$2,068,739
1919....	288,627	279,556	326,505	928,602	1,823,290	114,759	1,708,531
1918....	288,627	328,959	277,475	1,052,674	1,967,735	141,000	1,826,675
1917....	316,263	276,746	415,698	2,021,157	3,029,864	467,594	2,562,270
1916....	288,620	174,603	655,496	1,136,983	2,255,702	373,719	1,881,983
1915....	286,120	120,840	521,531	548,704	1,477,195	257,658	1,219,537
1914....	286,120	114,376	261,040	770,496	1,532,032	211,887	1,320,145

Cash includes Liberty Bonds.

Smelting contract: the Federal has a contract with A. S. & R. Co., dated October 16, 1905, terminating August 31, 1930, by which the Federal company must sell all of the silver-lead ore, slime and concentrate, of its own or leased mining properties, and all owned or leased property of any company in which the Federal owns 75% of the capital stock to the A. S. & R. Co., and the latter agrees to take all such output.

Apex litigation with the Bunker Hill & Sullivan, started in 1908, was settled in 1910 by agreement between the two companies. The Federal company holds 28,000 B. H. & S. shares.

Property: company entered upon the operation of its properties Sept. 1, 1903; $10,500,000 pfd. and $5,250,000 common stock, being issued upon the acquisition of all the mining property formerly owned by the Empire State-Idaho Mng. & Dev. Co., the Standard Mining Co., and the Mammoth Mines in Idaho; also certain smelting property at Everett, Wash. The smelting property has since been sold without loss to the company. The above mentioned mining property consists of silver-lead mines in the Coeur d'Alene region, Shoshone county and included the Tiger-Poorman and Last Chance mines, at Burke and Wardner.

The Morning mine, ½ mile N. W. of Mullan, one of the largest and best equipped lead-silver properties in the district, was purchased in 1905 It adjoins the Star Mng. Co.'s holdings and is the most important of the Federal group, though its ores are the lowest grade of any property in the district and very difficult to treat.

In 1910, company acquired an option on a portion of the stock of the Govt. Gulch Dev. Co., lying east of the Black Hawk mines in the Wardner district. On account of default of the stockholders, 414,000 shares out of a million reverted to the Federal Mining & Smelting Co. The property of this company consists of 1 patented and 6 unpatented claims. Company also controls through stock ownership the **Black Hawk Mng. & Dev. Co., Ltd.** with holdings in same district.

In 1912, Federal organized Green Hill-Cleveland Mng. Co. to take over the Cleveland group of the Idaho Investment Co., and the Green Hill ground at Mace in the Coeur d'Alene region, ownership and management resting equally between the Federal company and Green Hill interests. Operations began Nov. 1, 1912 and mines were finally worked out and closed early in 1918. Dividends to Federal from Green Hill-Cleveland for 4 years ending 1916, were $1,280,000. See Vol. XIV for further details.

The Helen-Frisco property, near Gem, was purchased in January, 1913, for $100,000; it includes the Black Bear mine. Operations proved unprofitable and mine was closed down, Aug. 9, 1916. The mill, plant and buildings were sold to the Tamarack Custer Cons. Mng. Co. for $150,000, the Federal company retaining all mineral rights. Shipping ore, however, was produced in 1917 and 1919 from the Frisco mine and in 1921, the Idaho Mines Leasing Co. (q. v.) began operations on the Black Bear mine.

In July, 1915, Federal purchased, at receiver's sale, the mine, concentrator, power line and supplies of the Iron Mt. Tunnel Co., at Superior, Mineral county, Mont., for $100,000. The mine is an old one, having been stoped for 1,700' above water level 20 years previous. Operations proved disappointing and the mine was closed down, August, 1916. Salvage value of plant was $78,331.

The North Star-Triumph mines, near Hailey, Blaine county, Idaho, acquired under bond 1916, have a 300-ton concentrator with flotation system and electric separator under construction. The properties are said to carry a large tonnage of complex ore, containing 14% zinc, 8% lead and 8 oz. silver. The ore-shoots are 20' thick and several hundred feet in length and depth. Treatment is hindered by an excess of arsenical pyrite and some antimony.

Negotiations for the purchase and development of the Independence mine at Hailey, in Wood River district, Idaho, for $500,000, were completed late in 1917. The ore is easy to treat, being almost free from zinc. It consists of shattered quartz coarsely crystalline galena and a little pyrite.

Company owns also the Lucky Jack and Brewster mines in Oklahoma and a 55% interest in the Lucky O. K. Mng. Co. of Kansas. These are described under their titles.

Reported late in 1921 that the Stemwinder and Ontario group adjoining the Sullivan mine of Cons. M. & S. Co., near Kimberley, in Fort Steele division, S. E. Kootenay district, British Columbia, has been placed under bond to the Federal. A former option expired in 1918. This silver-lead-zinc property is to be explored by drilling.

The Federal holdings in the Coeur d'Alene area are officially designated as the Burke mines, Mace mines, Wardner mines and the Morning mine. The Last Chance mine and the Sweeney mill became the property of Bunker Hill & Sullivan M. & S. Co. in 1918 and in 1920, the Tiger-Poorman mine and the Mono, O'Neil and Russell claims were taken over by the Hecla Mng. Co. Thus, the Morning mine remains the one important producing Federal property in the Coeur d'Alene. See Vol. XIV for other details.

Development: of company's mines in the Coeur d'Alene region, is by shafts, the deepest being 1,250', while at the Morning mine tunnels aggregate 12,000' Reserves at the latter at the end of 1920 were 625,000 tons, excluding those under litigation, compared with 1,088,600 in 1919. In addition to 55,520 tons of shipping ore, reserves are estimated to contain 30,000 tons of lead concentrates and 37,280 tons of zinc concentrates.

The Morning is a sub-level mine, in that below the main, or No. 6 tunnel is a shaft, the 20th level being 1,400' below it. This shaft was deepened 200' during 1920. Some interesting notes and diagrams on the mine will be found in the report of former State Inspector of Mines, R. N. Bell, for 1918.

The new 2,000' sub-level opened in 1919, shows normal ore 3,000' vertically below the apex of the vein. In 1920 a new shoot was opened for a length of 800'; it averages 30' in width, and ore is of good grade in lead and silver.

In the Independence, 6 levels have been opened at 100' intervals. In 1918, a shoot 80' long and up to 30' wide was developed. A small mill is making concentrates. A 3,000' tunnel, and 450' raise, to connect this mine and the North Star mill, was completed during 1920. Reserves are estimated at 40,000 tons of milling, of which 2,700 tons are shipping ore.

Equipment: company is amply provided with modern concentrating (one of 1,000 tons capacity employing flotation at Wardner), pumping, hoisting, compressing and electric plants. During 1920 a complete clubhouse, costing $100,000, was built for employees at the Morning mine, which has over 500 men on the payroll.

Ventilation of the mines has been attended to, and in February, 1918, a Sirocco fan of 30,000 cu. ft. capacity per minute was installed at the Morning, and one of 60,000 cu. ft. was ordered.

Adjoining the Morning mine is the property of the Star Mining Co., which late in 1917 brought suit against the Federal company, alleging wrongful extraction of ore, and claiming $500,000 damages. Many well-known engineers were retained by both sides. In March, 1918, the Star

lost the case. In an appeal, the U. S. Circuit Court reversed the decision in May, 1920. This long drawn out and costly litigation was suddenly terminated by compromise, December, 1921.

Another important apex suit was started in 1919. In this, Marsh Mines Consolidated, which has a 10-year lease, until 1926, on the Mono, O'Neil, and Russell claims of the Federal company, the result of previous litigation, started suit against the Hecla for alleged wrongful extraction of ore and claiming that the apex of the east orebody is within the Russell claims. In order to help prove its contention the Federal company sank 350′ shaft in this claim during 1920. It also applied to the Court to be allowed to raise from Hecla workings to meet this shaft, but was denied this permission.

Production:

Year	Ore, tons	Lead in products, tons	Silver products, oz.
1920	423,144*	20,811	1,161,614
1919	242,821	12,126	787,776
1918	320,794	19,702	1,015,986
1917	622,159	35,613	1,684,224
1916	802,288	37,338	1,683,587
1915	461,252	26,777	983,830
1914	421,631	25,487	913,498
1913	691,487	36,687	1,344,074
1912	836,947	50,937	2,649,667
1911	784,600	52,272	3,304,538
1910	741,650	48,155	2,801,319
1909	832,568	56,904	3,111,931

*Not including 74,488 tons from Lucky O. K. mine, but does include 90,394 tons from the Brewster mine.

The above table shows that though the company has been a big producer in the past, its Coeur d'Alene mines apparently are nearly worked out. Recognizing this, company has bought new properties at Hailey, Idaho, in British Columbia, Kansas and Oklahoma. Inasmuch as $12,000,000 7% preferred stock is in arrears over $2,000,000, and common has received no dividend since 1909, and is now worthless, and the various apex suits are costing so much, the principal property, the Morning mine—has a heavy load to carry.

FERN QUICKSILVER MINING CO. **IDAHO**

Address E. H. VanMeter, Cascade, Valley Co., Idaho.

Property: 5 quicksilver claims, at elevation of 9,000′ in Yellow Pine district, Valley county, 50 miles N. E. of Cascade, which is 40 miles from Knox, over bad roads. Freight costs about $100 per ton. Cinnabar occurs in chalcedonic quartz seams in soft yellowish limestone. The seams vary from a few inches to 3 or 4 feet, and are fairly persistent, one being followed 80′, with 2′ of ore assaying 3.8% mercury.

Development: by 3 tunnels, with several hundred feet of work.

Equipped with 12-cylinder Johnson-McKay type retort furnace. Ore treated averaged 5 tons per day, containing 2-5% quicksilver, when in operation. Idle 1921.

FIDELITY CO. **IDAHO**

Address: A. G. Kennedy, mgr., Murray, or Monarch, Idaho.

Property: the Monarch mine in the North Fork district, above Murray, Shoshone county, formerly owned by the **Monarch Mng. Co.**, and operated to May, 1912 by **Coeur d'Alene North Fork Mng. Co.** Ore carries lead, silver and zinc. The ground between the 1,100′ and 600′ levels is being operated by lessees and several shipments have been made to the B. H. & S. smelter. A small mill is available.

FIRST NATIONAL SILVER MINES, LTD. **IDAHO**

Address: 323 Lindelle Blk., Spokane, Wash.

Property: 27 claims, 7 patented, in Big Creek section of Coeur d'Alene, Shoshone county, under development, 1920-21.

FLORENCE MINING & MILLING CO. **IDAHO**

Address: John B. Steffes, sec.-treas., Kellogg, Idaho.

Officers: Chas. Dallaire, pres.; with J. D. Chisholm, Jas. Ezkiel, and John Haalund, directors, at last accounts.

Inc. 1908, in Idaho. **Cap.** $1,000,000; shares $1 par; assessable; 440,000 issued. Assessment of 2 mills levied on October 11, 1919. Annual meeting second Tuesday in July.

Property: 10 claims, 170 acres, due E. of the Alhambra and S. E. of the Sherman and Roanoke mines in the Yreka section of the Coeur d'Alene district. Ore occurs in vein in Revett quartzite, carrying lead, silver, and copper.

Development: by crosscut tunnels, 150′ and 300′ long, with a total of 800′ workings. A lower tunnel was started in 1917 to intercept the vein; in Jan., 1921, it was in 120′ and a contract was let to drive another 100′.

FLORIDA MOUNTAIN MINES CO. **IDAHO**

Address: R. J. Goodwin, supt., Silver City, Idaho. George Kessler, mine supt.

Property: over 1,000 acres of patented claims, including the old Trade Dollar silver mine at Dewey, near Silver City. Up to 1904 this mine produced over $10,000,000. Reopened in 1918. Ore, consisting of argentite and pyrite in a quartz gangue, occurs in fissure veins, from 1 to 3′ wide.

Development: previous work was by over 30 miles of drifts and tunnels driven near the base of Florida mountain, reaching a depth of 1,700′. The present company has been opening old stopes and picking up caved ground, amounting to 1,200′ by the middle of 1920.

Equipment: includes electric power, electric locomotives, I. R. compressor, 20 stamps, ball-mill, tables, vanners, shops, bunkhouses, dwellings, etc.

Company suspended operations early in 1921 and plans leasing blocks of ground to local miners.

FLYNN GROUP MINING CO. **IDAHO**

Address: J. F. Whelan,, sec Wallace Idaho.

Officers: J. J. Hayes, pres.; with J. J. Cronin, K. J. White and Therrett Towles, directors.

Inc. 1905, in Idaho. **Cap.** $1,000,000; decreased March, 1920 to $625,000; 25c. par; all issued.

Property: 4½ miles N. E. of Wallace, Shoshone county, on the high ridge between Canyon creek and the South Fork of Coeur d'Alene river. It includes 16 claims owned outright, and an interest in 3 others. The Black Bear and Frisco mines are on the W., and the East Flynn and Ivanhoe on the E. By securing an option on control of the Black Bear shares, a right-of-way through the Black Bear was also acquired.

There are 3 veins in Burke and Revett quartzite. No. 1 vein carries a little lead; Nos. 2 and 3 have no mineralization, though the latter is honeycombed and well oxidized. Little development has been done, but on the adjoining property, the Black Bear Fraction vein has been developed to a depth of 1,160′, at a point within 300′ of the Flynn. The shoots are irregular and from 5 to 7′ wide, the ore assaying 2.2 oz. silver, 7.76% lead, and 16.57% zinc. Future development can best be affected by tunnels. Transportation is good, and power is obtainable nearby. More work is required to prove whether this property has merit or not. Property is controlled by the Senator M. Co. and is under option to the Coeur d'Alene Syndicate.

FORT HALL MINING & MILLING CO., LTD. **IDAHO**

Address: C. W. Pomeroy, sec., Pocatello, Bannock county, Idaho.

Officers: Wm A. Hyde, pres.; C. W. Pomeroy, sec.; L. Fargo, treas., with M. A. Hendricks, W. H. Witty, and T. H. Doane, directors.

Cap. $350,000; $1 par. Stock listed on Salt Lake City Exchange.

Property: 23 claims, 9 miles S. E. of Pocatello, said by R. N. Bell to show big, low-grade deposits of copper-iron-sulphide ores, not as yet profitably mined.

Development: by 8,000′ of tunnels, 300′ shaft, 200′ winze, 100′ of raises and 300′ of crosscuts. Equipped with steam power and 50-ton mill.

No recent information.

FOUR TIMBERS MINING CO. IDAHO

Address: F. Bland, sec.-treas., Wallace, Shoshone county, Idaho.

An assessment of 2 mills per share due Dec. 4, 1920.

Property: between the Ray-Jefferson and Amazon-Manhattan mines.

Development: by tunnels, the uppermost 600′ long, cutting a well-defined vein. The lower adit was 900′ long with two shifts working late in 1919. **Equipment:** electric power, 3-drill air-compressor, etc.

FRIEND MINING CO. IDAHO

Address: 321 Lindelle Bldg., Spokane, Wash.

Officers: Wm. Schierding, pres.-treas.-mgr.; David Barth, sec.; T. F. Havens, v. p.; with Geo. Baxter and Herbert Nuffer, directors.

Inc. 1915, in Idaho. **Cap.** $150,000; 10c. par; assessable. Annual meeting first Wednesday in August. Assessments of 2 mills were levied Aug. 6 and Oct. 6, 1921.

Property: 9 unpatented claims in Beaver Creek district, Shoshone county, carrying veins with lead, silver, and zinc.

Development: by tunnels, and a shaft below the main adit.

Equipment: includes electric power and a 10-ton concentrating mill.

GAIETY MOUNTAIN GOLD MINES CO. IDAHO

Address: E. F. B. Dande, cons. engr.-agent, Warren, Idaho.

Officers: D. L. Rhodes, pres.; John Becker, v. p.; C.C.Roeder, sec.; F. M. Woods, treas., with J. H. Latham and Geo. Cochran, directors.

Inc. 1920, in Delaware. **Cap.** $1,200,000; $1 par; 300,000 shares issued.

Property: 226 claims, 4,560 acres, in Warren district, Idaho county, Ore occurs in quartz veins in granite, said to average $20 gold per ton.

Development: by 200′ tunnel. Work started in 1921 and small mill is to be erected.

GALENA MINING CO. IDAHO

Subsidiary of **Callahan Zinc-Lead Mng. Co.** Is a consolidation of the **Kill Buck** and **Chicago-Boston** mining companies.

Address: C. W. Newton, mgr., Wallace, Idaho.

Officers: D. A. Callahan, pres.-treas.; Dr. L. E. Hanson, v. p.; C. W. Newton, sec.-mgr.; with John Borg, directors.

Inc. 1921 in Ida. **Cap.** $2,500,000; $1 par.

Property: 15 claims on Lake creek, 2 miles W. of Wallace, Shoshone county, one mile from railroad and electric power. A ½ interest is held in the Tincup claim. There are two ore-bearing veins, one the Tincup, having high-grade gray copper ore, from which shipments have been made. The second vein, the Killbuck, is said to have 8 to 12′ of lead-silver milling ore, opened by No. 6 tunnel. The copper vein is up to 5′ wide, and some ore carried 20 oz. silver per ton. So far as explored, the property is within the Revett quartzite.

Development: by 6 tunnels and a 400′ shaft. A crosscut driven on the 400′ level cut the downward extension of the big orebody in Dec., 1921.

Property is now a mine, though it needs further development to determine the extent of the orebody and to block out ore for the mill.

GERTIE MINING CO. IDAHO

Office: 708 Hutton Bldg., Spokane. Wash. **Mine office:** Burke, Idaho.

Officers: L. W. Hutton, pres.; A. A. Booth, v. p.; with Eugene R. Day and F. W. Anderson, directors.

Cap. $150,000, increased in 1914 to $250,000; shares 10c par. Listed on Spokane Stock Exchange.

Property: 3 patented claims, 35 acres, near Burke, adjoining Hec'a mine on the S. E. and Maher Ahern group on the W. Also about 10 acres at mouth of crosscut tunnel. Company has driven a 4,100′ tunnel, with back of 1,400′, in the expectation of cutting ore in a vein mined on the Hecla property. This vein is said to have shown 3 or 4″ of clean galena, 300′ from the Gertie line and 250′ farther back Hecla is said to have mined 3 to 5′ of clean ore. A large vein was cut 1915, but results, being disappointing, management started a crosscut tunnel to Gertie claim to find the vein. Expenditures are over $75,000. In March, 1919, mine was closed down.

GIANT LEDGE MINING CO. **IDAHO**

Office: 714 Peyton, Bldg., Spokane, Wash.

Officers: J. J. Taylor, pres.; J. Erikson, v. p.; W. W. Johnson, sec.-treas., Spokane; D. S. Prescott and J. A. Folsom, trustees. Chas. G. Taylor, mgr.

Inc. 1913, as a reorganization of the Granite Allie Co., the new company assuming liabilities of $30,392, which have since been paid off. **Cap.** $1,500,000; $1 par; assessable; 1,350,000 shares issued.

Property: 65 claims, water-rights, and timber land (6,000,000′), on Granite gulch, 4 miles E. of Murray, Shoshone county, near the O-W. R. & N. Co's. line.

Development: by 400′ shaft and over 1,500′ of other workings. On the 400′ level the vein has been followed for 1,400′, and carries good value in lead, copper, and gold. One shoot, 120′ long, said to assay $36 per ton. The shaft is to be deepened.

Equipment: 7-drill compressor, hoist, pumps, 1½ mile flume and electric power. A 150-ton mill started 1917 was not finished by 1921, although lumber was being cut for this purpose and foundations were laid.

GIANT MINING & DEVELOPMENT CO. **IDAHO**

Address: 517 Bank St., Wallace, Idaho.

Officers: Paul Liver, pres.-mgr.; A. Rechsteiner, v. p.; E. R. Turk, sec.-treas.; with G. Malacrida and Isaac Davids, directors.

Cap. $100,000; 10¢ par; assessable; 3 mills per share levied, August, 1921.

Property: 7 claims in Beaver district, Shoshone county, opened by 1,600′ of workings, which show some lead-silver ore. A crosscut is being driven to the vein.

GILMORE MINING CO. **IDAHO**

Officers: 222 Kearns Bldg., Salt Lake City, Utah; and Gilmore, Lemhi county, Idaho.

Officers and directors: Edgar C. Ross, pres. and gen. mgr.; Frank Hahne, v. p.; Harry R. Hyde, treas.; Clarence Warnock, sec.

Inc. Feb. 10, 1912, in Utah. **Cap.** $1,000,000; shares $1 par, assessable; outstanding $800,000. Bonds authorized, $100,000; none issued. Company is a close corporation. Annual meeting, January 2. All receipts from ores spent in development work. Has levied 2 assessments, last one December, 1918, payments were to run until August, 1919.

Property: 12 patented claims, 250 acres, in the Texas mining district, at Gilmore, was purchased from the Allie Mng. Co., Ltd.

Ore: gold-silver in fissure veins in limestone, said to have an average value of $14.50 per ton. Veins strike N. 10° E. and dip 60°. See U. S. G. S. Bull. 528, p. 107.

Development: by a 60° incline and tunnels, greatest depth of workings on the vein is 850′; total workings, 8,800′. This company in conjunction with the Pittsburgh-Idaho and Allie Mining companies has run a 4,500′ development and transportation tunnel into Gilmore Mtn. which is said to cut a number of lead-silver fissures and one important gold vein.

Production: shipments in 1917 totaled $72,084, ore averaging 0.025 oz. gold, 7.75 oz. silver, and 23.16% lead; in 1920, 557 tons, returning $16,984.96,

compared with 2,281 tons returning $19,955.38 in 1919, and 1,286 tons returning $15,706.40 in 1918.

GLEN METALS MINING CO. IDAHO

Address: C. D. Miller, treas., Mullan, Idaho.

Last assessment, of 1½ mills per share, due Jan. 10, 1921.

GOLD CREEK MINING & MILLING CO. IDAHO

Address: Paul Bockmier, mgr., Pacific Hotel, Spokane, Wash.

Officers: E. V. Thompson, pres.; A. G. Crum, v. p.; Paul Bockmier mgr.; preceding with J. H. Fussy and C. C. Burr, directors.

Property: in Gold Creek district, Latah county.

GOLDEN AGE JUNIOR MINING CO. IDAHO

Address: Arthur W. Stevens, supt., Pioneerville, Idaho.

Cap. $1,000,000; $1 par.

Property: 300 acres in Boise Basin district, Boise county, shows veins carrying gold-silver ore.

Development: by a 1,700′ tunnel and a 500′ double compartment shaft sunk in 1920 to cut the vein 380′ below the tunnel.

Equipment: includes a 15-stamp mill to be remodeled and enlarged.

The Michigan Investment Co. of Grand Rapids, Mich., is said to be financing the company.

GOLDEN CHEST MINING CO. IDAHO

Address: T. H. Thomas, sec., Iron Mountain, Montana.

An assessment of 3 mills per share was due Nov. 22, 1920.

Property: 51 claims, 1 mile E. of Murray, Coeur d' Alene, Idaho.

Geology: quartz vein in Prichard slate. Ore from upper levels was free milling, and the gold easily recovered. At depth the ore became pyritic and rebellious. Gold and tungsten occur in the same vein, but the scheelite is confined to the disturbed part of the vein and is almost free from gold. The gold shoots are free of tungsten, though in mining both become mixed to some extent.

Development: consists of over 13,000′ of workings.

Treatment: in Bull. 128 of the A. I. M. E., R. R. Goodrich and N. E. Holden describe tests made on this ore, tungsten with a little gold. Considerable clean scheelite is sacked direct for market. It was found that gravity concentration gave 53.7% tungstic oxide concentrate, with much pyrite, not a marketable product; flotation does not clean the concentrate properly and loses tungsten in the overflow; roasting and magnetic separation of the pyritic tungsten material yields over 60% grade; and the net extraction of WO_3 is about 90%. A new mill was erected in 1918.

GOLDEN GATE PLACER MINES .. IDAHO

No information for several years. Former office at Pendleton, Ore. See Vol. XIV.

GOLDEN GLOW MINING & MILLING CO. IDAHO

Office: Hailey, Ida.

Officers: J. D. Pope, pres., Butte, Mont.; C. L. Friederichs, sec.-treas., Helena, Montana.

Property: 18 miles N. of Ketchum, Blaine county. Veins contain low-grade silver-lead-copper ore, opened by tunnels.

A 75-ton wet concentrator was built in 1920 and 300 tons of high grade ore shipped during the year.

GOLD FLOTATION DEVELOPMENT CO. IDAHO

Office: H. G. Loop, 1526 L. C. Smith Bldg., Seattle, Wash., or Mullan, Ida. E. A. Renny, supt.

Officers: W. H. Havlin, pres.; Harold Williams, v. p.; H. G. Loop, sec.-treas.; with John Brizel and O. W. Lewis, directors.

Inc. 1919, in Idaho. **Cap.** $1,500,000.

Property: the old Singiser, or Monument gold mine, a group of 6 claims in Lemhi county, 50 miles from Salmon. Idle for past 15 years. Formerly owned by the **Oregon Gold M. Co.** Ore contains gold and silver, said to average $11 per ton.

Development: by double-compartment incline, with drifts on the 40, 100 and 200′ levels, a total of 3,000′ of workings.

Equipment: includes 6-stamp mill, compressor, sawmill, etc.

GOLD HILL & IOWA MINES CO. **IDAHO**

Controlled by Boston-Idaho Gold Dredging Co. of Idaho City, Idaho.

Address: E. E. Carter, mgr., Quartzburg, Boise Co., Idaho.

Property: Gold Hill and Iowa group, at Quartzburg, also the Newburgh mine, a total of 43 claims. Veins consist of porphyry, carrying quartz stringers, averaging $10 to $12 per ton. Workings are on the intersections of 2 fissures and rhyolite-porphyry dikes.

Development: by 20,000′ tunnel work and a 550′ shaft.

Equipment: includes electric power, compressor, drills, and 150-ton plant using 8′ Hardinge mill, tables, and cyanidation.

Production: total to date is given as over $7,000,000.

Company was the largest gold producer in Idaho in 1919 and 1920. Employs about 150 men.

GOLD HUNTER MINING & SMELTING CO. **IDAHO**

Address: C. L. Herrick, Mullan, Shoshone Co., Idaho.

Officers: T. F. Kelley, pres.; E. C. Hennessy, sec.; C. L. Herrick, managing supt.; C. K. Cartwright, mine supt.; G. Almquist, mill supt.

Cap. $2,000,000; $10 par; is a close corporation.

Dividends: $50,000 in 1919; $100,000 in 1920.

Property: 7 claims and a fraction, 240 acres, patented, in Hunter district, Coeur d'Alene region; also 20-acre millsite. The Paymaster group of 3 claims, adjoining the Hunter, was acquired from the Greenough estate in 1920.

Geology: fissure zone in quartzite and shale. Lead-silver sulphide ore occurs in shoots with dip of 80° S. and course of N. 75° W. The mineralized area is 200′ by 1,800′.

Development: by tunnels and shafts. Main tunnel 4,800′ long. Winze down 1,200′ below tunnel level. Two shoots developed, the N. 12′ wide, the S. 20′ wide. Best ore came from east part of Yolande and west part of Hunter claims.

Equipment: includes 150 h. p. electric hoist, two 1,500 cu. ft. compressors, 100 g. p. m. pump, 500-ton mill.

Results of operations:

	Tons Ore	Gross	Cost Mining	Trans. and Treatment	Improvements	Net Profit
1915	118,764	$614,590	$333,904	$214,315	$34,707	$31,662
1916	119,490	815,779	482,275	180,186	8,044	161,361
1917	116,562	994,407	525,493	293,202	44,892	130,812
1918	.....	1,028,434	667,456	290,755	13,693	56,528
1919	132,921	821,456	463,762	279,134	11,623	66,937
1920	160,027	1,336,732	793,656	312,199	15,043	115,833

The monthly shipments of lead concentrate averaged 1,100 tons in 1918 and 1,900 tons in 1919. Operations suspended December, 1920, to await return of normal conditions.

GOLD MINES CO. **IDAHO**

Address: I. W. Higgins, 401 Chamber of Commerce Bldg., Spokane, Wash.

Officers: J. W. Higgins, pres.; H. G. Twomey, sec.; W. H. Stowell, treas.

Cap. $1,500,000; 10¢ par; 1,000,000 shares in treasury.

Property: 4 claims, in Bear Creek district, N. of Mountain Home, Elmore county, credited with gold production amounting to $250,000.

Development: by 700′ tunnel, reaching a depth of 350′, with about 4,000′ of workings.

GRAND FORKS LEASING CO. **IDAHO**

Address: H. V. Edwards, Wallace, Idaho.

Organized Jan., 1921, with a capital of 25 units, 15 of which pay $25 per

month for 5 months, a total of $1,875; while the promoter and associates take 10 units.

Property: a 4-year lease, until Jan., 1925, on the **Climax Silver-Lead M. Co.'s** 4 claims, E. of the Western Union, 2½ miles N. W. of Wallace, Shoshone county. Development is by tunnels, and equipment includes a compressor, etc.

GRAY COPPER MINING CO. LTD. **IDAHO**

Probably dead. Described in Volume XIV.

GREAT DUNKER M. & M. CO. **IDAHO**

Last Address: E. C. Connor, Kellogg, Idaho.

Company was organized in July, 1919, to develop ground near Kellogg. $40,000 was to be spent on equipment and new work. Probably dead.

GREAT EASTERN MINING CO., LTD. **IDAHO**

Officers: John Carlson, pres.; Charles A. Solberg, v. p.; John C. Furst, sec.-treas.; with Edwin Erickson and Charles Bollinger, directors.

Inc. Sept. 19, 1900, in Idaho. **Cap.** $1,000,000; shares $1 par; assessable. Annual meeting in April. In 1921 the **Senator Mining Co.** and **Coeur d'Alene Syndicate** secured an option on 225,000 shares of treasury stock at 10¢ per share and also were granted a permanent easement and right of way over Great Eastern property, the consideration being $5,000 cash, payable on or before May 15, 1924.

Property: the Great Eastern group, 14 claims, patented at Gem, 4½ miles N. E. of Wallace, Shoshone county, said to show silver-lead-zinc ore in fissure veins.

Development: by shafts and tunnels, longest tunnel 3,000'. Claims are still in the development stage. Property is easily accessible to Northern Pacific and Union Pacific (O.-W.) railroads.

GREAT WESTERN MINING CO. **IDAHO**

Address: Burke, Shoshone county, Idaho.

Officers: Jesse Norton, pres.; Victor Hunt, v. p.; W. S. Bowie, sec., with W. K. Karnes, F. T. Robinson, and J. J. Jenkins, directors.

Property: 7 claims, patented, 3 miles from Burke, show vein traced for about 1,200' by trenching, carrying copper and lead ore.

Development: by tunnels of 1,270' and 900', and a 207' shaft. Work was begun Aug. 12, 1904. A raise driven in 1914 was reported to have opened a 12' orebody, assaying 7% lead, 1.54% copper and 0.4 oz. gold.

Equipment: includes hoist and small air compressor, driven by a 6-h. p. motor. Idle since 1917.

GREEN HILL CLEVELAND MINING CO. **IDAHO**

See **Federal Mining & Smelting Co.**

GUELPH MINING & MILLING CO., LTD. **IDAHO**

Head office: Kellogg, Idaho. **Mine office:** Sunset, Idaho.

Officers: Byrd Coyle, pres.; H. H. Rhodes, v. p.; A. P. Corby, sec.; Eliza H. Steffes, treas., with L. M. Pung, E. P. Biotti, Alfred Conneybeare, J. B. Steffes and S. D. Lemieux, directors.

Inc. Mar. 6, 1916, in Idaho. **Cap.** $1,500,000; $1 par; assessable; 1,300,000 outstanding. Assessment of one cent a share levied in March, 1920.

Property: 7 claims and 3 fractions, in Sunset district, adjoining the Hercules, Ambergris, Sunset, and Callahan zinc-lead mines, Shoshone county.

Geology: quartz vein in Burke quartzite, with dip of 55° and strike, S. E. to N. W. Ore occurs as streaks and contains lead carbonate and silver chloride.

Development: by 250' two-compartment shaft a 125' upper and 1,100' lower tunnel, with 810' of drifts.

Equipment: includes 5-drill compressor, pump, hoist, electric power.

HAMBURG-AMERICAN COPPER M. & M. CO. **IDAHO**

Address: J. A. Rock, sec., Kellogg, Idaho.

Inc. Nov., 1908, in Idaho. **Cap.** $1,500,000; $1 par; assessable; 1½ mills levied in May, 1920, and 1 mill in May, 1921.

Property: 8 claims, between the Handspike and Riverside, on the Little North fork, 18 miles from O.-W. R. & N. line.

Development: 1,100′ tunnel opening copper ore. No operating data 1917.

HAMILTON MINING CO. **IDAHO**

Office: 307 Benton St., Portland, Oregon.

Officers: R. E. White, pres.; A. N. Hamilton, sec.

Cap. $2,400; shares $1; all outstanding.

Property: on the South fork of Salmon River, Idaho county, Idaho. Company reported, October, 1917, to have purchased the Grand Central mine, consisting of 2 claims in Cable Cove district, near Sumpter, Baker county, Oregon, formerly owned by Mollie Gibson Gold M. & M. Co.

Development: by 500′ of tunnels, said to show an ore-bearing vein from 2-4′ wide. No recent information.

HARMONY MINES CO. **IDAHO**

Offices: 105 W. Monroe St., Chicago, Ill., and 116 North Carson St., Carson Nevada. **Mine address:** Earl F. Nieman, cons. engr.-gen. supt., Salmon, Ida.

Officers: A. W. Nieman, pres.-gen. mgr.; C. F. Nast, v. p.; O. G. Paasche, asst. treas.; with C. Nickelsen, Henry Cohen, A. C. Skafgard, C. V. Nieman, Morris D'Hoore, and Richard de Smet, directors. Gladys Nieman, sec.; J. W. Reihman, treas.

Inc. Jan. 22, 1916, in Nevada. **Cap.** $1,000,000; $1 par; assessable; 791,498 issued. Annual meeting, third Thursday in January.

For year 1920, receipts were $193,617, of which $100,601 was from sale of shares; cash received on loans, $49,077; ore sold realized $15,687. Development, etc., cost $92,941; equipment, etc., $55,583; promotion expense, $2,222; administration, $12,294; and re-payment of loans, $20,882. The cash balance was $9,693. In 1920 receipts were $135,066, including $113,897 from stock sales; $639.99 from sale of ore; $6,150 received on loans; mine expenditures amounted to $51,795, not including $8,050, repayment on loan; balance, $28,242.

Property: 17 claims, being patented, in Withington Creek district, Lemhi county. Examined by I. A. Herndon and J. F. Inglis of Salmon, Idaho; J. W. Coples of Leesburg, Idaho, and R. O. Clifford of Salt Lake City.

Geology: the mine opens 2 veins, the Contention and the Leapyear. In the Contention, which is a shear-zone in schist, dipping 70° with a N. 60° W. course, the orebody is from 2 to 12′ wide, and shoots average 4′ in width and 100′ in length. The principal mineral is chalcopyrite assaying from 3 to 5% copper. In the Leap Year, the ore is massive chalcopyrite averaging 5.5% copper. The Income vein will be cut in 1922.

Development: by tunnels and varfous crosscuts, with total of over 6,000′ of workings. Ore reserves estimated at 53,840 tons. The 300′ level, or lower tunnel is to be driven along the Contention vein to Explore the full length of the shoot. A depth of over 2,500′ can be reached on the dip of No. 6 vein. Early in 1920, a parallel vein to No. 1 was found 36′ distant. It was 3′ wide, assaying 12% copper.

Equipment: 2 aerial trams, one a jig back two-bucket plant of 50 tons a shift capacity, and 2,400′ long; the other a friction grip tram of 100 tons capacity and 2,800′ long; also 2 fuel-oil driven compressors of 10-drill capacity, 7 7-mile transmission-line.

Mill: a 100-ton concentrating mill was constructed in 1919. Operations show that the mill recovery was but 54.71% of copper on 2,412 tons of 3.52% ore milled. Flotation is to be installed to increase saving to 85% or better.

Production: in 1920, was 213,793lb copper compared with 32 tons of

ore and 5,376lb of copper in 1916; 500 tons and 61,170lb in 1917, 100 tons and 20,000lb in 1918.

Over $250,000 has been spent on the Harmony mine, which seems to be of considerable merit.

HARTFORD MINING CO. IDAHO

Address: Therret Towles, sec.-treas., Gyde-Taylor Bldg., Wallace, Ida.

An assessment of 1½ mills levied March 24, 1921.

No other information available.

HARTWIG MINING CO. IDAHO

Out of business. See Vol. XIII for description of property.

HAYES CO. IDAHO

Officers: A. Hayes, pres., Kellogg, Idaho; Martin Nicholson, sec.; S. A. Easton, treas.

Inc. 1917, in Idaho. **Cap.** $50,000; shares $1 par. Organized by the Bunker Hill & Sullivan and Federal M. & S. companies.

Property: company has a lease on about 1,200 acres, including 3 miles of river bed along the Coeur d'Alene river, and operates a 75-ton flotation plant costing $50,000, for recovery of lead and silver from slime from the bed of the south side of Coeur d'Alene river.

Shipping about 200 tons of concentrate per month to the Bunker Hill smelter. Concentrate said to average 25% lead and 20 oz. silver.

HAYNES STELLITE CO. IDAHO

Address: Kokomo, Indiana; and Haynes Camp, Blackbird Creek, via Salmon City, Lemhi Co., Idaho.

Property: 30 claims in the Blackbird district, 32 miles S. W. of Salmon. A wide ore zone shows dissemination of cobalt-sulphide ore in fine grained black quartzite, with interbedded green schist. The ore occurs with abundant tourmaline.

The Haynes Stellite Co. is the largest user of cobalt in the world. The malleable stellite alloys made by it are composed mostly of cobalt and chromium. The metal is forged and polished, but cannot be machined.

Production: 4,000 tons of ore in 1918 yielded 55 tons of concentrates, assaying 17.74% cobalt, 0.63% copper, 15.32% iron, 23.75% sulphur, and 14.15% arsenic. Only development work done in 1919-'20.

HEADLIGHT MINING CO., LTD. IDAHO

Address: Wallace, Idaho, and Markwell Bldg., Long Beach, Cal.

Officers: F. P. Markwell, pres.; Alex. Murphy, v. p.; Everett H. Pattison, sec.; Oscar Nordquist, treas., with C. A. Markwell and Angus Sutherland, directors.

Inc. 1900, in Idaho. **Cap.** $1,800,000 $1 par; 1,438,995 issued. **Bonds:** $50,000 issued.

Property: 13 claims, 10 patented, 130 acres, in the Leland mining district, Shoshone county, reported to show lead-silver ore in fissure veins is quartzite. Developed by tunnels. Idle since 1917.

HECLA MINING CO. IDAHO

Office: Wallace, Idaho. **Mine office:** Burke, Idaho.

Officers: Jas. F. McCarthy, pres.-treas.-gen. mgr. at Wallace; W. J. C. Wakefield, v. p.; with Sarah E. Smith, Carl Landsee, F. J. Kipp, E. J. Nolan, and H. C. Lambach, directors. L. E. Hanley, sec., Wallace; C. H. Foreman, engr.; J. B. Sloan, mechanic.

Original Hecla Mining Co., inc. in Idaho in 1891, with **cap.** $500,000 and shares $1 par, owned the Hecla and Katie May claims. **Inc.** July, 1898, in Washington. **Cap.** $250,000; shares 25cts. par; all issued and fully paid. Security Transfer and Registrar Co., New York, transfer agent; Metropolitan Trust Co., New York, registrar. Annual meeting in April. Listed on New York Curb, Los Angeles and Spokane stock exchanges.

Financial statement for years ending December 31:

	1920	1919	1918	1917
Ore sales and sundry revenue	$2,573,840	$1,692,771	$4,035,339	$3,671,818
Operating charges, depreciation, etc.	1,385,774	1,066,232	1,980,621	1,507,868
Net profit	1,188,066	626,539	2,054,718	2,163,950
Dividends	650,000	600,000	350,000	1,600,000
Current assets	1,710,489	1,822,226	2,467,607	.....
Current liabilities	482,657	63,318	76,933	.....

Dividends: $7,224,000 up to Sept. 28, 1921. In 1915, dividends were but $220,000; increased to $565,000 in 1916; $1,550,000 in 1917; $1,600,000 in 1918; $600,000 in 1919; $650,000 in 1920 and $330,000 in 1921.

The total to end of 1920 was $8,505,000.

Property: 29 patented claims, 347 acres, in Burke, or Lelande district, of the Coeur d'Alene region, near Burke, and a mill site at Gem.

In Aug. 12, 1921, company agreed to cooperate on equal terms with Bunker Hill & Sullivan Mng. & Conc. Co. in the purchase and development of **Star Mng. Co.'s** holdings at Mullan, and which Bunker Hill had transferred to its subsidiary, the **Sullivan Mng. Co.**, on Dec. 13, 1920. On Aug. 17, an injunction to prevent this deal was granted to Eugene R. Day and Sarah E. Smith, as Hecla stockholders, on the principal ground that the Star mine is "worthless". In September Bunker was made codefendant. Hecla's total share under the purchase contract is about $437,000, of which $99,505, the initial payment, is ½ the cost to Bunker Hill of defending the Star Mng. Co. in its litigation with the Federal M. & S. Co. It is proposed to attack the Star vein through the Hecla shaft by an 8,000′ crosscut to cost $66,000. This vein is believed to be an extension of the Morning orebody of the Federal M. & S. Co.

Geology: ore is chiefly a silver-bearing lead sulphide accompanied by sphalerite and pyrite, occuring in the Hecla lode; strike N. W.-S. E., with average dip 80° to N. E. General country rock is sericitic Burke quartzite. The lode is intimately associated with a lamphrophyric dike, which has an average width of 2′. Ore averages 5′ to 6′ in width, occurs mainly in the quartzite on one or both sides of the dike, and, to a large extent, fills fissures. The pay-shoot has an extreme length of 1,200′. For geology of Coeur d'Alene district, see U. S. G. S. Prof. Paper No. 62, published in 1908; also paper by Oscar A. Hershey, published by M. and S. Press.

In November, 1919, the Federal M. & S. Co. for its lessee, the Marsh Mines Consolidated, instituted an apex suit against the Hecla, alleging ore was wrongly extracted from the east orebody of the Hecla. Although denying the allegations, Hecla in November, 1920, bought the Tiger-Poorman property, certain water rights at Burke, and the Russell, Mono and O'Neil claims from the Federal company for $750,000. As the three last named were subject to a lease held by the Marsh Mines not expiring until 1926, partial payment only was made pending negotiations for cancellation of lease. Final settlement was reached in March, 1920, with full payment. The Gertie **M. Co.** also started suit in January, 1920. By June it was permitted to inspect the Hecla No. 3 tunnel, which was driven through a corner of the Gertie, before 1911. Permission to examine other parts of the Hecla was denied by the Court.

Development: by a vertical 3 compartment shaft and by shaft No. 2. New work totaled, 6,420′ in 1916; 12,386′ in 1917; 13,566′ in 1918; 4,449′ in 1919; and 4,731′ in 1920.

The main shaft was 2,000′ deep in 1918; at this depth the drift on the vein showed ore 12′ wide, which by January, 1921, had been opened for 842′. It was then 16′ wide, and equal in grade to the 1,600′ level, with 3 to 8′ of shipping ore. Work in 1918 continued on the East orebody between No. 3 adit and the 900′ level, also from No. 2 shaft level to 1,200′ on the Ore-Or-

No-Go orebody; in 1919 but little new work was performed on these orebodies, and none in 1920.

Ore reserves were estimated at 1,296,000 tons in 1916; 1,326,399 tons in 1917; 1,584,115 tons in 1918; 1,549,833 tons in 1919, plus 750,000 tons probable; 2,095,745 tons in 1920.

The Tiger-Poorman, idle since 1908, is said to have reserves of lead-zinc ores, now of commercial value because of improved treatment methods. Its plant has been moved to the Hecla mine.

Equipment: the property is one of the best equipped in the district, with hoists, compressors, machine-shops, and a 750-ton concentrator with a flotation unit at Gem. In 1918, a leased 600-ton mill was also operated. Electric haulage was started in 1917.

Production:

	1920	1919	1918	1917	1916	1915
Ore milled, tons	185,275	175,102	309,656	292,726	184,209	.....
Ore and concentrate shipped, tons	34,200	27,179	52,894	45,517	40,832	26,214
Lead produced, lb	33,717,468	24,726,015	51,635,676	44,363,559	40,217,573	24,917,867
Silver produced, oz	924,179	795,050	1,590,062	1,366,960	1,195,841	692,444
Zinc produced, lb	.....	.....	433,341	507,888	.....	.....
Average lead price, cents per lb	7.60	5.79	7.35	8.47	6.94	4.87
Average silver price, cents per oz	105.68	111.10	98.00	82.90	67.30	50.40
Average zinc price, cents per lb	.....	.....	7.64	9.06	.....	.....
Cost of mining, sorting and general expenses, per ton	$4.944	$3.905	$4.316	$3.493	$2.346	.....
Cost of milling and transportation	0.805	0.671	0.674	0.686	0.612	.....

In 1917 company made a very favorable 5-year contract with the Bunker Hill & Sullivan Co. for the smelting of its lead-silver ore and concentrate at the Kellogg plant. Prior to this arrangement these products were sent to Tooele, Utah.

The Hecla mine, though unsuccessful in its early years, has become one of the steady dividend-payers of the district. The property is kept up to a high standard, is efficiently managed, and costs are low.

H. E. M. MINING CO. **IDAHO**

Consolidated with the Aurora-Sampson Mining Co., to form the **Western Union Mining Co.**, which see.

HENRIETTA EXPLORATION CO. **IDAHO**

Address: S. L. Shonts, mgr., Wallace, Idaho.

Organized, 1917, by Wm. A. Beaudry, P. Weber, Ben. Harmon, Sidney Shonts, and Frank H. Skeels. Has a 5-year lease from 1917 with option to purchase at $80,000, on the Bear Top mine, formerly owned by the late M. S. Simmons of Murray.

Property: about 5 miles from Murray, shows a vein in slate, carrying silver-lead ore in pockets and irregular shoots. Lessees operate on a royalty basis, paying 15% on lead settled for under 7½c. per lb., and 20% for shipments above that figure.

Development: 2,200′ of tunnels and over 2,000′ of other workings.

Equipment: power plant and concentrator, but no returns therefrom are published.

HENRIETTA LEASING CO. **IDAHO**

Name changed to **Henrietta Exploration Co.**, which see.

HERCULES MINING CO. **IDAHO**

Address: Eugene R. Day, mgr., Burke, Idaho.

Company is a partnership, not a corporation, the Day family owning a half interest and dominating the policy. It owns 500,000 shares Northport Smelting & Refining Co., at whose smelter at Northport, Wash., ore and concentrate from the Hercules and other mines was reduced, but in 1920, products from the Hercules were sent to the B. H. & S. plant at Kellogg.

Hercules holds the following stock:

168 shares Pennsylvania Smelting & Refining Co.
9,800 shares Hidden Treasure Co.
720,330 shares Idaho & Eastern Mining Co., a controlling interest.
912,719 shares Hummingbird Mining Co., a controlling interest.
505,333 shares Ambergris Mines Co., a controlling interest.
840,854 shares Basin Mining Co., a controlling interest.

Dividends: (estimated) see following table for distributions up to 1916; then $3,000,000 in 1917; $2,500,000 in 1918; none in 1919; $850,000 in 1920; total, $16,831,227.

Property: the Hercules mine near Burke, Shoshone Co., is the greatest bonanza of the Coeur d'Alene region. It has one big vein in quartzite and slate, cut by two cross-faults and one dike.

Development: by tunnels. In the lowest or Hummingbird tunnel nearly level with the town of Burke, there is a 1,200′ shaft, making a total depth of 2,900′ below the apex. This shaft is to be sunk 400′ deeper in 1921. Early in 1918, N. 5 level of this shaft, 2,000′ below the surface, entered rich lead-silver ore opened for a length of 480′ at last accounts.

Equipment: includes 175-ton mill erected in 1915, using rolls, jigs, tables, tube mill and Callow flotation plant.

Production: 1901 to October 28, 1916:

				Milling Ore		Shipments		Crude Ore	
	Average	Price	Tons	Lead	Silver	Crude	Concts.	Lead	Silver
Year	Lead	Silver	Mined	%	oz.	Tons	Tons	%	oz
1901....	4.36	58.95	362	.....	.....	362	.....	59.84	132.13
1902....	4.10	52.16	5,003	.....	.....	5,003	.....	62.34	83.92
1903....	4.26	53.57	10,043	.....	.....	10,043	.....	62.28	89.69
1904....	4.32	57.22	12,266	.....	.....	12,226	.....	56.40	77.55
1905....	4.70	60.35	14,691	.....	.....	11,384	38	55.47	68.81
1906....	5.66	66.79	74,998	7.34	6.90	9,379	8,178	57.53	58.55
1907....	5.35	65.32	90,683	7.82	7.54	9,537	10,929	54.20	54.29
1908....	4.23	52.86	90,087	9.53	9.32	6,395	13,050	56.61	52.55
1909....	4.30	51.50	61,820	10.07	9.43	6,076	11,874	54.16	47.01
1910....	4.49	53.49	161,550	10.70	9.86	6,627	19,138	46.00	38.87
1911....	4.46	53.30	176,325	9.49	8.32	8,459	22,940	49.79	44.89
1912....	5.15	60.83	180,286	9.20	7.90	11,402	22,595	44.06	40.44
1913....	4.39	59.78	132,955	10.76	7.97	15,684	25,008	52.02	42.65
1914....	3.87	54.81	192,361	12.45	10.58	20,364	39,282	57.32	52.61
1915....	4.67	49.69	215,089	10.10	8.02	12,603	36,428	51.20	39.61
1916....	6.85	65.66	231,568	10.88	8.73	20,400	49,144	47.29	35.40
Total	....	.....	1,650,087	.....	.....	165,984	258,604	.....	.....
Average 11 yrs.	....	.....	.....	9.85	8.60	.....	.....	51.83	46.08
Average 16 yrs.	4.70	57.27	.....	.....	.....	.....	.....	54.16	59.93

	Concentrate					
	Lead	Silver	Value			
Year	%	oz.	per Ton	Receipts	Profits	Dividends
1901.....	.....	.....	$84.53	$27,810	$20,567	$8,000
1902.....	.....	.....	55.12	266,785	169,527	94,200
1903.....	.....	.....	69.75	667,616	438,746	257,800
1904.....	.....	.....	63.55	731,107	430,418	544,000
1905.....	.....	.....	66.87	725,218	375,348	228,000
1906.....	57.53	58.55	74.51	1,272,000	787,534	880,000
1907.....	54.20	54.29	65.62	1,296,328	765,160	800,000
1908.....	56.61	52.55	48.46	907,071	383,751	448,000
1909.....	54.16	47.01	44.70	798,245	325,305	352,000
1910.....	46.00	38.87	36.52	874,955	418,542	384,000

1911.....	47.23	37.52	38.30	1,148,574	544,429	329,227
1912.....	48.18	39.34	43.36	1,415,462	715,763	704,000
1913.....	54.91	41.77	51.83	2,055,633	1,207,326	1,024,000
1914.....	55.76	46.56	50.76	2,991,148	1,868,761	2,176,000
1915.....	53.14	38.67	44.03	2,103,955	1,096,019	320,000
1916.....	47.95	34.33	54.22	3,690,703	2,368,682	1,432,000
Total	.....	.....	.....	$20,972,610	$11,915,878	$9,981,227
Average 11 yrs.	52.33	44.49				

Production for years ended May 1, as made to the County Assessor, is as follows:

Year	Ore & Conc. mined	Gross Value	Cost of Mining	Cost of freight & treatment	Cost of better-ments	Net profits
1918..	76,876	$6,193,539	$1,776,876	$2,414,204	$86,692	$1,915,766
1919..	17,801	1,611,153	736,023	652,481	3,131	219,517
1920..	52,435	5,337,360	1,979,251	2,172,193	38,208	*1,147,706

*Federal taxes not deducted.

The property normally employs 500 men. On account of the lead market, mine was closed for 5 months in 1919.

According to reports, all work but development was suspended in March, 1921.

Litigation in which the Hercules is involved is known as the Cardoner case. On October 28, 1916, a 1/16 interest in the mine was purchased from Mathilde Cardoner of Albuquerque, New Mexico, by Eugene R. Day, for $350,000. Later it was alleged that he did not give correct statements as to the value of the mine, therefore Mrs. Cardoner was not paid enough for her interest. On January 25, 1918, the U. S. District Court upheld the legality of the sale, but in August the case was appealed.

HERMIT MINING CO. **IDAHO**

Address: Clayton, Custer county, Idaho.

Officers: H. L. Carpenter, pres., 800 1st Nat. Soo Line Bldg., Minneapolis, Minn.; W. E. Smith, v. p.; Wm. M. McCrea, sec., with S. C. Sherrill, all of Salt Lake City, directors. W. E. Smith, supt.

Property: a group of claims 15 miles from Clayton, on which development work on a vein 20' wide has disclosed an ore shoot 2½' wide, the ore carrying 50 to 73% lead, 114 to 211 oz. silver, and $3.80 to $6.80 gold per ton according to report. One carload shipped to the smelter netted $1,700. Only such rich ore can stand the long haul to the railroad.

No recent returns.

HIGHLAND-SURPRISE CONSOLIDATED MINING CO. **IDAHO**

Address: First State Bank, Kellogg, Idaho.

Officers: C. R. Mowery, pres.; M. J. Sinclair, v. p.; George Lamielle, sec.-treas., with Al Page, H. H. Huemann, W. W. Papesh, and George Bitner directors.

Inc. 1912, in Idaho. **Cap.** $1,200,000; $1 par; assessable. Last assessment of 5 mills per share levied May, 1921 Seven assessments have been levied to date.

Financial statement for period beginning March 1, 1917 and ending June 1, 1920, showed, cash on hand, $1,099; receipts from smelters, $78.435; receipts from 5 assessments, $60,060; miscellaneous receipts, $3,600; bills remaining unpaid, $5,757. Report for 10 months ending March 1, 1921, showed receipts from assessment No. 6, $12,113, balance on hand, $783.

Property: 36 claims, at head of Stewart creek, in Pine Creek district, 15 miles S. of Kellogg.

Ore: carries silver-lead-zinc sulphides in fissure veins in slate; veins

strike N. 60° E., dip 70°. Ore said to average 5 oz. silver, 8% lead and 20% zinc. One shoot is 200′ long, 2 to 4′ wide, with a back of 270′.

Development: consists of 2,600′ of drifts, 1,515′ of crosscuts, 250′ of raises and 150′ of winze.

Equipment: includes 125-ton mill erected in 1915, using rolls, jigs, tables, tube mill and Callow flotation plant.

A few men employed on development work. See Vol. XIII, for details of property. Transportation up Pine creek is the main trouble.

HILARITY MINING CO. IDAHO

Dead. Listed in Vol. XIV. Consolidated Jan., 1917, with the **Pine Creek M. & M. Co.**, which see.

HILL MINING & MILLING CO. IDAHO

Address: L. S. Harrison, sec.-treas., Kellogg, Idaho.

Officers: Josiah Hill, pres.; Horace Trask, v. p., with L. S. Harrison and T. L. Rowland, directors.

An assessment of 1 mill a share was levied Sept. 10, 1920.

Property: a group of 3 claims and a fraction, near Kellogg, Shoshone county, adjoining the East Caledonia on the east.

Development: by tunnels, one 900′ long, exposes some lead-silver ore in a 4′ vein cutting slate and quartzite.

Reported operated under lease and bond by Patrick Brady and W. J. Stratton, October, 1921.

HOLTE MINE IDAHO

Acquired in 1921 by **Unity Gold Mines Co.**

HOMEBUILDER MNG. & DEVELOPMENT CO. IDAHO

Address: W. C. Brower, pres., 1329 Old Nat'l Bank Bldg., Spokane, Wash.

Property: 43 claims, 18 miles E. of Coeur d'Alene, Kootenai county. Company's literature issued in 1916 said 200,000,000 tons of ore were exposed in the mine, and that it carried gold, silver, copper, uranium, cobalt, zinc, and other valuable elements. A reduction plant was planned 1918. The absurd statements made about the mine caused suspicions as to its value.

No recent information.

HOMESTAKE GOLD MINING CO. IDAHO

Address: A. W. Boyd, 703 23rd. St., Spokane, Wash.

Property: the Homestake, Pennsylvania and Sadie H. No. 1 and 2 claims in Oro Grande mining district, south of Elk City, Idaho. Mine under lease and bond for $25,000 from James Penman of Elk City, has been under development since 1918 and is said to show a fine orebody.

HOMESTAKE MINING CO. IDAHO

Subsidiary of **National Copper Mng. Co.**, which owns practically all its stock.

Property: a group of claims, extending west across Deadman gulch to Enterprise, or Silver Reef property. Claims were acquired by National Copper Co. as site for deep tunnel when it was believed the ores of company persisted downward.

Development: on Homestake, comprises 4 tunnels, lowest near wagon road, 400′ long, to be extended 900′ by Silver Reef Co., to common end line, with back of 1,200′.

HOPE MINING & MILLING CO. IDAHO

Address: Hope, Bonner county, Idaho.

Officers: G. H. Martin, pres.; A. W. Bowen, treas.; John Larson, sec.; F. S. Hayes, supt.

Inc. June, 1916, in Idaho. **Cap.** $1,500,000; $1 par.

Property: 11 claims and a fraction, 225 acres, lying about 1½ miles E. of Hope, on main line of N. P. R. R. A vein with 14″ of ore contains copper, silver and lead. Is a prospect, developed by a short tunnel. A new 1,500′ tunnel, 600′ below the present one, was to be driven during 1921.

HORSESHOE COPPER CO IDAHO

Address: D. J. Archibald, sec., Mackay, Custer county, Idaho.

In August, 1919, the U. S. S. R. & M. Co. secured a lease and bond on the mine until Dec., 1920, employing a force of 25 men. Two thousand feet of development work was done and 50 cars of oxidized lead ore shipped.

HORSESHOE MINING CO. IDAHO

Address: J. B. Scoles, mgr., Mullan, Idaho.

Officers: Lawrence Hollywood, pres.; P. J. Scoles, sec.-treas., with P. B. Scoles, directors.

Inc. 1908, in Idaho. **Cap.** $1,500,000; $1 par; 900,000 issued.

Property: 12 claims, 1½ miles S. E. of Mullan, Shoshone county, and adjoining the Kennedy group in Rio Grande gulch.

Ore: carries silver and lead occurring as carbonate and galena in fissure veins in quartzite.

crosscut was driven early in 1921 to cut one vein at a depth of 400'.

Equipment: purchased electric power, compressor, etc., acquired from

Development: by tunnels, one being 1,000' long, cutting 2 veins. A the St. James M. Co.

HORST-POWELL COPPER MINING CO. IDAHO

Merged August, 1919, with the **Linfor Copper Co.**, which see.

HUMMING BIRD MINING CO. IDAHO

Address: W. H. Hoover, sec., Burke, Idaho. Reported controlled by the "Days".

Assessment of 5 mills per share levied July 6, 1921.

Property: 21 patented claims, at Burke. The portal of Hercules No. 5 tunnel is on Humming Bird ground. No record of development work.

HYPOTHEEK MINING & MILLING CO. IDAHO

Address: Gyde-Taylor Bldg., Wallace, Idaho. **Mine office:** Kingston, Shoshone county, Idaho.

Officers: J. H. Kerns, pres. and gen. mgr.; J. H. Guenther, v. p.; O. A. Olsson, sec.-treas. and mgr.; with W. W. Davidson, J. H. Kirk and S. A. Covet, directors.

Cap. $200,000; 10c. par; 1,700,000 issued; assessable. **Bonds:** $150,000, 7%, 12 year; authorized in 1914. An assessment of 5 mills per share was levied Feb. 21, 1921. Listed on Spokane Exchange.

Net smelter returns from November 1, 1916, to February 11, 1918, were $207,911, and expenses for same period totalled $211,829.

Property: 9 claims, 6 miles from Enaville, Shoshone county, located 1886 by Octave Guay, shows 3 veins; 2 of 10 to 20' estimated width; the third vein, known as the Great Western, of 8 to 25' width, having a 12 to 18" paystreak carrying native copper and cuprite, assaying up to 16%, balance of vein showing low-grade ore, estimated to carry 2% copper, with small gold and silver values in quartz gangue. The country rocks are gray and blue slates and thin bedded quartzites.

Development: by 1,000' tunnel and 3-compartment shaft to the 1,100' level. The 523' level (750' below surface) opened up a fine shoot of commerical lead ore. The 900' level showed this ore to be 6' thick and 400' long. This is the deepest mining work in the Prichard slates of the Coeur d'Alene sedimentary series, a formation hitherto considered unpromising. The finding of chalcocite at this mine below 1,000' of Burke quartzite completely contradicts all former views. In February, 1916, a crosscut on the 1,100' level opened up a vein of solid galena ore from 18 to 24" wide. In Dec., 1919, a new tunnel was started about 2,000' N. W. of the shaft to cut 2 veins found by drilling at a point about 400' in. The adit was completed late in 1920. One vein was cut at 170' and carried some lead and silver.

Property examined by J. V. Richards in June, 1917, who reported that the ore shoot opened by the 700', 900' and 1,100' levels was 400' long and averaged 3' in width. The ore is largely lead carbonate, assaying 10%

lead and 1 oz. silver per ton. Half-way between 900′ and 1,100′ the shoot is cut off and but little ore is found at 1,100′, or 100′ below it, although the vein is strong. Reserves would not exceed 20,000 tons. In 1917, the company let a contract for drilling the ground north and south of the vein, also below 1,200′, and it was reported that 4′ of 20.5% lead ore had been cut by the drill.

Equipment: the mine is electrically equipped and has a 200-ton concentrator with Chilean mill, Wilfley tables, Frue vanners, etc., A 3-mile aerial tram was installed to convey ore from the mine to the railway.

IBEX MINING CO. IDAHO

Presumably dead. Described in Vol. XIV.

IDAHO ANTIMONY MINING CO. IDAHO

Property: in Yellow Pine mining district, near Cascade, Valley county, shows stibnite ore 18 to 30″ wide, developed by 4 tunnels. Two carload shipments, 1915-16, are reported to have yielded 47% antimony. Operated under lease by Frank Novak, Inc., at last accounts.

IDAHO CARBONATE HILL CONS. MINING CO. IDAHO

Address: A. W. Witherspoon, Peyton Bld., Spokane, Wash.

Officers: W. D. Greenough, pres.; Alfred Thompson, v. p.; A. W. Witherspoon, sec.-treas.; with Herbert Wheeler and Dr. R. A. Griffiths, directors. W. E. Greenough, mgr.

Inc. 1917. **Cap.** $750,000; 25c par.

Property: 24 claims formerly owned by the Carbonate Hill and Idaho Giant Mining companies purchased 1917 for $275,000. Total area 473 acres, 2½ miles S. E. of Mullan, Shoshone county.

Development: both groups are opened by tunnels, workings aggregating over 5,000′. Ore carries lead and zinc. A shaft has been sunk 800′ below the Carbonate Hill tunnel, at a point 1,200′ from portal. Encouraging results were reported from the 400′ level in September, 1919.

Equipment: 12 by 15″ hoist, water-driven compressor, at Snowstorm mine at Larson connected by 11,000′ pipeline, dwellings, and shops. Normally about 25 men are employed.

Work was resumed on the 400′ level in April, 1920, and continued until September.

IDAHO CONSOLIDATED PLACER MINING CO. IDAHO

Mail returned from former address: Fred A. Clauson, 309 Broadway, New York.

Inc. 1919, in Delaware. **Cap.** $1,500,000; 600,000 shares in treasury. Security Transfer & Registrar Co., N. Y., transfer agents.

Equipment: 6 giants, capable of handling 7,000 cu. yd. daily.

IDAHO CONTINENTAL CO. IDAHO

Address: Klockmann, Idaho.

Officers: A. A. Klockmann, pres.-gen. mgr., 711 Paulsen Bldg., Spokane, Wash.; J. B. Whitehill, v. p.; R. Schacht, sec.-treas., with E. M. Robinson, and Wm. Wraith, directors. Joseph Lancaster, mine supt.

Inc. 1909, in Washington. **Cap.** $1,500,000; shares $1 par; all issued. John D. Ryan, through the International Smelting & Refining Co., advanced $325,000 for the development of the property on condition that it be given a 10 year contract to treat the company's ores at Tooele, Utah.

Property: 20 patented claims, 26 miles from Porthill, Boundary county, N. of head of Priest lake; said to show a strong vein in quartzite with a succession of ore-shoots, 8′ to 20′ wide, carrying galena, which have been opened to a depth of 700′ and on that level exceed 1,500′ in length.

Development: by 3 drift tunnels on the vein, the lowest (No. 4) being 1,800′ long with a back of 500′. Reserves above No. 4 tunnel were estimated to be 200,000 tons at the end of 1920 including 28,000 tons of broken ore in stopes.

Equipment: a hydro-electric plant 12 miles from the mine, sawmill, 15-drill compressor, assay office, shops, 1,750′ ground tram, 250-ton concen-

trator, replacing that burned in 1915, 2,000′ aerial tram across the Kootenai river, and 13 motor-trucks. A narrow-gauge railway from the mine to Porthill, 26 miles, is proposed. About 130 men are employed, when property is in full operation.

Production: total shipments, from 1916 to Jan., 1921, exceed 23,000 tons of crude ore and concentrate from 193,633 tons of ore. In 1919, 4,695 tons of concentrate averaged 63% lead, 22 oz. silver, 0.026 oz. gold, 3% zinc, and 4.5% iron. In 1920, to November, 2,400 tons of concentrate were shipped, that assayed 65% lead and 24 oz. silver.

The Idaho Continental is considered one of the important lead mines of the State, and has been rapidly developed despite its isolated position and high cost of operation.

IDAHO COPPER CO., LTD. **IDAHO**

Address: 419 Providence Bldg., Duluth, Minn., or Boise, Ida. Cooley Butler, mgr., 844 Title Insurance Bldg., Los Angeles, Calif. Frank A. Kennedy, supt., Cuprum, Ida.

Officers: O. H. Griggs, pres.; R. J. Whiteside, v. p.; Maytor Hoppenyan, sec., L. C. Brewer, treas., with E. C. Kennedy and Richard Johnson, directors.

Inc. Jan. 10, 1920, in Idaho. **Cap.** $500,000; $10 par; 8,600 shares outstanding.

Property: the Red Ledge copper mine, 44 claims, 800 acres, in Seven Devils district, Adams county, 15 miles N. W. of Cuprum, the nearest P. O. Claims cover an outcrop of red and yellow stained quartz porphyry, about 3 miles long and 3,000′ wide, bordered by granular igneous rock on one side and greenstone on the other, which is permeated with a fine-grained cupriferous pyrite, as well as stained with green carbonate of copper. Geologic examination indicates that the orebody is an anticline or saddle fold of bedded porphyry schist, 100′ thick.

Development: by 400′ and 300′ crosscut tunnels, opening up four ore zones, 46′, 70′, 118′, and 60′ in width, the latter averaging 2.50% copper, 2 oz. silver and .050 oz. gold. The ore mineral is said to be a primary sulphide. About 5,000′ of diamond drilling has been done and management estimates 10,000,000 tons of ore blocked out, August, 1921. Examined by Robt. N. Bell.

Appears to be a promising low-grade property.

IDAHO COPPER MINING CO., LTD. **IDAHO**

Offices: Wallace, Idaho, and Mullan, Shoshone county, Idaho.

Officers: John H. Nordquist, pres.; A. N. Stroud, v. p.; Geo. F. Stoney, sec.; A. H. Featherstone, treas.; W. H. Herrick, gen. mgr.

Property: 6 claims, 3 patented, on the Continental Divide, between Idaho and Montana, near the head of Willow creek, in the Hunter district, west of the Reindeer Copper & Gold M. & M. Co., Ltd. Claims carry about 4,500′ of the strike of the extension of the Reindeer vein, and are developed through the 3,000′ Reindeer crosscut tunnel. Idle at last report.

IDAHO COPPER MINING & SMELTING CORP. **IDAHO**

Omcers: M. R. Straight, pres.; H. B. Hershey, v. p.; J. B. Adrian, treas., with R. N. Stanfield and F. A. Reid, directors. A. H. Goddard, sec.

Inc. Sept. 18, 1919, in Virginia. **Cap.** $10,000,000; $10 par.

Property: the I. X. L. copper group, 60 claims, and fractions, 1,620 acres, in the Heath district, Washington county, 10 miles from the Huntington branch of Oregon Short Line, and 16 miles by road from Pacific & Idaho Northern Line, a branch of the O. S. L. at Weiser. Examined by H. C. Parker, D. MacVichie, and Robt. N. Bell.

Geology: the district embraces Cuddy mountain, 8,000′ high, with a central boss of quartz hornblende diorite, or monzonite. The mountain is flanked to the N., S. and E. by horizontal lava flows of basalt. The western slopes of the mountain show monzonite, cutting large bodies of greenstone porphyry, with included masses of marbelized limestone containing typical contact metamorphic minerals and lenses of characteristic sulphide ore.

The I. X. L. group covers a large part of an erosion basin; near the crest of the mountain there is also a well-defined zone, 400′ wide and a mile long, of more altered mineralized monzonite, in which the numerous shallow pits and trenches show copper carbonate stains and threads of chalcopyrite. Widespread mineralization is indicated by large patches of brown stained rock. Lower down the slope a second zone 800′ wide and a mile long traverses the middle of the claims. This also shows a carbonate and sulphide ore.

Development: by 3,000′ of tunnels, shafts, drifts and crosscuts. A recent prospectus states that the deposit contains "a very desirable concentrating copper ore aggregating 16 million tons, containing a gross value of $74,000,000 that promises a net profit of $16,000,000 on its extraction and treatment, with a potential possible ore resource that may warrant, on full development, a repeated multiplication of these figures". Mr. Bell considered the property a possible "porphyry copper".

Company does not maintain an office and Simpson, Thatcher & Bartlett, former fiscal agents, know nothing about the present status of the organization.

IDAHO EXPLORATION CO. IDAHO

Propery sold and company out of existence. Was a close corporation. See Vol. XIV.

IDAHO GIANT MINING CO. IDAHO

Absorbed by **Idaho Carbonate Hill Mining Co.**, which see.

IDAHO GOLD COIN CO. IDAHO

Controlled by the John A. Salzer Seed Co., La Crosse, Wis.

Property: in the Black Lake section of the Seven Devils district, Adams county, carries gold ore assaying from $12 to $16 per ton. Company expended $450,000 in 12 years' development work and built a 50-ton cyanide plant. Idle and mine for sale.

IDAHO GOLD CORPORATION IDAHO

Address: Thos. Marioneaux, sec., care Marioneaux & Beck, Kearns Bldg., Salt Lake City. **Mine address:** Rocky Bar, Elmore county, Idaho.

Officers: Earl McIntyre, pres.-mgr.; Jas. Ivers, v. p.; Judge Thos. Marioneaux, sec., with Norman D. McLeod, and Wm. D. Ebbert of Rocky Bar, Idaho, directors.

Inc. 1921 in Utah. **Cap.** 5,000,000 shares; 3,000,000 in treasury.

Property: 2½ miles along a mineral zone containing the Elmore, Vishnu and Mountain Goat gold bearing veins.

According to Geo. H. Short, each vein has been mined for only 500′ on its course and to an average depth of 400′ yielding several million dollars worth of $80 to $100 ore, some 50 years ago.

IDAHO GOLD & RUBY MINING CO. IDAHO

Address: Mohawk Bldg., Spokane, Wash., or Leonia, Boundary county, Idaho.

Officers: J. M. Schnatterly, pres.-gen. mgr.; A. B. Babb, v. p.; M. L. McCormick, sec.-treas., with S. A. Deardorf, directors.

Cap. $4,000,000; $1 par. Successor to Idaho Gold & Radium Co.

Property: 4,000 acres of placer ground and quartz claims, 5½ miles S. of Leonia, on which company's engineer estimated 300,000,000 cu yd. of gravel available.

Equipment: consists of three giants in operation since April, 1921, and reported handling 50,000 cu. yd. per day.

IDAHO GROUP MINING CO. IDAHO

Address: Geo. H. McKinnis, Kellogg, Ida.

Inc. 1921, in Idaho. **Cap.** $100,000; $1 par.

Property: 2-year bond and lease on the Idaho group of 3 claims, on Pine Creek, owned by Chas. McKinnis. Developed through the Nabob tunnel, the owners having a perpetual right to use this tunnel for development and operating purposes. Ore contains lead, silver, copper and zinc.

IDAHO AND LOS ANGELES M. & M. CO. IDAHO

Address: A. J. Dunn, Wallace, Idaho.

Cap. $1,000,000; $1 par; assessable; last assessment, of 2 mills levied Sept. 15, 1920.

Property: 14 claims, 7 patented, in Beaver and Placer Center districts, Shoshone county, said to show a well defined vein containing lead-silver-zinc ore. Developed by 1,700′ tunnel with various crosscuts, and drifts.

Working in 1920.

IDAHO METALS CO. IDAHO

Address: L. R. Eccles, Eccles Bldg., Ogden, Utah. **Mine office:** Mackay, Custer Co., Idaho; J. Ray Webber, supt.

Officers: L. R. Eccles, pres.; Ralph E. Bristol, v. p.; H. D. Campbell, sec.-treas., with R. B. Porter, C. A. Boyd and H. V. Jenkins, mgr., directors.

Inc. October, 1921, in Idaho to succeed Empire Copper Co., described in Vol. XIV. **Cap.** $1,200,000; par $1; all outstanding.

Dividends: by former company: 23% in 1913; none in 1914; 18% in 1915; 17% in 1916; 20% in 1917; and 10% in 1918; a total of $880,000.

Property: the White Knob Copper Mine, 3 miles south of Mackay on the Salmon River branch of the Oregon Short Line, with 39 claims, 18 patented, 700 acres, also mill and smelter sites of 480 acres, and a railroad right-of-way, in the Alder Creek district, Custer county.

Geology: property carries a great number of lenticular contact replacements, in quartz porphyry and granite porphyry. The property is remarkable for its peculiar ore deposits, varying greatly in size and shape, occurring in the metamorphosed garnetized margin of contact, garnetization existing in some instances for fully six hundred feet from the contact. The geology has been carefully studied and is described by Kemp in Transactions of A. I. M. E. for 1917, and in Genesis of the Mackay Copper Deposits, by Jos. B. Umpleby, Econ. Geol. The ore is largely a cupriferous pyrite with much chrysocolla derived from its alteration. The average assay of the 69,475 tons of ore mined in 1916 was copper, 4.008%; gold, 0.04 oz.; silver, 1.97 oz. per ton.

Development: mine has a glory hole, 125 to 200′ wide, but mining is mainly by tunnel. The property is opened by 46 tunnels and 5 shafts, and total workings of about 18 miles. The greatest vertical depth, 1,800′ is attained in the 6,000′ Cossack tunnel, which opens ore at 900′ below the present producing levels. Levels are at 125′ intervals and the cost of establishing one level is $100,000. Only shipping ore is mined, the last nine months of 1919, averaging 5.5% Cu., 2.5 oz. Ag. and $1 gold per ton. By mid-1920, a new shoot carrying 6% copper ore was opened on 9th level.

Equipment: includes steam driven air-compressors with a capacity of 36 drills, machine-shop, bunk-houses, boarding-house and commissary.

A 3-mile aerial tram of 100 tons an hour capacity, erected in 1918, connects mine with loading station near Mackay, from where connection is made with Blackfoot on the Oregon Short Line R. R. Co., by its 85-mile branch. This tram replaces the company's 36″ gauge Empire Railroad, 7¾ miles long, with an 80% reduction in haulage charges.

Smelter at mine is not in operation, ore being shipped to the A. S. & R. Co.'s plant at Garfield, Utah, for treatment.

Production:

Year	Tons Mined	Lb. Copper	Oz. Gold	Oz. Silver	Value
1920	9,300	.....	....	.....	.....
1919	12,380	.....	....	.....	.....
1918	53,484	.....	....	.....	.....
1917	66,807	.....	....	.....	$1,139,110
1916	69,475	4,999,147	2,860	123,253	.....
1915	54,295	4,702,119	3,155	125,135	.....
1914	18,251	2,012,244	962	53,768	.....
1913	34,722	3,565,479	1,812	92,805	.....

Thirty lessees, employing 100 men, are extracting 1,500 tons of 4 to 8% ore per month. Company employs 75 men. Idaho Metals continues to be the principal copper mine of Idaho.

IDAHO MINE DEVELOPMENT CO. IDAHO

Address: Robert N. Bell, pres., Clayton, Idaho.

Officers: Robt. N. Bell, pres.; Geo. A. Snow, v. p.; Wm. M. Snow, sec.-treas.

Inc. 1921, in Idaho. **Cap.** $500,000; $1 par.

Property: 3 groups of claims, formerly owned by the Clayton M. & Sm. Co., including the Ella, Silver Rule and Red Bird groups, at Clayton, Custer county. The Red Bird mine is the principal property, developed by 1,600' tunnel and shaft to depth of 900'. Ore occurs in well-defined veins, in hard blue limestone, and contains lead-silver-copper-gold. Property is held under a 3-year option to purchase at $100,000, with a 15% royalty to apply on purchase price.

Equipment: includes 50-ton mill and compressor.

Production: under former owners, mine is said to have yielded $1,500-000. Reserves estimated at 80,000 tons of milling ore, averaging 10% lead and 8 oz. silver per ton.

IDAHO MINERAL MINING CO. IDAHO

Address: Box 326 Spokane, Wash.

Officers: D. W. Cassidy, pres.-treas.; C. E. Adams, v. p.; B. B. Adams, sec.; with C. H. Pugh, M. C. Guilbert, and O. E. Cushing, directors.

Inc. Oct., 1909, in Washington. **Cap.** $150,000; 10c. par; 1,350,000 issued Annual meeting 1st Monday in October.

Property: 4 claims, 80 acres, on east side of Lake Pend d'Oreille, Bonner county. Group contains a fissure vein in quartzite, with silver-lead ore having some copper and gold.

Development: by 350 and 600' tunnels, and a total of 2,300' of workings with a maximum back of 350'. A long crosscut tunnel being driven in 1919 will give a back of 550'.

One car of sorted ore shipped in 1918 netted $48.60 per ton. Total output to date is 2 carloads. Is regarded as a good prospect.

IDAHO MINES LEASING CO. IDAHO

Address: Wm. J. Stratton, sec., Gyde-Taylor Bldg., Wallace, Idaho.

Officers: L. L. Sweet, pres.; Jas. Bond, v. p.; J. W. Wimer, treas., with Wm. J. Stratton and Frank Maneglia, directors.

Assessment of 5¢ per share, levied June 27, 1921.

Property: a lease on ground above the No. 3 tunnel of the Black Bear group, belonging to the Federal M. & S. Co., 4½ miles N. W. of Wallace. Ore occurs in a shoot 4' wide and 400' long, containing lead-silver-zinc.

Equipment: includes an 800' aerial tram, 50-ton mill employing crusher, rolls, jigs, and tables.

Operating in 1921 and several carload shipments made to the East Helena smelter.

IDAHO MINES SYNDICATE IDAHO

Address: 120 Broadway, New York.

Controls the **Unity Gold Mines Co.**, which see.

IDAHO-MONTANA AMALGAMATED MINING CO. IDAHO

Owns the Idaho-Montana mine, near Kalka station on the Great Northern R. R., 7 miles E. of Bonner's Ferry, Bonner county.

Developed by a 400' incline shaft which discloses a 2 to 4' vein in diorite with ore containing lead and silver values associated with iron sulphide, expected to develop copper with depth. Has 50-ton concentrator. A 2,000' tunnel is planned. Considered promising.

IDAHO-NEVADA EXPLORATION CO., LTD. IDAHO

Address: Wallace, Idaho.

Officers: M. J. Mahoney, pres.; Jos. Peila, v. p.-gen. mgr.; E. R. Turk,

sec.-treas., with A. B. Livingston and August Holst, directors. W. B. Lively, mgr.; S. L. Shonts, cons. engr. at last report.

Inc. 1914, in Idaho. **Cap.** 1,500,000 shares; shares given to those agreeing to pay an assessment of 1 mill per share every 2 months.

Property: 3 lode claims, the Castle Rock, Smart Alec and Arlington, and a mill site, formerly owned by the Castle Rock Mining Co., about 3 miles S. E. of Wallace on Placer Creek. Ore occurs as chalcopyrite in a 4' vein in quartzite. Developed to depth of 250', by crosscut driven to intercept the main vein.

Equipment: includes compressor and hoist. A carload shipment to Tacoma smelter in 1915 said to have assayed .04 oz. gold, 10.89% copper, 10.5% silica, 35.7% iron.

In June, 1919, mine was sold at forced sale for $60,000, to pay for mortgage and interest amounting to $73,916. The original owners bid in the property.

IDAHO NORTHERN MINING CO. IDAHO

Mine address: Oscar Eckman, supt., Murray, Idaho.

Officers: J. A. Sangren, pres.; O. M. Nordquist, v. p.-mgr.; W. M. Kesiter, sec.-treas., with Oscar Nordquist, Fred Williams and A. Engquist, directors.

Inc. in Washington. **Cap.** $1,500,000; shares $1 par.

Property: 18 claims, in the Summit mining district, 5 miles from Murray, shows copper, lead, silver and gold ore in 3 well defined veins.

Development: by tunnel being driven 1,600' to reach a depth of 1,000'; in about 400' at end of 1920.

Equipment: includes compressor, drills, etc.

IDAHO QUICKSILVER MINING CO. IDAHO

Address: Geo. C. Brewer, Boise, Ida.

Property: White Metal group of 7 claims in the Yellow Pine district, Valley county, east of the Fern Quicksilver mine. A gray quartz replacement vein, 4-5' wide contains cinnabar and a little copper carbonate. Little work has been done.

IDAHO-SEATTLE MINING CO. IDAHO

Mail returned in 1920, marked "gone" from 1604 Hoge Bldg., Seattle, Wash. **Mine office:** Tendoy, Idaho.

Officers: L. E. Eyman, mgr.; F. R. Van Tuyl, F. A. Linforth, and L. R. Margetts, directors.

Inc. Oct. 13, 1915, in Montana. **Cap.** $100,000; $1 par. Annual meeting 2nd Monday in January. Gross earnings in 1916 were $20,000 from dump and mine, and $7,000 in 1917.

Property: the Copper Queen mine, 3 claims, 2 patented, 60 acres, in Agency creek, 8 miles from Tendoy, Lemhi county. Claims show bornite, chalcopyrite, copper glance and quartz in fissure veins dipping at from 45 to 70°. Ore occurs in shoots 20" to 16' thick, said to average 10% copper, ½ oz. gold, 1 oz. silver per ton. One shoot is 500' long. Developed by 1,600' of workings to depth of 300'. Ore is mined by overhead stoping.

Equipment: includes a 20-ton concentrator. No record of shipments since 1918.

IDAHO STANDARD MINES CO. IDAHO

Address: E. H. McAuly, mgr., Warren, Idaho.

Property: 5 claims in Warren district, Idaho county, showing veins of gold-bearing ore developed by 2,000' tunnel work, etc.

Equipment: includes a mill with crusher, Huntington mill, vanners, boiler and engine. Idle since 1919.

IDAHO TUNGSTEN CO. IDAHO

Had a 7-year lease on the **Ima Cons. M. & M. Co.** (which see). No recent returns.

IDORA MINING CO., LTD. **IDAHO**

Absorbed 1918 by **Sunshine Consolidated Mining Co.**, which see. Described in Vol. XIII.

IMA CONSOLIDATED MINING & MILLING CO. **IDAHO**

Inc. 1900, in Idaho.

Property: 18 patented claims near Ima, on Patterson creek, 31 miles S. W. of Landore, Adams county. Tungsten was discovered on this property in 1903, but was not mined until 1911.

Ore: mainly hubnerite with some wolframite, occurs in white quartz fissure veins, 1-10′ thick, in a formation of pre-Cambrian sedimentaries, closely resembling silicious schist. The quartz gangue shows lead, zinc and iron sulphides.

Development: aggregates about 2,500′ of tunnels and drifts.

Equipment: includes a 50-ton concentrator with flotation unit. Property was worked under a 1-year's lease by the Idaho Tungsten M. Co. and shipped about 12 tons of 60% tungsten concentrates. Under lease to L. A. Jeffs and E. W. Johnson in 1916 and to J. Nolan in 1917. Idle.

IMPERIAL MINING CO. **IDAHO**

Office: Homer G. Brown, gen. mgr.-purch. agt., 710 Hotel St., Wallace, Idaho. Jas Doucette, supt.

Officers: John H. Nordquist, pres.; J. N. Thennes, v. p.; H. G. Brown, sec.; with Eugene R. Day and A. Lohoefer, directors.

Inc. Sept. 12, 1908, in Idaho. **Cap.** $1,000,000, increased later to $1,500,000; $1 par; assessable; 1,486,469 issued. Last assessment of 2½ mills per share levied Nov. 30, 1921. Financial statement for year ended July 1, shows receipts, $20,233; disbursements, $19,853; balance on hand, $380.

Property: 8 patented claims, 159 acres, adjoins the Copper King on the west, 1 mile E. of Burke. Deposit is a fissure vein in Revett and Burke quartzite, carrying silver-bearing lead ore.

Development: totals about 6,000′, including diamond drilling and raising to prospect the orebody found in the upper, or 4,200′ tunnel, which was not encountered below. Early in 1921, a 110′ raise was made at a point 2,600′ from the portal of the lower tunnel and a 500′ drift run from the top of the raise, which cut several stringers of ore containing 10-13% lead and 2.3 oz. silver.

Equipment: 3-drill electrically-driven compressor, sawmill, etc. Employs 6-8 men.

INDEPENDENCE LEAD MINES CO. **IDAHO**

Address: 511 Hyde Bldg., Spokane, Wash.

Officers: Henry W. Kingsbury, pres.-mgr.; John H. Wourms, v. p.; W. E. Cullen, Jr., sec., Hyde Bldg., Spokane, Wash.; with R. A. Carnochan and C. Van Ordstrand, directors.

Inc. Nov., 1914, in Idaho, as a reorganization of the Independence Gettysburg Mining Co. **Cap.** $1,500,000; $1 par; assessable; 1,400,000 shares issued. Assessments of 1c per share levied Feb. 1, 1921 and Oct. 17, 1921. Stock listed on the Spokane Exchange and New York Curb.

Property: 10 patented claims and a ½ interest in the Key Lode claim, in the Coeur d'Alene district, 1 mile from Mullan, on the N. P. R. R. Claims adjoin the Gold Hunter M. Co. holdings to the E. and the You-Like and Morning mines of the Federal M. & S. on the W. Mine shows 3 veins believed to be the extension of the Morning-Evening, You-Like and Midnight orebodies, which have been profitably worked to depth of 2,800′ on adjoining properties.

Development: mainly by 4 crosscut tunnels, 200′ 400′ and 1,800′ long. The longest, or No. 4 tunnel, 370′ vertically below No. 3 early in 1916 intersected the You-Like vein, showing 8′ of ore assaying 4 oz. silver, 3% lead with some iron sulphide. In 1918 this tunnel was continued north to reach the Morning vein. Mine was formerly owned by F. A. Heinze, and $50,000

has been spent in exploration. In 1918, it was reported that Harry L. Day had obtained control.

INDEPENDENCE MINING CO. **IDAHO**

Property: in Wood River district acquired by Federal M. & S. Co., for $300,000.

INDEPENDENCE PLACER CO. **IDAHO**

Address: William Fahle, mgr., Wallace, Idaho.

Property: 300 acres of placer ground near the old camp of Moose City, on the North Fork of the Clearwater river, 55 miles from Rivulet, Mineral county, Montana, on the Missoula branch of the N. P. R. R. There is said to be some good gravel and plenty of water is available.

INDEPENDENT COPPER MINING & MILLING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: John H. Nordquist, pres.-mgr.; Carlton Fox, v. p.; Otto A. Olsson, sec.-treas., with Sig. Torkilson and John A. Hanson, directors.

Inc. 1907, in Idaho. **Cap.** $1,250,000; $1 par; issued $950,000; assessment to date 1½ cts. per share. Special meeting held at the office of the secretary, Oct. 10, 1921.

Property: 3 claims, the Bullpen, San Quentin and Independent Fraction, in the Snowstorm copper belt, 3½ miles N. E. of Mullan in the Hunter district, Shoshone county. Claims show quartzite cut by 4′ fissure vein running N. 72° W., with dip 80° S., the vein underground said to be 10′ wide and to carry scattered bunches of 2% copper ore.

Development: includes 800′ crosscut tunnel, with 300′ or more of drifts at a depth of 300′ below the outcrop. Property idle 1908 to 1913; later work did not develop ore in commercial amount and the mine has been closed down several years.

INDEPENDENT DEVELOPMENT CO. **IDAHO**

Presumably out of existence. See Vol. XIV.

INLAND EMPIRE MINING & MILLING CO. **IDAHO**

Address: Box 73, Burke, Idaho.

Officers: Mary Madar, pres.; Frank Bath, v. p.; Geo. Clair, sec.; John Madar, treas.

Inc. Feb., 1910, in Washington. **Cap.** $1,000,000; $1 par; assessable; 1,000,000 issued.

Property: 11 acres, patented, in Leland district, Shoshone county. Sulphides of lead, silver, zinc, with low gold values occur in a quartz vein 80′ wide in Burke quartzite. Selected sample assayed $59 per ton.

Development: by 225′ inclined shaft, tunnels 450′ and 500′ long, and 1,200′ of workings.

Equipment: a 5 h. p. electric hoist, small compressor, 10 h. p. electric pump and partly completed mill. Expended $15,000 in 1918.

Property idle and company involved in litigation.

INTERNATIONAL MINING & METALS CO. **IDAHO**

Office: C. A. Gray, sec., Empire State Bldg., Spokane, Wash.

Property: embraces the former holdings of the Silver Tip Mining Co., known as the Inland, 140 acres, in the east Coeur d'Alene region, on the Montana side of the divide, 2 miles from the Snowstorm mine. Also the 11 claims of the **Hecla Copper & Silver M. Co.**, near Chewelah, Washington.

Development: at the Inland, by a 300′ tunnel and drifts. An 8′ vein, carrying zinc-lead-silver ore, is being developed. At the Hecla, by 75′ tunnel and 150′ shaft, from which a drift is following a vein of copper-gold-silver ore.

Equipment: each property has steam power, hoists, compressors, etc.

IRON KING MINING & MILLING CO. **IDAHO**

Address: A. P. Reinardt, Wallace, Idaho.

Property: a group of claims W. of Wallace, on which about 3,000′ of work was done previous to closing down 3 years ago. Work was reported resumed in 1920.

IRON MASK MINING CO. IDAHO

Officers: T. B. Huey, pres.; Leon Demers, v. p.; P. Martin, sec.-treas.; with J. J. Bouchard, and P. J. Bovingertner, directors.

Inc. May, 1908. **Cap.** $1,000,000; shares $1 par; $500,000 outstanding. Assessment No. 3, of 2 mills per share, levied June, 1913.

Property: 6 claims, well timbered and watered, 3 miles from rail, in St. Joe district, said to show a 10′ vein of concentrating ore, with an 18″ vein of smelting ore.

Development: by 1,400′ main tunnel with back of about 700′, and 2,400′ of drifting on the vein in the various tunnels. Workings show silver and lead ore of good average grade, with a small percentage of copper.

Equipment: includes gasoline power and necessary mine buildings. Apparently idle.

IRON SPAR COPPER MINING CO. IDAHO

Address: A. L. Honeker, Wallace, Idaho.

Officers: Wesley Everett, pres.; A. L. Honeker, v. p.-treas.; G. W. Doherty, sec.; with A. L. Nicholsen, directors.

Inc May, 1904, in Idaho. **Cap.** $1,000,000; $1 par; assessable.

Property: 6 claims, well timbered and watered, 3 miles from rail, in St. partly in Idaho and partly in Montana, 1½ miles from N. P. R. R. Vein carries gold-silver values in lead-copper ore, encased in quarfzite walls.

Development: by 850′ tunnel. No equipment on property.

IVANHOE MINING CO. IDAHO

Address: C. D. Miller, Wallace, Idaho.

Officers: J. A. Bean, pres.; C. D. Brock, v. p.; C. D. Miller, sec.-treas.; with S. C. Bean, J. H. Foss, and J. H. Nordquist, directors.

Cap. $1,500,000; $1 par; an assessment of 1½ mills was levied early in 1918.

Property: 2 claims, the Ivanhoe and Palisades, patented, adjoining the Star group on the S., 3 miles N. W. of Mullan, Shoshone county, shows lead-silver-zinc ore. Mine supposed to have continuation of Morning vein. A crosscut from the Star main tunnel (4,200′ long) intersected the main vein at 1,400′ vertical depth. Drifting on the ledge for 200′ proved it to average 6′ in width with 2′ of low-grade milling ore. Property has been under development since 1904. Diamond-drilling was suspended early in 1918 on account of litigation between the Federal and Star companies.

I. X. L. GOLD MINING CO., LTD. IDAHO

Address: H. W. Dorman, Caldwell, Canyon county, Idaho.

Inc. in Idaho. **Cap.** $200,000; $1 par; all issued.

Officers: Douglas Fleming, pres.; L. S. Diller, sec.; W. H. Kalback, treas.; H. W. Dorman, mgr.

Property: 120 claims in the Westview district, Boise county, near Pearl. Deposit is a 4′ contact vein between granite and porphyry, carrying sulphides of lead and silver with some gold.

Development: by 3,000′ tunnel giving a back of 550′. Idle for several years.

I. X. L. GROUP IDAHO

See Idaho Copper Mng. & Sm. Corp.

JACK WAITE EXTENSION MINING CO. IDAHO

Address: J. T. Ellarson, sec., Murray, Idaho.

Officers: Chas. McElroy, pres.; M. Schuelman, v. p.; J. T. Ellarson, sec.; Theo. Bedard, mgr. and director. John T. Pollock, supt.

Inc. in Idaho. **Cap.** $1,000,000; $1 par; 823,000 issued. Annual meeting first Monday in July

Property: 53 claims on Big Beaver Creek, adioining the Jack Waite, on the E., 9 miles from Whitepine, on the N. P. R. R.; 3 claims are in Idaho, balance on Montana side of the divide, in Sanders county, reported to carry the extension of the Jack Waite veins.

Geology: fissure vein 6-12′ wide cuts slate and granite.

Development: by crosscut tunnel on Idaho side, which will cut 2 veins, one at 650', a second at 1,000' from portal, claimed to be 6' wide and to carry gold-silver values.

Equipment: includes a 12-h. p. gasoline engine and compressor.

JACK WAITE MINING CO., LTD. **IDAHO**

Address: P. O. Box 2173, Spokane, Wash. **Mine address:** Union, Shoshone county, Idaho.

Officers: E. Winsby, pres.; Robert Shuffuls, v. p.; C. E. Chamberlain, sec.-treas.; C. I. Grimsmoe, supt.

Inc. Nov. 26, 1909, in Idaho. **Cap.** $1,500,000 $1 par; assessable; 1c assessments. Stock listed on Spokane Exchange.

Property: 3 patented claims on Tributary creek, 13 miles from rail at Prichard, said to show a vein in slate dipping 60° S. W. and pitching N. 70° W. Orebody is said to be 300' by 10' and average of ore from 8 to 15% lead.

Development: totals 5,000' including 2 tunnels, 1,400' and 2,900' long, respectively. The greatest depth of workings, is 1,300'. Plans to erect 100-ton mill.

Production: irregular but important. Shipments made in 1919-'20 reported to have averaged 55% lead. Is a small, but well known producer.

JIM BLAINE SILVER SYNDICATE, LTD. **IDAHO**

Address: P. O. Box 2173, Spokane, Wash. **Mine address.** Union, Shoshone county, Idaho. Harry Morrell, mgr.

Officers: M. Baumgartner, pres.; R. L. Brainard, v. p.; W. L. Niehorster, sec.-treas.; with Charles Lafavre and John Jahde, directors.

Inc. 1920 in Washington.

Property: 27 claims on Pine Creek, near the new Nabob mill, Shoshone county, including the Bristol and Chesapeake groups acquired in 1920. Ore carries silver and lead.

Development: by 500' tunnel. A new 1,500' tunnel is being driven to reach a depth of 650' on the Bristol vein, also to prospect several other veins.

JUMBO MINING CO. **IDAHO**

No recent returns. Listed in Volume XIV.

KELLOGG GALENA MINING CO. **IDAHO**

Idle **Office:** Old National Bank Bldg., Spokane, Wash.

Officers: C. C. McEachran, pres.; S. A. McCoy, v. p.; H. F. Aldrich, sec.-treas.; with Charles Lafavre and John Jahde, directors. Harry Morrell, mgr.

Inc. 1915, in Washington. **Cap.** $1,500,000; 10c par; 1,260,000 issued. Annual meeting second Tuesday in February.

Property: 2 groups, each of 7 claims, one 3 miles N. W., the other 2 miles S. E. of Kellogg, adjoining the Bunker Hill & Sullivan. Deposit is quartzite with iron carbonate and small values in silver and lead, opened by a 700' tunnel.

KELLOGG SUNNYSIDE MINING CO. **IDAHO**

Absorbed by **Kellogg United Mines Co.**, which see.

KELLOGG UNITED MINES CO. **IDAHO**

Address: Old Nat'l Bank Bldg., Spokane, Wash.

Officers: S. A. McCoy, pres.; J. A. McEachran, sec.; G. W. Sommer, treas., with Theo. Brown, directors. H. M. Throndson, mill supt.

Cap. $500,000; shares 25c par. Is a consolidation of the Kellogg-Sunnyside Mining, Brown Leasing, and Coeur d'Alene Atlas Mining companies.

Property: a lease on Corrigan group, 38 claims, Pine Creek district, Shoshone county, said to have 40,000 tons of lead-zinc-silver ore. Early in 1921, the Savage & Gordon leases on old workings of the Bunker Hill & Sullivan were purchased.

Development: by tunnels and shafts (the Corrigan is 800' deep); workings aggregating over 5,000'.

Equipment: includes a 50-ton flotation mill.

KENNAN MINING CO. **IDAHO**

Address: A. B. Ward, supt., Wallace, Idaho.

Officers: Robt. Scott Ord, pres.-treas., Empire State Bldg., Spokane, Wash., Chester J. Kennan, v. p.-sec.-mgr. and E. J. Roberts, directors.

Inc. 1917, in Idaho. **Cap.** $250,000; shares $1 par. Annual meeting, June 23rd.

Property: about 1,250 acres on Pony creek, between Wallace and Murray, Shoshone county. Management reports having 6 gold veins, a tungsten vein and 8 silver-lead-veins; latter having aggregate length of 8 miles. Late in 1920, a 5′ vein was cut carrying high tungsten content and $5 gold per ton.

KENT PLACER GOLD MINING CO. **IDAHO**

Presumably out of business. Described in Vol. XIV.

KEYSTONE MINES CORPORATION **IDAHO**

Liquidated 1918, stockholders receiving 13½c per share for their holdings. Property sold to **Armstead Mines Corporation.**

KILL BUCK MINING CO., LTD. **IDAHO**

Described in Volume XIV. Company consolidated in 1921 with Chicago-Boston Mining Co., as **Galena Mng. Co.,** which see.

KIMMEL MINING CO. **IDAHO**

Address: Marcus F. Whitman, mgr., Leadore, Idaho.

Officers: F. O. McFall, pres., W. L. Eckley, treas.; J. Williams, sec., Pocatello, Ida.

Stock offered at 10c., February, 1920, and quoted at 2c bid, 3c asked, September, 1920.

Property: 25 claims, 500 acres, includes the Kimmel lead-silver mine near Leadore, Lemhi county. A crosscut tunnel in 1920 opened a wide vein in quartz-porphyry, said to carry 6 to 15% lead and 3 to 7 oz. silver per ton.

Development: by 3,400′ of tunnel, raises and shafts.

KING DAVID CO. **IDAHO**

Address: 446 Peyton Bldg., Spokane, Wash. **Mine office:** Neva, Idaho.

Officers: A. R. Immisch, pres.; F. C. Dolke, v. p.; P. A. Hughes, sec.; L. A. Smith, treas., with J. A. Brown and T. W. K. Whitlan, directors.

Inc. Aug. 27, 1915, in Washington. **Cap.** $1,500,000; $1 par; 1,150,000 issued.

Property: 6 claims in Ruby Creek district, Clearwater county, said to show contact veins in trachyte and metamorphic granite with vertical streaks, 1 to 4″, carrying 45 to 63% zinc, with some lead and silver.

Development: 165′ shaft with 135′ drift on vein, and several crosscuts.

Equipment: includes steam hoist, compressor, pump, etc. A prospect.

KIRKHAM GROUP **IDAHO**

Address: H. L. Kirkham, owner, White Bird, Idaho county, Idaho.

Property: 6 claims, 61 acres, in Camp Howard district, Idaho county, containing a contact vein in granite and diorite. Ore contains copper sulphides carrying gold and silver and is said to assay $25 per ton.

Development: by 60′ tunnel.

LACLEDE MINING CO. **IDAHO**

Address: care Eugene R. Day, Burke, Idaho.

Cap. $1,000,000; $1 par; increased, 1916, to $1,500,000; all issued; assessable at the rate of 3 mills every 3 months.

Property: lies between the Callahan zinc-lead and Tamarack & Custer mines in the Coeur d'Alene district, Shoshone county.

Development: consists of 300′ crosscut tunnel and a winze down 300′ below the tunnel level, 600′ vertically below the apex of the vein, with levels run each way every 100′. Ore occurs irregularly.

The Day interests secured control, June, 1917, by purchase of 400,000 shares at 9c each. No recent information.

LAKEVIEW SILVER MINES CO. IDAHO

C. G. Fennell, pres., St. Louis, Mo.; T. C. Cunningham, supt., Lakeview, Idaho.

Inc. 1919, in Idaho. **Cap.** $1,000,000; $1 par.

Property: the Conjecture mine, 4½ miles E. of Lakeview, Bonner county, formerly owned by the **Pittsburg M. Co.**; also the Spider, Rainbow and Comet groups.

Development: by 2,000′ tunnel and 230′ shaft, said to have blocked out 40,000 tons of ore containing argentiferous galena, blende, and pyrite In the Spider claims there is a shoot 200′ long and 4′ wide; an orebody in the Conjecture claim is 600′ long and 5′ wide. There is over 3,000′ of development on the vein.

A 100-ton concentrating plant was to be finished during 1921. Hydro-electric power will be developed and transmitted 3 miles to the mine.

LAKINA COPPER CO. IDAHO-WASHINGTON

Officers: E. A. Patrick, pres.-mgr.; T. E. Coleman, v. p.; Luther Haynes, sec.-treas.; with E. E. Younge, Charles Zeige, V. C. Hill, and J. S. Ross, directors.

Cap. $3,000,000; shares $1 par; 2,175,000 outstanding.

Property: 2 claims, 40 acres, in Deadwood mining district, 3 miles N. E. of Lowman, Boise county, Idaho; and 4 claims, about 25 miles N. of Twisp, Okanogan county, Wash. The Idaho property has free-milling ore, 30′ wide, traversing granite-porphyry and giving assays of from $48 to $76 per ton. Both properties inactive.

Company also owns 750,000 shares in **Lakina Kennecott Mining Co.**

LATAH COPPER MINING CO., LTD. IDAHO

Potlatch, Latah county, Idaho. Idle since 1907. See Vol. XI. Copper Handbook.

LATEST OUT MINING & SMELTING CO. IDAHO

Address: Gilmore, Lemhi county, Idaho.

Officers: Ralph Nichols, pres.; D. L. Nichols, v. p.-sec.-mgr.; F. A. Nichols, treas., with A. C. Cherry and F. B. Watson, directors.

Inc. June 1, 1910, in Idaho. Cap. $500,000; $1 par.

Revenue from ore sales in 1918 was $163,293, and operating expenses were $151,331. **Dividends:** $10,000 paid in 1918.

Property: the Latest Out mine, 1 and a fraction patented claims, at Gilmore. Mine is a lead-silver-gold producer. (See full description by Nichols in Trans. Am. Inst. M. E. Vol. XLVI, pp. 937-9, 'Lead-Silver Mines of Gilmore').

Geology: fissure veins that cut limestone beds at right angles contain ore shoots of limonite and hematite replaced by lead ore. Sulphides appear to decrease with depth. Ore reported to average 25% lead, 25% silica, 15% iron, 0.5% sulphur, 10 oz. silver and 0.03 oz. gold per ton. Ore-shoots are upwards of 1′ wide, and have a southerly rake.

Development: by 900′ shaft, and total of 16,000′ of workings. Reserves: 20,000 tons blocked out with an equal quantity of possible ore. In December, 1919, a good orebody was being mined on the 600′ level.

Equipment: includes a 40-h. p. gasoline hoist and 750′ gravity tram. Fire destroyed the engine room, part of the tram, and bunkhouse late in 1920, causing a suspension of operations.

Production: $163,293 of ore shipped in 1918, and about the same in 1919 and 1920, total over $1,000,000 to date. Average grade was $22.50 per ton.

Apparently a good mine.

LAWRENCE MINING & MILLING CO., LTD. IDAHO

Address: Chas. A. Button, sec.-treas., Uniontown, Wash. Mine office: Clark Fork, Idaho.

Officers: August Loding, pres.; O. A. Turnbow, v. p., with Dr. W. A. Burg, and Louis Desirgues, directors. C. L. Wixstrom, mgr., P. O. Box 1694, Spokane, Wash.

Cap. $75,000; 5c par; 1,433,862½ shares outstanding.

Property: 9 claims, 1½ miles from Clark Fork, Bonner county, said to carry gold-silver-copper-lead ore in fissure veins 2″ to 9′ thick.

Development: by 817′ tunnel, with about 1,100′ of crosscutting and drifts and a 110′ incline shaft.

Equipment: 60-ton concentrator, pump, and compressor. Concentrates assay 75% lead and 17 oz. silver per ton. Total net receipts are over $55,000 to date.

Operations are to be resumed early in 1922.

LEAD CRYSTALS MINING CO. **IDAHO**

Address: L. L. Leighty, sec.-treas., 406 River St., Wallace, Idaho.

Officers: J. E. Steen, pres.; Frank Fisher, v. p.; with G. S. Lesher, Otis Fisher, Roy Steen, L. L. Leighty and John Anderson, directors.

Property: 12 claims on Eagle creek, 7½ miles from Eagle or Waite station on the O. W. R. & N. Ore contains lead, zinc and silver values.

Development: by 3 tunnels, longest 1,100′.

LEAD KING MINING CO. **IDAHO**

Merged August, 1917, into **Eclipse Mining Co.**, which see.

LEESBURG GOLD DUST MINING CO. **IDAHO**

Office: 420 Constitution Bldg., Salt City, Utah. O. E. Kirkpatrick, gen.-mgr.

Officers: D. H. Wenger, pres.; W. C. Burton, v. p.; W. S. Burton, sec.-treas.; with E. W. Stifel and T. H. Pollick, directors.

Cap. $1,500,000; $1 par; 1,096,705 issued.

Property: 4 claims, 2 patented, at Leesburg, Lemhi county. Deposit is a contact vein between granite and quartzite, containing ore said to average $7.50 per ton in gold and silver.

Development: by 150′ shaft and tunnel, with 1,000′ total workings.

Equipment: includes steam plant and a 10-stamp mill and cyanide plant completed in August, 1921. Developing for several years.

LEESBURG MINING & POWER CO. **IDAHO**

Address: M. H. Phillips, supt., Mackinaw, via Leesburg, Lemhi county, Idaho.

Cap. $1,000,000; $1 par.

Property: 29 claims in Mackinaw district, carrying veins of gold and silver ore.

Development: by 165′ and 200′ shafts with over 2,500′ of workings.

Equipment: hydro-electric plant, hoist, 40-stamp mill, sawmill, etc. Production reported to total $125,000 up to 1915. No recent returns.

LEMHI GOLD MINING CO. **IDAHO**

Formerly operated the property of the Virginia Cons. Mining Co., near Baker, Lemhi county, which is now worked by the **Mines Developing & Leasing Co.**, which see.

LEROY GOLD & COPPER MNG. CO. **IDAHO**

Described in Volume XIV. Succeeded by **Leroy Mining Co.**, which see.

LEROY MINING CO. **IDAHO**

Office: Wallace, Idaho.

Officers: G. F. Damm, pres.; C. E. Clark, sec.-treas., with Wm. Fissenger, Chas. Bollinger, and Mrs. Grace M. Hall, directors.

Inc. 1920, as successor of Leroy Gold & Copper Mng. Co. **Cap.** $1,600,000; par $1; assessable; 3 mills per share levied November, 1921. Annual meeting second Tuesday in August.

Property: 6 claims at Adair, on Milwaukee River, adjoins the Monitor mine, whose tunnel runs through the property. Ores carry gold and copper.

LESLIE COPPER CO. **IDAHO**

Described in Volume XIV. Company consolidated in 1921 with **Amazon-Dixie Mining Co.** and stock exchanged share for share.

LEWIS & CLARK MINING CO. IDAHO

Address: J. Wm. Grismer, pres., Mullan, Shoshone county, Idaho.

Inc. 1907, in Idaho. **Cap.** $1,250,000; $1 par.

Property: 9 claims, N. E. of the Snowstorm, has surface showing of red hematite, with silver and copper.

Development: consists of 120′ tunnel and 500′ of workings. Management was trying to raise funds for further development in 1917, but no information since.

LIBERTY BELL GROUP IDAHO

Address: E. M. Griffith, owner, Grangeville, Idaho county, Idaho.

Property: 3 claims in Buffalo Hump district, which contain 2 veins 20 to 35′ wide. One vein has a shoot showing 5′ of rich gold ore carrying some galena and petzite (a telluride of gold and silver).

Development: by 400′ tunnel, and considerable surface work.

Reported that $7,000 was spent on property during 1918, but litigation resulting from the discovery of such rich ore on the surface, stopped further development.

LINFOR COPPER CO. IDAHO

Successor of the Horst Powell C. Mng. Co.

Bankrupt and property sold. Fully described in Vol. XIV.

LISTON MINING CO., LTD. IDAHO

Address: Matt Baumgartner, pres., 323 Lindelle Bldg., Spokane, Wash.

Cap. $1,500,000; $1 par.

Property: 17 patented and 19 unpatented claims in Big Creek district, east of Wardner, Shoshone county.

Development: by tunnels, 1,100′ and 2,300′ long, which expose fissure veins containing galena and copper sulphide ore.

Equipment: includes steam power, 3-drill compressor, drills, shops and suitable dwellings.

Worked in 1918 and 1919.

LITTLE NORTH FORK COPPER M. & M. CO., LTD. IDAHO

Address: C. E. Metzgar, sec. Kellogg, Idaho.

Inc. Sept., 1903 in Idaho. **Cap.** $1,500,000; shares $1 par; assessable; 2 mills per share levied April 18, 1921.

Property: the Handspike mine, 10 claims, on Little Copper creek, near Little North Fork, 12 miles from rail, in Kootenai county.

Development: by the 2,320′ No. 1 upper tunnel, showing ore assaying up to 28.8% copper, 1 oz. silver and $1.20 gold per ton, and the No. 2 lower tunnel of 1,500′ showing a 12 to 18″ paystreak of argentiferous copper ore that averages $8 to $30 per ton. Property claimed to have $200,000 worth of copper ore blocked out.

LITTLE PITTSBURG MINE IDAHO

Address: G. A. Smith, Kellogg, Idaho.

Property: 2 unpatented claims on Denver creek, 1½ miles from the East Fork of Pine creek. Ore carries zinc, lead, and some copper.

Development: by a 500′ and 150′ tunnel, 1,000′ apart.

Equipment: includes a 150-ton mill.

LOG CABIN MINING & MILLING CO. IDAHO

Address: W. H. Hanson, sec., Gyde-Taylor Bldg., Wallace, Idaho.

Last assessment of 2 mills per share levied Sept. 29, 1920.

Annual assessment work only being done.

LOMBARDY MINING & MILLING CO. IDAHO

Address: H. J. Rossi, Wallace, Idaho.

Officers: Peter Albinola, pres. and gen. mgr.; Ed. Albinola, v. p.; Herman J. Rossi, sec.-treas.; Robert Albinola, asst. sec.; H. O. Beemis, mgr.

Inc. 1898, in Idaho. **Cap.** $1,000,000; shares $1 par. Annual meeting fourth Thursday in April. Last assessment payable July 26, 1920.

Property: 15 claims, patented, N. of Kellogg. A bedded vein estimated to average 27′ wide with shale foot and quartzite hanging wall has

been traced for 800'. Ore is said to carry some copper, and up to 47% lead and 33 oz. silver per ton.

Development: by tunnels of 360' and 900', and 200' shaft, with about 2,000' of workings. Management planned to crosscut at 200' and drift on the orebody cut on tunnel level.

Equipment: includes 85-h. p. electric motor operating hoist and drills. Only assessment work being done at last accounts.

LOOKOUT MOUNTAIN M. & M. CO. **IDAHO**

Office: R. L. Brainard, Kellogg, Idaho.

Officers: R. L. Brainard, pres.; Wm. Boro, v. p.; W. L. Penny, sec.-treas.; with Thomas Hackett and William Hallead, directors.

Inc. 1916. **Cap.** $375,000; 25c. par; assessable. One mill per share levied Sept. 1, 1921.

Property: 13 claims and 2 fractions, about 250 acres, in the Pine Creek district of the Coeur d'Alene, said to show three veins in quartzite carrying lead-silver values.

Development: by 2 tunnels, the lower one 500' long, being extended to cut the vein about 150' ahead. Management hopes to cut the downward extension of the 3 veins encountered in upper tunnel, which are reported to average 14" in width and to carry 37.5% lead and 10 oz. silver.

Equipment: includes an oil engine, compressor, etc.

LOST CABIN MINING CO. **IDAHO**

Probably dead. Described in Vol. XIV.

LOST PACKER MINING CO. **IDAHO**

Office: John P. Boyle, mgr., c/o Secretary, American Mining Congress, Salt Lake City, Utah. **Mine works office:** Ivers, Custer county, Idaho.

Reported October, 1921, that company had sold its property to the Bingham Galena Mining Co. of Salt Lake City, a George Graham Rice affair.

Inc. 1903, in Utah. **Cap.** $150,000; shares $1 par; changed 1916 to 600,000 shares, 25c par; assessable. Stockholders privileged to purchase new shares at ratio of 3 for each old share held. Dividend of 25c a share, paid October, 1913. Stock listed on Salt Lake City Exchange.

The Packer Co. was incorporated June 1917, as a holding company to take over 80% or more of the Lost Packer Mng. Co. stock.

Property: 34 claims, 4 patented, in the Loon Creek district, 112 miles west of Mackay the nearest rail point. The mine and smelter are in the mountains 7,100' above sea-level, but an auto road runs to the mine. Claims said to show a number of iron outcrops covering two contacts, two miles apart, one a limestone diorite contact, the other between limestone and quartzite. These outcrops are of favorable character.

Development: by tunnels. No 1 having a back of 450', No. 2 a back of 700', and No. 9 a back of 870', latter showing rich ore, and to have a back of 2,000', ultimately. Tunnels show vein to be 2 to 7' wide, with maximum width of 15 to 18', carrying ore said to average 9 to 16% copper, and 2-8 oz. gold per ton, with a paystreak of 2" to 5' width, proven to average about 2' for a distance of 500', and depth of 400'. Mine is developed to 1,000' level with 3' of $15 ore in winze below it. See U. S. Geological Survey Bull. 530 G.

Company at one time employed 80 men at the mines and 400 horses were required to handle supplies and output.

Equipment: about $225,000 has been expended on surface improvements and equipment, including the smelter, but excluding the 50-ton oil flotation concentrator. The property has water power, with an electric light plant, assay office and necessary mine buildings.

The smelter has a 100-ton water-jacket blast furnace, making matte of about 45% copper, 25 oz. silver and 8 to 10 oz. gold per ton, with slags running only about 0.2% copper. The smelter ran 24¾ days in the summer of

1913, smelting 1,800 tons of ore and producing 380 tons of matte. Total production to end of 1915 was $800,000. Management estimated 20,000 tons of ore in old stopes and expected to net $4.97 per crude ton.

Mine idle during past 3 years, due to remote location and economic conditions.

LOST PACKER MINING & SMELTING CO. IDAHO

Cap. $3,000,000; $5 par, **Inc.** 1907 in Wyoming, as a holding company, to gradually acquire the outstanding stock of the Lost Packer and other mining companies.

LUCKY BOY GOLD MINING CO. IDAHO

Office: Empire Bldg., Boise. **Mine office:** Idaho City, Idaho.

Officers: Thos Brown, pres.; E. W. Barry, v. p.; Fred V. Tinker, mgr., with R. E. Highnote, F. E. Johnesse and John G. Huber, directors T. E. Rippey, sec.-treas.

Inc. Sept. 30, 1914, in Idaho. **Cap.** $500,000; shares $1 par; 320,000 shares outstanding. Annual meeting second Tuesday in January.

Property: 7 claims, 120 acres, in Gambrinus mining district, 6 miles N. E. of Idaho City, Boise county, said to show a shear zone, 3-40′ wide, of granite porphyry, carrying some quartz streaks and considerable sott talc. The orebody runs E.-W. and dips about 60°. Ore is free gold.

Development: by 300′ shaft and 840′ tunnel to depth of 360′, with 2,100′ of drifts and crosscuts.

Ore reserves: estimated Feb., 1916, 130,000 tons of ore.

Equipment: includes 12″x14″ compressor, electric power, 100 h. p. crude oil engine direct connected to 55 k. w. electric generator, 100-ton Marathon mill and electric hoist.

Property: credited with production of $130,000 under former owners. Present management competent and property considered promising.

LUCKY BOY MINING & CONCENTRATING CO., LTD. IDAHO

Consolidated in 1920 with Silver Star Mng. Co., Ltd.

Address: Mullan, Shoshone county, Idaho.

Officers: M. D. Needham, pres.-mgr.; John Kammerer, v. p.; Walker Richardson, sec.-treas.

Inc. Jan., 1907, in Idaho **Cap.** $1,000,000; $1 par; assessable, 700,000 issued. Assessment of 3 mills per share levied Aug. 10, 1921.

Property: 17 unpatented claims, 280 acres, 3½ miles E. of Mullan. 1 mile up Gentle Annie gulch. Quartz vein cuts through shale, and carries ore said to average $2 gold, 2% lead, 1 oz. silver, and 3% zinc.

Development: by 250′ tunnel. Work was started through the Silver Star company's tunnel, and by March, 1919, the face was in 1,700′, attaining a depth of 500′. A prospect.

LUCKY CALUMET COPPER MINING CO., LTD. IDAHO

Office: Eagle Block, Wallace, Idaho. **Mine office:** Mullan, Shoshone county, Idaho.

Officers: John H. Nordquist, pres.-gen mgr.; Chas. H. Solberg, v. p.; Otto A. Olsson, sec.-treas.; with A. J. Olsson, directors. Al. J. Grills, supt.

Inc. Oct., 1906, in Idaho. **Cap.** $1,500,000; shares $1 par; assessable. Last assessment reported was 5 mills per share, levied in 1914.

Property: 10 claims, patented, 181 acres, on Snowstorm hill, between the Independent and Snowstorm mines, and about 5 miles N. E. of Mullan. Property shows 2 fissure veins of 10 to 50′ width in quartzite.

Development: by 3 tunnels. The upper one, of 1,700′ length, has a quarter-mile of drifts and crosscuts, which develop what is supposed to be the extension of the Snowstorm vein, showing low-grade ore carrying disseminated carbonates and bornite of 2 to 3% estimated copper tenor. The lower tunnel, a crosscut from the head of Gentle Annie gulch, is 3,600′ long, and has opened up a good body of ore, presumably the National at depth of 1,200′.

Equipment: includes electric power, with 2 motors, and a 5-drill air-

compressor. Property is worked intermittently with proceeds of annual assessments, but information is hard to obtain from this as well as all other Nordquist companies.

LUCKY FOUR MINING CO. **IDAHO**

Office: corner E. 73rd and E. Gilson Sts., Portland, Oregon.

Officers: Chas. Hyle, pres.; Henry Wingert, sec.-treas.

Cap. $50,000; 5c par; $29,285 issued.

Property: lode and one placer claim in Summit mining district, Shoshone county, containing lead, silver, and zinc ore. Probably idle.

Company pronounced delinquent, Jan., 1920 by Secretary of State of Idaho, for failure to file 1919 corporate statement a common fault among the many lesser companies of this state and others.

LUCKY FRIDAY MINING CO. **IDAHO**

Address: Wallace, Idaho. Is a reorganization (1914) of the Lucky Friday Mines Co.

Officers: Franklin Pfirman, pres.; Jas. A. Wayne, sec.; J. H. Wade, mgr.

Cap. $1,500,000; shares $1 par; assessable; 170,000 shares in treasury.

Property: 4 claims at Mullan, Shoshone county, adjoining the Hunter mine on the south.

Development: by 90′ shaft, 625′ upper crosscut tunnel and 800′ lower crosscut tunnel, developing a 10′ vein with 4′ paystreak giving assays up to 3.5% copper, 29% lead and 89 oz. silver per ton.

Equipment: includes electric drilling plant.

Presumably idle.

LUCKY STONE MINING CO. **IDAHO**

Address: G. H. Walters, sec., Wallace, Idaho.

Cap. $1,000,000; $1 par; assessable.

Property: 14 claims near Osborne, Shoshone county, Idaho, and 7 claims in Granite county, Montana. The former carries gray copper and silver-lead ore.

Development: by 1,000′ of tunnel work in the Idaho group in which 12 to 14″ of $100 ore was disclosed in the summer of 1919. In the Montana property two veins have been exposed by over 600′ of drift tunneling.

The claims have been surveyed for patent and development work resumed June, 1921.

LUCKY SWEDE GOLD & COPPER MINING CO. **IDAHO**

Out of business. Described in Vol. XIV. Succeeded by **Pearson Mng. Co.**, which see.

MACEDONIA MINING CO. **IDAHO**

Address: A. M. Mundell, Wallace, Idaho.

Officers: A. M. Mundell, pres.; A. D. Burrow, v. p.; Chas. A. Keating, sec.-treas., with Adolph Haupt and W. H. Hanson, directors.

Inc. 1921, in Idaho. **Cap.** $150,000; 10c. par.

Property: 23 claims, on Slate creek, said to contain three well-defined veins carrying silver-lead-copper.

A prospect.

MAGNET MINING & MILLING CO. **IDAHO**

Address: J. C. Brandon, 424 Dooly Bl., Salt Lake City.

Inc. 1921, in Idaho. **Cap.** 1,200,000 shares; 10c. par; assessable. Assessment levied. Dec. 9, 1921.

Property: 4 claims, 80 acres, includes the Hidden Treasure mine in Little Smoky district, 22 miles from Fairfield, Camas county. Ore said to average 15-20% lead, 10 oz. silver and 0.2 oz. gold.

Development: by 1,100′ of tunnels. Equipped with 100-ton concentrator.

MAINE-STANDARD MINING CO. **IDAHO**

Address: 6 P. O. Bldg., Wallace, Idaho.

Officers: Alexander Murphy, pres.-mgr.; J. W. Tator, v. p.; E. H. Pattison, sec.-treas.

Cap. $1,500,000; shares $1 par; assessable, assessment of one mill per share levied July 20, 1921.

Property: 5 unpatented claims in Yreka district, Coeur d'Alene region, on which $13,000 has been spent. Apparently idle.

MAJESTIC MINING CO., LTD. IDAHO

Address: Therrett Towles, sec.-treas., Gyde-Taylor Bldg., Wallace, Idaho. Jas. Dunne, pres.-mgr., Burke, Idaho.

Cap. $1,000,000; $1 par; assessable; assessment of 2½ mills levied Aug. 4, 1921.

Property: 13 patented claims, 1½ miles N. E. of Burke, Shoshone county. Veins with shoots of lead-silver ore have been opened by 1,525' of tunnel work.

Development: by tunnels. A new tunnel to explore 1,600' deeper than the present adit was driven 50' in 1920, and an additional 50' in 1921, opening up a 3' quartz ledge.

MANDARIN MINES CORPORATION IDAHO

A reorganization, 1914, of the **Yellow Jacket & Gold Mining Co.** Officers at that time were: C. W. Pope, pres., 25 Broad St., New York,; D. C. Catlin, v. p., 60 Broadway, New York; with C. E. Pope, H. E. Parker, and John B. Hastings, directors.

Inc. 1914, in Nevada. **Cap.** $1,000,000; par $1.

Property: 4 claims, patented and 3 millsites, on Yellow Jacket creek, in Lemhi county, 45 miles S. W. of Salmon City, was a producer until the ore above a large fault was exhausted. Gold ore occured in a quartz vein. Said to have produced $600,000 in the past. Mine has been idle for several years.

MARSH MINES CONSOLIDATED IDAHO

Office: 601 Empire State Bldg., Spokane, Wash. **Mine office:** Wallace, Idaho. W. G. Harris, supt.

Officers: Edward Pohlman, pres.; M. M. Lee, v. p.; Joseph McCarthy, sec.; J. V. Pohlman, treas., with F. Cushing Moore of Spokane, cons. engr. M. W. Lee, Duluth, Minn., trustees.

Is the successor of **Marsh Mining Co.**, which was incorporated 1909 in Washington. Reorganized July, 1916, as the Marsh Mines Consolidated, stock being exchanged share for share. In addition, for each three shares of Marsh, stockholders subscribed for one share of new stock at 15c. a share.

Inc. May, 1916. **Cap.** $1,500,000, increased to $2,000,000 at time of reorganization in July, 1916; shares 25c. par; reduced, 1918, to $500,000, same par value. Annual meeting in March. Stock listed on Spokane Exchange. Assessments, 1911 to Oct., 1918, aggregated $200,000. A levy of 1 cent was made in Dec., 1920. A 2c. dividend was paid June 20, 1921.

The chief reason given for shutting down the mines in 1916 was that litigation with the Federal Mining & Smelting Co. threatened. The latter company owns mining properties to the south and west of Marsh, and Marsh had been mining orebodies extending under the surface of the Federal ground, at a depth of 900' below the main tunnel level and 1,300' below the surface. This controversy was settled, by agreement, with the Federal Mining & Smelting Co., Marsh getting a 10-years' lease on the Mono, Russell and O'Neil claims of the Tiger-Poorman group, which include the vein in controversy. This agreement provided for a complete settlement of all claims for alleged trepass.

In Nov., 1919, the Russell vein was opened in the Russell claim, under lease from the Federal M. & S. Co., to July 20, 1926. A tunnel driven on this vein showed up to 6' of lead-silver ore at 380'. This vein can also be reached by 1,100' of crosscutting from the main Marsh tunnel. A suit was started against the Hecla Co. for alleged wrongful extraction of ore from the east orebody (see Federal M. & S. Co.) To help prove its contention, the Federal sank a 375' winze on this vein. It also applied to the Court for permission to drive a raise from the Hecla workings, but this was denied,

In Jan. 1921 the Russell tunnel was being extended 700′ through the east lines of the claim in order to show whether the vein actually passes through it before the Court will allow the Marsh company to raise 700′ from Hecla ground. In November, the Hecla purchased the Russell, Mono and Tiger-Poorman group of claims from the Federal for $750,000, thus ending that suit. A settlement of apex litigation with the Hecla and Federal companies was made in March, 1921, Marsh company getting $112,500 cash and valuable concessions including tunnel rights for exploration of the Russell vein and cancellation of the A. S. & R. ore contract. In return the Marsh company relinquished all right to title and interest to that part of the Hecla east orebody apexing within the Russell claim, held by lease from Federal Mng. & Sm. Co.

Property: 7 claims, about 100 acres in O'Neil gulch, N. E. of Burke and adjoining the Tiger-Poorman mines. Claims show simple fissure veins in quartzite. The vein is 2′ wide in the upper 175′ tunnel averaging 5′ on the 5th level. It carries silver-lead ore with zinc in shoots, the orebody thus far developed being 300′ long and 4½′ wide. The shoot is short, limited by a fault, and must be developed in depth to get tonnage..

Development: includes a main working tunnel and 940′ shaft with levels at 399, 550, 687 and 904′. Tunnel cuts the vein at 625′ and a drift follows it for 475′. The vein runs north 70° W. and dips 78° S. A rich lead-silver vein was cut, 1917, on the 900′ level and produces a small quantity of ore. The shoot is narrow, but promising.

Ore reserves: were estimated at 26,000 tons in 1918, equal to 8 or 10 months' production. Arrangements were under way to deepen shaft to 1,100′ and a winze is to follow the shoot found at 900′.

Exploration work on the Got-em-now vein, exposed in the Gertie tunnel, which traverses the Marsh property, is under way. This vein was cut 512′ from the portal of the Gertie tunnel and at a depth of 350′ to 400′ from the surface; ore from this vein can be quickly mined by utilizing the present working shaft of Marsh now 900′ deep and splendidly equipped to handle a large output.

Equipment: includes 1,150′ Ingersoll-Rand and 690′ Franklin compressors, 300-h. p. Nordberg electric hoist, 40-h. p. Lidgerwood and two Ottumwa hoists, Gould and Cameron pumps, Ingersoll, Waugh, and Wod drills, etc., with complete electrical equipment.

Company leases and operates the California or Pittsburg mill in Nine Mile Canyon, 2½ miles from Wallace. Freight on Northern Pacific costs 15c. a ton. This mill, remodeled at cost of $34.000 in 1915, handles 150 to 225 tons daily, saving 90% of the lead and 85% of the silver. It contains 2 sets of 14″x30″ rolls, 7′x10′ tube-mill, trommel, 4 Wood screens, 7 new concentrating tables, Pachuca agitator, Callow flotation cells, two 24′x10′ Dorr thickeners, etc.

The mill was operated jointly with the Hecla Mining Co., the Marsh Co. treating 200 tons daily for 10 days each month, being under control of the Hecla the rest of the time. This tenancy by Hecla is subject to cancellation on 30 days' notice. Milling was suspended in Feb., 1918, and only a few men were employed on surface exploration during 1919.

Smelting contract with the A. S. & R. Co. runs for a period of 10 years from July, 1916.

Production: in July, 1917, 2,200 tons of ore, yielding 200 tons of concentrate assaying 52 to 58% lead and 22 to 28 oz. silver; also 100 tons of concentrate containing 21% lead, 33% zinc, and 12 oz. silver per ton. Output yielded $14,000 net.

Net returns from ore shipments have been as follows: 1911, $30,313; 1912, $114 648; 1913, $139,429; 1914, $81,944; 1915, $143,640; none in 1916. The Marsh mine and mill were closed down May 15, after operating a little more than 4 months in 1916, and producing 17,828 tons of ore, worth $139,111, which just balanced expenses.

MASCOT MINING & MILLING CO. IDAHO

Address: Pocatello, Idaho. **Mine office:** Hailey, Idaho.

Officers: Charles Peter, pres. and mgr.; J. M. Stevens, sec.-treas.; A. J. Weber, v. p.-asst. sec.-treas.; Ferd. Walters, A. H. Freber, W. R. Calvert, F. Van Da Linda, R. E. Rosen, and William Jacobson, directors. H. E. Johnson, supt.

Inc. March 4, 1916, in Idaho. **Cap.** $1,000,000; $1 par; 800,000 issued. Annual meeting, first Monday after first Tuesday in October. Operating expenses in 1918 were $52,000.

Property: 25 claims, 4 patented, at Peter, near Hailey, in Warm Springs Creek mining district, Blaine county, said to show gold, silver and lead sulphide ore in a vein in limestone-shale formation. Examined by E. R. Zalinski, and H. A. Linke.

Development: by tunnels and over 5,000′ of workings. Main workings are on the Silver Fortune claim. A double-track 6x8 ft. tunnel, started in 1919, was driven easterly for 250′ and is to be continued northeasterly for 3,000′, to a vertical depth of 1,500′ below the outcrop. At 180′ from the portal, the Oregonian vein is being followed.

Equipment: air-compressor, oil engine, hydro-electric plant and complete quarters.

Company is well financed and is developing its property thoroughly.

MAYFLOWER MINING & DEVELOPMENT CO. IDAHO

Address: John H. Foss, pres., Mullan, Idaho.

Cap. $1,250,000; $1 par; assessable.

Property: 13 patented claims in Hunter district, Shoshone county, on which over 4,000′ of tunnels, etc., have been driven, opening veins with lead-silver ore. After a 5-years' shutdown, some work was done in 1918 and 1919.

McKINLEY GOLD MINES CO. IDAHO

Held a property near Idaho City, but is presumably out of business. Described in Volume XIV.

MELCHER MINING & MILLING CO. IDAHO

Office: 404 McIntyre Bldg., Salt Lake City, Utah. **Mine office:** Albion, Cassia county, Idaho.

Officers: Samuel McIntyre, Sr., pres., gen. mgr. and treas.; R. .M Wilkinson, sec. and purch. agt.; P. McIntyre, supt.

Inc. in Utah. **Cap.** $50,000; 10c. par.

Property: 37 claims, including former holdings of the Cumora Mining Co., bought 1912, in the Stokes district, 38 miles from rail and 12 miles from Albion. Country rock is schist, granite and quartzite, orebodies occuring in fissure veins in both schist and granite. The vein developed runs N. 10° E. and dips 68° west.

Development: by two shafts and 4 tunnels, one 3,290′ long. Shows a 3′ quartz vein carrying chalcopyrite and galena and lead carbonates, said to average 5% copper, 4% lead, 5 oz. silver and $5 gold per ton. A large quantity of ore is said to be available.

Equipment: includes 200 h. p. steam and water power plant, 5-drill air compressor and 100-ton mill and flotation plant.

In June, 1919, the mill was operating and one shipment of concentrate was made. Company is said to have expended $200,000 to date.

MERGER MINING CO., LTD. IDAHO

Address: E. R. Northrup, sec., Palouse, Wash. Mine under lease to **Collingwood Mining Co.**, until 1926.

Inc. Oct. 15, 1913, in Washington. **Cap.** $3,750,000; $1 par: assessable for annual labor only. Annual meeting April 16.

Property: the Mizpah mine, 20 claims, 318 acres, well watered and timbered, on Copper mountain, near the Palouse river, in the Hoodoo district, Latah county, almost 40 miles from Palouse. A 20-mile wagon-road runs to Harvard, 10 miles from the Puget Sound railway.

Geology: the property is covered by quartzite and schist, with fissure

veins on the quartzite-schist contact. The veins run N. E. and dip N. W. The developed orebody is 10 to 40′ wide, and contains 3% chalcopyrite and 22% copper glance.

Development: includes 5 tunnels, with about 3,000′ of workings reaching depth of 250′. A 30′ shaft revealed over 5′ of chalcopyrite, assaying 10% copper, early in 1920. Six of the eleven feet of the vein carried 2%.

Equipment: includes 60-h. p. gasoline power, with a 3-drill air-compressor. There are 16 buildnigs. A 50-ton mill is to be erected. Milling ore averages 4½% copper.

Production: 2,000 tons of milling grade has been mined, and 170 tons of high-grade ore shipped.

METTA MINING CO. **IDAHO**

Probably dead. Fully described in Vol. XIV.

MIDNIGHT MINING CO. **IDAHO**

Address: E. L. Kerstetter, sec., 50 Broad St., New York. **Mine office:** care N. C. Sheridan, Gyde-Taylor Block, Wallace, Idaho.

Officers. N. C. Sheridan, pres.-gen. mgr.; E. F. Carlson, v. p.; E. L. Kerstetter, sec.-treas.; M. F. Quinn, gen. mgr.

Inc. July 25, 1919, in Idaho. as Solid Mining Co., to which all the assets and liabilities of the Midnight Mng. Co. of Delaware were transferred. A little later the name of the Solid Mining Co., was changed to Midnight MiningCo. **Cap.** $1,500,000; $1 par; assessable, 1,345,104 shares issued and owned by **Mines Holding and Operating Corp.** New York Trust Co., registrar; Corporation Trust Co., transfer agent.

Property: Midnight-Bummer patented claims, 21½ acres, on Trapper creek, Pine Creek section, 1½ miles from Mullan; side lines the Morning and You Like claims of Federal M. & S. Co. Deposit is a fissure vein in quartzite, carrying silver-lead ores.

Development: by 1,600′ tunnel, the 3,700′ of workings reaching a depth of 1,262′. The vein has been opened by a 280′ drift and a 1,100′ raise to the surface, was being made in 1921.

MIDWAY SUMMIT MINING & MILLING CO., LTD. **IDAHO**

Address: W. W. Waltman, sec., 419 Chamber of Commerce Bld., Spokane, Wash.

Inc. 1911, in Idaho. **Cap** $1,500,000; $1 par; assessable.

Property: 11 claims, surveyed for patent, 1 mile S. of Burke, Shoshone county. Ore contains silver-lead.

Development: over 6,000′ of work has been done on property, without disclosing ore in commercial quantities, though some rich ore was opened. No recent information.

MILITARY MINING & MILLING CO., LTD. **IDAHO**

Address: Geo. K. Penkert, treas., S. 107 Elm St., Spokane, Wash.

Assessment of ½ mill per share levied June 25, 1921.

MINERAL FARM MINING CO. **IDAHO**

Offices: Paulsen Bldg., Spokane, and Mullan, Idaho.

Officers: C. J. Carlson, pres. and mgr.; Wm. Sellars, v. p.; C. D. Miller, sec.-treas., with J. H. Pelletier, director.

Inc. 1904, in Idaho. **Cap.** 1,500,000 shares; $1 par; assessable, outstanding 800,000. Annual meeting, first Monday in September. Listed on Butte Exchange.

Property: 8 claims, 7 patented, 170 acres, 1 mile west of Mullan, Shoshone county, has a fissure vein in Revett and Burke quartzite, on which work was started in 1908.

Development: 3 tunnels, 60′, 800′ and 1,445′ in length, with 3,700′ of workings. Probably idle.

MINERAL POINT MINING CO. **IDAHO**

Address: Paul Leuschel, sec., 114 Bank St., Wallace, Idaho.

Assessments of 1 mill per share, were levied Dec. 10, 1920 and July 26, 1921.

MINERAL ZONE MINING CO. **IDAHO**

Address: G. L. L. Baskett, supt., Elk City, Idaho.

Property: known as the Parr group, includes the Mineral Zone gold mine near Elk City.

Development: is by 2,000′ of tunnels, etc. There is a 3-stamp mill which was being worked in 1918. No recent returns secured.

MINES DEVELOPING & LEASING CO. **IDAHO**

Address: W. A. Byers, 207 Atlas Bldg., Salt Lake City, Utah.

Property: a lease on the holdings of the **Virginia Consolidated Gold Mining Co.,** 7 miles from Baker and 22 from Salmon, Lemhi county, Idaho, 1 mile south of the Montana-Idaho boundary.

Development: by tunnels and shaft, opening copper-silver gold ore. Formerly held lease on holdings of Lemhi Gold Mng. Co.

MINNIE MOORE MINES CO. **IDAHO**

Officers: I. E. Rockwell, pres., Bellevue, Idaho.

Cap. $500,000; shares $1 par.

Property: at Bellevue, in the Mineral Hill district, Blaine county, was bonded to Chas. M. Schwab interests, but relinquished by them in 1906 when ore was found to be cut off by complex faulting.

In June, 1912, all the property of the **Idaho Cons. Mines Co. was bought** at receiver's sale and in 1914 the Mill Site and Onyx lode claims were bought for $5,000. Some lead and zinc concentrates have been shipped.

Idle, "awaiting intensive prospecting," when funds permit.

MISSOULA COPPER MINING CO. **IDAHO**

Address: Mullan, Shoshone county, Idaho.

Officers: A. McLeod, pres.; C. A. Barnes, v. p.; J. R. Bean, sec.-treas., with R. J. McLeod, T. M. Brennan, L. Dooling, and H. E. Chaney, directors.

Inc. 1901, in Idaho. **Cap.** $100,000; increased 1907, to $1,500,000; shares $1 par, assessable; issued, 1,350,000. Shares listed on Spokane and Vancouver Stock Exchanges. Annual meeting, first Monday in November.

Assessment levied in April, 1917, to pay for having examination made of property.

Property: 10 claims, about 175 acres, at the head of Deadman gulch, adjoining the Lucky Calumet, and about 1½ miles N. W. of the Snowstorm, in the Hunter section.

Geology: property has a wide fissure vein in Revett quartzite, carrying native copper, cuprite, azurite, malachite, bornite and chalcopyrite, with value mainly in sulphides, ranging from about 1% on the hanging, to 8% on the foot-wall, ore averaging about ½ oz. silver per unit of copper. The property also carries some argentiferous galena. Geology described in U. S. G. S. Bull. 540 E., p. 48, 1913.

Development: consists of a 1,400′ upper tunnel and a 2,800′ lower tunnel, with a connecting shaft and nearly 1 mile of workings. The main tunnel runs N. 30° E. for 1,900′, then N. 70° E. for 700′, passing from purple St. Regis slates at the portal into Revett quartzite.

Diamond drilling was done October, 1917.

Equipment: includes a 100-h. p. electric plant, with an 8-drill air compressor and mine buildings.

March 1, 1914, ten of the largest stockholders formed an ironclad pool with 650,000 shares, deposited with Union Trust & Savings Bank of Spokane to March 1, 1916. In April, 1914, a lease and bond was given to Snowstorm M. Co. at $600,000, said agreement calling for expenditure of $2,000 for each month the option ran. Snowstorm expended $36,000, and option was cancelled on Sept. 12, 1915.

Missoula stockholders assert that property contains apex of National vein. The Missoula vein is flat, dipping about 37° S. towards National vein which was struck in long crosscut at vertical depth of 1,400′, and is said to show dip similar to Missoula's. It is said that National Co., feared to raise lest it prove apex in Missoula ground. Idle since 1919.

MIZPAH COPPER MINING CO., LTD. IDAHO

Property sold to Merger Mng. Co., which see.

MONITOR CONSOLIDATED COPPER MINING CO. IDAHO

Stockholders sold property to Montana-Idaho Copper Co., 1914, for $102,000, payable in shares of new company at par, stock exchanged April 17, 1917, and company disincorporated. See Mont-Idaho C. Co.

MONTANA-IDAHO COPPER CO. IDAHO

Address: Paulsen Bldg., Spokane, Wash. **Mine address:** S. P. Burr, supt., Adair, Idaho.

Omcers: H. F. DeBower, New York, pres.; J. L. Dirks, Spokane, v. p.; W. J. Kirby, sec.-treas.; with Otis Hill, and G. B. May, directors.

Inc. 1914 to take over holdings of Monitor Cons. C. M. Co. **Cap.** 6,000 shares; $100 par, increased to 250,500 shares, $10 par, in 1920.

Property: 44 claims, 10 patented, ¼ to 1½ miles from Adair, on main line of C. M. & St. P. Rv. First copper location in the eastern Coeur d'Alene. A fissure vein of 10 to 30′ width, with N. E. strike and nearly vertical dip has a paystreak carrying massive chalcopyrite ore, balance of vein carrying disseminated chalcopyrite, mainly of concentrating grade. Occasional native copper is found.

Development: by main tunnel 8,600′ long. At the 3,865′ point a drift driven 3,600′ on a vein, had a back of 1,400′. About $70,000 has been spent on exploration at the Monitor shaft.

Equipment: hydraulic power plant, compressor, drills, etc.

MONTE CRISTO GOLD MINES CO. IDAHO

Address: C. E. Eddy, Bonanza, Custer county, Idaho.

Property: a gold mine 4 miles from the Lost Packer copper mine, which was to "electrify the mining world and make a great new boom for mining in Idaho" in 1918. Examined by Paul Valtinke, who said that "the new quality of ore coming in at 150′ depth would commonly be called a telluride, but is in fact a selenide, resulting from super-heated action and volcanic fumes, which deposited the rich gold and silver values and gave the ore a peculiar blue-greyish cast." This is extremely interesting if true.

MONUMENTAL MERCURY MINES CO. IDAHO

Property: a lease on 10 claims in Yellow Pine district of Valley county, 50 miles N. E. of Cascade, adjoining property of the Fern Quicksilver Co.

Geology: brecciated quartzite and brecciated, silicified limestone carry cinnabar as seams and disseminations.

Development: by tunnels.

Equipment: 12 screw-top retorts, each capable of holding 14 lb. of 2% ore, and treating 3 charges, a total of one ton daily.

MOONLIGHT MINING CO. IDAHO

Address: E. Hedin, Wallace, Idaho.

Officers: Eugene R. Day, pres.; Jas. J. Murphy, v. p. and mgr.; E. Hedin, sec.-treas.

Cap. $1,500,000; shares $1 par; assessable.

Property: 9 patented claims, adjoining the Hercules mine on the east, in Shoshone county.

Development: the main tunnel through which the property has been worked is an extension of the old Trade Dollar tunnel, 600′ below the upper workings and 900′ below the outcrop. The vein was cut in 1914 and drifting was started, but vein was found to be cut off by a fault. A crosscut was then started 1,400′ back. About 800′ of drifting has been done, but little ore has as yet been found. Total workings over 5,000′.

Equipment: water power, compressor, etc., reaching depth of 1,000′. No recent returns.

MOUNTAIN GIRL MINING CO. IDAHO

Address: A. H. Peabody, treas., 1064 Third Ave., Salt Lake City, Utah. Inc. Nov., 1919, in Idaho. **Cap.** $250,000.

Property: claims in Stanley basin, Custer county. Work was started in 1920, and a car of lead ore shipped to the smelter.

MOUNTAIN QUEEN MINING CO. **IDAHO**

Address: W. M. Keister, sec., Wallace, Idaho.

Last assessment of ½ mill per share, levied Sept. 15, 1920.

MOUNT SULLIVAN MINING CO. **IDAHO**

John J. Howell, pres.-mgr., Mackay, Ida.

Property: a lease and bond on Geo. W. Stewart group on Alder Creek, near Mackay, Custer county.

Development: by 640′ tunnels. Shipments said to have assayed 25% lead and 35 oz. silver per ton.

MOYIE GOLD-COPPER M. & M. CO., LTD. **IDAHO**

Address: G. E. Crocker, Bonners Ferry, Idaho.

Officers: G. E. Crocker, pres.; A. J. Kent, v. p.; M. P. DeWolf, treas., with H. L. Medbury, directors.

Inc. Sept. 11, 1911, in Idaho. **Cap.** $1,250,000; $1 par; assessable; 750,000 issued. Annual meeting first Monday in September.

Property: 12 unpatented claims in Moyie Yakt district, 17 miles from rail; also 5 claims in Moyie Kootenai district, 3 miles from rail, all in Boundary county.

Geology: at the first or Damon group, a gold-bearing quartz vein cuts granite and diorite, the paystreak being 6″ to 6½′ wide. The second or Queen group has a contact vein in quartzite, that carries gold, silver, lead.

Development: at the Damon group comprises a 35′ shaft and 360′ tunnel; and at the Queen group a 480′ tunnel and open cuts, said to show a 20″ vein containing 55 oz. silver and 65% lead.

Properties appear to be worth development.

MULLAN MILLING CO. **IDAHO**

Address: C. L. Hewitt, mgr., Kellogg, Idaho.

Property: a lease on old tailing dump of Ontario & Silver King mines, in Government Gulch, W. of Kellogg, Shoshone county.

Production: averages 225 tons of silver-lead concentrate per month, with total shipments of about 3,000 tons.

MULLAN MINING CO. **IDAHO**

Address: L. Leighty, Wallace, Idaho.

Cap. $50,000; shares 5c par; assessable.

Property: 3 claims in Hunter district, Shoshone county, on which veins show lead-silver ore.

Development: a 1,000′ tunnel with 1,200′ of drift-work on vein.

MURRAY HILL MINING CO. **IDAHO**

Out of business. Described in Vol. XIV. Property sold to the **Paragon M. Co.**, which see.

NABOB CONSOLIDATED MINING CO. **IDAHO**

Subsidiary of Stewart Mining Co., financing Nabob Cons. and Nabob Mining, described in Vol. XII of this book. See **Stewart Mining Co.**

NABOB MINING CO. **IDAHO**

Absorbed by Nabob Consolidated Mining Co., now a subsidiary of **Stewart Mng. Co.**, which see.

NATIONAL COPPER MINES CO. **IDAHO**

Office: 926 Chamber of Commerce, Portland, Oregon.

Officers: Wm. Trevor, pres. and mine supt.; Dr. R. J. Marsh, v. p.; Edward H. Hayes, sec.; W. F. Coffey, treas., with Jas. Wolfs and Fred Hagstrom and C. H. Skewes, directors.

Inc. in Oregon. **Cap.** $3,000,000; $1 par; non-assessable.

Property: 33 claims, patented, in Cuprum Basin, Seven Devils district, Adams county, Idaho; also the Gold Barr mine and Coad placer mine, 2 patented claims, in southern Oregon. The Idaho claims are near Cuprum, a few miles from Homestead on the Northwest (Snake River), R. R.

Development: by over 3,500′ of tunnels, shafts, and open-cuts, showing

copper stained andesite and a little chalcocite. Is a stock selling proposition and unfavorably regarded.

NATIONAL COPPER MINING CO., LTD. IDAHO

Address: August Paulsen, Paulsen Bldg., Spokane, Wash.

Officers: August Paulsen, pres.; A. P. McCrae, v. p.; Chas. McKinnis, sec.-treas., Barnard Blk., Wallace, Idaho.; Jas. F. McCarthy, mgr., with Harry White, H. H. Stampaugh and R. C. Steese, directors.

Inc. Sept. 22, 1906, in Washington. **Cap.** $2,500,000; $1 par; increased from 1,250,000 shares in July, 1913; 1,800,000 issued; 800,000 shares treasury stock were sold at 50c. Assessments of 19½c. per share have been levied to date, a total of $342,000. Stock listed in Spokane. Quoted at 1¢ bid in Jan., 1921.

Company owns entire capital stock of Homestake Mng. Co., with claims at mouth of Deadmans Gulch.

Property: 9 patented claims, 180 acres, in Deadman gulch between Mullan and Larsen, on the north side of the Coeur d'Alene Valley. It is about 1½ miles west of and in same belt as the Snowstorm copper property, which it closely resembles in character.

Geology: ore occurs in a fault-vein in thickly-bedded white Revett quartzite, with talcose slips bordering the ore. The vein runs nearly E.-W., and dips steeply to south. The surface gives no indications of the orebody 1,700′ beneath it, in fact the ore-bearing quartzite does not show in the upper workings.

During the boom days of 1906-07, the company sank a 400′ shaft and drove an adit tunnel developing a fissure vein and strong fault, but found no ore in commercial quantity. Dec., 1912, a large body of silver-bearing copper ore was cut at a distance of 4,800′ from the portal, about 1,000′ lower than the old tunnel and shaft. The crosscut tunnel runs for 4,000′ through very hard and tight Wallace slates and St. Regis quartzites to a slightly mineralized fault separating the St. Regis from the more favorable Revett quartzite. The National vein is cut 200′ from this big fault. It is a vertical quartz vein, filling a fault in Revett quartzite. The vein carries copper ore and a drift east disclosed the orebody which gave the mine its short-lived prominence. A sample cut across the orebody where it was 85′ wide showed an average value of 2½% copper, 5 oz. silver, and 80c. in gold.

Development: by a 1,200′ upper tunnel, a 4,800′ lower crosscut tunnel with about 1,000′ of drifting on the vein,, a 400′ shaft with 400′ of drifting and a winze sunk to the 1,500′ level. In Feb., 1916, company reported sufficient ore above the 1,200′ level to run the mill 2 years. Leached areas on the 800′ and 1,000′ levels make the extent of orebody uncertain. An estimate of 545,000 tons of ore available above the 1,000′ level, made 1913, was changed to 170,000 tons because of an unexpected barren streak.

Equipment: a 500-ton concentrator with Callow flotation plant, and 2-mile trolley line. The crushing plant can handle 500 tons in 16 hours and reduce the ore to ½″. The storage bins have a capacity of 1,100 tons, receiving the ore over a 2-mile electrically operated railroad. The various motors at the mill total 615-h. p.

Mill was operated two months early in 1914, and again in Oct., 1915, crushing 4,243 tons of 0.83% copper ore carrying 1.99 oz. silver per ton. Operations were suspended in June, 1916.

In August, 1917, a crosscut from shaft at depth of 535′ below main working tunnel, passed through 35′ of ore of better grade than in upper workings, which confirmed theory that better ore would be found at depth.

Property represents an investment of $400,000 without a dollar's profit, the mill having been built before a producing mine had been developed. Deep work alone can open up a large tonnage, but management announced this would not be done unless new work above the 1,200′ level justified it.

In May, 1918, a small profit was being made from 1½% copper and 4 oz. silver ore, but unluckily, the 1,500′ level showed the vein to be more oxidized

and leached than on the upper levels. A new hoist and electric pump were installed in 1918, and the mill ran at 33% capacity, the ore coming from the 800,900, 1,000 and 1,200′ levels. The mill treated 300 tons daily, early in 1919, the January output being 14 cars of concentrate running 15% copper and 40 oz. silver. A raise above the 800′ level opened good ore early in 1918, but the mill had to be stopped two months for repairs. The monthly output averaged about 15 cars of concentrates, netting approximately $20,000. Fifty men were employed in July. In September, the mine was closed indefinitely and a statement published that liquid assets, including $51,205 in cash, totaled $59,079. There were no liabilities. From Nov., 1917, to July, 1919, the mill treated 105,129 tons of ore averaging 1.05% copper and 3.27 oz. silver per ton. The value was $4.68 per ton, and costs were $4.085. The 5,931 tons of concentrate averaged $83.11 per ton, carrying 15% copper and 43 oz. silver; the recovery was 80% and 74% respectively. No ore of commercial grade has been found below the 1,500′ level, as the Snowstorm fault ends the National vein a short distance below this horizon. The ore opened by 1,820′ of work carried up to 0.7% copper and 1 to 2 oz. of silver. This mine has proved to be a disappointment after extensive intelligent development and large expenditure of capital, and unless a new orebody is found the property cannot be made to pay. In January, 1920, it was decided to reopen the mine and continue the 1,000′ level crosscut 300′ further. All work was finally stopped in March. The equipment, worth nearly $200,000, is for sale.

NATIONAL LEAD MINING CO. IDAHO

Address: J. L. McCormick, asst. sec., 608 Cedar St., Wallace, Idaho.

Last assessment of 1 mill per share levied Dec. 27, 1921.

NATIONAL MINING & DEVELOPMENT CO. IDAHO

Address: A. C. Gallupe, pres., Placerville, Idaho.

Inc. Sept. 23, 1911. **Cap.** $1,000,000; $1 par; divided into 600,000 common and 400,000 preferred shares.

Property: the Mountain Chief mine at Placerville, Boise county, shows gold-silver ore in a fissure vein, 1-3′ wide. Ore averages from $20-$25 per ton. Developed by 5 tunnels.

Equipment: includes 30-ton all-sliming cyanide plant.

Practically idle since 1918. Property promising.

NELLIE BLOOM MINING CO. IDAHO

Formerly operated near Horse Shoe Bend. Presumably defunct.

NELLIE MINING & MILLING CO. IDAHO

Address: Wallace, Idaho.

Officers: C. E. Benedict, pres.; O. E. Cushing, v. p.; W. F. Cushing, sec.-treas.

Cap. $60,000; $1 par.

Property: 1½ miles from Osborne, Shoshone county, on O.-W. R. & N. R. R., has a fissure vein with gray copper ore (tetrahedrite) in quartz, the ore being said to carry 100 to 240 oz. silver per ton.

Development: by 3 tunnels, shafts and 10,000′ of stoping and raises. A crosscut on the 500′ level opened up a vein 3′ wide, showing good milling ore. Shipped 20 tons of high-grade ore in Sept., 1914, from leasing operations. Has water power plant for pumping and hoisting work, and a small mill. Idle except for work by leasers, since 1918.

NEVADA-STEWART MINING CO. IDAHO

Address: H. M. Huemann, 611 S. 4th St., Wallace, Idaho.

Officers: Dr. C. R. Mowery, pres.; H. E. Huemann, sec.-treas., M. J. Sinclair, mgr., and A. J. Devlin, directors.

Inc. Nov. 19, 1915, in Idaho. **Cap.** $150,000; 10c par; assessable. One mill per share levied Aug. 13, 1921.

Property: 7 claims in Pine Creek district, near Kellogg, Shoshone county, adjoining the Highland Surprise on the west, shows lead, silver, zinc ore. The vein lies in a fault-zone in slate.

Development: by 800′ crosscut tunnel, and 200′ of drifts. During 1920

a 7' vein was opened, showing stringers of lead-zinc ore, one being 18" wide.

Equipment: includes electric power and air-compressor.

NEW CALEDONIA CONS. MINING CO. **IDAHO**

Address: M. W. Emmett, sec.-treas., Kellogg, Idaho.

Officers: Geo. S. Decker, pres.; Walter Owens, v. p.; E. C. Moore, gen. mgr.

Inc. in 1920. Company succeeded the **Bernice and Wardner** Mining companies. **Cap.** $375,000; 25c par; 500,000 shares in treasury.

Property 20 claims on N. Slope of Haystack peak, near Wardner, Shoshone county, adjoining the Caledonia on the S. and W. Ore contains silver, lead, and gold.

Development: by open-cuts with a 450' crosscut tunnel on the New Caledonia and a 750' tunnel on the Magnet group.

Equipment: includes purchased electric power, compressor, drills, etc. Developing.

NEW HOPE MINING CO., LTD. **IDAHO**

Address: Otto A. Olsson, sec.-treas., Gyde-Taylor Bldg., Wallace, Ida.

Officers: Eugene Thomas, pres.-mgr., Osborn, Ida.; with Otto A. Olsson, E. F. Gentry, O. W. Lewis and C. A. Solberg, directors.

Assessment of 2 mills levied July 20, 1921.

Property: on Two Mile Creek, near Osborn, Shoshone county, developed by 1,800' of tunnels and drifts, disclosing a vein of silver-lead ore. Assessment work only being done.

NICKEL PLATE MINING CO. **IDAHO**

Office: 701 Mohawk Blk., Spokane, Wash.

Officers: S. M. Daniels, pres.; J. R. Fordyce, v. p.; Chas. F. Cowan, sec.; Thos. Keogh, treas, with L. Oriard and S. L. Americus, trustees.

Inc. in Washington. **Cap.** $2,000,000; $1 par. Annual meeting first Monday in June.

Property: 22 claims on Nickel Plate Mountain, between Reeder and Granite creeks in Bonner county. Country rocks include granite, syenite, and gneiss. Cut by veins reported to have shown some cobalt, platinum and palladium values together with gold and copper. About $30,000 was spent on equipment up to 1918, and about 1,000' of work done.

NIPSIC MINING CO. **IDAHO**

Mine sold to Cons. Interstate-Callahan, now **Callahan Zinc-Lead Co.**, which see.

NONPAREIL COPPER MINING CO. **IDAHO**

Address: H. J. Rossi, sec., Wallace, Idaho.

Inc. in Idaho. **Cap.** $1,500,000; shares $1 par; assessable; assessment of 1 mill per share was levied Aug. 10, 1921.

Property: 4 full and 3 fractional claims, on the west fork of Willow creek, across from the Carney mine, 3 miles S. E. of Mullan, Shoshone county.

Development: by 4 tunnels. Surface ores have given assays up to 1.5% copper, and 8 to 19 oz. silver per ton.

Idle.

NORTH AMERICAN M. & M. CO., LTD. **IDAHO**

Address: J. J. Presley, Wallace, Idaho.

Officers: J. J. Presley, pres.; C. F. Reedy, v. p.; J. F. Morton, sec.; F. J. Presley, treas., with Alex Murphy, directors.

Inc. May, 1903, in Idaho. **Cap.** $1,500,000; $1 par; none outstanding. Held annual meeting, June 1, 1920.

Property: 25 patented claims, 390 acres, 3 miles S. E. of Kellogg, Shoshone county, adjoining the Bunker Hill & Sullivan, and believed by manager to carry the continuation of the B. H. & S. main fissure. Examined, 1919, by F. J. Davey. Also 280 acres of millsite, water-rights, etc. The vein is in Revett quartzite, and ore averages 1% lead and ½ oz. silver per ton.

Development: by tunnels totaling 1,700' reaching depth of 400'

In 1916, company tried to raise funds with which to continue the main tunnel another 1,200′, by lurid advertisements, written by an "advertising agent." The engineer's report is worth quoting: "It is a good business proposition to go into, for while there may be some chance that ore will not be found in commercial quantities, it is remote under the conditions existing elsewhere in the same vein."

No record of operations obtainable.

NORTH BUNKER HILL MINING CO., LTD. **IDAHO**

Address: N. T. Hardy, mgr., Kellogg, Idaho.

Officers: Elmer Brown, pres.; J. L. Trowbridge, v. p.; N. T. Hardy, sec.; Chas. Cartwright, treas., with A. W. Vangilder, E. A. Vangilder and J. E. Gunn, directors.

Inc. Feb. 16, 1907, in Idaho. **Cap.** $1,250,000; shares $1 par; assessable; 4 mills per share called Dec. 11, 1920 and April 2, 1921; 1,079,721 issued.

Property: 3 patented claims, 60 acres, at Wardner, Coeur d'Alene district, joined on the E. by the East Caledonia, on the W. by the Caledonia, and on the S. by the Bunker Hill & Sullivan Mines.

Development: by tunnels, and 500′ incline from tunnel level, opening an ore shoot 30x115′, said to average 30% lead and 15 oz. silver.

Equipment: 75-h. p. motor, 500 cu. ft. compressor, electric hoist and pump.

Work is paid for by calling assessments, and the installation of the machinery noted shows that shareholders are getting good value for their money.

NORTHERN LIGHT MINING & MILLING CO. **IDAHO**

Address: B. E. Harmon, sec., 352 W. Morton St., St. Paul, Minnesota, and S. L. Shonts, mgr., Gyde-Taylor Bldg., Wallace, Idaho.

Officers: W. G. Nye, pres.; Fred W. Sachse, v. p.; Tom J. McGrath, treas., Benj. E. Harmon, sec., with S. L. Shonts, directors.

Inc. Jan., 1915, in Idaho. **Cap.** $75,000; shares 5c par; assessable; last assessment of 1¼ mills levied Feb. 10, 1920; 1,100,000 outstanding. Annual meeting, second Saturday in May, at Wallace, Idaho.

Property: 5 claims 234 acres, 2½ miles south of O. W. R. N. Ry. on Pine creek, 5 miles west of Kellogg, and 3½ miles west of the new Bunker Hill smelter at Bradley, Shoshone county.

Mine reported on by Merriam Bros. of Wallace, and Albert Burch.

Property contains four veins in beds of quartzite separated by slates. Mill ore averages 3 to 8% lead, 6 to 10% zinc, and 1.5 to 3 oz. silver per ton.

Development: by 500′ tunnel and 400′ vertical shaft, with 2,400′ drifts and crosscuts, 100′ raises and 70′ winze.

Equipment: includes hoist at main shaft, Ingersoll-Rand compressor, electric power, Gould and Cameron pumps, air hoist in winze, machine drills, etc. and 200-ton mill to be erected.

The secretary wrote in June, 1919, that the mine was not worked during 1918, because the shaft was flooded, power being disconnected. Work will be resumed when litigation over the power supply is settled.

NORTH FRANKLIN MINING CO. **IDAHO**

Address: Norman Ebbley, pres., Wallace, Idaho.

Inc. in Idaho. **Cap.** $1,000,000; shares $5 par; assessable.

Property: 7 claims adjoining the Morning mine on North, near Mullan, Shoshone county, Idaho. About 3,000′ of work has disclosed bunches of lead-silver ore, but not in commercial amount. Idle several years.

NORTH STAR M. & D. CO., LTD. **IDAHO**

Address: G. W. Dougherty, sec.-mgr., 516½ Cedar St., Wallace, Idaho.

Officers: D. E. Wherry, pres.; A. J. Mullen, v. p.; G. W. Dougherty, sec.-treas., with J. E. White and E. L. Wherry, directors.

Inc. 1920, in Idaho. **Cap.** $1,250,000; $1 par; assessable; 906,170 shares issued. Assessment of 1 mill per share levied July 26, 1920 and April 30, 1921.

Property: 5 claims, 90 acres, in the Nine Mile district, 2½ miles N. of

Wallace, Shoshone county. Ore occurs in quartz veins carrying lead and silver.

Development: by 4 by 6′ tunnel, 1,000′ long and 334′ crosscut, being extended to the main orebody.

NORTHWESTERN DEVELOPMENT CO. **IDAHO**

Former address, Salmon, Idaho.

Property: the Ranger copper mine, 12 miles E. of Salmon, in Lemhi county, worked for gold in the eighties, though the copper content prevented gold recovery, 60% being lost. About $260,000 was spent on the mine at the time. In 1917 the mine was unwatered after 33 years idleness, and new work disclosed an ore shoot 320′ long, 4′ wide, some of the ore carrying $50 to $75 per ton. About 100′ out of 150′ in depth was stoped In 1918, an 800′ tunnel was started to cut the vein at depth of 650′. Dumps said to contain 10,000 tons of $10 ore.

Hydro-electric power can be developed nearby.

NORTHWESTERN MINING CO. **IDAHO**

Out of business. Described in Vol. XIV.

OLD HICKORY MINING CO. **IDAHO**

Address: Oscar Nordquist, pres., 424 E. Nora St., Spokane, Wash.

Inc. Oct., 1918. **Cap.** $150,000; shares 15c. par.

Property: the Old Hickory claim of North Star M. & M. Co., adjoining You Like claim of Federal M. & S. Co. Lead ore was opened in 1919, in a tunnel, and geological conditions were said to be encouraging. Idle 1920-21.

OLD VETERAN MINING CO. **IDAHO**

Office: Barnard Blk., Wallace, Idaho.

Officers: M. J. Farrell, pres.-gen. mgr.; Allan G. Kennedy, v. p.; L. L. Brainard, sec.-treas., with B. J. Farrell, directors.

Inc. March, 1915. **Cap.** $150,000; shares 10c. par; assessable; 750,000 shares were sold at 2cts. per share, upon which assessments of 2cts. were to be levied every two months.

Property: 10 claims, 2 miles above Burke, Shoshone county, shows several fault fissures.

Development: by 1,500′ of tunnels. No. 3 tunnel cut a few inches of ore, carrying 1.84% copper and ½ oz. of silver in 1918, and drifting continued in 1919 and 1920, showing more or less copper, but no large orebody. Assessment work only being done, 1920-21.

OMAHA MINING CO. **IDAHO**

Address: O. B. Olsson, mgr., Wallace, Idaho. Controlled by August Paulsen, Paulsen Bldg., Spokane.

Property: the Omaha group of 4 claims and the Albany group of 6 claims, near Mace, Shoshone county, under development during 1920.

Equipment: includes compressor and complete machine shop.

ONTARIO MINING CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: M. A. Folsom, pres.; H. Nicholson, v. p.; Stanley A. Easton, sec.-treas. and gen. mgr.

Cap. $25,000; shares $1 par.

Property: on Ontario Creek, adjoining the Steward in the Kellogg-Wardner district, Shoshone county, shows quartz fissure veins carrying pyrite, sphalerite and galena, and proved to be the southern extension of the main Steward orebody. The vein system is faulted, as in the Steward, and the ore crushed, making mine operations troublesome.

An apex suit brought by the Steward Mining Co. was decided, in 1915, in favor of the Ontario Mining Co., giving the latter company a verdict for $48,245.

Development: by 800′ crosscut tunnel from which a shaft was sunk to 320′ depth.

Equipment: compressor, 200-ton mill, and complete plant.

Production: 8,209 tons of ore worth $712,666 in 1915, and 1,201 tons worth $32,811 in 1917. It is generally understood that this mine has made a profit of over $500,000, but this cannot be verified.

OOM PAUL CONSOLIDATED MINING CO. IDAHO

Office: Wallace, Idaho.

Officers: Jas. F. McCarthy, pres.-mgr.-treas.; F. H. Richardson, v. p.; supt.; L. E. Hanley, sec., with Edward Ryan, J. B. Sloan and Walter Mackay, directors.

Inc. April, 1907, in Idaho. **Cap.** $1,600,000 shares $1 par; assessable; 7 assessments of 1c. each levied; 1,397,598 shares issued. Stock formerly listed on Butte and Spokane Stock Exchanges.

Property: 10 patented claims, 200 acres in Coeur d'Alene district, near Burke, shows silver-lead ore in fissure veins traversing a quartzite formation.

Development: by 3,500′ crosscut tunnel, driven to cut the downward extension of the ore found above. A vein was cut but contained no value.

Equipment: consists of compressor. Work suspended, 1917, because of disappointing results. The Ajax Mining Co. which adjoins it, arranged for use of the tunnel to prospect its own ground during 1918.

OROGRANDE GOLD MINING CO. IDAHO

Address: Judge Geo. Turner, Columbia Bldg., Spokane, Wash. William Hogan, pres.; M. A. Sherman, v. p.

Cap. $1,500,000; $1 par; non-assessable.

Property: on the Crooked River, 64 miles S. E. of Stites, nearest rail point, Idaho county. Ore carries $2.30 to $3.60 per ton gold, and is developed by 1,000′ of tunnels and lateral workings. Mining is done by the glory-hole method.

Equipment: includes a 500-ton all-sliming cyanide mill. In August, 1918, trial runs showed that 1,700 tons ran $2; 2,697 tons gave a recovery of $2.03; and 2,939 tons went $1.93. Small shipments made in 1919.

OVERLOOK MINING & DEVELOPMENT CO. IDAHO

Probably defunct. See Vol. XIV.

THE PACKER CO. IDAHO

Former address: Mackintosh Block, Salt Lake City, Utah.

Officers: Chas. Read, pres.; E. G. Rowe, v. p., with W. A. Black, T. E. Guhin and A. L. Miller, directors. J. H. Woodmansee, sec.-treas. Registrar & Transfer Co., N. Y., registrar and transfer office.

Inc. June 12, 1917, in Maine. **Cap.** $600,000; $1 par; $500,000 issued.

Organized as holding company to take over 80% or more of **Lost Packer Mining Co.** stock (which see).

PANDORA COPPER MINING CO., LTD. IDAHO

Address: care J. C. Weatherhead, Larson, Shoshone county, Idaho.

Inc. Oct., 1906, in Idaho. **Cap.** $1,000,000; shares $1 par; assessable; issued 450,000. Annual meeting, fourth Wednesday in October.

Property: 10 claims, 150 acres, adjoining the Snowstorm mine on the east, and supposed to carry about 3,000′ of the Snowstorm ore zone. Property shows St. Regis and Revett quartzites, with copper impregnations in the latter.

Development: includes 1,750′ main, or working tunnel, which has not yet crosscut the vein. Only assessment work done in recent years.

PARAGON CONSOLIDATED MINING CO. IDAHO

Name changed to **Paragon Mining Co.**, which see.

PARAGON MINING CO. IDAHO

Office: 709 Commerce Bldg., St. Paul, Minn. **Mine address:** Chas. Grimsmore, supt., Paragon, Idaho.

Officers: Geo. S. Monson, pres.; M. O. Nelson, v. p.; F. O. Hammer, sec.-treas., with W. W. Dunn, N. C. Johnson, R. C. Patterson, directors.

Inc. Nov., 1908, in Minnesota. **Cap.** $1,500,000; $10 par; outstanding, 1,205,430. **Bonds:** authorized, $100,000; outstanding, $25,000. Annual meet-

ing in November. Listed on New York Curb. Registrar & Transfer Co., New York, transfer agent.

Property: 52 claims, 19 patented, about 1,000 acres, in the Coeur d'Alene district, Shoshone county, shows fissure and contact orebodies. Values are in lead, zinc, silver and gold. Holdings include the Murray group, formerly owned by **Murray Hill Mining Co.**

Development: by tunnels and 300' shaft with about 20,000' of workings. A double-compartment shaft being sunk 300' in 1921.

Equipment: includes the Murray Hill 100-ton concentrating mill, 1-drill compressor, tram, etc. Power is developed at waterfall nearby, but operations have been hampered by scarcity of water, so steam is used part of the time. The mine has been an intermittent shipper during the past few years, but returns are not made public. Fifteen men employed in 1921.

PARK COPPER & GOLD MINING CO., LTD. IDAHO

Office: 616 Cedar St., Wallace, Idaho. **Mine office:** Mullan, Shoshone county, Idaho.

Officers: O. W. Lewis, pres.-mgr.; Nellie J. Stockbridge, sec.-treas.

Cap. $150,000; shares 10c par.

Property: 7 claims, on the southern side of Stevens Peak, 5 miles from a railway. The porperty is said to have a fissure vein in quartzite, of about 60' in average width, capped by a 40' gossan of mixed hematite and siderite, carrying kidneys of high-grade copper carbonates and chalcopyrite, with occasional native copper.

Development: by two 25' shafts, and 3 tunnels, the two upper tunnels showing ore, while No. 3, the lower tunnel, of 1,680' length, with a back of about 1,000', shows no ore. The mine has about one-half mile of workings.

Idle since 1917.

PARROT MINING CO. IDAHO

Absorbed by **Sunshine Cons. Mining Co.**, which see.

PATUXENT MINING CO. IDAHO

Address: Gyde-Taylor Bldg., Wallace, Idaho.

Officers: J. H. Wourmes, v. p.; F. C. Boutin, sec.

Annual meeting held May 19, 1921.

Property: adjoining the Callahan Zinc Lead on the S., in the Coeur d'Alene district, Shoshone county, reported to show a 4' vein of high-grade lead-zinc ore, in a fissure zone 50' wide.

Development: totals 3,000' of tunneling, crosscutting and drifting. Development operations are conducted through the Rex. Cons. workings.

PAWHATTAN MINING CO. IDAHO

Address: Joseph Turner, pres., 505 Cedar St., Wallace, Idaho.

Last assessment of 1 mill per share, levied Dec. 6, 1920.

PEARSON MINING CO. IDAHO

Address: J. F. Ferguson, treas., 7 Shoshone Bldg., Wallace, Idaho.

Morris Pearson, pres.-supt.; Harry Pearson, gen. mgr.

Inc. 1920, in Minnesota. **Cap.** $250,000; $1 par. A reorganization of the **Lucky Swede G. & M. Co.**

Property: 14 claims in the St. Joe district, Shoshone county, S. E. of Mullan, near the C. M. & St. P. R. R., shows 3 veins with surface ores giving good assays in copper and gold.

Development: by a 1,950' crosscut tunnel, with 200' to be driven in 1921, to reach the main vein.

Equipment: includes oil engines, compressor, and a Pelton wheel.

PEGRAM M. & M. CO. IDAHO

Property: at Pegram, Bear Lake county, 18 miles E. of Pocatello, said to contain a large deposit of low grade gold ore. Developing at last account.

PHEDORA SILVER-LEAD MINING CO. IDAHO

Address: Kellogg, Idaho.

Officers: Wm. Schaefer, pres.; Geo. Moison, v. p., with M. Mosauer, Al. Bland, Wm. Weyer, and Chas. Bollinger, directors.

Cap. $1,500,000; shares $1 par.

Property: 12 lead-silver claims, adjoining the Jack Waite, in Eagle district, near Murray, Shoshone county.

Development: about 1,000′ of workings.

PHOENIX MINING & MILLING CO., LTD. IDAHO

Address: E. C. Allen, asst. sec.-treas., Ryan Hotel Bldg., Wallace, Ida.

Officers: Norman Ebbley, pres.; Jos. Whelan, sec., with R. H. Kingsbury, and W. Roberts, directors.

Cap. $1,000,000; shares $1 par; assessable, 800,000 shares outstanding. Annual meeting, second Monday in May. Assessment of 5 mills per share levied June 25, 1921.

Property: 14 lead-silver claims, in Coeur d'Alene district, near Wallace, Shoshone county, opened by 1,500′ of workings, but still only in exploration stage.

PINE CREEK DEVELOPMENT CO. IDAHO

Dead. See Vol. XIII for data.

Mine held by **Sherman Lead Co.**, which see.

PINE CREEK M. & M. CO. IDAHO

Consolidated Jan., 1917, with the **Hilarity M. Co.**

Address: O. W. Lewis, sec., Wallace, Idaho. C. S. Stone, pres.; E. G. Gnaedinger, cons. engr. H. W. Ingalls, mgr.

Cap. $1,000,000; $1 **par.** Listed on Butte, Mont. exchange. Assessment of 1½ mills per share levied Jan. 11, 1922.

Property: 14 claims in the Pine Creek district, Shoshone county, covers about 1 mile along strike of vein said to be the extension of the Constitution and Douglas.

Ore is low grade, consisting of pyrite, sphalerite, pyrrhotite and a little galena and chalcopyrite in quartz.

Development: by 2 tunnels, 400′ and 250′ long. Property is a prospect.

PIONEER MINING CO. IDAHO

Address: S. H. Linn, Wallace, Idaho.

Officers: O. A. Olin, pres., San Francisco, Calif., with S. H. Linn, Ole H. Linn, Wm. Shannon and Herman Marquard of Wallace, directors.

Property: 12 claims on Beaver Creek, adjoining the Ray-Jefferson on the N. W. and the Callahan on the W., and said to carry extension of these veins.

Development: by crosscut tunnel being driven 1,700′. Only assessment work being done.

PITTSBURGH-IDAHO CO., LTD. IDAHO

Address: 23 Fourth Ave., Pittsburgh, Pa., or Kearns Bldg., Salt Lake City, Utah. **Mine address:** A. D. Ross, Gilmore, Idaho.

Officers: A. S. Ross, pres.; Irvan Neckermann and Robt. B. Little, v. p.'s; W. A. McCutcheon, sec.-treas.; with G. W. Provost, J. W. Brown, E. C. Chalfont and J. S. Alexander, directors. J. E. Walker, supt.

Inc. in Idaho. **Cap.** $1,000,000 common, $250,000 pfd.; $1 par; 846,000 common and 83,000 pfd. shares outstanding. **Bonds:** $150,000, with $127,000 outstanding Commonwealth Trust Co., Pittsburgh, registrar; company makes its own stock transfers. Annual meeting, first Monday in July.

Stock listed on New York Curb.

Finanical Statement years ending December 31:

Year	Revenue	Operating charges	Profit or loss	Dividends	Surplus
1917.....	$199,060	$247,208	—$48,145	$65,523	$68,738
1916.....	.....	165,468	+159,934	44,928	182,409

Balance sheet dated Jan. 1, 1920 showed accounts receivable, $4,766; ore in transit, $11,786; accounts payable, $22,773; bills payable, $128,500; surplus, $9,662.

Dividends: total $375,000.

Property: 25 claims, 5 patented, about 500 acres, in the Texas district, near Gilmore, Lemhi county, shows limestone cut by fissure veins 3 to 30′ wide and traceable for 200 to 700′. Veins strike N.-S. and dip about 45°. Ores are a mixture of lead carbonates and cube galena, averaging 25% lead, 11 oz. silver, 0.03 oz. gold and 15% iron. Ore at the bottom level is still partly oxidized.

Company is also developing the Brown group on which high-grade ore has been discovered.

Development: by 18,000′ of workings including a 45° shaft to depth of 850′, and a 6,000′ transportation tunnel connecting with the 400′ level. The 7th level had cut 7 orebodies by December, 1920.

Equipment: electric power is produced by two 250-h. p. Diesel engines direct connected to 135-k.w. generator close to rail, hoist, compressor, pump, tramway, and other complete plant.

Production: 120,656 tons ore has been sent to the smelters since 1910, yielding over $5,000,000. During 1919 shipments amounted to about 400 tons per month.

PITTSBURGH LEAD MINING CO. IDAHO

Merged with **California Cons. Mng. Co.** and Panhandle M. & M. Co., July, 1916.

Former properties noted under California Consolidated in this volume.

PLACER CREEK SILVER-LEAD MINING & MILLING CO. IDAHO

Address: 415 Chamber of Commerce Bldg., Spokane, Wash.

Officers: Oscar Cain, pres.; G. B. Dennis, v. p.; F. C. Bailey, sec.-treas.-mgr., with G. W. Rumberger, J. Elmer West, E. J. Bailey and W. H. Kleiman.

Cap. $1,000,000; $1 par; 700,000 shares issued; assessable at rate of 1 mill per month.

Property: 7 claims, on Placer creek, 6 miles from Wallace, Shoshone county, developed by a 1,750′ tunnel, which is reported to have cut the main ledge at a depth of 500′, in August, 1921.

POCATELLO GOLD & COPPER MINING CO. IDAHO

Address: Pocatello, Idaho. H. W. Lockhart, pres.

Inc. Dec. 1, 1902, in Idaho. **Cap.** $1,000,000; shares 50c. par.

Property: 6 claims, 120 acres, in the Fort Hall district, 9 miles N. E. of Pocatello, Bannock county, shows a 3′ vein of chalcopyrite, replaced near surface by chalcocite, bornite and malachite. Ore is of milling grade but contains a small streak of rich ore, from which shipments gave returns of 17 to 22% copper and 8 oz. silver per ton.

Development: by tunnels, with about 1,000′ of workings. Presumably idle, 1921.

POLARIS MINING & DEVELOPMENT CO. IDAHO

Address: Wallace, Idaho.

Officers: W. E. Mann, pres.; P. J. Gearon, mgr.; L. C. Wilson, sec.-treas., with P. Schmitz and H. M. Davenport, directors.

Inc. Dec., 1915, in Idaho. **Cap.** $50,000; shares 5c par.

Property: 3 patented claims between Osborne and Kellogg, in the Coeur d'Alene, Shoshone county. Ore carries lead and silver, with some copper.

Development: by 1,100′ of tunnels, winze, and several hundred feet of other workings.

Production: several carloads shipped reported to average 140 to 200 oz. silver and 3% to 6% copper, and in 1916, 7 cars netted $25,163. No later figures available.

PONDERAY MINING & SMELTING CO. IDAHO

Offices: 922 Old National Bank Bldg., Spokane, Wash., and Sandpoint, Bonner county, Idaho.

Officers: Geo. S. Brooke, pres.; Leo Greenough, sec.-treas.

Cap. $500,000; $100 par; all issued.

Property: 4 patented gold-silver-lead claims near Lakeview, in Bonner county, and 4 copper claims near Bayview, Kootenai county.

POPE-SHENON COPPER CO. IDAHO

Address: Salmon, Lemhi county, Idaho.

Officers: R. H. Winder, pres. Thomas Austin, v. p.; C. R. Bradford, sec.-treas.; A. Boulais, supt.; R. H. Bradford, metallurgist.

Cap. 1,000,000 shares; 800,000 issued.

Six assessments have been levied, the latest on February 21, 1919.

Property: claims near Salmon, Lemhi county, covering a wide mineralized zone. Ore carries carbonate and oxide of copper, chalcocite, and chalcopyrite.

Development: by 5 tunnels, No. 5 being 800′ long. Reserves are said to amount to 100,000 tons of 5% ore.

Equipment: includes a 50-ton plant employing a combination of the Bradfort volatilization and Cottrell precipitation processes, said to give good results.

Small shipments have been made.

PORTOMA MINING CO. IDAHO

Officers: D. C. O'Reilly, pres., Bates Bldg., Portland, Oregon. F. A. Knapp, sec.-treas.

Cap. $100,000; 5c. par; $53,000 issued.

Property: 4 claims in Beaver district, Shoshone county, showing lead-zinc ore, opened by 1,300′ of tunnels, etc.

PRINCEMONT MINING CO. IDAHO

Officers: S. B. Holbert, pres.-mgr., Wm. M. Ramsey, sec.-treas., C. F. Briggs, W. J. Williams, E. F. Holbert, and W. H. Batting, directors.

Inc. 1916, in Idaho. **Cap.** $2,000,000; shares $1 par; non-assessable; 1,650,000 issued. Annual meeting second Monday in September.

Property: 43 claims, 875 acres, as follows: Copper Prince of 13 claims, on C. M. & St. P. R. R., Ida., also the Idaho-Virginia group of 24 claims near St. Joe, Ida.; and the Pilgrim group of 6 claims near Noxon, Sanders county, Mont.

The Copper Prince and Idaho-Virginia properties are fully equipped; the former developed by 600′ tunnel and 125′ shaft and the latter by 162′ shaft. The Pilgrim is opened by tunnels.

No record of recent operations.

PROFILE METALS CO. IDAHO

Address: Judson Spofford, gen. mgr., 403 Empire Bldg., Boise, Idaho

Officers: Judson Spofford, pres.; J. B. Burns, v. p.; E. G. Davis, sec.-treas., with J. B. Eldridge and E. C. Kiersted, directors.

Inc. July 7, 1919, in Idaho. Stock offered at 50c.

Property: Combination mine, 3 claims, 60 acres about 1½ miles S. of Profile, Valley county and 12 miles N. of Yellow Pine, said to show 3 fissure veins in granite-prophyry, carrying gold, silver, copper and lead. Developed by 400′ of workings.

PURITAN MINING CO. IDAHO

Address: Otto B. Olsson, Wallace, Idaho.

Officers: Frank Boutin, pres.; Theo. Anderson, v. p.; Chas. A. Solberg, sec., with O. B. Olsson, and John H. Roberts, directors.

Cap. $1,500,000; shares $1 par.

Property: 5 patented lead-silver claims in Pine Creek section W. of the Tamarack & Chesapeake.

Development: by 1,100′ tunnel and over 2,000′ of other workings. No

recent information obtainable. Is a promising prospect controlled by the late Jim Callahan.

RABBIT FOOT MINING CO. IDAHO

Address: R. E. L. Ramey, Farney, Lemhi county, Idaho.

Property: 15 quartz and 16 placer claims near Farney, gold-silver ore being opened by 2,000′ of tunnels. A 10-stamp mill and cyanide plant was formerly operated.

RAINBOW MINING & MILLING CO., LTD. IDAHO

Office: Peyton Bldg., Spokane, Wash.

Officers: Geo. Austin, pres; Henry Tuft, v. p.; R. P. Woodworth, sec.-treas., with I. A. Libby, A. H. Nourse and A. E. Bronson, directors.

Inc. June, 1907, in Idaho. **Cap.** $300,000, increased 1913 to $500,000; shares 25 cts. par, assessable; 800,000 in treasury, Aug., 1919. Annual meeting, June 1st.

Property: 19 claims, 7 patented, 360 acres, in 2 groups. The Rainbow No. 1 group, 3 miles west of Wallace on Shields creek, Shoshone county, has St. Regis and Burke quartzite cut by the Sunshine and the Rainbow veins. The Sunshine vein carries grey copper ore with iron and quartz gangue.

Development: about 3,000′ includes a 40′ tunnel on the Sunshine vein and the main No. 3 tunnel on the Rainbow vein. The latter is a crosscut for 250′, then follows vein N. 75° W. for 1,050′, reaching a depth of 500′. Lead-zinc ore was opened at 300′, 20″ assaying 26% lead, 30% zinc, and 16 oz. silver. A shaft was being sunk on this in 1921. Another tunnel on the opposite side of the creek is 450′ long.

Equipment is ample, and railroad but ¾ mile away.

The second group, of 5 claims, bought 1910, is about 3 miles from the Handspike mine, and 15 miles from a railway, at the mouth of Bootjack creek, a tributary of the North fork of the Coeur d'Alene river, in Secs. 23 and 24, T. 31 N., R 1 W., in an unorganized district. This property shows a vein of 12′ estimated average width, traceable 6,000′, carrying lead and copper ore, associated with iron carbonate, in a quartz gangue.

Equipment: engine house, 25-h. p. oil engine, 8 by 9″ compressor and air pipe and flume supplying water to operate an air blast. Company is developing steadily with funds derived from stock assessment, and by selling timber.

RAMSHORN MINING & SMELTING CO. IDAHO

Address: F. H. Skeels, mgr., Bayhorse, Idaho; and G. A. Joslin, cons. eng. Felt Bldg., Salt Lake City, Utah.

Property: at Bayhorse, Custer county, Idaho.

Geology: claims show replacement veins in black altered slate. Vein worked averages 14″ in width and carries quartz and spathic iron, with ore-shoots containing streaks and spots of tetrahedrite carrying 3% copper and 100 oz. silver per ton.

Development: by tunnels, said to block out over 20,000 tons of high-grade silver ore.

Equipment: hydro-electric plant, compressor, motor-trucks, and tramway; a 100-ton mill, including flotation was erected in 1919. Fifty men are employed.

Production: several carloads of ore were sent to a Utah smelter during 1918, and regular shipments were being made in 1919. During 1920 the output was 265,000 oz. silver.

RANKIN CREEK PLACER MINES CO. IDAHO

Address: A. S. Thatcher, pres., Walker Bank Bldg., Salt Lake City, Utah. T. B. Meldrum, sec.-treas.

Inc. 1917, in Utah. **Cap.** $25,000; shares 25c. par; 60,000 in treasury.

Property: 80 acres in Yankee Fork district, Custer county, reported to carry free gold. About 1,000′ of placer ground previously worked aver-

aged $3 per cu. yd. There is an old mill on the ground. No record of operations since 1917.

RAY-JEFFERSON MINING CO. IDAHO

Address: Daniel L. McGrath, mgr., Wallace, Idaho.

Officers: E. R. Day, pres.; J. J. Murphy, v. p.; P. J. Maggy, sec., with Geo. K. Garrett and D. L. McGrath, directors.

Cap. $2,000,000; $1 par; assessable. An assessment of 12 cents, 2½ cents at a time, was levied in May, 1919. Last assessment of 2½¢ per share levied May 3, 1920.

In May, 1916, control passed to the Day interests, owners of the Hercules, Tamarack and Custer mines, and of the Northport S. & R. Co. Company sold treasury stock to finance construction of mill and installation of electric haulage system, 1916.

Property: 38 claims, 600 acres in a compact group, adjoining the Callahan Zinc Lead Co. holdings and including the Hill group. Is reported to show the Interstate-Callahan, Amazon and Manhattan veins, one with an orebody 400′ long. The Carlisle is a cross vein running northerly and intersecting the Interstate. The latter is supposed to be of the Hercules vein.

Development: by the Blue Grouse and Carlisle tunnels. The Mountain Goat tunnel opens a shoot 300′ long, showing 3′ of shipping ore and 9′ of mill ore on the Callahan vein. The Carlisle tunnel has 400′ of drifting on the vein of this name, said to carry 5′ to 10′ of mill ore for the entire distance. A long tunnel was driven in 1918 to cut the vein 1,000′ below the upper workings.

The Beaver Creek branch of the O.-W. R. & N. line was completed to the Ray-Jefferson in Feb., 1917.

Equipment: compressor, drills, shops, tramway, and 400-ton mill.

Idle several years.

RED BIRD MINING & SMELTING CO. IDAHO

Property acquired by Clayton Mining & Smelting Co., which is under option to **Idaho Mine Development Co.**

RED HORSE MINING CO., LTD. IDAHO

Address: Harrison, Kootenai county, Idaho.

Officers: M. W. Frost, pres.; E. R. Goodwin, v. p.; M. A. Kigar, sec.-treas.; with D. R. Frost, Otto Borchardt, S. Jones, R. A. Jones, John Demay, and Charles Custer, directors.

Inc. 1904, in Idaho. **Cap.** $1,500,000; $1 par; assessable; 1,000,000 issued.

Property: 16 claims, 320 acres, 5 miles N. E. of Springston, Idaho. A quartz vein in granite carries ore with gold, silver and copper values.

Development: by 80′ shaft and 2,000′ tunnel. During 1918, $2,000 was received from assessments and expended in development work. Development work reported resumed July, 1921.

RED JACKET MINING CO. IDAHO

Property: Caldwell group, in War Eagle district, near Silver City, Owyhee county. Developing 1920-21.

RED LEDGE COPPER MINE IDAHO

See **Idaho Copper Co., Ltd.**

RED MONARCH CONSOLIDATED MINING CO. IDAHO

Offices: 300 Title Bldg., Spokane, Wash., and Wallace, Idaho.

Officers: G. I. Toers, pres.; Conrad Wolfle, v. p.; David Ackerman, sec.-treas., with Moritz Thompson, F. J. Guth, A. J. Davis, and H. E. Reiners, directors. T. H. Keefer, supt.

Inc. in 1915, in Washington. **Cap.** $2,000,000; shares $1 par; assessable; 1,533,000 issued. Annual meeting, first Tuesday in April.

Property: 43 claims, about 800 acres, in Beaver Creek district, Shoshone county, 9 miles north of Wallace, adjoins Cons. Interstate-Callahan on the west; claims are on S. W. slope of Sunset Mt. and on opposite side of the mountain from the Interstate. Said to show 5 well defined fissure veins of

silver-lead-zinc ore in Prichard slate and Burke quartzite. Veins are parallel, strike N. 70° W., dip 80° to the S. W.

Development: up to the time acquired by the present company, Nov., 1915, consisted of 2,000′ of prospect tunnels and open cuts. Ore had been found in one tunnel, 650′ long, at a depth of 500′. The company has since driven two tunnels from Missoula gulch, one north to attain a depth of 1,000′ within a length of 1,000′, and one south to attain a depth of 2,000′ within a length of 3,000′. By Oct., 1918, the latter was in 4,410′. It cut three promising lead-zinc veins. Work was suspended for a year, but was resumed late in 1920.

Equipment: includes compressor, capacity 2,000 cu. ft., operated by a 250-h. p. G. E. motor.

The property was advertised for sale at sheriff's sale Oct. 29, 1921, to satisfy judgment for $52,860, obtained by D. Ackerman.

REED LEVEL MINING CO. **IDAHO**

Address: H. M. Thorndsen, supt., Wardner, Idaho.

Is a consolidation of various leases held on the upper workings of the Bunker Hill & Sullivan mine and the Co-operative Milling Co.

The mill is being enlarged to handle 200 tons per day.

Production: about 50 tons per day; 14 cars of concentrate shipped to Bunker Hill smelter to May, 1921, said to have netted $1,000 per car.

REINDEER QUEEN MINING CO. **IDAHO**

Office: Wallace, Idaho. **Mine address:** Mullan, Idaho.

Officers: J. C. Glahe, pres.; A. P. McRae, v. p.; J. R. Bean, sec.; S. D. Lemieux, treas. with D. E. Keyes, directors.

Inc. Sept. 19, 1913, in Idaho. **Cap.** $200,000; shares 10 cts. par; assessable. Company is a consolidation of the **Copper Queen** and the **Reindeer Queen** companies, whose holdings are contiguous and cover extensive copper exposures. The new company exchanged stock, share for share. The consolidation was made so that the Reindeer tunnel could be extended along the vein into the Copper Queen.

Property: 15 claims in the Mullan copper belt, including the Stevens Peak (or Copper Queen) group and the Reindeer group of 6 claims, all at the head of Willow Creek. The outcropping shows a big copper-stained fissure vein, 5 to 20′ wide.

Development: by a crosscut tunnel which has cut the vein at a depth of 800′, showing bornite and chalcopyrite ore opened by a drift on the vein. Some lead-silver ore occurring in Burke quartzite was encountered in drift, May, 1917, while in 1918 there had been opened 150′ of 2½% ore.

Equipment: includes compressor, 200-ton mill and electric power.

Examined by Rush J. White. No recent returns.

RESCUE GOLD MINES CO. **IDAHO**

Address: J. I. Bauer, mgr., Gibbonsville, Idaho.

Property: 400 acres of lode and placer claims and millsite, at Gibbonsville, Lemhi county.

Development: by tunnels and shaft. **Equipment:** 15-stamp mill, tables and small cyanide plant.

REX CONSOLIDATED MINING CO. **IDAHO**

Name changed, 1918, to **Rex Mining Co.**, which see.

REX MINING CO. **IDAHO**

Office: 25 Broad St., New York City.

Officers: L. E. Whicher, pres.; Raymond Guyer, v. p.-gen. mgr., 25 Broad St., New York; R. M. Atwater, Jr., treas.; S. L. Sherman, sec., with Henry Sachs, C. C. Burger, Theo. Gross and John Corlow, directors.

Inc. July 31, 1915, in Delaware, reorganized in 1918. **Cap.** $1,250,000; 25c. par; 3,809,702 shares outstanding. Stock listed on N. Y. Curb. U. S. Corporation Co., registrar and transfer agent.

A reorganization of the **Rex Consolidated Mining Co.**, effected during 1918. This included the issuance of 5,000,000 shares of new stock, having a

par value of only 25 cents, of which 2,000,000 shares were to be exchanged, on a basis of share per share, for the 2,000,000 shares of existing stock, having a par value of $1 a share and to offer rights to the present stockholders to subscribe to 1,500,000 more of the new shares at 15 cents a share, as well as to pay for the new properties with the remaining 1,500,000 new shares. By March, 1919, the Rex Mining Co. owned all the properties and equipment, free of encumbrance, and had cash assets of about $40,000.

Statement dated April 2, 1921, showed assets, $1,285,036, which included, cash, $7,800; Liberty Bonds, $24,549; bills payable, $7,000.

Property: 15 claims and fractions, 185 acres, in Nine Mile section, Coeur d'Alene, including the Sixteen-to-One mine, about 6 miles N. of Wallace.

The claims are in the slate belt, long considered valueless as an ore formation, until work at the Interstate-Callahan demonstrated its falsity. The claims contain 3 strong veins, the Rex, Okanogan, and Delaware, which converge at depth.

Development: through a main working tunnel 900′ long. Below this a 2-compartment shaft has been sunk to No. 9, or 1,280′ level. A crosscut at this depth cut 3 parallel veins. The Okanogan vein is from a few inches to 10′ in width. The Delaware outcrop is stronger than the Rex or Okanogan and lies 350′ S. of the latter. Underground work totals over 10,000′, and cost over $350,000. From a relatively small area in the upper workings there was produced nearly $2,000,000 of silver-lead ore. Most of the zinc ore remains.

Equipment: 75 h. p. electric hoist and 3 air hoists under ground, 15-drill compressor of 1,050 cu. ft. capacity driven by 200-h. p. motor and mill costing $250,000. On lead ore the mill had a capacity of 350 tons daily, and on zinc-lead ore, 200 tons. Plant includes flotation units and an Oliver filter. At upper terminal of the 6,600′ aerial tram of 400 tons capacity, a modern sorting plant is operated. Surface improvements include repair shops, bunk and boarding houses, dwellings, etc.

Production: during 1917 the mill treated 39,731 tons of ore, yielding 8,446 tons of concentrates producing 2,965,395 lb. of lead, 5, 954,280 ib. of zinc, and 58,629 oz. of silver. The gross value was $492,943. Mining, development, equipment, freight, and treatment absorbed the whole amount.

Since the reorganization the upper levels of the mine have been leased and the main shaft deepened below the 1,380′ level. Company resumed operations in 1921, after an idleness of three years. Property considered promising.

RHODE ISLAND MINING CO. IDAHO

Address: C. E. Clarke, sec., 204 Bank St., Wallace, Ida.

Cap. $50,000; 5c. par; assessable. An assessment of 1 mill per share levied Aug. 4. 1920.

Property: 5 claims, N. W. of Osburn, Shoshone county. An old mine, but with only limited development.

RICE M. & M. CO. IDAHO

Property: Mother Lode claim, in Big Creek district, 28 miles from Elk City, Idaho county. Ore is free milling.

Equipment: includes compressor and machine drills. A hydro-electric power plant is planned.

RIVERSIDE MINING CO. IDAHO

Address: T. R. Mason, pres., Kellogg, Idaho. Owned in Kellogg and Spokane.

Cap. $1,000,000; shares $1 par; assessable.

Property: 5 claims in National Forest Reserve, at headwaters of the North Fork of Coeur d'Alene river, Kootenai county, shows a 7′ vein with 18″ of high-grade silver-lead ore.

Development: 460′ crosscut tunnel reaching depth of 100′.

Equipment: steam power, compressor, hoist, etc.

Idle several years.

ROBERTA MINING & MILLING CO. IDAHO

Idle and no record of recent work. See Vol. XIV for description.

ROCKFORD MINING CO. IDAHO

Address: W. H. Hanson, sec., Gyde-Taylor Bldg., Wallace, Idaho. Charles Garenson, pres., Chas. Hyland, v. p., with August Holtz and Wm. Johnson, directors.

Last assessment of 2 mills, levied Aug. 18, 1921.

Property: 11 patented claims at the head of the west fork of Big Creek, adjacent to the B. H. & S. holdings. Assessment work only being done.

ROYAL MINING CO. IDAHO

Address: Soren Simonson, sec., 231 Wright-Stonestreet Bldg., Coeur d'Alene, Idaho.

Assessments of 2 mills per share levied on June 1 and August 25, 1921.

Property: on slate creek. In 1920, 250' of crosscutting at $18 per foot was done.

RUTH CONSOLIDATED MNG. & MLG. CO. IDAHO

Address: Box 2186, Spokane, Wash.

Officers: C. M. Crego, pres.; F. W. Tueting, v. p.; G. D. Crego, sec.-treas., with Jos. McCarthy; Wm. Hoare, M. H. McCall, and J. F. Thompson, directors.

Inc. 1905, in Washington. **Cap.** $1,500,000; shares $1 par; assessable to 10 cents; all issued.

Property: 7 claims, 120 acres, in Placer Center district, 3 miles N. of Wallace, Shoshone county. Ore carries lead and silver.

Development by 2,000' of tunnels, and a total of 5,000' of workings; a depth of 700' has been reached. About $3,000 was spent in 1920.

Equipment: electric power connections, compressor, drills, shops, and dwellings. No production reported.

SABINA MINES CO. IDAHO

Address: E. C. Allen, sec., Ryan Hotel Bldg., Wallace, Idaho.

Officers: E. J. Duff, pres.; W. R. Miller, v. p.

Inc. 1920, in Idaho. **Cap.** $100,000; 10c. par; assessable; 693,440 shares issued. Assessment of 2 mills per share levied Aug. 21, 1921 and 2½ mills, Aug. 9, 1921.

Property: 11 claims, E. of Sunset peak, between the Phoenix group and Cedar creek. Tunnels have revealed promising shoots of lead-silver ore. Assessment work only is being done.

SABINA M. & M. CO. IDAHO

Succeeded 1920 by the **Sabina Mines Co.**, which see.

ST. JAMES MINING CO., LTD. IDAHO

Described in Volume XIV. Consolidated with **La Fleur Mng. Co.** of Wash. and described under **La Fleur-St. James Mng. Co.**, Washington.

ST. LOUIS & IDAHO M. & M. CO. IDAHO

Address: Russell F. Collins, pres., E. 1211 - 12th St., Spokane, Wash.

Property: 2 claims and 3 fractional claims in Gorge Gulch, near Burke, Shoshone county.

Development: by 1,900' of workings, with 600' and 700' tunnels. Work resumed in 1921 after an idleness of six years.

SAMSON MINING CO. IDAHO

Address: R. L. Brainard, sec., Wardner, Idaho.

Last assessment of 2 mills per share, payable Oct. 30, 1920.

SAMSON MINING & DEVELOPMENT CO. IDAHO

Address: R. L. Brainard, sec., Wardner, Idaho.

Property: 8 claims on Eagle creek, near Wardner, Coeur d'Alene district, Shoshone county. Ore contains silver, lead and copper.

Development: by shaft, tunnel and drifts. No record of production or recent development work.

SENATOR MINING CO. **IDAHO**

Address: Ed. Ehrenberg, 1124 14th St., Spokane, Wash.

Inc. 1918. **Cap.** $1,500,000, changed to $625,000; 25c par; 2,000,000 shares outstanding.

Property: the Flynn group of 20 patented claims adjoining those of the Star company near Mullan, Shoshone county, and considered to contain an extension of the Federal company's Morning vein. The Senator holdings are optioned to the **Coeur d'Alene Syndicate,** which see.

Company in 1921 acquired an option on stock control of the **Great Eastern M. Co.,** with a permanent easement and right of way over Great Eastern ground for development purposes.

SEVEN DEVILS COPPER CO. **IDAHO**

Address: Wm. K. MacNamara, pres., Huntington, Pa. **Mine office:** Landore, Adams county, Idaho.

Officers: Wm. K. MacNamara, pres.; Chas. H. McColloch, sec.; Fred D. Smith, treas. and gen. mgr.; with Chas. Marvin, directors; Geo. A. Jones, supt.

Inc. March 31, 1908, in Arizona. **Cap.** $2,000,000; $1 par; issued $1,558,993.

Bonds: $250,000 authorized at 6%. Annual meeting, second Tuesday in March.

Property: 15 claims, partly patented, 134 acres, including the Arkansaw, Margaret mines, and bond and lease on the Decorah mine, 16 miles from rail. Lands show contact deposits, between diorite and limestone, having a strike of N. 75° W., and said to be 15 to 50′ in width. These deposits carry oxidized ores, succeeded at a little depth, by sulphides, the chalcopyrite and bornite ores said to average 5% copper, 2 oz. silver and $1 gold per ton.

Development: exclusively by tunnels, there being drift tunnels of 900′ and 150′, and a 483′ crosscut tunnel, with 2,800′ of workings, estimated by the management to show 182,700 tons of ore blocked out for stoping. The Arkansaw mine has produced a little high-grade ore in the past.

Equipment: includes a 125 h. p. electric plant, taking power from the Oxbow station of the Oregon-Idaho Power Co., and there is a sawmill near the mine.

Production: to 1916, 555 tons ore said to have averaged 11.2% copper. Inability to pay off $20,000 debentures caused closing down of mine and suspension of all operations except leasing, in 1915. Company's Arkansaw mine has since been taken over by the Arkansaw Leasing Corporation. The Seven Devils company is alive legally, being held to take over the various interests when the results of development are completed, giving a better basis for distribution of interests in the corporation.

SHERMAN DEVELOPMENT CO. **IDAHO**

Described in Volume XIII. Absorbed by **Sherman Lead Co.,** which see.

SHERMAN LEAD CO. **IDAHO**

Successor to Sherman Development Co.

Address: Charles McKinnis, v. p., Ranger, Texas.

Inc. 1918, in Idaho. In return for an advance of $100,000, 51% of the shares were given to E. R. Day, who controls company.

Property: the Union claims, originally owned by **Pine Creek Development Co.,** on Canyon creek, near Burke, Shoshone county. Ore is lead and silver bearing.

Development by tunnels. In 1918, No. 4 tunnel disclosed 4′ to 8′ of 20% lead ore for 180′, at a depth of 1,000′. To develop this shoot further, the old Creek tunnel of the Tiger-Poorman mine was cleaned out and is to be extended. This orebody is considered to be on the strike of the Tamarack & Custer vein. In August, 1919, a raise had opened ore. No recent returns.

SIDNEY MINING CO. **IDAHO**

Address: L. W. Gay, Kellogg, Idaho.

Officers: L. W. Gay, pres.; C. F. Gloystein, v. p.; W. T. Simons, sec., with Evans and Leslie Gay, directors.

Inc. in Idaho. **Cap.** $1,500,000; shares $1 par; assessable; 1,275,000 issued.

Property 19 claims in Pine Creek district of Shoshone county, adjoining the Denver mine of the Nabob Cons. Ore carries silver, lead, and zinc.

Development: by tunnel and drifts. A 10′ vein opened 500′ from the old workings has been drifted on for 250′ in length, yielding 175 tons of ore said to average 50% lead and 40 oz. silver.

Property reported under 2-year lease from May, 1921, to W. W. Papesh of Kellogg.

SIERRA NEVADA CONSOLIDATED MINING CO. **IDAHO**

Subsidiary of **Bunker Hill & Sullivan Mining & Concentrating Co.,** which see.

Officers: Stanley A. Easton, Pres., Kellogg, Idaho; C. W. Simmons, sec.

Property: 5 patented claims in Deadwood gulch, Coeur d'Alene region, near Kellogg, Shoshone county, developed by about 5,000′ of workings.

Company began shipping ore in July, 1913, selling its output under contract to April 29, 1915, to the A. S. & R. Co. Management being unable to extend contract satisfactorily, discontinued production during 1916 and 1917.

Production:

Year	Tons	Net Profit
1915	15,159	$46,364
1918	19,234	188,042
1919	14,820	108,650
1920	10,877	99,765

SILVERADO MINING CO. **IDAHO**

Office: C. D. Muxen, sec.-treas., Old National Bank Bldg., Spokane, Wash.

Officers: J. E. Orr, pres.; C. D. Muxen, sec.-treas., with F. P. Matie, W. B. Pickerell, Wilbur Wood, F. M. Gardner, J. F. Daily, and William Patterson, all of Spokane, Wash., directors. Fred Bell, supt.

Inc. In Washington. **Cap.** $2,500,000; $1 par; about 1,500,000 shares issued. Has a $4,000 mortgage.

Property: 20 claims, 560 acres, near Osborne, Shoshone county, reopened in 1915, after several years' idleness, shows fissure vein in shale, running downward into the underlying quartzite.

Development: 4,000′ tunnel, 400′ of it a drift on a 1 to 3′ vein showing 6 to 18″ silver-lead and gray copper ore. A 170′ shaft shows persistence downward.

Equipment: includes 6-drill compressor, electric power, and a 100-ton mill with flotation plant. Mill seems to have been erected before enough ore was developed, as there was a suspension of operations from 1918 to 1921, save that some leasing was done. Work was resumed late in 1920.

SILVER CITY MINING CO. **IDAHO**

Defunct. See Volume XIV.

SILVER CLIFF GOLD AND COPPER MINING CO., LTD. **IDAHO**

Address: Halver Johnson, Wallace, Idaho.

Officers: Thomas Jay, pres.-gen. mgr.; Halver Johnson, v. p.-treas.; Edw. C. Young, sec., with John Rolin and J. A. McLachlan, directors.

Cap. $1,500,000; $1 par; assessable; an assessment of 2½ mills per share levied July 25, 1921.

Property: 18 claims, 7 miles from Mullan near Larson, Shoshone county, developed by 3 tunnels, the lowest of 850′ and longest of 1,500′ showing copper ore with some lead and fair value in gold. Total openings, 3,000′

Equipment: includes a Pelton wheel and an 8-drill air-compressor.

SILVER DALE & BIG HILL MINING CO. IDAHO

Address: D. W. Knudson, 168 McKinley Ave., Kellogg, Ida.

Officers: J. R. Niemeier, pres.; E. G. Johnson, v. p.; D. W. Knudson, sec.-treas., with J. Olson, P. Petterson and Carl Arenauder, mgr., directors.

Inc. Sept. 12, 1917, in Idaho. **Cap.** $10,000; shares 1 cent par, assessable; 425,000 issued. Three mills per share, levied July 5, 1921.

Property: 21 claims on Big creek, east slope of Kellogg peak, the west line adjoining the Bunker Hill & Sullivan. Deposit is a contact in Revett and Burke quartzite. Ore carries galena, containing silver, and is developed by an 1,100′ tunnel, giving a depth of 700′. Tunnel was extended 200′ in 1921. Outcrops are promising. Management reports having spent $18,000 since 1917 on the mine.

Owners are candid in saying that property is a wildcat project, whose proximity to the Bunker Hill & Sullivan warrants the real exploration that is underway.

SILVER EAGLE MINING CO. IDAHO

Address: C. W. Betts, sec., 406 Bank St., Wallace, Idaho.

Property: claims adjoining those of the North Star in Nine Mile canyon. **Development:** by 4 tunnels, No. 4 being 1,100′ long. Work was resumed in 1921 after a suspension of 4 years.

SILVER LEAF MINING CO. IDAHO

Address: J. B. Sullivan, Lakeview, Bonner county, Idaho.

Property: silver-lead prospect near Lakeview, which in 1918 was opened by tunnels, with some ore ready for shipment. The upper level showed 20″ of $125 silver ore, alongside 36″ of $35 lead carbonate ore.

SILVER LODE M. & M. CO. IDAHO

Address: M. W. Emmett, sec., Kellogg, Idaho.

Officers: L. T. Wilson, pres.; Chas. Hollar, v. p.; H. D. Lance, mgr.

Assessment of 1 mill per share payable Nov. 1, 1920.

Property: on Prospect Creek, 15 miles S. of Wallace, Shoshone county, developed by 175′ tunnel, said to have opened 8′ of galena bearing ore.

SILVER MOON MINING CO., LTD. IDAHO

Address: Gus Ehrenberg, Palmerston Hotel, Spokane, Wash.

Officers: Eugene Sage, pres.; H. C. Lambach, v. p.; G. Ehrenberg, sec.-treas., with Geo. Steward and Ed. Ehrenberg, directors.

Inc. Sept., 1906, in Idaho. **Cap.** $1,500,000; $1 par; assessable; 946,903 issued. Three mills per share levied on Oct. 19, 1920.

Property: 10 claims, north side of Canyon creek, 4½ miles from Wallace, Shoshone county, adjoining the Frisco mine, shows 2 veins of lead ore in quartzite.

Development: by 2,133′ crosscut tunnel and 1,723′ of other work, to depth of 600′. Prospecting being continued, while 2 veins cut in tunnel are to be opened.

Equipment: includes a 200 cu. ft. compressor, electrically driven.

Property is a promising prospect; but promoters were frank enough to state that "buyers must be prepared for a long pull." Assessment work being done.

SILVER MOUNTAIN MINING CO., LTD. IDAHO

Address: W. E. Horstkotte, 950 Pine St., Potlach, Latah county, Idaho.

Officers: L. Tice, pres.; E. D. Wilkins, v. p.; W. E. Horstkotte, sec.; G. L. Fulton, treas., with G. Carlson and G. Kruger, directors. Arthur Horstkotte, mgr.

Inc. in Idaho. **Cap.** $1,500,000; shares $1 par; assessable; an assessment of 2 mills per share levied June 6, 1921.

Property: 9 claims, 4 patented, near the Alice mine, on St. Joe Gulch, shortly west of the Morning mill, about 3½ miles from Mullan, Shoshone county. The mine has three tunnels, and a 900′ crosscut tunnel intersects an

8' vein carrying ore said to give assays of 2% copper, 3 oz. silver, and $1.80 gold per ton.

Equipment: includes a small steam plant and air compressor. Developing with a small force.

SILVER RANGE MINING CO. IDAHO

Address: E. M. Burt, mgr., Wallace, Idaho.

Officers: C. W. Crews, pres.; Fred Williams, v. p.; E. M. Burt, sec.-treas., with Reuben Crandell and Chas. Downing directors.

Property: 7 claims, adjoining the Chicago-Boston, about 2 miles from Wallace, Shoshone county. Ore carries lead and silver.

SILVER REEF MINING CO. IDAHO

Address: J. W. Buhler, N. 4512 Howard St., Spokane, Wash.

Property: a group of claims in Deadman gulch near the National Copper group, and close to the Gold Hunter mine near Mullan, Ida.

Development: by tunnel shows an ore shoot 887' long, and as much as 12' wide, with high grade ore on one wall. Further development is to be done by an extension of the lower tunnel of the Homestake Mining company, which will give a total depth of 1,700' below surface.

SILVER STAR MINING CO., LTD. IDAHO

Out of business. Consolidated in 1920 with the **Lucky Boy M. & C. Co.**, which see.

SILVER STATE MINING CO. IDAHO

Address: C. W. Newton, Wallace, Idaho.

Officers: D. A. Callahan, pres.-treas.; Jacob Hill v. p.; C. W. Newton, sec., with John Borg and C. S. Kalb, trustees.

Controlled by the Callahan Zinc-Lead Co.

Inc. in Washington.

Property: 6 patented claims on the N. side of the Callahan Zinc Lead.

SILVER TIP MINING CO. IDAHO

Merged with **National Mining & Metals Co.**, which see.

SILVER TRIUMPH MINING CO. IDAHO

Offices: Hailey, Idaho, and 479 Mills Bldg., San Francisco.

Officers: W. H. Slayton, pres.; G. K. Ford, sec.-treas.; with Elliott Johnson and H. K. Lewis, directors. Frank Dillon, mgr.

Inc. Nov., 1919, in Idaho. **Cap.** $150,000.

Property: 238 acres near Hailey, Blaine county. The mine was first worked in 1880 and had been closed from 1892 to Sept., 1919. On cleaning out old workings, large orebodies were found unworked. Ore carries silver, lead, and zinc.

Development: by 300' shaft with 2 miles of openings, 1 mile along the orebodies. Reserves are estimated as 400,000 tons of positive ore, averaging $30 per ton, and 800,000 tons of probable ore of same grade.

A 300 or 500-ton mill is to be erected.

SINKER TUNNEL MINING CO. IDAHO

Address: W. G. Adams, sec., Nampa, Idaho.

Property: the War Eagle group of gold claims in Silver City district, Owyhee county. Idle since 1878, but re-opened in 1916, since when the 6,400' tunnel has been extended 310', cutting a rich free gold vein. The depth is 2,000'. An electric locomotive is used in the tunnel.

SISTER LEASING & MINING CO. IDAHO

Address: A. G. Kennedy, sec.-treas., Wallace, Ida.

Officers: Ben Murphy, pres.; Amos Thompson, v. p.

Inc. 1920, in Idaho.

Property: a lease on the Sister mine, on Canyon creek, 1 mile from Wallace, Shoshone county, developed by 600' tunnel. Ore occurs in shoots 6" - 3' wide, containing silver, lead, and zinc. Five shipments to July, 1921, reported to have averaged 33 oz. silver, 32% lead and 16% zinc.

Seven men employed.

SLATE CREEK MINING CO. IDAHO

Address: Walter H. Hanson, Wallace, Ida.

Directors: Peter Peterson, John A. Lewis, Alfred Greenwald, August Holst and Walter H. Hanson.

Inc. 1921, in Idaho.

Property: on Slate creek, Coeur d'Alene district, 12 miles S. of Wallace, formerly owned by Franklin Security Co., said to contain lead-silver ore.

SLAVONIAN MINING CO. IDAHO

Address: Risto V. Kajonich, mgr., Wallace, Ida.

Officers: R. V. Kajonich, pres.; G. W. Dougherty, sec.-treas., with Mike Savage and John Lucas, directors.

Inc. Nov. 26, 1910, in Idaho. **Cap.** $1,500,000; $1 par; assessable; 641,837 shares issued.

Property: 3 claims, 60 acres, at Wardner, Shoshone county, E. of the Last Chance mine. Ore occurs in quartz vein containing silver and lead.

Development: by tunnel to depth of 500' with 1,100' of workings.

Mine under option to **Wardner Leasing Co.**

SMOKY BULLION GROUP IDAHO

Address: E. A. Worswick, Soldier, Camos county, Idaho.

Property: 3 claims, patented, 57 acres, on headwaters of Smoky river, near Hailey, Blaine county, idle many years. Fully described in Volume XIV.

SNOWSHOE MINING CO. IDAHO

Address: Mullan, Shoshone county, Idaho.

Officers: P. J. Gearon, pres.; Paul Lucia, v. p. and gen. mgr.; J. L. Martin, sec.-treas., with J. A. Bean, William Wallace, and A. P. McRae, directors.

Inc. Sept., 1903, in Idaho. **Cap.** $1,000,000; $1 par; assessable; fully issued; last assessment 2 mills per share levied Aug. 1, 1921. Shares are listed on the Spokane and Butte Exchanges.

Property: 7 claims patented, adjoins the Snowstorm on the east and supposedly carries the extension of the Snowstorm fault, at the head of Gentle Annie gulch, near the top of Snowstorm mountain, in the Hunter district, 1 mile from railway. Claims show Revett quartzite, mineralized for 30' in the Snowstorm fault, with some cuprite, azurite and chalcopyrite, giving assays up to 9% copper and 8 oz. silver per ton.

Development: by crosscut tunnels, longest 2,000', and drifts, a total of about 5,000' of workings, showing a mineralized zone of 30 to 40' width, carrying various copper ores sparsely disseminated. Drifting on the N.-S fissure opened up a body of high-grade copper ore, 8 to 24" wide, at 650' depth and about 1,600' from portal of No. 2 tunnel. The upper crosscut tunnel, 700' long, intersected a vein up to 60' wide and running from 1-20½ copper, at a vertical depth of 250'. A second crosscut, 696' vertically below No. 1, cut the vein 1,700' in. Some good lead-silver ore has been opened.

Equipment: includes 3-drill air-compressor, power house, mill and buildings. Further development planned and necessary.

SNOWSTORM APEX MINING CO. IDAHO

Letters returned from Mullan, Idaho. Probably idle. Listed in Volume XIV.

SNOWSTORM EXTENSION COPPER MINING CO. IDAHO

Address: Mullan, Shoshone county, Idaho.

Inc. Oct., 1909, in California, as successor of **Snowstorm Extension Mining Co.**, Ltd. **Cap.** $1,000,000; assessable.

Property: 9 claims, adjoining the Snowstorm on the east, supposed to carry the extension of the Snowstorm ore zone. Pits and trenches have shown ore of about 3% copper tenor, markedly similar to that of the Snowstorm.

Development: by a drift tunnel, starting from North Fork creek, 2,000'

long at last accounts, planned to be driven to secure an eventual back of 1,630′ on the dip of the vein. No recent information.

SNOWSTORM MINING CO. **IDAHO**

Company dissolved, July, 1916, and succeeded by **Snowstorm Mines Consolidated** (Montana), which see. For production and description of organization, etc., see Vol. XIII.

SOLID MINING CO. **IDAHO**

Incorporated 1919, in Idaho, to take over holdings of Midnight Mng. Co., a Delaware corporation with non-assessable stock. Name changed later to **Midnight Mng. Co.**, which see.

SONORA MINING & MILLING CO. **IDAHO**

Address: W. A. Smith, White & Bender Bldg., Wallace, Idaho.

Officers: A. H. Featherstone, pres.; W. A. Smith, sec.-treas., with J. T. Boyle, C. B. Lund, M. Werkheiser, O. A. Dubach and H. S. Tofte, directors.

Cap. $1,000,000; shares $1 par; assessable. Last assessment of 2 mills per share delinquent on February 14, 1920.

Property: 12 claims, patented, over the hill from the Marsh mine above Burke, Shoshone county. Is an old mine worked intermittently since 1896; $75,000 expended and 3,200′ of work done prior to 1908, when a 6′ vein was cut at 1,400′ from portal and at depth of 800′. Total workings are over 4,000′.

Mine reported under lease to A. P. Reinhardt, July, 1921, company to receive 10% royalty on net smelter returns. Four men employed.

SOUTHERN IDAHO DEVELOPMENT CO. **IDAHO**

Probably dead. See Volume XIV.

SOUTH FORK MINING & MILLING CO. **IDAHO**

Office: 401 Chamber of Commerce Bldg., Spokane, Wash.

Officers: W. H. Stowell, pres.-mgr.; H. C. Kreyssler, v. p.; J. W. Higgins, sec.-treas.; with W. D. Scott, directors.

Inc. April 15, 1914, in Washington. **Cap.** $1,500,000; $1 par; assessable to 5 cents (1 cent a year); 945,946 issued.

Property: 12 claims, 220 acres, in Ten mile and Elk City district, Idaho county. Deposit is a quartz vein in granite, carrying $10 gold per ton. Shoots are 430′ long; $8 is recovered by amalgamation and $4 in sulphides.

Development: by 4 tunnels totaling 3,000′, reaching depth of 400′. Workings amount to 4,000′.

Equipment: water and steam power, and 5-stamps with concentrator. Concentrates assay $150 per ton. A new mill and water power are planned.

Production: totals about $200,000.

SPRINGFIELD MINING CO. **IDAHO**

Address: Tillie Zeitfuchs, sec., 414 First St., Wallace, Idaho.

Assessment of 1½ mills per share levied Aug. 18, 1920.

STANLEY MINING CO. **IDAHO**

Address: Eugene R. Day, Burke, Idaho.

Cap. $1,500,000; shares $1 par; treasury, 200,000 shares. Listed in Spokane. Controlled by Day family, principal owners of Hercules Mining Co.

Property: 12 patented claims, west of Benton and N. E. of Humming Bird, in George Gulch, half mile N. of Burke, Shoshone county, said to show antimony ore. Authentic information is scarce. The Humming Bird crosscut tunnel, run by the Hercules, passes through Stanley ground.

STAR ANTIMONY CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: B. A. McIntosh, pres.; W. F. Smith, sec.-treas., with Joe Gordon, Geo. Gordon and Theo. Brown, directors.

Inc. March, 1916, in Idaho. **Cap.** $10,000; shares 1c par.

Property: the Brown & Fennell claims and others, eleven in all, on Pine creek, Coeur d'Alene district, Idaho. Ore carries stibnite (antimony sulphide).

Development: by 3 tunnels, equal to 1,500′.

Production: 3 carloads in 1916, assaying 52.4 to 54.8% antimony. Mine assayer reports 50c. to $15.36 gold per ton. Idle since 1919.

STAR MINING CO. IDAHO

Address: Charles Hussey, sec., Mullan, Idaho, or 507 Empire State Bldg., Spokane, Wash.

Officers: W. J. C. Wakefield, pres.; Austin Corbin, v. p., with Chas. Hussey, J. G. Cunningham and Chas. E. Bender, directors.

Cap. $1,000,000; $1 par. The Bunker Hill & Sullivan has an option on the property at 75¢ a share, equal to $750,000, and financed the litigation with the Federal M. & S. Co.

Property: 9 patented and 7 unpatented claims adjoining Morning mine on west, 2 miles from Mullan. Late in 1917 the Star company brought suit against the Federal for alleged wrongful extraction of ore from its ground. The case was heard in March, 1918, many well-known engineers being retained by both sides. The Star received an adverse judgment, from which it appealed in August.

The Appellate Court reversed this decision. A re-hearing was denied the Federal in September and the Star company brought suit for an accounting of ore wrongfully extracted. This suit was settled by compromise. December, 1921.

Development: by 2 tunnels, one 400′, the other 2,200′ long, with 3,700′ of drifting on the vein.

STECKNER GOLD MINING CO. IDAHO

Address: care D. B. Cornell, sec.-treas., Great Barrington, Mass. Henry Tator, pres.; F. H. Cornell, v. p.

Inc. Feb. 17, 1914, in Arizona. **Cap.** $2,000,000.

Property: the Gold Dollar group, 10 lode and 5 placer claims, near Orogrande, Idaho county, shows fissure veins in granite. The veins are 2 to 4′ thick and carry gold ore, shown by systematic sampling to carry $3 to $13 per ton.

Development: by 3,000′ of work, all tunnels, 1,000′ depth.

Idle several years, but presumably awaiting new financing.

STERLING MINING CO., LTD. IDAHO

Address: J. J. Presley, pres., Kellogg, Idaho.

Inc. 1903, in Idaho. **Cap.** $1,500,000; shares $1 par.

Property: 12 claims, 240 acres, in Lake gulch, 3 miles S. W. of Wallace, Shoshone county. Contains a vein in Revett quartzite, surface samples assaying 13% lead and 8 oz. silver per ton. Development by a 850′ tunnel.

STERLING SILVER MOUNTAIN MNG. CO., LTD. IDAHO

Address: 323 Lindelle Block, Spokane, Wash.

Officers: R. L. Brainerd, pres.; F. W. Miller, v. p.; M. Baumgartner, sec.-treas.; Harry Morrell, supt., Kellogg, Idaho; with Dan Krehbiel, C. C. Schweer, and E. T. Richter, trustees.

Receipts from Sept., 1919, to March, 1920, were $3,714, and expenditures $2,606. Assessment No. 2 of 3 mills per share was levied in March, 1920.

Property: 7 claims on Big creek, adjoining the Yankee Boy, 4 miles E. S. E. of Wardner, Shoshone county. Veins are in qaurtzite, and ore carries silver and lead. Examined 1920 by R. S. Merriam of Wallace.

Development: by crosscut tunnels, the lower being over 2,500′ long. New work in 1920 amounted to 537′, and in 1921 the lower crosscut was driven 600′

Equipment: includes electric power, compressor, mills and buildings. Six men employed. A prospect.

STEWART MINING CO. IDAHO

Office: 1465 Broadway, New York. **Mine address:** Kellogg, Idaho.

Officers: J. E. Harrington, pres.-treas.; J. L. Williams, sec. and asst.-treas., with Nash Rockwood, counsel, Albert H. Featherstone, and W. Harrington, directors. B. N. Sharp, gen. mgr.

Inc. Aug. 29, 1902, in Idaho. **Cap.** $1,250,000; $1 par, increased July,

1916, to $3,000,000; $1 par; 2,738,362 outstanding. No bonded indebtedness. M. A. Hennessey, 1465 Broadway, New York, transfer agent; Metropolitan Trust Co., New York, registrar. Annual meeting in August. Listed on Boston and New York curbs. Stock inactive, but 500 shares were sold at public auction in New York, Feb., 1921, for 5.2 cents per share.

Company controls the Coeur d'Alene Development Co. through ownership of 562,498 of 1,000,000 shares; also the Nabob Consolidated Mining Co., holding 1,750,000 shares.

Current assets, June 30, 1917, amounted to $159,966, and liabilities, $21,996. A year later the respective totals were $256,787 and $100,525. The surplus was $670,186 in 1917, and $484,486 in 1918.

On Jan. 23, 1919, there was assigned to the American Smelting & Refining Co. a mortgage by the Nabob Consolidated covering the Nabob mill in lieu of advances made by the A. S. & R. Co. to the Stewart Mining Co.

Dividends: paid at the rate of 10c quarterly from 1913 to Dec., 1915, with extra dividends amounting to 32½c. in 1913; 62½c. in 1914; 70c. in 1915. Rate was reduced to 5c. quarterly in 1916; none since. The total is $2,043,296.

Holdings: company owns the Stewart mine at Kellogg, Idaho and controls the **Nabob Cons., Coeur d'Alene Development Co., Stewart Tuscarora Mining Co.** (controlling **Tuscarora Nevada Mines Co.)**

Property: the Stewart mine at Kellogg, 8 claims, partly patented, 150 acres. The mine covers about 2,000′ along a fissure vein at a fault contact between quartzite and slate. The outcrop of the contact carried silver-lead ore averaging $6.06 per ton for 2,000′. Output during 1914 and 1915 averaged 500 tons daily, but declined to 125 tons in 1916. The mine was formerly considered as worked out, because extensive development in 1915 failed to find any new orebodies, but in 1920 a careful geologic examination indicated that prospecting for the orebody E. of the fault should be done.

Equipment: the Stewart mill at Wallace, 12 miles from the mine, has a daily capacity of 500 tons. It includes crusher, 4 sets of rolls, 2 Huntington, 12 Wilfley tables, 18 Frue vanners, 35 Harz jigs, 4 Deister slime-tables, and a flotation unit. Concentration ratio is 6 to 1, the product averaging 50% lead and 50 oz. silver per ton. About 200,000 tons of tailings were available for treatment in 1920.

Production: a few figures are available. In 1915, 189,615 tons of ore was valued at $2,140,363. The profit from this was $554,433.

The mine was under lease to H. M. Childs of the Bunker Hill & Sullivan company, 1920-21, who shipped several cars of rich ore during 1920. The company reopened mine late in 1921, to recover the main vein lost in the old workings by a fault.

Management searched for new properties for some time, and various mines were investigated, including the Old Sport Group of the Quatsino Copper Co., comprising 26 patented claims, 2,000 acres, Vancouver, B. C., on which $100,000 was spent before the option was relinquished.

Litigation with the Ontario Mining Co., was decided adversely, April, 1915, and the Ontario company granted $48,000 for ore illegally extracted.

Notwithstanding the spectacular career of the Stewart company under the Heinze regime, the mine made good, paying $1,000,000 a year dividends for two years.

Coeur d'Alene Development Co.

Address: Wm. E. Benton, sec., Saratoga Springs, N. Y.

Property: 10 patented claims, developed to 400′ level and equipped with a mill. Twelve years ago a rich orebody produced about $150,000 worth of ore, but property was abandoned when this vein was worked out. Extensive development work was under way in 1917 and 1918, but no details are available.

Judgments for a few thousand dollars for legal fees were obtained against company in 1921, which will of course be paid off, and property redeemed.

Stewart Tuscarora Mining Co.

Described in Nevada section of this volume.

Nabob Consolidated Mining Co.

Subsidiary of Stewart Mining Co., financing Nabob Cons. and Nabob Mining, described in Vol. XII of this book.

Office: 1465 Broadway, New York, and Kellogg, Idaho.

Officers: J. E. Harrington, pres.; John L. Williams, sec.-treas., with A. H. Featherstone, and Nash Rockwood (counsel), directors. B. N. Sharp, gen.-mgr.; R. Sherwood, mine supt.; H. M. Throndson, mill supt.; R. H. Hughes, office mgr.; B. M. Moye, assayer.

Inc. 1917, in Idaho. **Cap.** $3,500,000; $1 par; 2,600,000 issued; 1,750,000 shares held by Stewart Mining Co. The Lippert Investment Co. of Spokane is largely interested. Annual meeting in August. Registrar, Metropolitan Trust Co., and transfer agent, M. A. Hennessey, 1465 Broadway, both in New York. Listed on New York Curb. Quoted at 4 cents in Jan., 1921.

Property: 28 claims on Pine Creek near Kelllogg, Shoshone county. Principal claims are the Denver, Mascot, and Nabob. Veins occur in Burke quartzite and Prichard slate; ore is a mixturt of galena, sphalerite, pyrrhotite, and pyrite in a quartz gangue.

In Aug., 1921, the Stewart company announced that the rich silver-lead ore in adjoining Sidney mine, was on a vein that continued into and traversed the company's claims. Development work uncovered this vein in Nabob ground and disclosed rich silver-lead ore in commercial amount at the surface at one point and zinc-lead ore at anotner.

Development: by 3,000′ tunnel, shaft, etc., totaling over 6,000′. Reserves in 1918 were estimated as 22,000 tons possible and 46,000 tons probable ore, but augmented by later work. In the Denver claim, ore averaging 10% lead, 16% zinc, and some silver has been followed for over 400′ on two levels. Several other tunnels and workings have opened a good deal of ore. A rich shoot of ore in lower Nabob tunnel yielded several cars of ore in 1918. The mill ore carries 10% lead, 15% zinc, and 7 oz. silver per ton. Five shoots were yielding ore in 1920.

Equipment: complete 3,800′ 3-rail gravity tram, connecting No. 4 tunnel with Pine creek, and 150-ton mill including flotation, started work early in September, 1918.

Mill construction work was financed by a loan of $60,000 from the A. S. & R. Co., through the Federal M. & S. Co., to be repaid by a smelting charge of $2 per ton on shipments of concentrate, while a smelting contract was signed for 5 years, with renewal privilege for a similar period. The sum proved insufficient owing to increased cost of labor and supplies, and further loan of $15,000 was granted.

The mill was run for a month or so in March, 1920 after a financial arrangement was made with creditors, and several carloads of 51% lead and 25 oz. silver concentrates were shipped. In November, work was suspended again, on account of the lead market.

SUCCESS MINING CO., LTD. **IDAHO**

Office: Gyde-Taylor Bldg., Wallace, Idaho.

Officers: Franklin Pfirman, pres.; Jas. F. Callahan, v. p.; Herman J. Rossi, sec.-treas., with W. R. Mullan, and M. L. Mahoney, directors. A. G. Kennedy, mgr.

Cap. $1,500,000; shares $1 par; all issued; assessable. Last assessment was 1¢ a share with delinquent date, Dec. 29 and sale, Jan. 26, 1922. Listed in Butte Spokane, and on New York Curb.

Dividends: suspended April 20, 1913, totaled $345,000 to that date; resumed April 30, 1915, and $550,000 paid in 1915; $345,000 to July 26, 1916; none since.

Financial statement dated Nov. 1, 1921, shows: plant valuation $200,000; supplies, $1,998; cash and bills receive, $560; prepaid insurance, $346; operating cost, $5,703. Misc. income was $835; bills pay., $5,000; acc'ts pay., $1,201; royalties, $119; surplus, $1,452.

Litigation with the adjoining Alameda company, which claimed payment for ore, said to have been extracted from its ground by Success was decided in favor of Alameda Co., but the Success Co. appealed and won. This was followed by the Alameda appealing, but the court dismissed case in May, 1917.

Property: 8 claims on Nine Mile creek, 2 miles N. W. of Wallace, is one of the oldest located properties in the Wallace district; first operated by the Granite Mining Co., taken over in 1905 by H. F. Samuels, who organized the Success Mining Co., continued under his management until 1915, when control passed to "practical" mining men and brokers, and large blocks of stock, aggregating over a million shares were worked out through the New York, Duluth Spokane and Butte exchanges.

The company received considerable publicity during 1917, as a result of stock manipulation, said to have been aided by the management, and to friction between the management and several mining publications. This was aggravated by the seeming aversion of the directors to take stockholders into their confidence, especially in connection with the new smelter contract with the Grasselli Chemical Co., effective May 1, 1916. The distrust of the management culminated, April, 1916, in the Success officials being summoned to court to show why stockholders should not know the terms of contract. This covered 2,000 tons monthly for 3 years, with minimum zinc content of 38%, and maximum lead of 5% at certain prices.

The old management was ousted in Dec., 1917.

Geology: according to the Government geological report (U. S. G. S. Prof. Paper, No. 62) there is no vein, the ore occurring in masses of irregular form and size, which are chiefly replacements of quartzite in places where it has been most thoroughly fissured. The ore is strictly confined to the sedimentary rock; surrounding country rock is monzonite. Ore carries zinc, with lead and silver.

Development: by tunnels to 700′ level, and by shaft from 700′ to 1,600′ level. From July, 1916, to Feb., 1918, 4,000′ of driving was done on the 1,200, 1,300, 1,400, 1,500, and 1,600′ levels, and 480′ of sinking, revealing 25,000 tons of ore. Two years' work above the 1,200′, amounting to 5,000′, exposed 150,000 tons of ore. Exploration was practically confined to the known ore-shoot but ground to the east was to be explored during 1918, and it is reported that the 1,500′ level shows 6′ of high-grade zinc ore and considerable lead.

Equipment: complete and includes a 250-ton mill, employing flotation.

Production: in 1916, was valued at $693,045 from ore mined and flotation slime.

The mill was operated during part of December, 1918, and January, 1919. In February, 1919, the mine was closed indefinitely, excepting for work being done above the 700′ level by lessees. Royalties paid to company by lessees amounted to $3,944 to January 1, 1921.

SUNRISE MINING CO. IDAHO

Address: O. C. Smith, sec., Wallace, Idaho.

Cap. $100,000; assessable. An assessment of 2 mills per share was levied June 28, 1920.

Property: adjoins the Sunset mine of Senator Clark, near Burke in Coeur d'Alene district, Shoshone county.

Development: by several tunnels, drifts and crosscuts.

Stock closely held and work financed by assessments.

SUNSET-BANNER MINING CO. IDAHO

Absorbed, 1918, by **Sunshine Consolidated Mining Co.**, which see.

SUNSET MINING CO. IDAHO

Address: J. H. Cooke, 602 Dooly Bldg., Salt Lake City. **Mine address:** Leadore, Idaho.

Officers: J. H. Cooke, pres.; I. Coleman, sec., with J. C. Lynch, W. Van Wagenen, (gen. mgr.), and J. R. Murdock, directors.

Assessment No. 10 of ½c. per share, levied April 27, 1921.

Company is controlled by Utah capital. 7,600 shares sold for $5 the lot at public auction in New York on Dec. 22, 1920.

Property: is 20 miles north of Gilmore, in Lemhi county. Examined by S. M. Soupcuff and L. G. Burton of Salt Lake City.

Geology: the ore occurs in a contact deposit between blue Carboniferous limestone and an underlying sheet of white silicious quartz-porphyry. The best ore is found under a red fault gouge, which overlies the ore-bearing brecciated limestones and separates them from a capping of Tertiary lake bed gravels that constitute the hanging wall. Deposit has a flat dip. Ore in upper levels consists of grey lead carbonate, but the orebody in the lower tunnel consists of fine-grained steel galena scattered through brecciated limestone, with occasional segregations of clean shipping ore. On the 500′ level the orebody is 10′ to 20′ thick and 200′ long, all of it of milling grade.

Development: by tunnels and extensive lateral workings, opening a considerable tonnage of ore.

Equipment: includes a 60-ton concentrating plant.

Production: in 1918 irregular shipments of 11% lead and 7-oz. silver ore were made to Utah smelters, while in 1919 and 1920, regular shipments were made to Midvale and Murray. Mine closed down in 1921 on account of low price of lead and high freight rates.

SUNSHINE CONSOLIDATED MINING CO. IDAHO

Officers and Directors: Dan McGrath, pres.; John Lucas, v. p.; H. J. Hull, sec.-treas.; A. L. Horneker, all of Wallace; David C. Smith and Dr. E. G. Ellis, of Missoula, Mont.

Inc. Jan., 1918. **Cap.** $2,500,000; shares $1 par; assessable. Assessment of 2½ mills levied July 11, 1921.

Property: a consolidation of the **Idora Mining Co., Parrot Mining Co., Sunset Banner Mining Co., Sunshine Mining Co., Toughnut Mining Co.** and **Tuscumbia Mining Co.,** all operating on Beaver creek, Shoshone county. The Consolidation includes about 30 claims on which over 15,000′ of work has been done through tunnels, the Idora having one of 5,000′, and the Tuscumbia one of 4,000′. It is planned to drive a main working tunnel to serve the group and to open ore at much greater depth. Orebodies are in Prichard slate, and carry lead, silver, and zinc.

Equipment: each mine has suitable machinery and buildings, including compressors at the Idora, Sunshine, and Tuscumbia mines, drills, and aerial tram and 150-ton concentrator employing flotation at the Idora.

Production: the Idora and Tuscumbia have shipped ore and concentrate for several years, but figures are lacking.

This consolidation should ultimately benefit these 5 properties, which have had but limited development for want of funds.

SUNSHINE MINING CO. IDAHO

Is a consolidation of the **Yankee Boy M. Co.** and **Yankee Girl Mng. Co.**

Address: Eugene C. Tousley, 509 Empire State Bldg., Spokane, Wash. **Mine address:** Wm. F. Newton, mgr., P. O. Box 144, Kellogg, Idaho.

Officers: Geo. Kebel, pres.; Wm. F. Newton, v. p.; Eugene C. Tousley, sec.-treas.

Inc. May 25, 1920, in Washington. **Cap** $150,000; 10c. par; 1,000,000 shares in treasury.

Property: 14 claims, 4 patented, 280 acres in Big Creek district, about 7 miles from Kellogg, Shoshone county. Ore occurs in quartz veins, containing mainly silver with some copper and lead.

Development: by tunnels to depth of 1,100′ with 6,000′ of workings.

Equipment: hoist, compressor and electric power. A 50-ton mill was completed in 1921. and is producing 3 tons of concentrate per day. Shipments made to Bunker Hill smelter at Bradley.

Production: Yankee Boy is credited with past production of $400,000.

SUNSHINE MINING CC., LTD. IDAHO

Absorbed 1918 by Sunshine Consolidated Mining Co., which see.

SWASTIKA MINES CORPORATION **IDAHO**

Address: A. H. McKnight, mgr., Dixie, Idaho.

Officers: A. H. McKnight, pres.; H. A. Henderson, v. p.; Miss F. T. Bannon, sec.-treas., with W. T. Fox and F. Joesling, directors.

Inc. May 20, 1919, in Idaho. **Cap.** $500,000; $1 par; 300,000 shares outstanding.

Property: 20 claims, 400 acres, 4½ miles S. E. of Dixie, Idaho county, central Idaho. Ore occurs in fissure vein in porphyry, carrying gold, silver and lead.

Development: by tunnels, 600', 500' and 700', with total workings of 1,811'.

SYNDICATE MINING & EXPLORATION CO. **IDAHO**

Address: Lewis Stevens, sec., Wardner, Idaho.

An assessment of one mill per share levied in July, 1920 and July, 1921.

Property: a group of claims near Wallace, at the mouth of Big creek, Shoshone county.

Development: by a crosscut tunnel (1,000' long Sept., 1919,) in which it was expected the vein would soon be cut.

TAMARACK & CUSTER CONSOLIDATED MINING CO. **IDAHO**

Address: P. O. Box 328, Wallace, Idaho.

Officers: J. J. Day, pres., gen. mgr. and treas.; E. R. Day, v. p.; H. L. Day, sec., with R. M .Walker, E. H. Knight, E. Boyce, and F. M. Rothrock, directors.

Inc. 1913, in Nevada. **Cap.** $2,000,000; $1 par; 1,877,288 issued; shares quoted at $2.

Financial statement shows net profits for 1914, $187,063; for 1915, $346,796; for 1916, $338,746; and $350,857 in 1918.

Dividends: initial of 2c per share was paid May, 1916; total in 1916 was $71,050; $53,287 in 1917; $266,855 in 1918; $56,400 in 1919; $75,000 in 1920: 4c. per share paid Jan. 6, 1921.

Property: about 40 claims and fractions, acquired from the old Tamarack & Chesapeake and Custer companies, on Nine Mile creek, Coeur d'Alene district, Shoshone county. The Hercules mine nearby is controlled by the same interests. Ore carries galena with silver values and as mined is part direct smelting and part concentrating material.

Development: by 7 tunnels, No. 7 now being driven from Canyon Creek to open orebody several hundred feet lower, will be about 7,000' long.

This company, together with the Herclues interests, built and operates the lead smelter at Northport, Wash.

Early in 1917 the 500-ton Frisco mill at Gem was purchased from the Federal Mining Co., for $150,000, also the 8,000' Hercules aerial tram. To this line was added 2½ miles to connect the mine and mill. In June, 1919, operations were resumed after 3 months' suspension. The remodeled mill includes a flotation plant. About 350 men employed when operations are normal.

Production: in 1920 was 22,889 tons with gross value of $1,711,658, and net profit of $169,371 compared with 14,121 tons in 1919, with gross value of $1,044,753 and net profit of $221,429. Mining costs in 1920 were $891,770, betterments, $29,053 and freight and treatment $621,462.

TEDDY MINING & MILLING CO., LTD. **IDAHO**

Address: J. B. Cox, sec., Kellogg, Shoshone county, Idaho.

Cap. $1,000,000; shares $1 par; assessable. Last assessment, 1½ mills per share, levied Dec. 15, 1920.

Property: 7 claims and a mill-site, 1 mile E. of Kellogg, shows 2 veins, 1 of above 15' width carrying copper ore with quartz gangue, and 1 of about 12 to 35' width, carrying silver-lead ore giving assays up to 12% lead and 30 oz. silver per ton.

Development: by crosscut tunnels of 100' and 550', and total of 1,200' of workings.

Property operated by lessees at last account.

TERRIBLE EDITH MINE IDAHO

Address: Washington Snyder, Murray, Shoshone county, Idaho.

Property: 4 claims, 1½ miles E. of Murray.

Development: by 1,300′ crosscut and 1,700′ of drifting, opening lead-zinc ore of shipping grade. Several shipments of 50% ore were made, prior to 1916, and that years' output returned $100,000. No recent information.

TORINO MINING CO. IDAHO

Address: Jos. F. Whelan, sec., 408 Sixth St., Wallace, Idaho.

Last assessment of 1 mill levied July 19, 1920.

Property: in Hunter district, near Mullan, Shoshone county, developed by 2 tunnels, said to contain lead-silver ore.

TREASURE MINES CO. IDAHO

Address: Bob Mabry, Mabry & Co., Hutton Bldg., Spokane, Wash.

Property: a gold mine in the Rocky Bar district, Elmore county, opened by tunnels, and said to have reserves valued at $200,000.

TRI-METALLIC MINING CO., LTD. IDAHO

Address: Pardee, Idaho county, Idaho.

Officers: H. F. Bethmann, pres.; A. C. Jack, v. p.; F. M. Bethmann, sec.; E. F. Bethmann, treas.; William Jack, mgr.; Miles Johnson, cons. attorney.

Inc. in Idaho. **Cap.** $250,000; $1 par.

Property: 7 claims and a millsite, all patented, ½ mile N. W. of Pardee, in the Lolo mining district, near the N P. R. R. Claims show a quartz vein in granite, the ore carrying copper carbonates and sulphides. Examined by Samuel Aughey.

Development: by 700′ of shafts and tunnels. A 2-drill compressor is available. No recent work has been reported.

TUCKER MINING & MILLING CO. IDAHO

Address: Box 551, Wallace, Idaho.

Officers: Peter Bahn, pres. and gen. mgr.; J. Pearson, v. p.; W. Turner, sec.-treas., all directors.

Inc. June, 1908, in Idaho. **Cap.** $1,000,000; $1 par; assessable; 600,000 issued given in exchange for the property. Annual meeting in June.

Property: 6 claims, unpatented, 120 acres, in the Hunter district, Shoshone county, 3 miles E. of the Snowstorm and 7 miles E. of the Morning, shows Revett quartzite, cut by a diabase dike with veins, 1 to 4′ in surface width, said to carry silver ore.

Development: by a 1,000′ tunnel. A prospect.

TUNGSTEN HILL MINING CO. IDAHO

Address: C. D. Muxen, sec., Old Natl. Bank Bldg., Spokane, Wash.

Officers: Austin Ready, pres.; G. A. Henkel, v. p., with C. D. Muxen, F. P. Motie and A. E. Douglas, all of Spokane, directors.

Cap. $50,000; shares 5c. par; assessable.

Property: 17 claims, formerly known as the Bull Moose group, in the Moyie-Yahkt district, Boundary county. Ore carries scheelite, gold, silver, and lead. The formation is diorite and serpentine.

Development: by a 300′ tunnel. Late in 1920, results were reported as encouraging.

Equipment: includes gas engine and compressor; a concentrating plant was planned at last accounts.

TUSCUMBIA MINING CO. IDAHO

Absorbed, 1918, by **Sunshine Consolidated Mining Co.**, which see.

UNA MINING CO. IDAHO

Address: Ralston McCraig, sec., N. 1319 A. Ave., Spokane, Wash.

Inc. 1914. **Cap.** $1,250,000; shares $1 par; 650,000 issued; assessable.

Property: 3 claims. 4 miles west of Orogrande, shows a vein 10′ wide, carrying pay streaks of a few inches to 5′ thick. In the 40′ shaft the ore is said to average $7 per ton in gold, with some silver.

Development: by 1,100′ tunnel which cut the vein, in 1919.

UNITED LEAD CO. **IDAHO**

Name changed to **Silverado Mining Co.**, which see.

UNITED METALS & POWER CORPORATION **IDAHO**

Address: Century Bldg., Pittsburgh, Pa.

Mine Office: Stanley, Ida. Walter Hovey Hill, Consulting Engineer.

Officers: J. C. Hungerman, Pres., E. L. Keally, Vice Pres., H. C.Curstead, Vice Pres., A. L. Schweibinz, Stc'y and Treas., with Dr. J. A. Stevens, J. I. Rogers, C. M. Hafer, M. E Frazee, and W. P. Fowler, Directors.

Inc. April, 1918, in Delaware. **Cap.** $5,000,000; $5 par; 600,000 issued.

Property: Eight quartz claims six of which 111.2 acres, patent application. Five placers 100 acres, all contiguous, covering part of Sea Foam Mountain, in district same name, Custer County, Idaho.

Nearest rail Ketchum, 102 miles. In granite area, dikes, andesite, diorite, and rhyolite. Four known veins. Shear zones. Ore replacemen deposits. Gold ore, small silver values, 40% to 90% free recovery. Other deposits silver, lead, copper and gold.

Development: tunnels all on vein or in ore body. No equipment. Planning hydro-electric power and all sliming gold mill 50-ton capacity.

UNITED MINES CO. **IDAHO**

Office: 501 C. of C. Bldg., Spokane, Wash. **Mine office:** J. L. Magney, Fairfield, Idaho.

Officers: T. S. Griffith, pres.; E. J. Peterson, v. p.; L. J. Raef, sec.; Chas. Uhden, treas., with V. A. Johnson, E. A. Worswick, Jack Wallace, and J. C. Lawrence, directors.

Inc. May 17, 1916, in Washington. **Cap.** $250,000; 25c par; 659,670 issued.

Property: 13 claims, 10 miles N. E. of Fairfield, Blaine county, said to show a fissure vein in granite, dipping 45° with N.-S. course. Shoots are 3 to 7′ wide, 260′ long and 150′ deep. Ore is mostly sulphide, carrying pyrite, galena and chalcopyrite. Value in gold, silver, and copper is $20 per ton.

Development: by 511′ tunnel, opening to 157′ depth with total of 1,800′ of workings. Ore reserves estimated at 30,000 tons, 13,000 tons blocked out.

Equipment: 10-stamp mill, 2 concentrators, flotation plant, assay office sawmill, etc. No details availiable regarding operations, 1920-21.

UNITED STATES SILVER-LEAD MINES CO. **IDAHO**

Address: Jos. McCarthy, sec., Paulsen Bldg., Spokane, Wash. C. J. Diebrel, pres.; A. N. Nash, mgr.

Property: 11 lode claims, in the Eagle district, near the Jack Waite, 13 miles from rail at Prichard, Shoshone county. Veins are in quartzite, and ore carries lead and silver.

Development: by 2 tunnels, both 350′ long. No. 1 opened 13″ of 80% lead and 20 oz. silver ore. Late in 1920 a 7′ vein was reported cut in the lower tunnel and 200′ of drifting E. and W. was done in 1921.

Equipment: includes steam power, gasoline engine, compressor, etc.

UNITY GOLD MINES CO. **IDAHO**

Offices: Warren, Idaho county, Idaho, and 120 Broadway, New York.

Officers: James H. Hawley, pres.; Lorren M. Hart, v. p.; George C. Luebbers, treas.; Eduard C. Christensen, sec.; Jay A. Czizek, managing director, also directors.

Inc. April, 1916, in Delaware. **Cap.** $2,500,000; $5 par; 375,000 outstanding. Listed on New York Curb. Security Transfer & Registrar Co., New York, transfer agt. and registrar. Company has no debts, and has funds to bring property to production stage.

Property: 200 acres, patented, including the Little Giant and Charity mines, and 2 tunnel sites, each 3,000′ long and 1,500′ wide, crossing vein sys-

tem at right angles; all at town of Warren, Idaho county, 40 miles from Lakeport on O. S. L. Ry.

Geology: typical quartz veins occur in granite cut by later dikes of porphyry. Veins are step faulted, both by these dikes and by fault fissures. Shoots of free milling quartz occur, one in the Little Giant mine being 800' long, 3' thick, and averaging $85 per ton for 5,500 tons milled. The ore shoot of Old Charity mine workings is 1,000' long, and averaged $30 per ton. These shoots are faulted and were lost in old mine workings, but the deep crosscut drainage tunnel proves the shoot to persist in size and value down to that level 450' below old stopes. One vein cut in the tunnel carries high-grade tungsten ore.

Development: by 800' incline shaft and extensive lateral workings. Re-cross section driven beneath the old mine workings at a depth of 300' to 800' below the vein outcrop. This has opened up five veins each with stoping back of 300 to 500 ft. and crosscuts, raises and drifts expose the veins, and open up stoping ores. This tunnel will be extended 2,500' farther to crosscut five other known veins.

Production: in former years said to total $1,200,000 from 150' backs stoped in the two mines; including the 5,500 tons from the Little Giant.

A scheelite vein was cut at 1,850' in main tunnel at a depth of 450'. A drift on it for 120' shows vein to be 3' wide. Ore was stripped for 40'. Product tested by Ledoux & Co., New York, shows 60% concentrate from crude ore. Analysis showed 75.8% tungstic acid; phosphorus, 0.005%; arsenic, 0.18%; copper, 0.05%. Recovery was 94.7%.

Equipment: hydro-electric power developed from water carried in ditch 4½ miles, gives 238' head for driving compressors 50-ton stamp-mill, and tramming ore and waste through tunnel.

Company in 1921 acquired the Holte gold mine and cyanide mill in Marshall Lake district, Idaho county. Is regarded as a well managed property, which has solved the faultings, is now blocking out ore, and should soon be on a producing basis.

UTAH BELLEVUE MINES CO. **IDAHO**

Address: J. H. Saxman, pres.-mgr., Bellevue, Idaho.

Cap. 500,000 shares; in treasury, 165,000. No bonded indebtedness.

Property: 3 claims in Wood River district, Blaine county. Veins carry gold-silver-lead-zinc ore.

Development: by 108' incline shaft and 500' crosscut tunnel, said to disclose a large orebody of milling grade. Some shipments have been made.

VALENTINE CINNABAR MINING CO. **IDAHO**

Address: Black Pine, Cassia Co., Idaho.

Property: a group of claims on eastern slope of Black Pine mountains. 4½ miles W. of Black Pine P. O., Cassia county.

VERDE MAY MINING CO. **IDAHO**

Address: Charles Jackson, treas., Gem, Idaho.

Assessment of 1 cent a share due Jan. 6, 1921.

VIENNA-INTERNATIONAL MINING CO. **IDAHO**

Address: R. A. Marshall, sec., Wallace, Idaho.

Officers: A. H. Featherstone, pres.; Geo. Moison, v. p.; R. A. Marshall, sec.-treas., with A. B. Livingston and Hugh Toole, directors.

Cap: $1,500,000; shares $1 par. Annual meeting first Tuesday in September.

Property: 6 claims, 3 patented, and a mill-site, near the mouth of Flora gulch, on Placer creek, 6 miles S. of Wallace, shows banded shales and quartzites of the middle part of the Newland formation, striking N. 50 to 60° W., dipping 70° S. Principal vein has a quartz-sidrite orebody, 3 to 5' wide with strike almost E.-W. and vertical dip. Ore on the dump shows galena, pyrite and chalcopyrite in a quartz-sidrite gangue of too poor a grade to be profitably concentrated.

Development: by a 400′ shaft, and 2 tunnels of 700′. Mine was optioned to Spokane people in 1916, but the bond was forfeited in 1917; company then did a little more work, but finally suspended development in 1918.

VIRGINIA CONSOLIDATED GOLD MINING CO. **IDAHO**

Property leased to **Mines Developing & Leasing Co.**, which see.

WALLACE MINING, MILLING & REALTY CO. **IDAHO**

Address: G. G. Evans, sec.-treas., Wallace, Idaho.

Assessment of 1c. a share levied Oct. 23, 1920.

Property: 9 claims on Placer creek, alongside of city limits of Wallace, Shoshone county, said to show a big vein with scattered galena ore.

Development: by 2,000′ tunnel, and total of 2,400′ of workings. Several veins were reported cut in 1920.

WALL STREET MINING CO. **IDAHO**

Address: C. Fred Kratzer, sec.-treas., 519 Waverly Place, Spokane, Wash. C. A. Pooley, pres., Burke, Idaho.

Cap. $1,250,000; $1 par. **Assessment:** of 5 mills per share levied July 9, 1921.

Property: the Owatonna group, 19 claims, N. E. of the Morning and S. E. of the Hecla, developed by tunnels. A lower tunnel is being driven to cut the vein at depth of 600′.

WALTON MINES CO. **IDAHO**

Address: Geo. R. Colvin, mgr., Hailey, Idaho.

Cap. $375,000; par 10¢. Property acquired for $25,000.

Property: Lucky Point group of 4 claims, in Smoky district, 14 miles N. of Fairfield, Camas county. Sulphide ore occurs in a vein 2-4′ wide, reported to contain gold, silver and lead.

Development: by 900′ of tunnels.

Equipment: includes 50-ton mill, tramway and sawmill.

WARDNER LEASING CO. **IDAHO**

Address: J. D. Owen, Kellogg, Idaho.

Officers: R. A. Carnochan, pres.; D. W. Price, v. p.; J. D. Owen, sec.-treas., with C. E. Struthers, directors. W. A. Beaudry, mgr.

Inc. April, 1917, in Washington. **Cap.** $500,000; increased to $600,000 in 1918; $1 par; assessable.

Company has a 2-year option, until 1922, on the holdings of the **Slavonian M. Co.** at Wardner.

WARDNER MINING CO. **IDAHO**

Succeeded by the **New Caledonia Cons. M. Co.**, which see.

WASHINGTON MINING CO. **IDAHO**

Address: C. A. Dettman, sec., Burke, Idaho.

Assessment of 2 mills per share levied July 13, 1921.

Property: east of Burke, Shoshone county, developed by 1,100′ and 870′ tunnels. Ore contains lead and silver. Development work was resumed in July, 1921.

WAVA MINING & MILLING CO. **IDAHO**

Address: J. D. Hedrick, Hailey, Idaho.

Inc. Sept., 1919 in Idaho. **Cap.** $50,000; in 35,000 common and 15,000 preferred shares of $1 par.

Officers: C. E. Gordon, pres.; Jack Edwards, v. p.; J. D. Hedrick, sec.; C. S. Shepherd, treas.

No information is given out as to property or operations.

WEILER MINE **IDAHO**

Address: H. W. Weiler, Mackay, Idaho.

Property: 6 claims, in Antelope district, Butte county, Idaho. Ore occurs in fissure and contact veins in porphyry and limestone, the veins varying up to 4′ wide. Ore reported to assay 20% lead, 25 oz. silver, and up to $1 gold per ton.

Development: 200′ shaft and 5,000′ workings. Reserves are estimated at 2,500 tons.

Equipment: 6-h. p. gasoline hoist.

WEIMER COPPER CO. IDAHO

Controlled by W. H. Timlin, Milwaukee, Wis.

Property: 18 claims, 360 acres, on Birch Creek, in Skull canyon district, 40 miles from Dubois, shows a crushed zone 100 to 200′ thick between quartzite and limestone, which carries high-grade ore in pockets and in cross fissures, of 3″ to 2′ width, running at right angles to the main contact deposit.

Development: by an open-cut and 2 tunnels of 300′ each. A car of hand-sorted ore averaging 30% copper was reported shipped in August, 1921.

WEST COAST MINES CO. IDAHO

Address: H. J. Hibschman, Wellington Apts., Spokane, Wash.

Cap. $500,000; shares $1 par; non-assessable.

Property: 13 claims, the Pearl mine near Boise, Ada county, showing a vein of gold-silver ore, developed by 200′ shaft and several hundred feet of lateral workings. Idle since 1917 for want of capital.

WESTERN STAR MINING CO. IDAHO

Address: Elmer Johnson, sec., Gyde-Taylor Bldg., Wallace, Idaho.

No. 4 assessment, of 4 mills per share, levied Dec. 8, 1920.

Property: 6 claims in Big Creek section, Coeur d'Alene district, Shoshone county. Ore contains copper and silver.

Development: by 2,000′ of workings.

WESTERN UNION MINING CO. IDAHO

Is a reorganization of Aurora-Sampson and H. E. M. companies.

Address: Ben L. Collins, sec.-mgr., 1109 Paulsen Bldg., Spokane, Wash.

Officers: D. H. Anderson, pres.; Eric Hagman, v. p.; B. L. Collins, sec.; J. F. Austin, Tacoma; J. E. Burbank, Cheney, Wash.; H. D. Winchester, Wm. Holm, Geo. W. Allen, directors.

Inc. Jan. 1916, in Idaho. **Cap.** $200,000 10¢ par; 1,800,000 shares issued; assessable. Last levy of 5 mills per share was payable July 15, 1920.

Financial report to June 1, 1921 showed receipts from assessment No. 4 $9,995; receipts from royalties, $8,932; expenditures include, development, $7,199; right of way and tunnel site, $2,000; surplus, $4,810.

Property: 20 claims, 2½ miles N. W. of Wallace, known as Aurora-Sampson and H. E. M. groups, carries fissure veins in quartzite and slate.

Development: aggregates over 9,000′; the main tunnel is 4,900′ long, 2,300′ as a crosscut, the remainder a drift on the vein. The mine is operated by five sets of lessees.

Production: by lessees from Nov., 1920, to July, 1921, amounted to 666 tons, netting $35,725. Shipments averaged 40.86 oz. silver and 50% lead. Company receives 25% royalty on net smelter returns.

WEST HECLA MINING CO. IDAHO

Office: 601 Empire State Bldg., Spokane. Wash.

Officers: Morton Webster, pres.; J. V. Pohlman, sec.-treas., with A. A. Booth and T. A. Russell, directors.

Inc. in Washington. **Cap.** $1,500,000; shares $1 par; assessable; 1,450,000 issued.

Property: 3 patented claims opposite the Hecla mine, Burke, Shoshone county.

In Sept., 1917, company was prospecting in quartzite for the Hecla lead-silver vein. Workings to depth of 650′ totaled 1,750′. Idle since 1917.

WEST HUNTER MINING CO. IDAHO

Address: J. L. Martin, Mullan, Idaho.

Officers: E. T. Davey, pres.; T. B. Cosgrove, v. p.; J. L. Martin, sec.-treas.; with Mike Murray, P. J. Sweeney, J. H. Hunter, directors.

Cap. $1,500,000; 10c. par; assessable.

Property: 2 patented, 10 unpatented claims about one-half mile from Mullan, Shoshone county, adjoining the You Like mine on the E. and the Gold Hunter on the W.

Development: by two tunnels, 300′ and 600′ in length, with about 1,200′ of workings. A crosscut was driven from No. 3 tunnel of the American Commander and a 200′ drift run on a 12′ vein containing silver-lead, and said to be the extension of the You Like vein.

Equipment: compressor, black-smith shop and dwellings. Development work financed by sale of treasury stock.

WEST NINE MILE MINING CO. **IDAHO**

Address: Chas. Heilbronner, pres. and gen. mgr., Wallace, Idaho. H. C. McAllister, treas.

Cap. $1,000,000; shares $1 par; assessable.

Property: 4 claims west of the Success and Alhambra mines on west fork of Nine Mile creek, Shoshone county.

Development: by 700′ tunnel that shows a vein said to carry occasional bunches of ore. Only assessment work being done at last advice.

WEST SUNSET MINING CO. **IDAHO**

Controlled by the Day interests.

Address: Jerome J. Day, P. O. Box 328, Wallace, Idaho.

Property: the Portland mine, in Nine Mile section, Coeur d'Alene district. Ore contains silver and lead. A drift is being extended on the 1,000′ level of the adjoining Sunset mine, (owned by Senator Clark), into West Sunset ground.

WILBERT ANNEX MINING CO. **IDAHO**

Bought out, 1919 by **Wilbert Mining Co.**, which see.

WILBERT MINING CO., LTD. **IDAHO**

Office: 222 Kearns Bldg., Salt Lake City, Utah.

Officers: A. S. Ross, pres. and gen. mgr.; J. A. Foley, sec.-treas.; D. J. Lennion, supt.

Inc. 1907, in Utah. **Cap.** $1,000,000; shares $1 par; assessable; increased to $2,000,000 in February, 1918. Annual meeting in May. Stock transferred at company's office. Listed on Salt Lake Stock Exchange and New York Curb. U. S. Corporation Co., New York, transfer office. Assessment No. 5 of 1 cent per share was levied June, 1919.

Dividends: $10,000, Nov. 15, 1915; $40,000 in 1916; and $40,000 in 1917, and $30,000 in 1918.

Financial Statement, years ending May 1:

Year	Revenue	Expenses	Dividends	Cash Balance
1918.....	$165,961	$135,961	$30,000	$925
1917.....	181,389	128,475	40,000	12,914
1916.....	.....	.....	40,000	42,467

Property: 16 patented claims, plus those of the Wilbert Annex, in the Dome mining district, 40 miles from Arco, Butte county.

Geology: the claims show Cambrian quartzite cut by a fissure vein that contains lead and silver ore, mostly of concentrating grade. The top of the vein has been folded into a nearly horizontal bed, worked by quarrying. The main ore-shoot has been followed to a depth of 800′ and is stoped out from No. 5 level to the surface.

Development: by 800′ incline shaft and extensive lateral workings. Recent work has been concentrated on the 500′ level.

Equipment: most of the surface plant, including a 100-ton mill, was burned in August, 1918.

Production: for year ending May 1, 1916, was 15,204 tons crude ore, assaying 25% lead and 3.86 oz. silver, which yielded by sorting and concentration 5,787 tons, assaying 52% lead and 8 oz. silver. Costs were $3.56 per ton.

In 1916-'17, the mill treated 6,981 tons of 18.7% lead and 4.9 oz. silver ore, yielding 1,758 tons of concentrate assaying 54.2% lead and 15.3 oz. sil-

ver. Extraction was 72.9% and 78.6%, respectively. Milling costs were $1.89 per ton.

WILLOW CREEK MINING CO. IDAHO

Address: Andrew Hedin, pres., Mullan, Idaho.

Property: 8 claims between the Carney Copper and Reindeer-Queen mines, on the northern slope of Stevens peak, 4 miles from Mullan. Veins are in quartzite, and ore contains lead and silver.

Development: by a crosscut tunnel started in Carney ground. It is to be driven about 1,000′ to reach a depth of 700′. The length was 500′ by mid-1920.

WISCONSIN MINING CO. IDAHO

Address: W. O. Straight, sec., Kellogg, Idaho. Louis Bolduc, pres.-mgr.

Inc. 1912. **Cap.** $1,500,000; $1 par; assessable. Company is practically the successor of the Gold Leaf Consolidated Mines and the Coeur d'Alene Consolidated Mining Co., the shares of the old companies being made transferable share for share in the new company, upon payment of back assessments. Three mills per share was levied in June, 1920.

Property: 4 claims, unpatented, 2½ miles east of Kellogg, has 800′ of tunnels and crosscuts and one 90′ vertical shaft, developing a vein of 5 to 6′ width, carrying copper ore and a little lead.

Equipment: includes a 2-drill compressor, run by water power from Moon creek, and a hoist. Idle.

WISE BOY GROUP IDAHO

Address: E. W. Oliver, Grangeville, Idaho.

Property: 5 claims, 3 patented, in northern part of Buffalo Hump district, Idaho county, 50 miles by road from Grangeville. Surface exposures are said to be promising.

Development: a 500′ crosscut tunnel and a 200′ shaft. A drift on the vein for 700′ north and 200′ south from bottom of shaft exposes an average thickness of 7′ of ore estimated to run $20 gold per ton. Owing to litigation, mine was closed or 15 years, so that timbering, 10-stamp mill, boiler, engine building, etc., require considerable overhauling. Dumps are said to contain $25,000 of free-milling ore.

WONDERFUL MINING CO., LTD. IDAHO

Office: A. H. Featherstone, sec.-treas., Otterson Blk., Wallace, Idaho.

Officers: W. H. Holden, pres.; with John Taylor, A. H. Featherstone, and H. E. Howes, directors.

Cap. $1,500,000; $1 par; assessable.

Property: 3 patented and 6 unpatented claims, in the St. Joe district, near Mullan, Shoshone county, Idaho, W. of the Bullion mine, on the eastern slope of Stevens peak. Ore carries lead and copper, the former predominating.

Development: by 2 tunnels, 200′ apart, and about 2,000′ long.

YANKEE BOY MINING CO. IDAHO

Out of business. Consolidated in 1920 with the Yankee Girl Mining Co., as **Sunshine Mng. Co.**, which see.

YANKEE GIRL MINING CO. IDAHO

Consolidated in 1920 with Yankee Boy Mng. Co., as **Sunshine Mng. Co.**, which see.

YELLOW JACKET GOLD MINING CO. IDAHO

Reorganized, 1914, as **Mandarin Mines Corp.**, which see.

YELLOW PINE QUICKSILVER MINING CO. IDAHO

Office: 822 Main St., Boise, Idaho.

Officers: J. E. Fox, pres.; J. A. Marks, v. p.; G. G. Adams, sec.; Wm. McIntyre, treas., with O. R. Call, directors.

Inc May 24, 1918, in Idaho. **Cap.** $1,000,000; $1 par; assessable. Annual meeting, May 24.

Property: 4 claims being patented in Yellow Pine district of Valley

county. Examined by W. H. Hill. The deposit is in quartzite and limestone, and carries from 2 to 10% mercury.

Development: by 100′ tunnel, to be extended 300′. About $8,000 was spent during 1918. A 25 or 50-ton furnace was contemplated.

ILLINOIS

The metal mine output of Illinois is practically confined to lead and zinc ores. These come from two distinct areas of very different geologic character. Those of northern Illinois occur in gently folded dolomite and limestone (Galena and Platteville beds) of Ordovician age. The deposits of Hardon and Pope counties occur with fluorite in fissure veins, controlled by jointing and faulting in Mississippi limestone, in the northern extension of the Kentucky fluorspar regions.

Zinc, lead, and silver recoverable from ores mined in northern and southern Illinois during 1920 were valued at $1,052,450, compared with $1,219,151 in 1919. The tenor of the ore in the northern fields may be judged from the following.

	1919	1920
Crude ore, tons	404,000	312,000
Zinc, per cent	2.07	1.87
Lead, per cent	0.40	0.26
Zinc in concentrates, per cent	33.50	32.40
Lead in concentrate, per cent	74.50	74.80
Value of zinc concentrate, per ton	$19.63	$22.03
Value of lead concentrate, per ton	63.51	81.21

As the lead-zinc output of the southern Illinois area is procured as a by-product to the fluorite industry, it is not included in the above figures. See U. S. G. S. Mineral Resources, 1920, Pt. 1, page 120.

AMERICAN ZINC CO. OF ILL. — ILLINOIS

A subsidiary of the Amer. Z. L. & Sm. Co. and described under that title. Operates a zinc smelter at Hillsboro, Ill.

BLEWETT MINING CO. — ILLINOIS

Office: Galena, Ill.

Officers: J. H. Billingsly, pres.-mgr.; J. W. Westwick, v. p.; R. I. McKee, sec.-treas.

Inc. April, 1918, in Illinois. **Cap.** $100,000; $100 par. Company is financed by the Burr Mining Co.

Property: 60 acres of zinc-lead land, 1½ miles N. W. of Galena.

Development: 230′ shaft to be sunk. **Equipment:** mill handling 200 tons of ore each 10-hour shift. Was the third largest producer of sphalerite of the State in 1920.

BURR MINING CO. — ILLINOIS

Address: Connersville, Ind. Controls the **Blewett Mng. Co.**, which see.

Officers: F. C. Bosler, pres.; Jos. R. Mountain, v. p.; P. H. Kinsler, sec.-treas.; J. H. Billingsly, gn. mgr., Galena, Ill.; with J. H. Banghman, directors. F. J. Dewilde, cons. engr.

Inc. in Indiana and Wisconsin. **Cap.** $30,000; shares $100 par.

Property: the Treganza lease, 40 acres mineralized land, near Galena, Ill. A 165′ shaft develops sheet-ground formation.

COLLINSVILLE ZINC CORPORATION — ILLINOIS

Address: 1000 Times Bldg., St. Louis, Mo., or Collinsville, Ill.

Officers: O. F. Mesiter, pres.; A. F. Versen, v. p.-gen. mgr.; R. W. Barrell, treas.; J. T. Williams, Jr., sec., with W. R. Wild, H. W. Schulz, Jos. Carr and C. D. Lukens, directors. Schuyler Frazier, supt.

Inc. 1918, in Delaware. **Cap.** 10,000 shares; no par value; 5,000 shares

outstanding. In January, 1919, company authorized $500,000, 7% first mortgage, convertible gold bonds, due January, 1929; $415,000 outstanding.

Property: the Lost Mill mine of 80 acres at Moselle, Missouri, estimated to contain 300,000 tons of zinc-lead ore and barite. Also a smelter at Collinsville, Ill., of 50 tons daily capacity of metallic zinc, complete in every detail. The original plant was erected in 1873.

Object of the bond issue was to equip a quarter of the smelter for the manufacture of 30 tons of lithopone daily. The demand for this pigment (mixture of 70% barium sulphate and 30% zinc sulphide) is reported large and increasing.

FAIRVIEW FLUORSPAR & LEAD CO. **ILLINOIS**

Address: Rosiclare, Ill. W. C. Bohn, gen. mgr., Rosiclare; S. E. Herl, supt. Golconda, Ill.

Officers: J. M. Blayney, pres.; E. P. Raab, v. p.; D. W. Vayles, sec., with W. H. Saunders, Hugo Eysell and R. A. Griffin, directors.

Inc. in Ill. **Cap.** $550,000.

Property: includes the Good Hope and Extension mines 800 acres at Rosiclare, Hardin county, Ill. and Crittenden county, Ken. The Good Hope, or Fairview-Rosiclare vein, first developed in 1862, is the largest of its type in America. It is a true fault-fissure, between walls of limestone and sandstone. The vein dips almost vertical and strikes N.-S. Fluorspar occurs in lenticular masses, from 2 to 30′ wide, in a gangue of calcite with a little lead and zinc. Orebody continuous into Rosiclare Co. ground.

Development: by 4 shafts, deepest 500′, and extensive workings on the 200 and 500′ levels. The shrinkage system of stoping is generally employed Water is troublesome, and there is danger from flooding.

Equipment: complete with electric power, 6 pumps with total capacity of 7,000 g. p. m., electric locomotives underground, hoist, compressor etc. The mill, of 50-ton an hour capacity includes washer, picking-belt, crusher, rolls, trommels, classifiers, and jigs. A lead concentrate is made carrying up to 80% metal and 8 oz. of silver per ton.

Property closed down, February, 1921, owing to lack of demand for fluorspar.

Production: in 1919, 47,604 tons; 1920, 47,334 tons; 1921, 6,484 tons; or a total of 101,422 tons, of ore carrying 40 lb. lead per ton.

FEDERAL LEAD CO. **ILLINOIS**

Subsidiary of the American Smelters Securities Co.

Office: 120 Broadway, New York. **Works address:** Rudolph Porter, mgr., Federal, Ill.

Operates a smelter with an annual capacity of 96,000 tons of pig lead. Also owns lead mines in **Missouri**; see thereunder for description.

FRONTIER MINING CO. **ILLINOIS**

Office: Fletcher Trust Bldg., Indianapolis, Ind.

Mines at Galena, Ill. See description under Wisconsin.

GREAT WESTERN LEAD MANUFACTURING CO. **ILLINOIS**

Idle and letters returned unclaimed from Galena, Ill.

Property: the Pittsburgh lead mine was the second largest producer in northern Illinois. Workings are down 140′ and a 100-ton mill was operated at last report (1919).

GREAT WESTERN SMELTING & REFINING CO. **ILLINOIS**

Office: 41st and Wallace Sts., Chicago, Ill.

Offices: Ivan Reitler, pres.; Zachariah Lippe, sec.; Joseph Mathes, treas., with David Blum, Emile Benjamin, A. Glanz and Adolph Saltzer, directors. Charles Granberg, supt.

Inc. in Ill. **Cap.** $7,500,000; all outstanding.

Company is a smelter and refiner of metals, mostly secondary material, and has branches at Atlanta, Cincinnati, Cleveland, Detroit, Kansas City, Mo., New York, Pittsburgh, Minneapolis, Portland, Ore., St. Louis, San Fran-

cisco, Los Angeles, Seattle and Vancouver, B. C. The copper furnaces at Chicago have a capacity of 7,000 tons per annum.

HEGELER ZINC CO. ILLINOIS

Operates a zinc smelter at Danville, Ill.

HILLSIDE FLUORSPAR & LEAD MINING CO. ILLINOIS

Address: Rosiclare, Ill.

In 1920, was opening a new mine and building a concentrator, near Rosiclare.

ILLINOIS ZINC CO. ILLINOIS

Address: E. H. Wolff, Peru, Ill. **Eastern sales office:** 280 Broadway, New York.

Company operates a zinc smelter at Peru and manufactures brass, slab zinc and sulphuric acid. All operations were suspended early in 1921. Has been one of the best buyers of Wisconsin zinc ores for years. Employs 1,000 men at zinc, acid and sheet mills, and its coal mines, when operating at normal capacity.

JOPLIN SEPARATING CO. ILLINOIS

Address: Galena, Ill.

Company has a roasting and magnetic separation plant of 50 tons capacity in 10 hours. Mill product carrying 16 to 40% zinc is partly roasted (without sizing) in a rotary tube, and then passed through a Cleveland-Knowles separator, which gives a 58% product.

LANYON ZINC & ACID CO., R. H. ILLINOIS

Property: a zinc smelter at Hillsboro, Ill.

MATTHIESSEN & HEGELER ZINC CO. ILLINOIS

Office: La Salle, Ill.

Officers: Jos. Brennemann, pres.; C. B. Lihme, v. p.; Geo. P. Blow, sec., with M. H. Carus, F. W. Mathiessen and F. O. Wetmore, directors. H. C. Nichol, treas.

Owns and operates large zinc oxide and spelter furnaces, etc., and is a noted buyer of pure and high-grade zinc ores from the Missouri-Oklahoma and Wisconsin fields. Is also a manufacturer of sulphuric acid, zinc sheet, plate and ribbon.

Company also has a mine in Illinois, producing coal for use at its smelters. Officers of the subsidiary are Joseph Brennemann, pres.; G. B. Blow, v. p.; C. B. Lihme, sec.; H. C. Nichol, treas.; M. A. Field, mgr. and D. McCrindle, supt.

Reported to be controlled by Schwab interests since Jan., 1921.

MINERAL POINT ZINC CO. ILLINOIS

Subsidiary of the **New Jersey Zinc Co.**, 160 Front St., New York.

Among other activities, operates a zinc smelter at Depue. See description of mines under company's name in Wisconsin section of this volume.

NATIONAL ZINC CO., INC. ILLINOIS

Subsidiary of **International Minerals and Metals Corp.**, which see.

Address: Springfield, Ill.

Operates a zinc custom smelter at above address, of 7 blocks with a total of 4,480 retorts, and an acid plant. Plant closed during 1921.

See also description of zinc smelter at Bartlesville under Oklahoma and of acid plant at Argentine, Kansas.

NORTHWESTERN MINING CO. ILLINOIS

Out of business. Described in Vol. XIV.

OHIO VALLEY FLUORSPAR CO. ILLINOIS

Address: care E. P. Earle, 165 Broadway, New York City.

PIGMY MINING CO. ILLINOIS

Owned by Rosiclare Lead & Fluorspar Co. **Address:** Rosiclare, Ky.

ROSICLARE LEAD & FLUORSPAR MINING CO. ILLINOIS

Address: Mills Bldg., Washington, D. C. **Mine address:** Rosiclare, Ill.

Officers: Benedict Crowell, pres., 407 Perry Payne Bldg., Cleveland, O.;

Edw. B. McLean, v. p.; F. H. Bugher, sec.-treas. W. P. Hanson, gen. mgr.; E. C. Clark, supt.

Property: at Rosiclare, Hardin county, is the largest fluorspar mine in the world. Developed to depth of 620′ and equipped with 500-ton mill, designed to save lead and zinc, by jigs and tables.

ST. LOUIS SMELTING & REFINING CO. — **ILLINOIS**

Subsidiary of **National Lead Co.**

Works address: Collinsville, Ill.

Operates a lead smelter and refinery. For further details, see same title under Oklahoma.

SANDOVAL ZINC CO. — **ILLINOIS**

Operates a zinc smelter at Sandoval, Ill.

SPAR MOUNTAIN MINING CO. — **ILLINOIS**

Address: Martin Schwerin, mgr., Cave-in-Rock, Ill.; John W. H. Blee, supt.

Officers: A. H. Strong, pres., 120 Broadway, New York; Chas. J. W. Mackelvey, sec.

Inc. in Delaware.

Property: a fluorspar mine at Cave-in-Rock, developed by 600′ tunnel, with 5,000′ of drifts and crosscuts. Equipped with hoist, compressor, and 120-ton mill. Galena does not apparently occur as in the case of some Illinois fluorspar mines.

VINEGAR HILL ZINC CO. — **ILLINOIS**

Address: Platteville, Wisconsin.

See description under this title in Wisconsin section, this volume.

WISCONSIN ZINC CO. — **ILLINOIS**

Subsidiary of the American Zinc, Lead & Smelting Co., 55 Congress St., Boston, Mass.

Address: Platteville, Wisconsin.

Property: the Birbeck zinc mine in the Galena district, northern Illinois.

INDIANA

AMERICAN ZINC PRODUCTS CO. — **INDIANA**

Office: Greencastle, Ind.

Officers: W. A. Taylor, chairman; C. W. Martin, pres.; C. C. Stewart, v. p.; C. H. Stewart, sec.

Inc. in Ohio. **Cap.** $1,400,000.

Works: modern zinc-rolling mill on Pennsylvania railroad, with monthly capacity of 1,000 to 1,500 tons of zinc plates and sheets. Described by J. H. Dietz in "E. & M. Journal" of Nov. 2, 1918.

GRASSELLI CHEMICAL CO., THE — **INDIANA**

Address: Terre Haute, Ind.

A zinc smelter and acid plant. See company under U. S. section.

GRASSELLI REFINERY — **INDIANA**

See **U. S. S. Lead Refinery, Inc.**, of Indiana.

INTERNATIONAL LEAD REFINING CO. — **INDIANA**

Subsidiary of the **Anaconda Copper Mng. Co.**

Works address: G. P. Hulst, supt., East Chicago, Ind.

Operates a lead refinery; see under **International Smelting Co.** for description.

U. S. S. LEAD REFINERY, INC. — **INDIANA**

Also known as the "Grasselli Refinery".

Works address: F. Y. Robertson, pres., East Chicago, Indiana. Operates a custom electrolytic lead refinery. Is a subsidiary of the **U. S. Smelting, Refining & Mining Co.**, which see for details.

KANSAS

For Kansas see Tri-State district under Missouri.

KENTUCKY

Lead and zinc ores occur in both central and western Kentucky, the latter being the well known fluorspar region that extends into Illinois. Production for 1920 was 172 tons of lead concentrate, containing 122 tons of lead valued at $12,295, and 25 tons of zinc carbonate valued at $1,458. This is the lowest production for many years.

AMERICAN SPAR CO. KENTUCKY

Address: Salem, Livingston Co., Kentucky.

Operated the Hudson mine, owned by the Eagle fluorspar Co., during 1920, but made no shipments.

KENTUCKY FLUORSPAR CO. KENTUCKY

Address: care C. W. Haynes, Marion, Ky.

PERSON, J. M. KENTUCKY

Address: Marion, Ky.

Operated several properties in 1920-1921.

ROBERTS FLUORSPAR & LEAD CO. KENTUCKY

Address: Marion, Kentucky.

MAINE

DOUGLAS COPPER MINE MAINE

Address: Blue Hill, Hancock Co., Maine. Was operated by American Smelting & Refining Co. for the 60,000 tons of fluxing ore developed on property, but was closed early in 1919. Mining was done through a 300′ inclined shaft. The silicious chalcopyrite ore was treated by flotation in a 125-ton mill. It yielded well in copper, with a little gold and silver.

PISCATAQUIS IRON CO. MAINE

Address: Frederick Hill, pres.; Bangor House, Bangor, Maine.

Property: the Katahdin iron mine, on the Bangor and Aroostock railway, in Piscataquis county, Maine, 85 miles from tidewater. Examined late in 1917 by E. S. Bastin for U. S. Geological Survey. Under option to J. S. Morris 206 Spring Street, Portland, Maine. Mine was worked from 1846 until 1890 for iron ore, the gossan being mined. Beneath this is an orebody, 300′ to 700′ wide and 2,300′ long, estimated to contain 5,000,000 tons of pyrrhotite, running 42 to 50% iron and 26 to 35% sulphur. It was proposed to extract the ore by quarrying, and sell it for its sulphur content. Total costs of delivering ore to New York or nearby were estimated at $4 per ton under conditions prevailing in 1918 and $2.90 for normal times.

MARYLAND

BALTIMORE COPPER SM. & ROLLING CO. MARYLAND

Address: W. H. Pierce, gen. mgr., Baltimore Copper Works, Fourth Ave. and Fifth St., Canton Baltimore, Md.

Officers: Wm. H .Peirce, pres.; F. H. Brownell, v. p.; H. A. Thoman, sec.; Chas. N. Sappington, treas. Company succeeded the Baltimore & Cuba Smelting & Refining Co., which built the first American copper smelter, 1845, and is controlled, through stock ownership, by American Smelters Securities Co., a subsidiary of the A. S. & R. Co.

Lands: 45 acres, located on one of the best harbors of the Atlantic seaboard, with direct rail connections, being advantageously located for both domestic and foreign business. The plant is large and modern, including a nickel refinery, electrolytic plant, and sheet copper rolling mill. The electrolytic refinery, of 1,000 tons daily capacity, has anodes arranged on both series and multiple plan. Material treated is entirely auriferous and argentiferous, being received in the form of blister copper from various western states, and from several foreign countries. Works normally employ about 3,000 men.

CHROME MINING CO. **MARYLAND**

Address: Lee W. Squier, sec., Finance Bldg., Philadelphia, Pa.

Property: the State Line mine in Cecil county, near Rock Springs. This old property was unwatered in 1918 by present company. Producing in 1920.

GREAT FALLS MINE **MARYLAND**

Formerly called the Hill-Townsend gold mine, in Montgomery county, Md. In 1914 the old workings were cleaned out, the shaft re-timbered and new drifts run. The 25-ton tube mill was only used to make tests of ore mined.

MARYLAND CHROME CORPORATION **MARYLAND**

Address: F. A. Dolfield, pres., Canton National Bank Bldg., Baltimore, Md.

Property: chrome deposit, 4 miles W. of Owings Mills, and 15 miles N. W. of Baltimore, owned by the Tyson Mining Co. Was the first chrome mine of this country, opened in 1827.

TYSON MINING CO. **MARYLAND**

Address: W. H. Pleasants, Tyson Estate, Baltimore, Md. See under California for further details. Maryland holdings operated by **Maryland Chrome Corporation.**

UNITED M. M. & COPPER SM. CO. **MD. AND PENNSYLVANIA**

Idle. **Office:** Frederick, Md. Mines at New London, Md., and Charmian, Pa. A. L. Wickart, sec., Allentown, Pa.

Inc. 1913, in New Jersey, as a merger of the Eagle Metallic Copper Co. and the Linganore Copper Co., now dead. Owns all the property of Linganore C. Co. **Cap.** $2,000,000.

Property: 806 acres, in 2 groups, include the Dolly Hyde, New London, and Eagle mines, on the Western Maryland and Baltimore & Ohio railroads.

The Dolly Hyde mine, 220 acres, was for many years the principal copper property of Maryland, though never a large producer. The mine has contact deposits in dolomite and phyllite, carrying a little malachite in the upper workings, succeeded at shallow depth by bornite and chalcopyrite in white marble.

The New London or Linganore mine, 86 acres, with 14 acres of timber land, was opened and worked 1835-55, apparently at a profit, and was idle after 1881, until reopened, May, 1907, but is again idle. The property has two 4 to 5′ fissure veins in slate, with N.-E. strike, carrying bornite and gray copper, estimated to average 3% copper and 16 oz. silver per ton, with a trace of gold. Development is by a 250′ shaft and 4 tunnels, longest 340′, with a total of 1,095′ of workings, estimated to block out 17,307 tons of ore for stoping.

The New London mine has a 65-h. p. steam plant, with a 35-h. p. hoist, good for 500′ depth, and an 8-drill air compressor. There are 12 buildings.

The mill, 40x25′ in size, consisting of a ball mill and slime tables, was built in 1911.

The Eagle mine comprises 500 acres near Charmian, including an old copper mine, never successfully worked. Property shows a mineralized zone of 400′ average width, carrying native copper, chalcocite, bornite, chalcopyrite and tetrahedrite, averaging about 2 oz. silver per ton, with

traces of gold. Mine has a 480′ shaft at 40° incline, in ore from surface, giving assay up to 6% copper, but is worked opencast.

Equipment: includes a 175-ton smelter and 150-h. p. steam plant.

MASSACHUSETTS

DAVIS SULPHUR ORE CO. **MASSACHUSETTS**

Address: C. B. Stranahan, pres., 65 Wall St., New York.

Inc: 1907, in New York. **Cap.** $25,000; $100 par; all issued.

Property: an old and long-worked pyrite mine at Davis, Franklin county, Mass., idle several years.

MERRIMAC DEVELOPMENT CO. **MASSACHUSETTS**

Address: T. C. Woodworth, pres., Newbury, Mass. Walter Norris, supt.

Property: old Chipman mine, at Highfield, 3 miles S. W. of Newbury, Essex county, and 32 miles from Boston, reopened in 1919. The Chipman lode is the principal orebody. It is a replacement vein containing galena and pyrite, with some tetrahedrite, chalcopyrite, sphalerite and bornite.

Development: by 220′ shaft and 2,100′ of workings. The shaft is to be sunk 300′ further. A carload of lead-sulphide ore containing gold and silver returned $67 per ton.

Equipment: steam power, hoist, compressor, etc.

NEW ENGLAND MINING CO. **MASSACHUSETTS**

Office: 35 School St., Greenfield, Mass. **Mine office:** Chalemont, Franklin county, Mass. Othello A. Fay, pres.; E. Forrest Sweet, sec.; Capt. Geo. H. Davenport treas, and gen. mgr., at last accounts.

Inc. 1902. **Cap.** $500,000; shares $5 par.

Property: about 1,000 acres, 2 miles west of the Davis pyrite mine. Vein traceable 700′, is approximately vertical, conforming closely in dip and strike with the Savoy schist in which it occurs. Deposit apparently is a fahlband, lacking well-defined walls, ore occurring scattered through 15 to 20′ of the schist, with 6 to 12″ of quartz, well mineralized, on the south wall, and a heavy impregnation of chalcopyrite, 1 to 2′ wide, on the north wall. Property has been partly stripped, and vein trenched across. Idle.

MICHIGAN

Michigan contains the oldest iron and copper mines of the country, in continuous operation for three quarters of a century and still producing. The mining companies are described alphabetically and not grouped—as heretofore—geographically, or by metal content.

The copper production for 1920 was 154,695,073 lbs. copper and 470,189 oz. silver of a total value of $28,976,399, compared with 178,826,486 lbs. copper and 441,430 oz. silver of a total value of $33,756,128 in 1919; of $56,527,619 in 1918 and $70,376,231 in 1917, the record production.

Normally, the American production of iron ore is about 60,000,000 tons, but was only 35,349,876 tons in 1920. Of this, the Lake Superior region contributes 85%, Michigan accounting for 25%. There are three iron ranges or districts in Michigan, namely the Gogebic, Marquette and Menominee. Part of Gogebic is in Wisconsin, but the most important, section is in Michigan. The iron formation rests on quartzite, cut by igneous dikes. The ores are mostly soft, red hematites, carrying 54% iron, 0.03% phosphorus, and 6% silica. Some of the mines are over 2,000 feet deep.

The **Marquette** range is smaller than the others. The formation lies in quartzite and greenstone, and is cut by dikes. The ores are massive or micaceous hematite (rarely magnetite) similar to those of the Gogebic area, but carry 60% iron, 0.5% phosphorus, and 7% silica. The mines are also deep, down to 2,200 feet. The **Menominee** range though usually considered a

Michigan district, is partly in Wisconsin. In Michigan, the productive formation occurs in steeply-dipping narrow belts, resting on dolomite and overlain by slate. The ores are soft, bluish-black hematites containing 55% iron, 0.6% phosphorus, and 5% silica. Mining is conducted to a depth of below 1,500 feet.

From the various ranges the ore is transported by rail to docks on Lake Superior, carried by steamer to lower points, and then by rail to furnaces at Pittsburg and other centers.

ADVENTURE CONSOLIDATED COPPER CO. **MICHIGAN**

Office: 52 Broadway, New York. **Mine office:** Greenland, Ontonagon county, Mich.

Officers: W. Parsons Todd, pres.; W. A. O. Paul, sec.-treas.; Chas. J. Devereaux, W. R. Todd, Jas. L. Bishop, J. S. Dunstan and Chas. D. Hanchette, directors; E. W. Walker, supt.

Inc. Oct. 17, 1898, in Michigan. **Cap.** $2,500,000; shares $25 par; paid in, $24. American Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agt. Annual meeting, first Thursday after first Wednesday in June. Stock listed on Boston Stock Exchange.

An assessment of $1 per share was levied July 20, 1911, and again in March, 1916, On December 31, 1918, debit balance was $11,295, which compared with $11,892 on December, 1917, and $53,784 credit balance on December, 1916. Gross receipts for 1918 totals $14,436 and expenses were $13,839, which compares with gross of $205,832 and expenses of $271,506 in 1917. The 1918 receipts came from rent, and sale of copper and silver on hand. In 1919, revenue was $4,942 and expenses $13,417. Current assets at end of 1919 were $17,095 and liabilities $36,865; balance of liabilities over assets, $19,770.

Property: consists of 3 old mines, the Adventure, Knowlton and Hilton opened in 1850, 1853 and 1863 respectively, 1,696 acres on the mineral belt, also a mill site on Lake Superior. The mineral lands are located in Secs. 35 and 36, T. 51 N., R. 38 W., and in Secs. 1 and 2, T. 50 N., R. 39 W. The tract is surrounded by the Toltec, South Lake and Mass ground. The village of Greenland lies on the northwestern corner of the Adventure's principal tract, and the village of Maple Grove, controlled by the company is near the mine.

The old Adventure mine was opened 1850, along a line of ancient pits showing prehistoric mining. The largest annual production was 233,941 lbs, fine copper, 1857. After being closed by owners, the old openings were worked for years by tributors, proving notably rich in silver.

The Hilton, or Ohio mine, opened 1863, on the Mass lode was never worked vigorously. The Knowlton was opened in 1853. These three old mines made 1,949,173 lbs. fine copper, previous to their merging as the Adventure Consolidated which started work November 1, 1898.

The **Adventure** property is crossed by the Evergreen belt of Ontonagon county, a series of upturned beds of trap, amygdaloid and conglomerate, 7 of these amygdaloidal beds carrying copper on the Adventure tract in a distance of 1,200′.

The cupriferous beds of the Evergreen belt though very rich in places are bunchy. On the Adventure tract the lodes run N. 73° E. on the main tract, where operations were conducted, shafts being sunk at an angle of 45°.

There are 5 shafts, No. 5 being 1,520′ deep. The No. 1 lode, opened by an 80′ crosscut on the 1,021′ level was drifted upon for a distance of about 200′ and disclosed very little copper. An 1,150′ exploratory crosscut south and west on the 1,500′ level intercepts 3 beds, designated as No. 2, 3 and 4, cutting the first at a distance of 634′, the second at 880′ and the third at 1,015′ from the shaft. These lodes, opened by drifts out from the crosscut, are practically without promise so far as opened. A fifth lode, No. 1½, first

encountered in shaft sinking, is opened for a distance of about 130' at a depth of 1,190' in the shaft, and had a fair showing.

The new Mass lode, so-called, lying about 120' S. E. of the Evergreen bed, shows a width of 8 to 12', but carries flaky copper, with considerable epidote.

Production has been as follows: 23,572 lbs. in 1900; 29,361 lbs. in 1901; 606,211 lbs. in 1902; 2,182,608 lbs. in 1903; 1,380,480 lbs. in 1904; 1,606,208 lbs. in 1905; 1,552,628 lbs. in 1906; 1,244,874 lbs. in 1907; 16,500 lbs. in 1916, and 652,977 lbs. in 1917. Shipments to the Winona mill recommenced in November, 1916, and gradually increased up to May, 1917, when about 300 tons per day were sent out.

Operations were suspended in Oct., 1917 and have not been resumed since.

AHMEEK MINING CO. MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. **General Office:** Calumet, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; with Wm. A. Hodgson, Thomas L. Chadbourne, Jr., John T. Burnett, and Q. A. S. McKean, directors; Clarence H. Bissell, sec.-treas.; G. L. Osgood, Jr., asst.-sec.-asst.-treas.; Ocha Potter, supt.; A. L. Burgan, mill supt.

Inc. March 22, 1880, in Michigan and charter extended, 1910, for 30 years. **Cap.** $5,000,000; shares $25 par; fully paid, all issued increased June 8, 1915, from a capitalization of $1,250,000, par $25, paid in $17. In the change four new shares were given for each old share issued. Last assessment $5, paid February 5, 1905. American Trust Co., Boston registrar; State Street Trust Co., Boston transfer agent. Listed on Boston Stock Exchange. Annual meeting, second Tuesday in April.

Dividends: in 1911, $5; 1912, $22; 1913, $17; 1914, $4; 1915, $13, on old capitalization and $5 on new; 1916, $14; 1917, $14; 1918, $8; 1919, $3; 1920, $1.50, making a total of $12,150,000.

Is controlled by Calumet & Hecla Mining Co., through ownership of 99,168 shares out of a total issue of 200,000 shares.

Balance Sheet as of June 30, 1921, shows the following:

Assets.

Real estate	$2,538,548
Buildings and machinery	2,950,024
Fair value of mineral deposits	30,832,335
Development and underground equipment	1,042,422
Cash	212,439
Notes receivable	511,200
Accounts receivable	342,598
Reserve for pledged copper	35,784
Copper	2,626,915
Supplies	115,890
Profit and loss	3,869,555
Total	45,077,733

Liabilities.

Capital stock	$5,000,000
Reserve for depletion	7,071,288
Reserve for depreciation	1,549,781
Mineral deposit supplies	30,832,355
Reserve for foreign sales	511,200
Accounts receivable	113,108
Total	45,077,733

Current assets exceeded liabilities by $3,079,475 at end of 1921; $3,235,289 in 1920; $2,709,065 in 1919, $2,438,720 in 1918; $1,505,444 in 1917; $2,233,364 in 1916; $1,583,654 in 1915, and $968,772 in 1914.

Income account year ended December 31:

Year	Net Income	Miscel. & Taxes	Dividends	Balance
1920	$159,630	$601,549	$300,000	$741,919 (a)
1919	640,423	.....	600,000	709,536 (a)
1918	3,174,625	1,640,000	1,600,000	122,992 (a)
1917	3,157,889	1,047,635	2,800,000	727,920 (a)

(a) Deficit. In 1918 the increase in reserves for depreciation and depletion totaled $624,456, making a surplus balance of $501,464.

Unsold copper on hand Jan. 1, 1921, 17,003,646 lbs. carried at 13¢, or $2,283,154 and Dec. 31, 1921, 9,892,100 lbs. carried at 14c., or $1,384,894.

Property: 931 acres, lying between the Mohawk and Allouez mines, acquired 1880, from the Seneca Mining Co., in order to mine the Kearsarge or Houghton conglomerate. Under the management of Capt. John Daniell, 2 shafts were sunk on this bed, which averages about 70′ width, with 3 paystreaks of 2 to 3′, aggregating 7′ width, each carrying copper in good quantities, but bed not payable as a whole, owing to great width of partly or wholly barren rock. Boundary lines were rectified, by exchange of 11.18 acres with Allouez, July, 1903, and by a similar exchange of 20 acres, with Mohawk, 1909, giving straight boundary lines on the dip of the bed, permitting easier development by all mines concerned. Work on the present mine was started 1902, after work at the Mohawk had disclosed the position and trend of the Kearsarge lode.

The Kearsarge bed, on which the present mine is opened, varies from 14 to 18′ in width, with but little poor ground in the entire mine. Openings are carried ahead of stoping requirements, and blocking out is almost entirely by drift stopes, which are carried about 9′ wide and 14′ high, to the boundary limits, where extraction is begun and brought backward to the shafts, reducing timber requirements to a minimum. The mine keeps 3,000,000 to 3,500,000 tons of stamp rock blocked out for stoping. All levels below the first are 125′ apart. A Richmond electric bell signal system connects all underground workings with the engine rooms, and underground stations are connected with surface by telephone. Concrete is substituted for timber in the construction of the shafts, and in other places where practicable, rendering the shafts as nearly fireproof as possible. Mules are used in tramming rock underground.

Development: the mine has 4 shafts, numbered from south to north, planned to develop the entire tract. Nos. 1 and 2 shafts, 1,445′ apart, sunk at 42°, are each 8x17′ 4″ in size, with 2 hoisting compartments and a ladderway. These shafts were 2,799′ and 3,677′ deep respectively at end of 1920. Each shaft has, between the 9th and 10th levels, a 400-ton rock bin, equipped with a measuring hopper holding exactly one 7-ton skip load, loaded in 20 seconds by one man, this system saving much time, and confining hoisting of all rock mined down to 10th level to one point in the shaft. No. 1 shaft is bottomed 43′ below 22nd level, in a shattered area, requiring close timbering. The 20th level, has been holed through to corresponding level of No. 2 shaft, through which rock mined below the 22nd is hoisted. No. 2 shaft can be sunk much deeper before lode passes into Allouez ground.

The No. 1 shaft workings all show ore of averaged quality, save the stopes on No. 10, 11, 14, and 16 levels south, beyond the disturbed area. The 10th and 16th levels south have reached property boundaries.

During 1916 and up to April, 1917, exploration was continued in the Kearsarge comglomerate, when work was temporarily suspended owing to labor shortage. The Kearsarge conglomerate was cut in 1916, on level

No. 10. shaft No. 2, when a drift was driven at right angles to general strike of the lode and continued as a crosscut, 1,352′ W. of the Kearsarge lode. The body is 36′ wide, and carries a little copper in streaks.

During 1919, all shafts opened ground of average grade. In 1920, shafts 2 and 3 were sunk 144 and 200′, respectively; No. 1 shaft having reached the Allouez boundary will cease to be a producer. Drift extensions on the Ahmeek fissure at No. 2 shaft were made on 15, 16, 17, 19, 20, 22, 23 and 24 levels, the 16th opening rich ore and mass copper. At No. 3 shaft, the 22, 24 and 25th levels were advanced. The use of power shovels will hereafter permit of higher stopes and fewer new levels.

The northern end of the mine is developed by two shafts known as Nos. 3 and 4, which have a common collar, being only 6′ apart at surface, but diverging north and south, from the surface, at an angle of 42°. These shafts are sunk through 70′ of overburden, and are concreted into the solid rock ledge for depth of 95′ from surface, the outcrop of the Kearsarge lode being owned by the Mohawk, Ahmeek having only the underlay at its northern end, shafts 3 and 4 are sunk in the hanging, at an angle of 80° on a plane corresponding longitudinally to the strike of the bedded formation, and bend at depth of 980′, in a curve with a radius of about 400′, bringing the shafts to 34°, to correspond with the rather flat dip at the Kearsarge bed, both shafts entering the bed at depth of 1,275′. Concrete sets and stringers have been used in these shafts wherever ground would permit. Each shaft has 3 compartments, with two 8x8′ skipways and a 4x8′ ladderway. The upper portion of the bed was worked by crosscuts, beginning at 1,020′ in No. 4 shaft which is the 1st level in this and No. 3 shafts, though there are 3 stations above the point where the bed intersects, from which crosscuts will be run to the Kearsarge bed, to the Mohawk line. No. 3 shaft was 3,241′ and No. 4 was 2,880′ deep at end of 1920.

During 1917 and 1918 a commercial grade of "rock" showed in all the openings of shafts No. 3 and 4. In shaft No. 3, the 17, 18 and 19 levels south, reached the Mohawk boundary and levels N. 16 to 19 north correspond with those of No. 4 shaft.

New openings totaled 3,018′ in 1921; 14,657′ in 1920; 17,771′ in 1919; 13,085′ in 1918; 16,085′ in 1917; 12,848′ in 1916, and 8,769′ in 1915.

Equipment: the main power house is in 2 parts, of brick and steel, with composition roof. Equipment of No. 1 power house includes 60-drill and 50-drill cross-compound 2-stage air compressors, and a 32x72″ cylinder hoist. The electrical plant consists of a 13x26″ tandem-compound engine, direct-connected to a 200 k. w. 250-volt generator. Condenser pumps and reheaters are located in the basement. No. 2 engine house is a duplicate of No. 1, containing a similar hoist with double conical drums with maximum diameter of 18′6″, capable of hoisting 10-ton skips in counterbalance from 1 mile depth. Nos. 1 and 2 engine houses are connected to a steel-frame boiler house, having six 200 h. p. boilers, with room for 8, equipped with feed pumps, ash sluices, coal trestle, etc. The boiler house has a self-supporting steel smokestack, 150′ high and 7′ 6″ in diameter, on a sandstone-faced concrete base. A 1,360 cu. ft. compressor was installed early in 1917.

Shafts 3 and 4 are equipped with two 32x72″ cylinder hoists, a triple-expansion compressor, and turbo-generator, housed in a brick structure, 65 x 146′, with corrugated-iron roof; a steel boiler house, 57x84′, with corrugated-iron roof, housing eight 200 h. p. boilers, and a steel self-supporting brick-lined smokestack, 7′ diameter and 140′ high. There is also a change house of brick construction, 39x139′. One shaft rock house serves both shafts.

Storage battery locomotives to be used for tramming were installed 1917-1919 as follows: 6 in shaft No. 2; 2 in shaft No. 3 and 5 in shaft No. 4. In 1919, 32 five ton cars were installed on levels of shafts 3 and 4. Power scrapers in stopes were adopted in 1920.

The central crushing plant, of brick, is 800′ north of No. 1 shaft, and 624′ south of No. 2 with which the plant is connected by a temporary frame

trestle 37′ high and 14′ wide, carrying a double track for 7-ton tram cars, which are dumped by means of cradles, and rock directed by grizzlies and chutes to the crusher, below which is a hopper, feeding directly into a shaker driven by a 7½ h. p. electric motor, crushed ore being fed automatically into a link-belt conveyor driven by a 35 h. p. motor, going to the rock bin. The crusher building, of steel, contains 3 Farrell crushers, driven by a 12x24″ engine, and tram cars are actuated by two 35 h. p. motors, located in the 2nd story of the building. Crushed ore goes to a 1,600-ton cylindrical steel rock bin, 32′ in diameter and 48′ high, set on concrete piers, with tunnel and railway track beneath, permitting the filling of cars by gravity, 1 man loading a 40-ton car in 10 seconds.

Mine buildings include office, machine shop, warehouse connecting with railway tracks; an office for mining captains and timekeepers, smithy, cold-storage shed, and about 100 dwellings. The locality is protected by a water system having 6,000′ of 6″ mains with 16 Ludlow hydrants. Water is taken from an 8′ dam across the outlet of Seneca lake. A large water supply could be developed from Ahmeek lands near the Allouez boundary, and an inexhaustible, supply is available from Lake Superior, 4 miles distant, but about 600′ lower. The fire-protection system connects with that of the Calumet & Hecla.

The Mineral Range and Keweenaw Central railway lines run to the mine, the former connecting mine and mill over a steel trestle 100′ high.

The stamp mill, at Hubbell, on Torch lake, has 8 heads, each stamp breaking about 500 tons of rock daily. The mill site has a frontage on Torch lake, of about 2,000′ with a maximum water depth of 90′, providing for tailing sands for many years.

The mill is steel and concrete throughout. Stamps rest on concrete piers, each standing on a concrete slab 4′ 6″ thick, that rests directly upon a hard pan of closely cemented gravel. Each slab holds about a mile of wire cable interlaced upward on its surface and reaching into the pier above, which is 40x40′ at the base, pyramidal in form and 38′ high, giving the stamps an elevation of about 50′ above lake level. There are four 1,000-ton rock bins. The mill has double-deck floors, the jigs being located on the upper or roughing floor, and sands overflowing to Wilfley concentrators on the ground floor. The jigs and tables are run by electricity.

The mill power house has six 200 h. p. boilers, and a low pressure steam turbine. The plant has a 300 k. w. generator, and a pump of 40,000,000-gal. daily capacity, capable of supplying water for 8 heads, connected with Torch lake by a 600′ pipe intake.

Production:

Year	Tons Ore Treated	Lb. Cu p. t. Ore st'pd	Cost(a) p. t.	Lb. Copper Produced	Tot. Cost per Lb. cents	Rec'd per Lb. cents
1921*.....	212,170	29.48	.....	6,255,200	14.56	12.86
1920.....	822,192	24.9	$2.62	20,489,438	16.08	18.60
1919.....	756,870	22.8	2.59	17,223,111	14.02	18.81
1918.....	1,196,541	20.8	2.18	24,851,235	14.30	24.30
1917.....	1,271,275	22.0	1.74	27,919,812	9.42	17.42
1916.....	1,164,010	20.7	1.46	24,142,158	11.47	25.72
1915.....	948,874	23.0	1.26	21,800,492	7.96	18.28
1914.....	590,519	23.1	1.55	13,634,605	9.71	13.08
1913.....	383,749	24.0	1.77	9,220,874	13.30	15.42
1912.....	652,260	25.2	1.39	16,455,769	7.85	16.61
1911.....	598,549	25.4	1.42	15,196,127	7.17	12.85
1910.....	530,365	22.3	1.42	11,844,954	11.05	12.94
1909.....	406,045	22.7	....	9,198,110	15.48(b)	13.39
1908.....	298,178	21.1	....	6,280,241	12.66	13.36

(a) Includes mining, transportation, stamping and taxes. (b) Due to unusually heavy construction costs. * 3 months.

Copper production is marketed through the United Metals Selling Co. Reserves not officially given are maintained at about 5,000,000 tons, and the life of the mine is estimated at 18 years, with present output.

Operations ceased, April 1, 1921.

ALGOMAH MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon county, Mich.

Officers: R. M. Edwards, pres. and gen. mgr.; S. L. Powers, v. p.; Henry Tolman, treas., with A. C. Paine and Thos. S. Woods, directors. Thos. Bennetts, supt.; Wm. Wearne, mg. capt. Albert L. Wyman, sec

Inc. June 4, 1910, in Michigan. **Cap.** $2,500,000; shares $25 par; issued 70,000 shares; paid in $13. Last assessment, May 18, 1916, $1. Of the capitalization, 60,000 shares were given land owners in full payment for property and 10,000 shares were sold to public at $10 per share. Annual meeting, third Tuesday in April. American Trust Co., Boston, transfer agent; Federal Trust Co., Boston, registrar Stock is listed on the Boston Stock Exchange.

Financial statement: in 1919, current assets exceeded liabilities by $5,078; in 1918, surplus of $10,331; in 1917, surplus of $16,868; in 1916, surplus of $26,470; in 1915, deficit of $18,133; in 1914, surplus of $14,597; in 1913, surplus of $27,707. At the end of 1919 the profit and loss account stood at $269,640 and on Dec. 31, 1920, at $275,588 with a deficit for the year of $5,948.

Property: 480 acres, adjoining the Lake mine in Ontonagon county, Michigan, being the N. ½ and S. W. ¼ of Sec. 3 T. 50 N. R. 30 W. Property was formerly owned by a company of the same name, which began work in 1852, and did a little prospecting with negative results, expending about $65,000.

Development: an 8x12′ exploratory shaft, was over 560′ deep at end of 1916. For the first 95′ the shaft was in amygdaloid vein material, passing into the hanging wall at about 95′ from surface. The first level, opened at 104′, has about 2,350′ of drifts, and a 90′ crosscut to the eastern sandstone. The second level, 212′ from surface, has a crosscut northwest across the formation which, for more than 1,000′, exposes almost solid trap, a small amygdaloid bed 560′ from the shaft, showing some native copper in about 680′ of drifts. The Algomah bed, in which the shaft is sunk, apparently has a dip of about 80° and a width ranging from about 40′ at the first level to about 60′ at a depth of 470′, as indicated by diamond-drill borings.

The Algomah bed is peculiar in both strike and contents, the strike being apparently nearly north and south, in line with the strike at the Lake mine, to the north. The bed carries copper oxide instead of the native copper found in all of the other copper mines of the Lake Superior district thus far opened on the bedded formation of the Keweenawan series.

Ore is mainly black oxide, or melaconite, carrying traces of native copper, and chrysocolla ore of 16 to 19% assay tenor was found in a test pit near the shaft. Assays made of a small quantity of selected ore, removed in the course of shaft sinking, gave a copper value of 24.1%, this sample representing one-eighth of the entire body of material taken from the shaft.

Extensive diamond-drilling west of the orebody to great depths has given conflicting results so that little is known concerning dip, strike or value of the several copper-bearing formations encountered. A shipment of selected ore made in 1914 yielded 5,005lb copper and sold for $1,695. A few shipments of ore, taken from above the 40′ level, ran 14% copper. Shaft sinking, is expected to encounter the lodes worked in the Lake and South Lake mines, as they flatten downward and dip toward the Algomah ground. Shaft sinking and all mining operations have been stopped since 1917 owing to high costs and adverse labor situation.

Equipment: includes a steam hoist, with capacity to lift a 3-ton load from a depth of about 500′, and an air-compressor. Buildings include a

power plant, office and boarding houses. Property considered promising.

ALLOUEZ MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Allouez, Keweenaw county, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; with Harry F. Fay, D. S. Dean, E. B. Dane, Geo. S. Mumford, D. L. Pickman and Alex. Whiteside, directors; Geo. G. Endicott, sec.-treas.; H. L. Bennett, asst. sec.-asst. treas.

Inc. Sept., 1859, in Michigan. **Cap.** $2,500,000; shares $25 par; paid in $22.25; last assessment, $3 a share, levied 1904. Capital was increased in 1889, from $500,000, shares $25 par. At that time company was reorganized and reincorporated. Annual meeting, second Wednesday in April. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Owns 36,164 of the 100,000 shares in the Lake Milling, Smelting & Refining Co. Is controlled through ownership of 41,000 shares, by Calumet & Hecla Mining Co.

Dividends: initial dividend, $1 per share, July 31, 1915; $7 in 1916; $12 in 1917; $7.50 in 1918, and $1 in March, 1919, totaling $28.50 per share or $2,850,000. None since.

As of December 31, 1921, Allouez had on hand a net surplus of cash and quick assets, $570,043, made of cash, accounts receivable, government securities and the small amount of $78,957 for supplies at the mine. **Allouez** produced no copper in 1921. The company had on hand January 1, 1921, 1,265,581 lbs. of copper valued at 13¢ a lb., and sold during the year at an average price of 12.90 cents per pound. Including the cost of selling and delivery there was a loss of $10,585 which, together with maintenance expenditures of the property, closed down for the year, made a total loss of $104,944 shown prior to adjustments of "other income" and depreciation, the latter bringing down the actual decrease in the balance of current assets to $88,561.

Balance Sheet, December 31, shows:

	Cash	Other Quick Assets	Accts. Payable	Reserve for Taxes	Bal. of Quick Assets
1920.....	$ 76,193	$541,701	$ 37,285	.....	$ 580,610
1919.....	363,401	846,451	115,450	$86,539	1,007,863
1918.....	363,401	873,373	115,450	228,765	892,560
1917.....	715,567	960,159	273,230	244,793	1,157,703

Income Account:

	Receipts	Costs	Other Deduct'n	Depr'n Depl'n	Taxes	Def. (a)
1920..	$ 522,523	$ 571,824	$214,762	$ 88,316	$ 94,387	$270,134
1919..	578,500	626,361	37,689	107,773	.....	293,323
1918..	1,819,148	1,386,882	.....	.....	242,782	464,070
1917..	2,101,303	1,015,666	.....	.....	273,092	388,110
1916..	2,633,679	1,086,847	.....	.....	.....	582,003(b)

(a) Includes deduction of assessments, levied by The Lake Milling, Smelting and Refining Co., which totaled $11,811 in 1919; $48,902 in 1918; $126,152 in 1917 and $42,508 in 1916. (b) Surplus.

In 1918, company added $198,927 as increase in reserves for depreciation and depletion, which made decrease in current assets $265,143 instead of $464,070.

Property: 3,400 acres including mineral ground 640 acres, adjoining the Ahmeek Mining Co., which contains the Kearsarge amygdaloid lode at great depth.

History: the old mine, opened 1859, is on the Allouez conglomerate, a bed underlying the greenstone. The conglomerate, 30' wide in many places, with strike of N. 39° E., and dip of 39°, averages 0.7 to 1% copper, and is very refractory under the stamps. Mining was begun actively in 1869, and stopped in 1877, with an exhausted treasury. The mine was then leased to

Watson & Walls, who made money from it, after paying a royalty of one-eighth on gross production. In 1880 the company resumed control, to quit once more, financially exhausted, in 1885. Watson & Walls took the mine again, and once more did well; the company resumed work on its own account for the third time, and again lost money, stopping all work in 1892. The old mine had been idle for some years, except for exploratory and development work in 1898 to 1900, when a shaft was sunk 1,200′ on the Osceola lode, and nearly 4,000′ of openings secured thereon, with indifferent results. The old Allouez made 26,051,528 lb. fine copper, 1869 to 1892.

Development: as the Allouez mine is on the Kearsarge amygdaloidal bed which does not outcrop on Allouez lands, though it underlies the entire 640-acre tract, the shaft was sunk in the underlay. The mine had but one producing shaft until 1909. Shafts No. 1 and 2 are connected by crosscuts and drifts, on several levels. The Kearsarge bed, above the 14th level, is opened by crosscuts, uppermost being at the 6th level. The Kearsarge bed averages about 16′ width in the Allouez mine.

Underground openings totaled 1,802′ in 1920; 3,562′ in 1919; 2,759′ in 1918; 2,838′ in 1917; 3,504′ in 1916; 4,458′ in 1915; 3,526′ in 1914; 4,400′ in 1913; 8,517′ in 1912.

No. 1 shaft, at the extreme southeastern corner of the tract, with 3 compartments, and 4,254′ deep, leaves surface at an angle of 75° but at slight depth takes an angle of 80°, continuing thereon to about 1,435′ in depth, when a curve of 60° brings the shaft to an angle of 38° 30′, which is the dip of the bed. At the change of angle, on reaching the bed, a single idler with a very wide flange cares for the cables passing at either end. Owing to the steep pitch of the shaft, back rails of 6x10″ timber are set so close to the wheels of the skips that their flanges cannot leave the steel rails, the wooden timbers serving as guides.

The first level is opened at depth of 1,264′. In order to save pumping charges on surface water, a gutter, cut entirely around the shaft, leads to an incline 36′ long, used as a sump. This shaft showed very fine ground in its upper levels, but deeper openings are not so good. Equipment at No. 1 shaft includes a 42x62′ steel shaft rock house having two 18x34″ crushers. The floor was re-modeled during 1916.

Development in 1920 brought the shaft 346′ below the 22nd level, but in poor ground. Openings were made on the 23rd. and 24th. levels and extended N. and S. on the 21st. and N. on the 22nd. levels, while stoping was done on the 17, 18, 19 and 20th levels.

No. 2 shaft, 1,500′ northeast of No. 1, is similar to No. 1 in general design, but changes pitch when entering the bed at 2,307′ from surface from 80 to 42°. This shaft is sunk further in the hanging than No. 1, owing to the proximity of a Lake. The collar of No. 2 shaft is of concrete. Washington fir and 16x24″ steel I beams, with 14x14″ square timber wall plats and 4″ planks are used. The interior, from collar to solid rock ledge, is lined with 22″ of concrete, dividers having their ends bedded in concrete, this giving an impregnable shaft, sunk through 52′ of treacherous quicksand overburden. No. 2 shaft is 3,553′ deep During 1920, 986′ of work was done at No. 2 shaft, the 20th level was extended N. to the boundary; the 21st and 23rd levels extended N. and the 22nd N. and S., showing an average grade of ore. Output was from stoping on the 13th to 17th levels N. and 18-19th levels S.

Equipment: includes a hoist with 32x72′ duplex cylinders and 18″ double-conical drum for No. 1 shaft, and No. 2 has a 20x30″ engine good for depth of 5,000′. No. 1 engine house, of mine rock, with redstone trimmings, has 12-drill and 18-drill air compressors, and No. 2 engine house has a 60-drill air compressor. The stone boiler house has five 125-h. p. boilers and a 120′ self-supporting steel smokestack. Buildings include a redstone machine shop and smithy, and a large warehouse. There is a very considerable mine location, with numerous dwellings, some remaining from 40 years

ago, and some new. The mine is reached by a spur of the Mineral Range Railroad.

At No. 1 mill, Point mills, Hardinge conical mills replaced Chilean mills Nos. 4, 5 and 6. At No. 2 mill, Hubbell, the 4th stamp, was put into commission in 1918. A pumping plant to dump tailings farther out into Torch lake, was put in commission in spring of 1919. Both mills were closed in 1919 and ore sent to the Osceola plant adjoining.

Production:

	Tons ore Treated	Lb. Cu. per Ton Ore Stpd.	Mine Cost per Ton (a)	Lb. Cu. Produced	Total Cost per lb. Cts.
1920.....	131,643	18.98	$3.52	2,499,239	23.90
1919.....	235,312	15.94	3.04	3,749,984	20.74
1918.....	514,888	13.73	2.119	7,071,218	19.09(b)
1917.....	566,674	15.69	1.869	8,892,915	13.84
1916.....	566,960	18.02	1.589	10,219,290	10.47
1915.....	534,705	18.78	1.365	10,043,459	9.31
1914.....	354,457	17.09	1.583	6,056,548	11.18
1913.....	236,663	17.29	1.687	4,091,129	12.09
1912.....	333,618	16.56	1.613	5,525,455	13.52
1911.....	288,610	16.56	1.668	4,780,494	13.30
1910.....	247,119	18.84	1.769	4,655,702	11.57

(a) Includes mining, transportation, stamping and taxes.

(b) Includes a charge for depreciation and depletion amounting to 2.81 cents per pound.

Operations were suspended in July, 1920, due to the market.

AMERICAN-BOSTON MINING CO., THE — **MICHIGAN**

Office: Diorite, Mich. J. R. Thompson, mgr. M. A. Hanna & Co., sales agent.

Property: the American mine on the Marquette range, in Marquette county, opened in 1880. Ore is a Bessemer hematite containing 54% iron and 0.027% phosphorus. It is mined by caving to a depth of 1,850'.

Production: has been decreasing yearly. In 1916 it was 745,969 tons; in 1917, 142,526 tons, compared with 120,756 tons in 1918 and 72,228 tons in 1919, a total of 1,648,253 tons.

ANTOINE ORE CO. — **MICHIGAN**

Address: Francis J. Webb, gen. mgr., care Republic I. & S. Co., Duluth, Minn., or Youngstown, Ohio. **Mine office:** Iron Mountain, Dickinson county, Mich. Frank Carbis, supt.

Republic Iron & Steel Co. owns 50% of capital stock.

Property: the Clifford mine, opened in 1895, on the Menominee range. Ore carries 38% iron, 0.18 to 0.29% phosphorus, and 37 to 41% silica.

Production: 2,131,694 tons to end of 1919; in 1916, 113,361 tons; in 1917, 115,823 tons; in 1918, 118,894 tons.

ARCADIAN CONSOLIDATED MINING CO. — **MICHIGAN**

An amalgamation of the New Arcadian and New Baltic Copper Companies, effected Oct. 7, 1919. **Office:** Houghton, Mich.

Officers: Robert H. Shields, pres.; S. T. Everett, v. p.; W. F. Miller, sec.-treas., with W. B. Anderson, J. C. and J. W. Shields, L. W. Killmar, H. W. Fesing, and J. G. Stone, directors.

Inc. Dec. 11, 1919, in Michigan. **Cap.** $6,250,000; $25 par; $14.50 paid in; 152,311 issued, assessable. Of the 250,000 shares, 150,000 go to New Arcadian stockholders and 44,042 to New Baltic, 20,000 shares treasury stock were sold at $3 per share, March 1, 1920. Assessment of 50c. per share was levied in October, 1921.

The company's capitalization is equal to that of the two companies combined. Shares of the new company were issued, share for share to holders of

New Baltic and New Arcadian, 24,000 shares of the new company going to the New Arcadian, because it owned 24,000 shares of New Baltic; New Baltic's 18,958 shares becoming treasury stock of new company. The shares issued, as well as all treasury stock are on a basis of $13.50 per share paid-in.

Transfer office, American Trust Co., Boston; and registrar, Boston Safe Deposit & Trust Co. Listed on Boston Stock Exchange and New York Curb. Annual meeting second Tuesday in February.

Balance sheet at end of 1920 shows cash and supplies, $46,121; liabilities, $1,867. There was $17,941 due on assessments and $519,933 treasury stock; profit and loss, $819,119. Total receipts were $84,699 and disbursements, $68,119.

New Arcadian Property: 3,500 acres, includes five old mines worked at various periods in the past. The Arcadian Copper Co., operated the property with great vigor, 1898-1901, and equipped it with machinery, and a 3-stamp mill at Grosse Point. Operations on the Isle Royale bed proving unsatisfactory, all work was suspended, 1903; the hoist, machinery and shaft-houses were sold to the Trimountain Mining Co., the stamp-mill to the Centennial Copper Mining Co., and the property dismantled. The floating debt of the old company was liquidated by the sale of 800 acres of land, for $750,000, to the Quincy Mining Co. The old mine and equipment were fully described in Vol. I and II of The Copper Handbook.

Development: exploratory work was resumed Oct., 1905, by the Arcadian company, on an amygdaloidal bed about one-fourth mile east of the Isle Royale amygdaloid previously worked, and crosscutting from the 200′ level of the exploratory shaft disclosed 5 cupriferous beds in a distance of 110′. Work was suspended March, 1908, until organization, and was resumed August, 1909, by diamond-drill boring from the bottom of the 200′ exploratory shaft, which is in the S. W. ¼ of Sec. 29. Exploratory work, 1910-13, included considerable trenching and test pitting, but was devoted mainly to securing 3 cross-sections, nearly 1 mile apart, by diamond drilling, 26 holes being drilled, aggregating over 26,000′. Drill-hole No. 22 cut a promising amygdaloid lode, in the north area. A shaft started June, 1912, on this lode, was 1,860′ deep in 1918, and is to be sunk to a depth of 2,500 to 3,000′.

Crosscutting was done on the 750′ level to explore the 2 copper-bearing amygdaloid beds disclosed by diamond drilling, one 300′ east, the other 150′ west of the shaft. On this level an amygdaloid vein of great promise was opened up 150′ east of the shaft. Crosscuts and drifts have also been driven on the 250′, 600′, 900′ and 1,050′ levels and disclosed good copper contents.

The Old Arcadian vein was exposed in 1918, in the west extension of the 1,500′ level crosscut. The No. 8 conglomerate, which was well mineralized on the 900′ level, was encountered in the E. crosscut of the 1,700′ level, 520′ from shaft. It is 26′ wide, with some fine copper, but not of commerical value. The New Arcadian vein is exposed 47′ from shaft on both the 1,700′ and the 1,850′ levels; it is 18′ thick and heavily charged with copper.

Equipment: includes a steam plant, a hoist good for 2,500′, 15-drill air-compressor, necessary mine buildings, and a fully equipped ore-house with an 18 by 24″ crusher.

In 1922, the new Baltic shaft was deepened from 942′ to 1,100′ to correspond with the 1,050′ level of the New Arcadian shaft.

Production: in 1916, 1,391 tons yielded 23 lb. of copper per ton: in 1917, from stock-pile, 4,900 tons yielded 10.87 lb.; in 1918, 10,195 tons yielded 16.16 lb. copper.

New Baltic Property: 800 acres, Sec. 16, T. 55 N., R. 33 W., with mineral rights to N. W. ¼ of the N. W. ¼ reserved by the New Arcadian. Exploration, begun June 10, 1909, included extensive trenching in the horizon of No. 3 conglomerate, supplemented by boreholes put down by a Calyx shot-drill cutting a 3½″ core, considerable trouble having been experienced

in getting down stand-pipes. No. 3 borehole, at a depth of 330', cut 2' of exceptionally good copper-bearing rock, with 6" of heavy copper, and a drill core fairly charged with copper was taken, Sept., 1909, from what was thought to be the western Baltic bed, at depth of 300'. In Nov. 1909, a drill-hole pitched at an angle of 60°, cut an amygdaloidal bed estimated to pitch at 60° in opposition, giving cores of 105' aggregate depth, showing copper at various points, the final 7' being well charged with fine stamp copper and a considerable amount of very coarse stamp copper. The drilling also disclosed an unidentified amygdaloidal bed of about 75' width, carrying considerable copper in masses approaching barrel-work size. Deepest hole bored was 1,200'.

Ground was broken June, 1910, for an exploratory shaft, which was started about 35' in the footwall trap, and sunk to a depth of 500'. Although the shaft was started in the foot, the formation rolls so that the bed was cut at 3 points in the depth of 310'. At 200' the shaft cut the footwall of the amygdaloidal bed, carrying much calcite but devoid of copper. At depth of 310' the bed was cut again, carrying extremely heavy copper of a grade materially better than the average of the payable mines of the district. Drifts on the 350' and 500' levels disclosed exceedingly bunchy ground, with occasional pockets of rich copper, and a crosscut on the 500' level showed further copper ground in an unidentified amygdaloidal bed underlying No. 4 conglomerate bed, distant about 1,500' from the shaft. This crosscut was continued to a point over 1,900' from the shaft. Facts concerning this vein were obtained from work done on it by the New Arcadian, the adjoining property.

The drilling campaign ended with No. 7 hole at a depth of 1,235' in 1916. No. 8 conglomerate was 41' thick at depth of 1,192'. Hole passed through good-looking amygdaloid veins, with copper in beds at 329', 493', 652', 792', and 1,192'. TheNew Arcadian vein was probably that cut at 792'. A shaft was started to cut the N. extension of this vein, and was down 500' in August, 1918. At 60', 250' and 400', where the vein was cut, it was well charged with copper. Company reported an exceptionally good showing on the 400' level. On the 500' and 600' levels, the showing of copper was on a par with that of upper levels, with the vein 26' wide, and management estimated, Dec. 31, 1920, that, if the vein disclosed same copper values between the shafts as prevailed at the shafts, there would be 1,000,000 tons of merchantable vein rock above 900'.

On March 1, 1921, shaft had reached 942' and a 2,500' drift, to be 3,400' in all, begun to connect with the 900' level of the New Arcadian shaft. Reported that drift had advanced 700' by November 1, and that good copper-bearing ore was exposed with a vein width of 5 to 20'.

Development in feet:

	Sinking	Drifting	Crosscutting	Total
1918	170	100	185	455
1917	180	185	105	770

Work was suspended in Sept., 1918, due to abnormal labor and supply conditions, but was resumed in May, 1920, and has continued since. H. W. Fesing, company's engineer, says "company possesses possibilities of becoming within a reasonable time, one of the largest Lake Superior copper producers."

Equipment: includes a hoist, compressor, boiler-house, etc.

The new company has good management and a property of immense mineral acreage that offers great possibilities of profitable and long continued mine operations.

ARNOLD MINING CO. **MICHIGAN**

Office: 70 State St., Boston Mass. **Mine office:** Copper Falls, Keweenaw county, Mich.

Officers: Francis L. Maguire, pres.; C. J. Morrisey, sec.-treas.; Capt. Wesley Clark, supt., with Edward F. Newton and John E. Fitzerald, directors. Annual meeting, second Tuesday in May.

Inc. May, 1864, in Michigan. **Cap.** $2,500,000; $25 par; issued, $1,550,000 paid in $621,308. Listed on Boston Stock Exchange.

Property: 3,323 acres, in T. 58 N., R. 31 W., in 2 tracts, including the Old Copper Falls mine and the Arnold mine proper, with frontage of about 3 miles on Lake Superior. The Copper Falls mine, worked 1850, until Aug., 1893, made 25,686,429 lb. fine copper, mainly from the Owl Creek fissure, and paid dividends of $100,000. The Arnold mine proper developed on the Arnold ashbed, was opened 1863, reopened 1897, and closed 1901. Ore stamped averaged under 0.8% copper. Has a stamp-mill and 2½-mile narrow-gauge railroad known as Arnold & Eagle Harbor, rolling stock of which has been sold. No. 1 shaft of the Arnold is about 1,000′ deep, sunk at an angle of 26° with the horizon. Total production, 1899 to 1911, inclusive, was 2,065,817 lb. fine copper.

Idle for several years.

ASHBED MINING CO. **MICHIGAN**

Office: 70 State St., Boston, Mass. **Mine office:** Copper Falls, Keweenaw county, Mich.

Officers: Francis L. Maguire, pres.; C. J. Morrisey, sec.-treas.; Capt. Wesley Clark, supt., with Edward F. Newton and Chas. G. Lund, directors.

Inc. 1880, in Michigan. **Cap.** $1,000,000; $25 par. Listed on Boston Stock Exchange. Annual meeting, second Tuesday in March.

Property: 1,143 acres, Petherick mine, in vicinity of Copper Falls, adjoining the Arnold mine. The last mining work was done 1905-06. Described in detail in Vol. II of the Copper Handbook.

ASHLAND MINE **MICHIGAN**

See **Hayes Mining Co.**, Michigan.

ATHENS MINING CO., THE **MICHIGAN**

Office: Negaunee, Mich.

Officers: M. M. Duncan, mgr.; G. R. Jackson, supt. Cleveland-Cliffs Iron Co. and Pickands, Mather & Co., sales agents.

Property: the Athens mine on the Marquette range, Marquette county, opened in 1913. A Bessemer hematite carrying 52% iron is mined.

Production: 20.923 tons in 1918; 74,500 tons in 1919.

ATLANTIC MINING CO. **MICHIGAN**

Controlled by **Copper Range Co.**, which see.

BALTIC MINING CO. **MICHIGAN**

Dissolved. Property now owned by Copper Range Co., which see.

BATES IRON CO. **MICHIGAN**

Office: Iron River, Mich.

Officers: F. A. Vogel, gen. mgr.; Andre Formis, supt. M. A. Hanna & Co., sales agents.

Property: the Bates mine on the Menominee range, Iron county, opened in 1910. Ores are Bessemer and non-Bessemer hematites, containing 54 to 59% iron and 0.342 to 0.348% phosphorus. It is mined by stoping to a depth of 1,050′.

Production: 449,492 tons since 1915; in 1918, 98,194 tons; in 1919, 91,049 tons.

BOHEMIA MINING CO. **MICHIGAN**

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon county, Mich. **Operating office:** Dee Bldg., Houghton, Mich.

Officers: Wm. A. Paine, pres.; Chas A. Snow, v. p.; Robt. H. Gross, sec.-treas., with John H. Rice, Thos. S. Dee, Richard M. Edwards and F. Ward Paine, directors.

Inc. Jan. 29, 1910, in Michigan. **Cap.** $2,500,000; $25 par; assessable; paid in, $8; issued, $1,875,000. Of the 75,000 shares issued, 30,000 were given for

lands, and 45,000 were sold to the public at $8. Boston Safe Deposit & Trust Co., transfer agent. Registrar, State Street Trust Co., Boston. Annual meeting, third Wednesday in April. Shares listed on Boston Curb.

Cash and Liberty Bonds on Feb. 28, 1921, totaled $140,226, compared with $136,977 in 1920.

Property: 960 acres, originally known as the Piscataqua, and later as the Henwood, is traversed by the cupriferous amygdaloidal bed of the Lake Copper Co. Diamond-drilling was done 1910. Drill-holes have yielded a number of cores, from various amygdaloidal beds, with copper in fair quantities, but with nothing remarkably promising or that would justify sinking a shaft. As soon as sufficiently important developments are made on adjoining properties, development work will be resumed. No work has been done since March, 1911.

BOSTON & LAKE SUPERIOR MINERAL LAND CO. **MICHIGAN**

Office: Leopold Bldg., Houghton, Mich. Fred W. Nichols, resident agent. Property is mineral land in the Lake Superior copper district. No mining work ever done.

BREITUNG HEMATITE MINING CO., LTD. **MICHIGAN**

Office: Negaunee, Mich. C. B. Dunster, mgr.; E. N. Breitung & Co., sales agents.

Property: the Breitung Hematite No. 1 and 2 mines, reported sold to Jones & Laughlin Ore Co., in 1921.

Breitung & Co., being sued, Jan., 1922, for $420,000, by Robert Ingalls, who claims this amount is due him as a 5% agent's commission on sale of above property.

BREITUNG IRON CO. **MICHIGAN**

Name changed July, 1918, to **Marquette Iron Co.**, which see.

BRISTOL MINING CO. **MICHIGAN**

Office: 1208 Hanna Bldg., Cleveland, O. E. W. Hopkins, range mgr., Ironwood, Mich. Arvid Bjork, supt., Oglebay, Norton & Co., sales agents; W. K. Carter, purch. agent, Ironwood, Mich.

Property: on the Menominee range, Iron county. **Ore:** Bessemer and non-Bessemer hematite, containing 52.96% iron, 4.04% manganese, 0.612% phos., and 7.25% silica. **Mining method:** by stoping to 1,274'.

Production: 1920, 291,835 tons; in 1919, 133,159 tons; in 1918, 245,151 tons; in 1917, 188,688 tons; in 1916, 462,801 tons; total to end of 1920, 5,277,780 tons.

BROTHERTON IRON MINING CO. **MICHIGAN**

Subsidiary of the Lackawanna Steel Co., through the Lake Erie Co.

Address: C. H. Munger, gen. mgr., Western Reserve Bldg., Cleveland, O. W. P. Chinn, asst. gen. mgr.; L. M. Hardenburgh, gen. supt. **Sales agents:** Pickands, Mather & Co., Cleveland, Ohio.

Property: the Brotherton mine on the Gogebic range, opened in 1886.

Ore: Bessemer and non-Bessemer hematite. Mining by under ground method to depth of 1,342'.

Production: 107,813 tons in 1916; 84,524 tons in 1917; 6,905 tons in 1918; 5,002 tons in 1919, a total of 2,626,541 tons. No production in 1920-'21.

BRULE MINING CO. **MICHIGAN**

Address: E. W. Hopkins, range mgr., Ironwood, Mich. F. J. Smith, supt. Stambaugh, Mich.; Oglebay, Norton & Co., sales agents; W. K. Carter purch. agent.

Property: the Berkshire mine on the Menominee range, Iron county, opened in 1908. Ore is a non-Bessemer hematite, carrying 56% iron, 0.60% phos. and 0.22% manganese. Mining is by caving to depth of 492'. The Chatham mine, which yielded 1,371,396 tons of ore, was abandoned in 1919.

Production: 49,073 tons in 1919; 152,860 tons in 1920; a total of 567,292 tons to end of 1920.

BUFFALO IRON MINING CO. **MICHIGAN**

Address: E. C. Bowers, mgr., Iron River, Mich. H. E. Duff, supt.

Cap. $200,000; $25 par.

Property: the Homer mine, on Menominee range, Iron county. Ore is a non-Bessemer hematite carrying 50% iron and 0.355% phosphorus.

Extraction is by sub-stoping to depth of 660'.

Production: in 1918, 213,059 tons; in 1919, 205,254 tons; total is 885,496 tons.

CALUMET AND HECLA MINING CO. **MICHIGAN**

Office 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Mich. **Mill office:** Hubbell, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; with Robert F. Herrick and W. Hunnewell, directors. Chas. A. Hall, sec. asst. treas.; H. Vivian, engr.; John Knox, gen. supt.; W. M. Gibson, asst. supt. Ocha Potter, chief efficiency engr.; Henry Fisher, mill supt.; C. H. Benedict mill metallurgist. **Smelter offices:** Hubbell, Mich. H. D. Conant, supt.; L. C. Graton, geologist.

Inc. 1871, in Michigan. **Cap.** $2,500,000; shares $25 par; paid in, $12. Charter renewed, 1900, for 30 years, and amended, 1905, under the new laws of Michigan, making the corporation a securities-holding company, as well as a mining and smelting company. Was organized as a consolidation of the Hecla, Calumet, Portland and Scott mining companies. Stock is listed on the Boston Stock Exchange, and traded in on the unlisted department of the New York Stock Exchange. Annual meeting, second Thursday in April. Old Colony Trust Co., Boston, transfer office: American Trust Co., Boston, registrar. Range of shares during 1920 was $415 high and $206 low, the lowest for 25 years. In 1921, the range was $280 to $210; in 1907, $1,000 was touched, and $630 in 1916. In February, 1921, company took a 6% interest, $2,400,000 total amount, in the Copper Export Association's $40,000,000 8% note issue.

The company controls the following subsidiaries, each described under its respective title:

Ahmeek, Allouez, Centennial, Cliff, Gratiot, Isle Royale, La Salle, Superior, Osceola, White Pine C. Co., Calumet Transportation Co. and Great Lakes Transit Corporation.

Balance sheet as of June 30, 1921, shows the following:

Assets

Real estate	$5,685,296
Building and machinery	21,285,287
Tamarack sands	1,054,533
Stampage and timberlands	122,755
Fair value of mineral deposits	44,386,662
Development and underground equipment	7,588,552
Stamp mills patents	55,169
Investments in other companies	16,086,505
Cash	498,663
Fourth Liberty loan bonds	1,200,000
U. S. certificates of indebtedness	200,000
Notes receivable C. E. A.	1,369,680
Notes receivable	990,000
Accounts receivable	2,210,041
Copper	3,200,936
Total	112,573,133

Liabilities

Capital stock	$1,200,000
Reserve for depreciation	12,282,738

Reserve for depletion	16,196,621
Reserve for foreign sales	1,369,680
Mineral Deposit Surplus	44,386,662
Accounts payable	1,577,664
Surplus	35,559,767
Total	112,573,133

Net current assets at end of 1920 were $12,901,087, as compared with $14,376,730 for 1919; $12,591,964 (revised) for 1918, and $10,624,485 for 1917.

Dividends: (100,000 shares outstanding):

1921	$..	1914	$10	1907	$65
1920	5	1913	32	1906	70
1919	10	1912	42	1905	50
1918	55	1911	24	1904	40
1917	85	1910	29	1903	35
1916	75	1909	27	1902	25
1915	50	1908	20	1871-1901	830

The grand total is $152,250,000.

Dividends received from other mining companies amounted to $3,011,205 in 1917, and $1,800,747 in 1918; $472,371 in 1919; $182,312 in 1920.

Since the change in charter, 1905, permitting the acquisition of stock in other corporations, the Calumet & Hecla has secured control of various other mines and mineral tracts, by organizing subsidiary corporations and also by acquiring stock in companies previously organized. In 1905 the company bought the following stocks, at a cost of $8,592,129.99 in cash and notes; 9,600 shares of Osceola; 19,400 shares of Tamarack; 24,796 shares of Ahmeek; 27,507 shares of Isle Royale; 10,316 shares of Seneca; 25,000 shares of Laurium. The attempt to secure physical control of the Osceola Consolidated Mining Co., at the annual meeting, March, 1917, was met by determined opposition, which took the fight into the Michigan legislature and the Federal courts. After nearly 2 years of litigation, the Calumet & Hecla assumed control of the Osceola and other Lake Superior mining companies formerly under the management of A. S. Bigelow, by the sale of his entire stock interests to the Calumet & Hecla.

Securities Owned on December 31, 1920.

	Shares Owned	Shares Issued		Shares Owned	Shares Issued
Ahmeek Mining Co..	99,168	200,000	Superior Copper Co..	50,100	100,000
Allouez Mining Co...	41,000	100,000	White Pine Co. (Common)	42,602	85,320
Centennial Cop. Mng. Co.	41,500	90,000	White Pine Co. (Pfd.)	10,000	10,000
Cliff Mng. Co.	28,785	60,000	Calumet Transp. Co..	3,482	.....
Isle Royale Cop. Co..	35,000	150,000	Great Lakes Transit		
La Salle Cop. Co...	152,977	302,977	Corp. (Pfd.)	1,000	.....
Osceola Cons. Mng. Co.	33,560	96,150	Great Lakes Transit Corp. (Com.)	1,000	.....

The Frontenac, Laurium, Manitou, Dana, St. Louis, and Tamarack companies have been completely absorbed and the Laurium Mng. Co. has been dissolved.

On Dec. 23, 1916, the company sold to the Seneca Corporation its 11,207 shares of Seneca Mng Co. for $672,420 and in 1919, its 50,100 shares of Gratiot Mng. Co. for $100,000. Capital investment was increased in 1919 by $20,000 for stock of the Copper Export Assoc'n and in 1920 by $192,000 for 65,000 Copper Canyon Mng. Co. shares.

Property: the mine and landed holdings of the Calumet & Hecla, including property owned outright, property controlled through subsidiary corporations, mining lands under options, and timber and miscellaneous lands, in Houghton, Keweenaw and Ontonagon counties, amounts to about 165,000 acres, of which 102,804 acres are in Keweenaw county. The company, with its subsidiaries, has a water-front of more than 34 miles, on the shores of Lake Superior, Lac La Belle and Torch Lake, and approximately 60,000 people are supported by the operations of the company and its allied interests.

The Calumet & Hecla mine proper, about 2,750 acres, lies in a compact tract in Secs. 11, 13, 14, 15, 22, 23 and 24, T. 56 N., R. 33 W., in addition to which the company owns extensive tracts, all west of the Tamarack mine, carrying the underlay of the Calumet conglomerate at such stupendous depth that opening would require a 2-mile vertical shaft, and it is very doubtful whether these lands ever will become available for mining on the Calumet conglomerate. The lands west of the Tamarack were explored in 1904 by diamond-drill, in search of a supposed cupriferous conglomerate, but nothing of promise was found.

The original **Calumet & Hecla** mine is opened on the Calumet conglomerate bed, and a parallel mine has been developed on the Osceola amygdaloid, while a third parallel mine has been partly developed on the Kearsarge amygdaloidal bed.

The Calumet conglomerate proved unprofitable both to the north and south of the Calumet & Hecla, though workable at the Tamarack mine, which has developed the underlay by vertical shafts. The conglomerate has an average strike of N. 33° 30′ E., with average dip of 37° 30′ with the horizon. The bed is of 5′ to 26′ width, with an average of 13′, giving about 2,400 fathoms of stoping ground, or about 43,200 tons of stamp rock per acre. As a rule, the richer portions of the conglomerate are in the central part of the Calumet & Hecla tract. The walls of the conglomerate carry considerable copper, especially the amygdaloidal footwall, and much of the adhering trap rock formerly rejected is now milled. Pillars of 75′ and even up to 150′ width, left on either side of every conglomerate shaft, contain stamp rock equivalent to about 18% of the stoping ground available before the robbing of the pillars.

The conglomerate lode in the lower workings is not up to its average value above, being wide and low in copper. By 1914, yield per ton had decreased to 1.32% copper, but this has since been much improved, partly because old pillars have been robbed.

About 18,000,000′ of timber, board measure, is used in the mine annually, and to the end of 1918, over 935,000,000′ of timber had gone underground. Iron pillars are used as supports in crosscuts connecting the Red Jacket shaft with drifts on the bed, and in various incline shafts to support the hanging wall. Iron, mainly scrap material, such as worn out skip rails, cut to 10′ lengths and placed above I-beams, is used for lagging, to some extent.

The Calumet & Hecla has suffered severely from underground fires. The ore carrying native metal cannot burn, like sulphide ore, but the old timbering eventually becomes nearly as inflammable as tinder.

Development: the Conglomerate property of the Calumet & Hecla is worked as 2 separate mines, known as the Hecla and Calumet branches, the South Hecla being a southerly continuation of the Hecla branch, and the Red Jacket vertical shaft a part of the Calumet mine. The Calumet to the north, the Hecla in the center, and the South Hecla at the south, form one continuous mine, developing the Calumet conglomerate by inclined shafts, the Red Jacket being the one exception. The conglomerate, opened for 2 miles along the outcrop, has 11 shafts, 8 single compartment, 2 double compartment, and one, the Red Jacket, with 6 compartments. Also opened by a blind shaft and 3 shafts on the Tamarack property.

No. 11 Hecla, 2,400′ deep, showed poor ground at the bottom. All pillars were removed and shaft abandoned in 1918.

No. 12 Hecla shaft, at the company's southern line, is 5,643′ deep, bottomed in poor ground, disclosing a formation nearly barren of copper at depth. This shaft is to be extended to connect with the 81st level haulage system, and also for ventilation, supplies, and safety.

The 4,900′ Red Jacket vertical shaft, of 1,800 tons, daily capacity cuts the bed at 3,287′. Rock temperature was 87° F., reduced to about 70° by connection with No. 4 Calumet shaft, exhaust air from the power drills aiding in cooling the mine. The Red Jacket shaft is 14′ 6″x24′ 6″ within timbers, and is built of brick and cement from collar to the solid rock, and timbered below with Georgia pine. Of the 6 compartments, 2 are used for hoisting, 2 for water, and 2 for men and supplies. The 2 hoisting compartments have cages with 9-ton Kimberly self-dumping skips swung under. The 2 western compartments have double-deck cages for men and material, and 2 middle compartments have large cylindrical steel bailers, for raising water. Timber for the Red Jacket shaft is lowered through No. 4 Calumet, with which the Red Jacket is connected by a crosscut. The Red Jacket shaft hoists rock from all of the northern shafts below the 56th level, at which point the conglomerate is intersected. There are 9-ton steel storage bins at the various productive levels, which aid in maintaining the uninterrupted hoisting service that is absolutely essential in a shaft of a mile depth. The shaft ore-house of the Red Jacket is 100x100′, and 110′ high, with 4 crushers, 1 for poor ore. The work of removing shaft pillars and arches is being continued, 349,384 tons of ore in 1919, and 308,590 tons in 1920 coming from that source.

Sinking has been discontinued at shafts No. 6 and 7 Hecla, and No. 9 and 10 South Hecla, due to excessive cost of maintenance, but in order to reach the deeper ground at this end of the mine, a 9x12′ haulage-level (80th level) was commenced in 1918, to connect this area with the Red Jacket shaft. This haulage-level is driven in an amygdaloid lode, 180′ under the Conglomerate, and will be 7,800′ long when completed. From this main haulage level sub-shafts will be sunk, and the lower part of the conglomerate mined. The ore mined will be trammed by electric-power to the Red Jacket shaft. This project will be completed in mid-1922. The four shafts mentioned are 7,875′, 7,978′, 8,132′ and 8,132′ deep respectively.

Tamarack No 3 is 30′ below the 18th level, or 5,223′ from surface. Tamarack No. 3 (inclined), 129′ below the 24′ level or 5,990′ below the surface. Tamarack No. 5, 147′ below the 40′ level, or 5,309′ from surface, is used only for bailing water. The hoist operates 9,000 gal. tanks, and discharges 3,000,000 gal. daily.

The "Five Forties" is a tract of 200 acres, a quarter-mile wide and 1¼ miles long, lying between the Tamarack and Tamarack Junior mines, carrying the underlay of the conglomerate at great depth and, to obviate sinking a deep and costly vertical shaft, this tract is opened by a blind slope shaft, 1,583′ deep, starting from the 57th level, 2,750′ N. E. of the Red Jacket vertical shaft. The blind shaft is sunk 40′ under the footfall, at the same angle as the dip of the conglomerate, thus assuring solidity of walls while saving long and expensive crosscuts to the bed on each level. A footwall lateral on the 57th level parallels the regular drift, at a distance of 40′ in the footwall between the Red Jacket vertical shaft and the blind shaft, offering an avenue for operations that obviates the confusion certain to result were the regular mine drifts given double duty. The blind shaft starts in the footwall drift, under and parallel with the 57th level, and eventually will be about 1 mile in depth, opening four of the five 40-acre tracts, leaving the 5th and last to be opened by a sub-shaft from the blind shaft, which doubtless will be sunk on the same system. The necessity for this peculiar method of development arose from the fact that the boundary lines of the property run north and south, while the strike of the bed is N. 33° 30′

E., giving a plane of dip of N. 56°-30′ W. Owing to the incline shafts being sunk on the dip of the bed, while the blind shaft must follow the section lines, the latter descends diagonally on the dip of the bed, giving the blind shaft an average dip of about 22° only, although the bed dips at 37° 30′. This unusually flat incline permits the hoisting of rock in tram cars, by an electric hoist on the 57th level, cars being hauled through the blind drift and dumped into the steel bins of the Red Jacket shaft for hoisting, thus saving a transfer at the mouth of the blind shaft. The workings of the "Five Forties" show the conglomerate bed to average about 14′, with about 10′ carrying milling ore, the bed as a whole being very lean at this great depth. The abandoned workings of the Tamarack Junior mine of the Osceola Consolidated, which adjoins the "Five Forties" are drained by holes bored by diamond-drill from the boundary stopes.

A drainage drift is driven, at depth of about 5,000′ measured on the incline, 250′ from the conglomerate, with a length of 5,100′, extending from No. 10 South Hecla shaft to No. 7 Hecla and from Tamarack boundary to Nos. 5 and 6 Calumet. This drift drains water to shafts Nos. 7, 5 and 6 from which it is lifted to surface by centrifugal electric pumps.

The shaft ore (or "rock" of Lake Superior usage) houses are all of uniform pattern and accommodate 40-ton railroad cars. Rock is hoisted to the top of each shaft house, passing thence over grizzlies that allow the finer rock to fall through, the larger masses being reduced in 24x36″ crushers. Crushed ore falls into storage bins, whence it is dumped into cars that take it to mills, railroad tracks running underneath each rock house. The standard equipment includes a 50-h. p. induction motor at each shaft, for driving crushers.

Work on the Conglomerate lode totaled 4,019′ in 1920; 8,966′ in 1919; 10,841′ in 1918; compared with 2,942′ in 1917; 5,142′ in 1916.

The Osceola lode (Amygdaloid Mine) bed, which outcrops 730′ east of the Calumet conglomerate, with parallel strike and average dip of about 38°, underlies the entire main tract of the Calumet & Hecla mine, with about 11,000′ on the strike. The lode runs about 35′ wide, with principal values along the foot and hanging; the middle third being lean as a rule. It carries fair copper content, at a depth of nearly one mile in the Tamarack property. There are 6 shafts, Nos. 13 to 18 inclusive, numbered from south to north and all with 3 compartments, of which 2 are used for hoisting and 1 for pipes and ladder-ways. The mine has over 35 miles of workings and has frequent connections with the conglomerate by crosscuts. Laterals in the Osceola workings are carried as drift stopes of 12′ height along the hanging wall. The mine was closed 1901, and reopened 1904.

Depths of Shafts Jan. 1, 1919		Distance between Shafts	
No. 13	3,232′	13 to 14	2,780′
No. 14	3,235′	14 to 15	2,400′
No. 15	3,236′	15 to 16	2,100′
No. 16	3,384′	16 to 17	1,800′
No. 17	2,279′	17 to 18	1,600′
No. 18	1,460′		

As a result of introducing one-man drills in the mines in 1911, the daily output of ore was increased from 11.42 tons per man in 1912, to 26.29 tons in 1920; while costs dropped from 35 to 34¢, in spite of a 100% increase in wages and supplies.

During 1918, 14 storage-battery locomotives were installed for tramming in the Osceola lode. Stope scrapers, each doing the work of 5 men, were introduced in the conglomerate area during 1920. Each handles over 60 tons of ore per shift.

Openings on the Osceola lode covered 13,076′ in 1920; 14,883′ in 1919; 10,192′ in 1918; 16,690′ in 1917; 16,582′ in 1916.

The Kearsarge Amygdaloid bed outcrops about 2,200′ east of the Osceola lode and 2,900′ east of the Calumet conglomerate, with parallel strike and dip of about 38°, underlying the entire main tract. Development was begun August, 1903, and there are 3 shafts, numbered from north to south, each having 3 compartments and being practically duplicates of those on the Osceola amygdaloid. The shafts above the ledge are "timbered" with steel, brick and concrete, the hanging wall being lined with 3 arches of brick, laid in 3 to 5 courses, thickness being increased with depth, supported by 2 rows of I-beams which serve also as dividers for the shaft. The Kearsarge lode, as opened by these shafts, is erratic, though showing stretches of ground that probably will yield 18 to 22 lb. fine copper per ton, with reasonable selection.

No. 19 shaft, about 1,000′ south of the Centennial boundary line is 1,350′ deep; No. 20 shaft, next south of No. 19, is about 1,350′ in depth; No. 21, the southernmost shaft on the Kearsarge bed, is 8,000′ south of No. 20, and, at shallow depth, showed well in copper, but deeper workings were not so promising, the rock yielding only about 12 lbs. of copper per ton of rock mined; it is 2,291′ deep. No work done on this lode since the beginning of the strike, July 23, 1913.

The Laurium property carries about 1½ miles of the strike of the Kearsarge bed, with 280 acres of underlay. The Laurium shaft, started August 7, 1909, as a result of previous diamond-drill borings, is about 2,200′ from the S. W. corner of Sec. 26, and about one-half mile N. of No. 1 Tecumseh shaft. The shaft is 1,661′ deep, with about 7,000′ of workings. The mine was closed in 1913, at the time of labor strike. When operations were suspended, workings on the 12th, 14th and 15th levels were in poor ground, showing little copper. Equipment included a boiler-house, engine-house with a large hoist and air-compressor, and a change-house.

The Calumet amygdaloid, lying between the conglomerate and the Osceola amygdaloid, has been little opened, but might prove payable, as it shows some good ground in a crosscut on the 900′ level.

Equipment: on surface at the Calumet & Hecla is probably the most complete installation to be found in the world. With few exceptions everything is duplicated, to prevent possible delay or suspension, by reason of fire or accident.

The power-plants at the main mine, on the Calumet conglomerate, include 4 large boiler plants and 6 hoisting plants. The hoists of the conglomerate mine are very powerful, ranging in capacity from 1,000 to 5,600 h. p. each. Miners are carried to and from work, in the incline shafts, by man cars, these being long trucks having tiers of circus seats, replacing skips when needed, being shifted quickly on or off the skip tracks by large cranes. This method has proven the safest, quickest and cheapest for moving men in and out of deep incline shafts.

At No. 4 Calumet shaft there is a group of the most powerful mining machinery in existence. Engine house contains the 2,500-h. p. Corliss engine "Superior," with 40" cylinders and 72" stroke; the auxiliary engines "Baraga" and "Rockland," of 1,000 h. p. and 600 h. p., respectively; 2 Rand air compressors, of 25 and 40-drill capacity, and the engine "Mackinac," a 4,000-h. p. quadruple-cylinder triple-expansion steel giant, operating 4 Nordberg air compressors with a combined capacity of 500 drills. There also are four 35-drill auxiliary compressors. In the old Riedler compressor, water was injected into the compression cylinders, while the Nordberg machines deliver the compressed and greatly heated air to a cylindrical steel cooler, 12′ in diameter and 30′ high, into which water is sprayed from above and drawn off at the bottom, cooling the air to 80° F. Power is supplied by batteries of boilers in 2 boiler houses adjoining. Locomotives haul the coal into the boiler-houses, where it is fed to the grates by stokers.

The Hecla engine-house, flanked by a large boiler-house, contains the 1,200-h. p. compound hoisting engine "Frontenac" and 2 auxiliary engines,

of 600 h. p. each, also a 30-drill Rand air compressor and a pair of water-plunger air compressors, with combined capacity of 144 drills, being the largest machines of this type ever constructed.

South of the Hecla plant is the "G. H. & S." engine house, having the "Houghton" and "Seneca" engines, of 1,300 h. p. each. The Hecla boiler house has 5 large boilers and a 200′ smokestack, of 9′ 6″ internal diameter.

The engine house operating Hecla shafts Nos. 7 and 9 contains the engines "Hancock" and "Pewabic," each of 1,400 h. p. which operate 25′ drums by spur gearing, and two 600 h. p. vertical compound engines for man cars. Boiler-house has 5 boilers and a 250′ smokestack of 12′ 6″ internal diameter.

The South Hecla engine-house at shaft No. 11 has a 1,000-h. p. Lidgerwood hoist.

The Red Jacket shaft has two 2,850-h. p. triple expansion hoists, and in an adjoining building are five 300-h. p. boilers. In raising 10-ton loads perpendicularly from a depth of 1 mile, the weight of the cage and steel cable nearly equals that of the cargo of rock, but with the aid of counter-balance the engines can hoist 10-ton loads at a speed of 40 miles per hour, the regular hoisting time being about 90 seconds for distance, including time taken for starting and stopping, an achievement no locomotive could duplicate on a horizontal plane. The engine operates on a system devised by S. B. Whiting, formerly manager of the company. To overcome the dangerous strain caused by unequal wearing, Walker differential rings are placed on the sheaves, the cables taking 4 complete turns around the driving sheaves.

Equipment at the Amygdaloid shafts on the Osceola bed is practically the same at shafts 13, 14, 15 and 16. Shafts 13 and 16 have Nordberg first-motion double conical-drum hoists, operating 7½-ton skips in balance, good for 5,000′ depth each. No. 14 and 15 have Corliss hoists with 25′ cylindrical drums, good for 5,000′ depth. Shafts No. 17 and 18 are equipped with small Lake Shore and Lidgerwood hoists and single 5 and 2½-ton skips. All the shafts have permanent shaft rock-houses, similar to those of the conglomerate workings. All engine-houses have air connections with the main compressor-plants at the old mine.

The machine-shop has an equipment excelled by only a few of the largest shops in the country, including a 25-ton electric traveling crane and mammoth planers, with electric power throughout. These shops are capable of handling anything and everything in the line of repair work, and also have complete manufacturing facilities for the making of mining, milling and smelting machinery, and have turned out hundreds of Wilfley tables, and other special machinery, under agreement with the owners of the patents.

The foundry has 2 iron cupolas and a brass foundry, with a 20-ton electric traveling crane. The pattern shop has 2 departments, one for the shop proper and one for the storing patterns. The carpenter shop is equipped with as complete a line of labor-saving machinery as can be found in any general woodworking establishment. The blacksmith shops are as large as those of the largest manufacturers of machinery, and are fully equipped. The Calumet shop alone sharpens upwards of 50 tons of steel drills daily. The Hecla shop does blacksmithing and forging for the entire mine. The various shops employ upwards of 150 blacksmiths.

The main electric plant of 12,000 h. p. capacity is at the mills, in Lake Linden, with a substation at the mine.

The office building is a large and handsome stone structure, housing the various executive departments and the engineering force of the mine. The company's private telephone system has an exchange with about 220 instruments, including a number of deep underground stations, with local and long-distance connections.

The Calumet & Hecla public library had 45,000 volumes in 1917; ranks third in point of circulation in the State of Michigan, with an attendance in reading rooms of 88,040 in 1917. In addition to books in English, there

are works in German, French, Italian, Swedish, Norwegian, Slavonian, Polish, Hungarian, Finnish and Croatian, with periodicals and newspapers in a score of languages, about 30 different nationalities being represented on the company's payroll. There also is a branch library and reading room at Lake Linden, for employees of the stamp-mill and smelters.

The company maintains a hospital, for employees solely, with complete surgical and laboratory apparatus and a dozen physicians.

The company owns about 1,200 dwellings, furnished to employees at an average rental of 6% on actual cost, plus cost of maintenance, and upwards of 1,200 dwellings are owned by employees on lands leased from the company at low yearly rentals. This low rent is equivalent to an increased wage, compared with Western mines.

There are 15 school houses on the lands of the Calumet & Hecla, most of which were built by the company, including a fine manual training school, and a truly magnificent high school building at Calumet. Also there are upwards of 30 churches, of a dozen different denominations, for which sites were donated by the company; and in most cases substantial aid has been given in their erection and maintenance, entirely regardless of creed.

The company built a $50,000 bath-house containing tubs, showers and a 26 by 40' swimming pool. A charge of 2½ cts. per bath is made, except in the women's department, which is free to women and children. The charge covers merely the cost of washing the towels and in no way compensates for the operation of the bath-house proper.

In October, 1919, C. & H. and its subsidiaries announced that it had taken out a blanket life insurance policy covering the life of each of its employees in sums ranging from $1,000 to $1,500, without cost to the insured. The contract amounted to $10,000,000.

The company maintains 4 distinct systems of waterworks, one at the mines in Calumet, one at the mills in Lake Linden, and two on the shore of Lake Superior, 4 miles N. W. of Calumet. The Lake Superior plants pump water for domestic uses at Calumet against a head of 733', with an electric centrifugal pump of 3,000,000 gals. daily capacity and also furnish water to the mill and smelter boilers, on Torch lake. At the Calumet dam and mine there are 7 pumps having a combined daily capacity of upwards of 45,000,000 gallons.

The company maintains a fire department, affording protection to the mine buildings and locations, and responding to calls from Red Jacket, Laurium and the other towns that go to make up the mining camp of Calumet, with 40,000 population.

The Hecla & Torch Lake standard gauge railroad, owned by the company, connects the mines, mills, smelter and shops by upwards of 20 miles of main tracks, spurs and sidings. Equipped with 250 forty-ton steel rock cars and several locomotives.

The two stamp mills, known as Hecla and Calumet, are at Lake Linden, 4 miles from the mine, on a tract of 998 acres, having several miles of frontage on Torch Lake. The mills have steel frames, with concrete foundations, spaced 20" apart, with 2 and 3 tiers driven to bed-rock, and topped with 6x12" square timber, capped by a 4x6" bed of concrete. The mills have 27 Leavitt heads and 1 Nordberg steeple-compound head; 17 heads treating conglomerate ore and 11 crushing amygdaloid rock. Stamps are actuated by steam power, but the other milling machinery is operated electrically. The Leavitt heads have a daily capacity of about 350 tons of conglomerate, and 500 tons of Osceola amygdaloid. The mill equipment below the stamps, includes Woodbury-Benedict jigs, Dorr thickeners, and flotation machines, which in 1918 replaced round tables and Wilfley tables. Chilean and Hardinge mills are used for regrinding.

As the mills stand on the flat western shore of Torch lake, but little above water level, tailings speedily filled the shallow lake for some distance

off shore, and to deposit the sand it became necessary to secure a considerable initial elevation, which is gained by sand wheels. The material entering the mills as conglomerate rock leaves as coarse sand to the extent of fully 6,000 tons daily. The sludge is washed through launders to the sand-houses, where it is scooped up by the buckets of the wheels and dumped, high above, into launders running on trestles far out into the lake. There are two wheel-houses, one for each mill. The Calumet wheel house has sand wheels of 50′ diameter, and the Hecla 50′ and 64′ diameter. The largest wheel weighs 500 tons, and is mounted upon massive concrete masonry. Four 25-ton iron bed plates support the pillars carrying the 21-ton Krupp forged steel axle, which is 27′ long and 32″ in diameter with a hollow core of 26″ diameter. Radiating from axle to rim are 2″ steel spokes 32′ long. The completed wheel is 10′ wide and 64′ in diameter, driven by gear and pinion, power being furnished by a 700-h. p. motor, and has a capacity of 55,000 gal. per revolution. Nearly 2 years were required to build and adjust this great wheel.

Flotation tests in the laboratory having been encouraging, two 50-ton Mineral Separation machines were installed in 1916. In 1917, two 600-ton units were ordered with all the necessary auxiliary machinery, including Dorr thickeners and Oliver filters. A plant of 2,000 tons daily capacity was in commission in 1918, and second plant of like capacity was put in commission in 1919. The six units of the Hecla mill were remodeled 1918 and 11 units of the Calumet mill during 1919. Two additional units were being added in 1920. Conglomerate ore only is treated by flotation. All ore will be subject either to flotation or leaching as a final treatment. Company will pay Minerals Separation 1c royalty per lb. of copper recovered.

The No. 1 regrinding plant built 1908-09, and in full commission January, 1910, occupies a 195 by 340′ building. The frame is of steel, resting on concrete foundations, the floor being of stamp sand, with a concrete capping, no wood entering into the construction of the building. Power is furnished by eight 250-h. p. induction motors, giving about 100% excess capacity, to provide against delays through overhauling and repairing.

Equipment: includes 24 large Hardinge mills (8′ diameter by 72″ cylindrical length), which replaced in 1918 the 48 Chilean mills formerly used.

There are 200 Wilfley tables, each section of the plant having 6 grinders, 18 tables for roughing, 4 tables for middlings, and 12 tables for slimes. Product from each set of 2 grinders goes to a settling tank, from whence the roughings go to the first 3 tables, and the slimes to 2 other tables, the middlings from each 15 tables going to 2 additional tables. The coarse sands from the Calumet mill go to sand wheel No. 2, and waste sands to wheel No. 1, the coarse sand elevated by wheel No. 2 running to the regrinding plant, where the amount going to each mill is regulated by feed gates, an overflow tank at the end of the launder caring for the surplus, in case of stoppage of the mill. A Hardinge conical tube-mill crushing coarse tailings, is 8′ in diameter at the larger end, the pulverizing of sands being accomplished by the use of Danish pebbles on a lining of hard brick. Re-modeling of No. 1 plant was completed in 1918.

The regrinding mill has traveling cranes, and every piece of machinery is duplicated, so that breakages can be repaired quickly. The mill is fed with coarse sand carrying up to 17 lb. copper p. t. No slime goes to the regrinding plant, which treats exclusively coarse gravel and sand from the jigs and tables. The product is clean mineral, of good average tenor, which is pumped into bins, and thence loaded into cars for shipment to the smelter. Labor costs are low, the plant being automatic throughout, and the force is only 12 men and boys per shift.

No. 2 regrinding plant, started in 1914, is practically a duplicate of No. 1. It contains classifiers, 64 Hardinge conical mills, and tables. It is fed

by tailings reclaimed from Torch lake, recovered by a suction dredge, known as the reclamation plant.

A duplicate regrinding plant to that at Lake Linden is being constructed near the site of the dismantled Tamarack mill, at a reported cost of $2,500,000. Tamarack sands carry 14 lb. copper per ton.

An ammonia leaching plant of 4,000 tons daily capacity, using ammonia in solution, treats tailings from the regrinding plants.

Details of the work of the regrinding reclamation, and leaching plants are as follows :

Regrinding plants:

Year	Tons treated	Assay headings —(From mine)—	Assay tailings	Copper lb.	Lb. Cu. per ton	Cost per lb. (a)
1918	530,657	0.599%	0.414%	2,243,022	4.23	6.75c.
1919	581,583	0.564	0.387	2,186,209	3.76	7.22
1920	540,327	0.626	0.428	2,221,000	4.11	8.15
		(From old sands)				
1918	715,007	0.868	0.568	4,776,302	6.68	4.33
1919	714,359	0.775	0.510	3,808,796	5.33	5.58
1920	777,538	0.771	0.479	4,692,200	6.03	6.04
Reclamation plant:						
1918 (a)	715,007	0.868	0.244	9,245,383	12.93	7.20
1919	915,659	0.694	0.189	9,082,952	9.92	7.62
1920	1,378,500	0.655	0.150	14,138,240	10.26	6.60
Leaching Plant:						
1918	1,005,015	0.535	0.126	8,035,156	8.00	7.71
1919	1,070,300	0.488	0.120	7,519,517	7.03	6.44
1920	1,333,780	0,517	0,115	10,880,940	8.16	5.26
Flotation plants:						
1920	705,747	0.503	0.187	4,534,824	6.43	3.08

(a) exclusive of smelting and selling charges.
(b) Total treated prior to 1918, 1,458,002.

Water for the mills is supplied by 4 pumps, of which the "Michigan" is the most powerful in the world, having a daily capacity of 60,000,000 gals. Auxiliary pumps are the "Huron" and "Ontario" of 20,000,000 gal. capacity each, and an I. P. Morris pump of 22,000,000 gal. daily capacity.

The electrification of the Calumet & Hecla was begun in 1904, and eventually will be completed, at mines, mills and smelters, except for some of the big compound hoists and air compressors at the mine, where a change from steam to electricity would be doubtful economy, as well as necessitating enormous initial outlays.

Machinery at the power plant includes a 10,000 kilowatt mixed flow turbine, and a Leavitt engine of 3,000 h. p., built originally for hoisting purposes, direct-connected to a 2,000-k. w. generator. A second turbine of 10,000 k. w. capacity was put in commission in 1918, giving the power-house a total capacity at maximum load of 22,500 k. w. The electric equipment of the mills includes 15 motors, of 20 to 250 h. p. each.

The boiler house has twenty 500-h. p. Babcock-Wilcox tubular boilers. There are coal crushers, feeding an endless link-belt system with 308 steel link buckets, of 60 tons hourly capacity, taking coal to overhead bins, whence it is fed to the grates by Roney automatic stokers. Water requirements at the boiler plant are about 750,000 gals. daily, obtained from a 750,000-gal. reservoir, fed from Lake Superior via the Calumet pipe-line. Coal on hand amounts to one year's supply.

The Torch Lake smelter it at Hubbell, about a mile south of the mills, on a 30-acre site having ample frontage on Torch lake, with deep water in front and 3 railways at the rear. The smelter has 4-stone furnace buildings, and a 50x70′ furnace building, both blast-furnaces and reverberatories having been rebuilt within the past few years. There are 18 reverberatories, which are top-charged, having platforms above on which the mineral is thoroughly dried before charging. The blast furnace is 40x128″ at the tuyeres, its comparatively small size being due to the use of reverberatory furnaces for the bulk of the smelting work. A new steel-frame smelter building houses three 150-ton reverberatory-furnaces, of so-called Jumbo pattern, modeled after the furnaces of the Lake Superior Smelting & Refining Co. The practice of the smelting plant is fully abreast of the time, in all essentials. In November, 1916 another furnace was blown in. In 1921, coal dust firing was started in the furnaces. The smelting works have an assay-office, a laboratory, and a large warehouse for supplies.

The electrolytic plant, 155x270′ at Hubbell has superseded the Buffalo reduction plant, which has been abandoned. It is built of steel and brick, contains four 7½-ton traveling cranes and 512 lead-lined wooden tanks, 3′x11′x3′ 9″ deep, in 4 sets of 128 tanks. Each set is arranged in 4 sections of 32 tanks, and each section in two tiers. The electric current is furnished by four 125-volt direct current generators driven by alternating current motors operating on current transmitted at 13,000 volts from the power plant at Lake Linden, transformed to 2,300 volts. There is a continuous circulation through the deposition tanks of the electrolyte which contains about 3 to 4% copper and 10 to 12% sulphuric acid. The plant has a capacity of 65,000,000 lb. copper per year. Company markets its own copper. This plant also recovers several hundred thousand ounces of silver yearly.

There is 1 concentrate or mineral house, with a storage capacity of 18,000 tons, at Hubbell. Calumet & Hecla concentrate, locally called mineral, carries less than 60% copper.

The power plant at the smelter has three 125-h. p. boilers, and each of the two large reverberatory furnaces has a 300-h. p. boiler attached through which the waste gases pass.

The dock system of the Calumet & Hecla is extensive, including a series of very large coal sheds at Lake Linden and a series of docks at the mills and smelters on Torch lake. An electrically operated coal bridge capable of handling, from vessels, 10,000 tons per 24 hours, was commissioned in spring of 1918. This bridge will unload all coal formerly handled at No. 1 and 2 docks. It also owns and operates the ship canal connecting Torch lake with the government waterways on Portage lake, this canal being 21′ deep and accommodating the largest vessels plying the Great Lakes. Tolls, ranging from 10 cts. on soft coal to 50 cts. per ton on package freight, are charged by the company on independent cargoes entering Torch lake through this canal.

The company owns extensive tracts of pine, hemlock and hardwood timber along the southern shore of Lake Superior, this land carrying between 400,000,000′ and 500,000,000′ of standing timber. The company also has a long term timber contract with the Keweenaw Association, Ltd., and buys extensively of jobbers, the requirements for underground timbering alone being 18,000,000′ annually, in addition to the many million feet of timber and lumber used on surface at the mines, mills and smelters.

Construction: cost $186,955 in 1920, compared with $592,850 in 1919; $179,588 in 1918; $2,274,901 in 1917.

Net returns: the conglomerate from the old Calumet & Hecla workings has shown a strongly declining tendency in metal content for many years past. Net returns were almost 5%, or 100lb of fine copper per ton in 1873; 4.75%, or 95lb fine copper per ton, in 1880; 3.012%, or 60.24lb per ton, in 1889, 2.99% or 59.93lb in 1900; 2.62% or 52.44lb in 1902.

Recent Net Returns.

	Cu. per ton			Cu. per ton	
	%	lb.		%	lb.
1907	1.98	39.68	1914	1.32	26.38
1908	1.80	35.96	1915	1.49	29.74
1909	1.66	33.14	1916	1.50	29.97
1910	1.51	30.12	1917	1.44	28.78
1911	1.52	30.38	1918	1.40	28.00
1912	1.49	29.73	1919	1.48	29.61
1913	1.39	27.85	1920	1.76	35.10

Ore from Osceola Amygdaloid Returned:

	lb. of Ore per ton		lb. of Ore per ton		lb. of Ore per ton
1907	18.45	1912	15.08	1917	12.79
1908	17.67	1913	14.31	1918	11.58
1909	16.40	1914	13.62	1919	15.57
1910	15.82	1915	13.31	1920	15.74
1911	15.89	1916	13.60		

Production: has shown a decline since 1906, in which year the high mark of 100,023,420lb fine copper was reached; in 1913 it was only 45,016,890lb copper, climbing to 53,691,562lb in 1914 and 71,030,518lb in 1915. Production in 1913 and 1914 was seriously affected by the labor strike, called by the Western Federation of Miners on July 23, 1913, and declared off on April 12, 1914, and by the extraordinary conditions prevailing in the copper market in 1914, due to the European war. The mine was operated on a ¾-time basis from September 1, 1914, until February 1, 1915, when work was resumed on full time.

Production and costs since 1910:

	Tons Ore Treated	lb. Cu. per Ton Ore	Mine Cost per Ton Exc. Cons.	Copper Production lb.	Net Cost per lb. Cents	Rec'd. per lb. Cents
1920..	1,560,240	27.87	$4.22	43,489,643	19.98	18.76
1919..	1,830,760	23.91	3.85	43,776,194	20.16	18.81
1918..	2,876,392	20.42	3.07	58,722,969	19.29	24.28
1917..	3,159,570	21.65	2.52	68,419,826	13.01	28.39
1916..	3,166,274	22.53	2.03	71,349,591	11.03	25.48
1915..	3,188,583	22.28	1.71	71,030,518	9.33	18.11
1914..	2,592,462	20.70	1.85	53,691,562	11.35	14.01
1913..	2,035,625	22.11	2.38	45,016,890	14.25	15.77
1912..	2,806,610	24.18	1.91	67,856,429	9.86	16.65
1911..	2,909,972	25.47	1.84	74,130,977	8.52	12.82

Production for first 2 months of 1921 was 9,343,184lb copper.

Conglomerate Lode:

1920..	978,000	35.10	$5.16	34,324,660	.....	.....
1919..	1,111,080	29.61	4.87	32,895,816	.....	.....
1918..	1,547,603	28.00	4.09	43,329,816	.....	.....
1917..	1,751,621	28.78	3.26	50,415,860	.....	.....
1916..	1,727,794	29.97	2.63	51,785,016	.....	.....
1915..	1,739,984	29.74	2.13	51,738,588	.....	.....
1914..	1,439,986	26.38	2.37	37,996,045	.....	.....
1913..	1,175,259	27.85	2.99	32,731,768	.....	.....
1912..	1,746,960	29.73	2.23	51,935,245	.....	.....
1911..	1,924,480	30.38	2.07	58,469,399	.....	.....

Osceola Lode. Amygdaloid:

	Tons Treated	lbs. Cu. per Ton	Cost p. t. Excl. Cons.	Copper lbs.
1920.....	582,240	15.74	$2.62	9,164,983
1919.....	719,680	15.57	2.28	10,880,378
1918.....	1,328,789	11.58	1.88	15,393,153
1917.....	1,407,949	12.79	1.60	18,003,966
1916.....	1,438,480	13.60	1.32	19,564,575
1915.....	1,448,599	13.32	1.07	19,291,930
1914.....	1,152,476	13.62	1.19	15,695,517
1913.....	842,162	14.31	1.53	12,051,238
1912.....	1,040,600	15.08	1.36	15,692,199
1911.....	985,492	15.89	1.34	15,661,578

Copper on hand at end of 1920 was about 70,000,000lb., compared with 28,000,000 a year previous.

The Kearsarge lode produced 228,985lb of copper from 19,050 tons of ore in 1912, and 233,915 lb from 18,203 tons in 1913.

In 1904, the Calumet & Hecla Mining Co. started a pension fund. Certain employees who had attained the age of sixty years or more and who had been in the company's employ twenty years or more, were retired on a pension proportionate to their length of service and their wages. These pensions have run from $9 per month to $38 per month.

On July 15, 1916, the C. & H. celebrated its 50th anniversary. Long-service medals were given to 1,371 employees; of these, 169 were for men who had worked over 40 years, 380 for 30 to 40 years, the remainder for 20 to 30 years.

Reviewing the 55 years career of this company, several features deserve attention. To the investor, the total dividends, $152,250,000 paid on an investment of $1,200,000 is not only remarkable for its amount, but because dividends have been continuous.

To the technical man this record is particularly noteworthy, when the mining record is considered. Beginning in 1866, with a small production from the rich native copper ore of the Calumet conglomerate, the company's present daily production is 10,000 tons, mined through 20 shafts, several of them a mile deep. The yearly production of copper is from 65 to 75 million pounds, with a record amount, 100 million, in 1906.

This production comes from very low-grade ore—lower, in fact, than that of the Utah Copper or other great porphyry deposits. The ore originally mined, carried nearly 5% or 100lb of copper per ton, but the grade of ore decreased from year to year as depth was gained until it is now only 25 to 28lb. copper per ton of ore. The maintenance of dividends, despite this decrease in metal content is due to the ability of the management in keeping down costs, so that a pound of copper is now produced as cheaply from the lean ore as it was from the richest ore. The company is also saving over 14,000,000lb of copper annually by retreating the old waste or tailings made many years ago at its mills and dumped into the lake. It has installed a leaching plant which gives a new youth to the entire district, by its treatment of ore carrying flake copper, and it has adopted flotation in connection with the treatment of conglomerate ores.

In 1906 the company, realizing that the Calumet conglomerate lode, on which the company was started, would eventually be exhausted, began the purchase of other properties and of shares in other Lake Superior companies. Controlling interest in six companies, bought for $8,592,000 has proved very profitable, these stocks returning over $11,000,000, in dividends, and meanwhile increasing in market value.

Operations on the Osceola lode were suspended toward the end of 1920 and on April 1, 1921, Calumet & Hecla and its subsidiaries stopped production. Development and smelting operations were, however, continued in a small way.

Management announced resumption of operations about April, 1922.

CASCADE MINING CO. MICHIGAN

Address: O. B. Warren, gen. mgr., 709 Security Bank Bldg., Minneapolis, Minn. Fully described in Volume XIV.

Property: Isabella mine, sold to Steel & Tube Co. of America, Wisconsin, and described under that title.

CASS COPPER CO. MICHIGAN

Address: Houghton, Mich.

Officers: Fred Smith, pres.; John T. Reeder, v. p.; F. W. Nichols, sec.-treas., with John H. Rice and Jas. P. Corgan, directors.

Inc. 1916, in Michigan, to take over the Norwich mine, formerly owned by the **Copper Crown Mining Co. Cap.** $3,750,000; shares $25 par; 40,000 shares were paid for the property and 14,660 issued to the public at $3 per share, to pay for diamond-drill campaign. Assessment of 10c. per share payable Jan. 16, 1922. Annual meeting, last Monday in June.

Property: 1,980 acres, in Ontonagon county, T. 49 N. R. 41 W., has several well-known lodes crossing the ground.

Development: by 9,550′ of diamond-drilling, which discovered an unidentified lode of shot and mass copper. This will probably be developed by an old 1,000′ tunnel. Work stopped August, 1917, until material and labor are again available at reasonable prices.

CASTILE MINING CO. MICHIGAN

Office: 1208 Hanna Bldg., Cleveland, O.

T. W. Hopkins, range mgr., Ironwood, Mich. P. S. Williams, supt., Oglebay, Norton & Co., sales agents; W. K. Carter, purch. agt.

Property: four mines on the Gogebic range, Gogebic county; the Asteroid, Castile, Eureka and North Mikado.

Production: total to end of 1920, 3,361,397 tons. Shipping ore carries from 60% to 62.76% iron and 0.042% to 0.102% phosphorus.

CENTENNIAL COPPER MINING CO. MICHIGAN

Subsidiary of Calumet and Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton County, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas MacNaughton, v. p.-gen., mgr. with H. F. Fay, Dudley S. Dean, E. B. Dane, Francis L. Higginson, and J. T. Burnett, directors. C. H. Bissell, sec.-treas.; G. L. Osgood, Jr., asst.-sec.-treas.; J. H. Chynoweth, mg. capt.

Inc. 1896, in Michigan, as successor of Centennial Mining Co. **Cap.,** $2,500,000 shares $25 par; 90,000 issued; paid in, $19.50. Last assessment, 1905, was $4. Calumet and Hecla owns 41,500, or 46%, of the 90,000 shares outstanding. Company owns 16,164 shares of the 100,000 shares of the Lake Milling, Smelting and Ref. Co. American Trust Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Annual meeting, first Tuesday in April. Listed on Boston Stock Exchange.

Dividends: Sept., 1916, $1 per share; 1917, $1; 1918, $2, amounting to $360,000.

Profits were $6,046 net in 1911, $50,511 net in 1912, $31,397 in 1913, $3,213 deficit in 1914, $142,440 in 1915, $276,546 in 1916, $145,399 in 1917 and $128,295 in 1918; $73,121 (loss) in 1919; $127,326 (loss) in 1920.

Balance Sheet, December 31:

	Current Assets			Current Liabilities		Excess of
	Cash, etc	Supplies	Total	Acct's. Pay	Reserve	Assets
1920.....	$208,986	$36,883	$245,870	$22,466	.....	$223,403
1919.....	362,358	48,463	410,822	33,672	.....	377,150
1918.....	423,750	45,637	469,387	33,387	$14,035	421,965
1917.....	408,333	66,389	474,722	34,230	4,384	436,108
1916.....	454,858	30,344	485,204	36,835	.....	448,368

Property: 670 acres, Sec. 12, T. 56 N., R. 33 W., and a trianglar patch of about 30 acres at the S. E. corner of the main tract, bought to secure the outcrop of the Kearsarge lode, and including about 10 acres, bought 1905, of the Old Colony, for the surface plant. The first work was done, 1863, by the Schoolcraft Mining Co., which failed to open a paying mine, and was reorganized, 1876, as the Centennial Mining Co., and again reorganized, 1896, with present title. Expenditures of upwards of $1,500,000 were made by the old company in unsuccessful efforts to open a payable mine on the northern extension of Calumet conglomerate. Seven shafts, 3 of considerable depth, were sunk on this bed, No. 3, the deepest, being bottomed at 3,200′. The Centennial lands are in the great mining area of Calumet, and are available for building purposes. Two additions have been platted and surface rights sold at good prices, mineral rights being reserved.

The present company did a little work, 1897 on the old conglomerate shaft, then turned attention to the Osceola bed, deepening 2 shallow shafts to 1,050′ and 1,150′ depth, respectively. The Osceola bed, where opened on the Centennial tract, averages about 15′ in width, but is lean.

Work on the Kearsarge bed was begun September, 1899. Owing to the outcrop of the Kearsarge occurring on the 30-acre tract bought of the Osceola, with only a 100′ right-of-way connecting it with the main tract, it was necessary to open the mine on the Kearsarge bed in a peculiar manner, by 2 shafts. These are but 90′ apart, on surface, and continue parallel, on the dip of the bed, until the 13th level, when the main tract is reached, after which No. 2 shaft diverges from No. 1 at an angle of 15° on the plane of the bed, 300′ being taken by the curve. This method of opening gives short drifts until the shafts enter the main Centennial tract. Each shaft is 17x18′ inside of timbers, with 3 compartments, sunk at an angle of 39° with the horizon, through an overburden of about 100′ depth. The Kearsarge bed averages about 16′ in width, and showed fair copper values in the upper levels, followed by a comparatively barren zone until the 14th level, when there came a gradual improvement, which unfortunately has not been maintained, the mine as a whole proving disappointing.

Development: new openings made during 1920 amounted to 1,021′, which compares with 1,729′ in 1919; 742′ in 1918; 1,409′ in 1917 and 2,208′ in 1916. No. 1 shaft is 4,000′ deep. No. 2 shaft, 4,689′ deep, is bottomed at 192′ below the 40th level. Drifts were extended N. & S. on the 39th level and N. on the 40th (in 1920); the ore disclosed was below the average grade. Stoping was carried on in levels No. 31, 33, 34, 35 and 36, where ore averaged about 2 lb. lower than in previous year.

Equipment: at shaft No. 2 includes a cylindrical steel shaft rock-house, with 1,000-ton bins, and a 32x60″ duplex straight-face hoist, with 2 drums of 14′ diameter and 15′ 6″ winding face, grooved for 1⅜″ cable. The hoist is fitted with devices to prevent overwinding, and is calculated to raise 5-ton skips at the rate of 4,000′ per minute, operating under 150-lb. steam pressure.

To overcome a labor shortage in 1917 a rope-haulage system was installed on No. 37 level. This handles ore sent from the 4 levels above.

The mine is served by the Copper and Mineral Range railroads, and has a private line connecting the shops and shafts.

The No. 2 mill of the Lake Milling, Smelting & Refining Co., at Hubbell, was closed in 1919 and rock has since been treated at the Osceola mill.

Production:

Year	Tons Ore Treated	Lb. Cu. P. T. Ore Stpd.	Mine Cost per Ton (a)	Lbs. Cu. Produced	Total Cost per lb., c.	Rec'd per lb.,c.
1920*	41,418	13.55	$4.327	561,284	22.96	18.66
1919	87,688	15.57	3.331	1,365,148	22.89	18.84

1918.....	159,040	15.67	2.275	2,492,857	19.11	24.61
1917.....	148,332	13.50	2.331	2,002,857	18.67	26.96
1916.....	150,617	15.72	1.916	2,367,400	13.44	25.02
1915.....	150,191	15.63	1.753	2,347,500	12.45	18.14
1914.....	138,136	16.56	1.838	2,287,130	12.56	12.11
1913.....	85,443	18.87	2.179	1,612,262	13.38	15.36
1912.....	106,517	16.36	1.920	1,742,338	13.46	16.98
1911.....	86,543	17.26	1.869	1,493,834	12.69	12.92
1910.....	102,133	15.40	1.948	1,572,566	14.48	12.62
1909.....	196,525	14.15	....	2,583,793	15.61	13.28
1908.....	169,693	12.94	....	2,196,377	18.49	13.39

(a) Includes mining, transportation, stamping and taxes.
*Operations suspended July, 1920.

CHAMPION COPPER CO. MICHIGAN

Office: 82 Devonshire, St., Boston, Mass. **Mine office:** Painesdale, Houghton county, Mich. **Mill office:** Redridge, Houghton county, Mich.

Officers: Wm. A. Paine, pres.; Chas. J. Paine, v. p.; F. W. Paine, sec.-treas.; with Frederick W. Denton, Geo. P. Gardner, W. Cameron Forbes, and Chas. F. Choate, Jr., directors; J. A. Ackroyd, asst. sec.-asst. treas.; W. H. Schacht, gen. mgr.; John Jolly, underground supt.; Edw. Koepel, mill supt.; M. L. Cunningham, asst. mill supt.; H. F. Mercer, chief engr.; E. W. Kruka, chief clerk; W. J. Richards, master mechanic.

Inc. Dec., 1899, in Michigan. **Cap.** $2,500,000; shares $25 par, all issued, full paid in. Is controlled jointly by Copper Range Consolidated Co. and St. Mary's Mineral Land Co., through equal ownership of stock, and owns $110.000 stock in the Michigan Smelting Co. Annual meeting second Wednesday in May.

Balance sheet of Dec. 31, 1919, showed a net profit of $1,399,714 and surplus of $1,953,398; and for 1920, a net profit of $399,772 and surplus, $1,721,756. Receipts for 1920 were $2,345,801 and expenditures, $1,946,028. Total assets of $1,801,774 include cash, $369,847; supplies, $344,143; liabilities, $80,017; excess of assets, $1,721,756.

Dividends: $3 in 1903; $2 in 1904; $10 in 1905; $12 in 1906; $10 in 1907; $5 in 1908; $8 in 1909; $9 in 1910; $5 in 1911; $11 in 1912; $9 in 1913; $31 in 1915; $60.14 in 1916; $44.80 in 1917; $19.75 in 1918; $12.80 in 1919; $6 in 1920; making a total of $258.50 per share or $25,850,260.

Property 1,240 acres, being the S. ½ of Sec. 30, W. ½ and N. ½ of N. E. ¼ and S. W. ¼ of N. E. ¼ of Sec. 31, T. 54 N., R. 35 W., practically all on the mineral belt. Neighbors are the Copper Range and Trimountain on the north, lands of St. Mary's Co. and Hussey, Howe & Co. on the east; Hussey-Howe lands and the Globe tract on the south, and Copper Range lands on the west. The tract carries 9,047′ on the strike of the bed, and, at the present angle of dip, the deepest shaft could go down to the impossible depth of 18,950′ before reaching the western boundary.

Geology: development started in 1899, under direction of Dr. L. L. Hubbard, and 3 parallel amygdaloidal beds were uncovered by trenching, one of which, the Baltic, showed phenomenal copper content. The 2 amygdaloids paralleling the Baltic bed showed copper in sufficient quantities to render their future exploration advisable. A fourth amygdaloidal bed, about 15′ wide, discovered 1901, east of the Baltic bed, carries heavy copper to an encouraging extent, and there also is a fissure vein of arsenical ore, apparently algodonite (copper arsenide) near "C" shaft. The width of this vein at surface is slight, and mineral contents variable, but on the second level the fissure is 2′ wide, and well mineralized.

The dip of the Baltic bed at the Champion is about 70° and strike same as at the Trimountain, not the easterly trend of the Baltic mine. The bed runs 13 to 45′ and averages 24′ width, carrying more epidote than at the Trimountain and Baltic. The surface of the tract is hilly, but the over-

burden is less than is found either to the northward or southward. The stretches of lean ground in the mine are few, and the bed carries heavy copper in profusion, mostly in barrel size, but running up to masses of 10 tons in weight. Only about 60% of the rock broken is hoisted, waste rock being sorted out and used for dry walling, packing itself.

All shafts are connected on numerous levels and about 2 miles of new workings are normally made yearly. The bed shows so little poor ground that nearly every level will be opened from end to end of the mine, eventually giving the longest average drifts of any Lake Superior property. The only really poor ground found in the mine was shown in "E" shaft, between the 3rd and 4th levels, and the mine shows some stopes of phenomenal width and richness. The ground opened in 1918 was of average grade. In 1919, by more careful rock selection, the yield of copper per ton was higher than at any time previously; further improvement was shown in 1920.

Development: by 4 shafts; No. 1, the northernmost and 1,835′ S. of Trimountain boundary, is 2,668′ deep; No. 2, 1,050′ S. of No. 1, 2,662′ deep; No. 3, 1,300′ S. of No. 2, 2,339′ deep; No. 4, 1,300′ S. of No. 1 and 3,900′ N. of Globe boundary, 2,388′ deep.

The third level of No. 4 shaft has been driven 3,000′ toward the Globe boundary. "F" shaft, started 1,300′ S. of No. 1, was abandoned on account of treacherous overburden, but the Baltic bed was located, 1907, by diamond drill at a new site, 1,800′ S. of No. 4, and 2,100′ N. of the Globe boundary.

New work in 1918 was 4,500′; in 1919, 6,814′ including sinking No. 2 shaft 149′; in 1920, 3,746′, including sinking No. 1 shaft 154′ to the 25th level and No. 2 shaft 50′ to the 24th level.

Equipment: the shafts are practically duplicates in all essential particulars, having 40x50′ shaft rock houses, with 90-ton ore bins. Equipment at each rock house includes a steam hammer for heavy copper, and one 12x15″ rock crusher, taking everything hoisted from the mine direct from chutes. The shafts have duplicate first-motion hoists with 24x60″ duplex cylinders and double conical drums of 14′ diameter, with capacity for two 3,000′ cables each, hoisting 6-ton skips. The boiler houses have Bradley and Burt boilers, with coal trestles connecting. Water for boilers is furnished from a 12,000,000-gal. dam.

Extensive use is made of electric power on surface, and there are some underground electric pumps. The electric plant at "F" shaft has a 250-k. w. generator, direct connected to a cross-compound vertical engine.

The adoption of power shovels for underground work is under consideration.

The main steel compressor building at "F" shaft has a 100-drill quadruple expansion 2-stage air compressor, with capacity to compress 9,120 cu. ft. of free air per minute to a pressure of 70 lbs. per inch. The compressor operates at a steam pressure of 280 lbs., and has a regenerative feed-water system. Power is furnished by three 250-h. p. water-tube boilers. At No. 1 shaft there is a 40-drill cross-compound 2-stage air compressor with vertical receiver inter-cooler. The electric plant, with a 100-k. w. generator, is in the main compressor building.

Buildings at the mine include a change house, dwellings and machine shop, with traveling crane and trolley rail for its entire length, with a 30-h. p. electric motor.

Mill: The stamp-mill is at Freda, on Lake Superior, 2 miles west of Redridge. Low-pressure turbine and accessories were installed in 1915. The mill has 6 stamps, there being 4 compound stamps, with 15½″ cylinders, each treating about 700 tons daily, and 2 simple stamps, with 28″ cylinders of about 660 tons daily capacity each, giving the mill a total capacity of fully 4,000 tons daily.

The concentration department has Hodge graduated adjustable-speed

jigs, with plungers working simultaneously or alternately in pairs, jigs and concentrating tables. Raggings are reground by crushing rolls having 1 roll fixed and the other in a spring bearing. The preliminary discharge from the stamp heads is treated on very large jigs, having 30x48" sieves, of punched steel, with one-eighth inch openings, installed in connection with the head. Each head has a V-shaped settling tank, 40' long, 9' deep, 12' wide at the top and 6" wide at the bottom, slimes being drawn from spigots at the bottom. The flow of water through the settling tanks does not exceed 6' per minute.

The boiler house has four 200-h. p. Stirling and 5 Scotch marine boilers. In 1916 a 235' concrete stack, 100" dia. at top, was constructed, and a new boiler installed. Coal is brought to the boilers by tram, and reduced to uniform size by a grinder before feeding to the grates, and ashes are washed into the lake through a launder. Exhaust steam passes through dry condensers, thence to a hot well, from which water is fed to the boilers. Power for the mill is supplied by a 500-h. p. cross-compound engine and a turbine, with a 180-h. p. engine in reserve.

The steel pump house, with truss roof and traveling crane, has a 20,000,000-gal. triple-expansion pump. Water for the mill and boilers comes from the lake through a 1,020' tunnel, the shore end having a well with bottom 8' lower than the lake level, this being the longest tunnel ever driven under Lake Superior. The intake crib has an area of 45 sq. ft. and, with a second crib, the tunnel could furnish water for 10 stamps. Water cost was less than 1½ cents per ton of ore stamped. Screens have been installed in the tunnel, obviating the trouble formerly caused by sand and wood pulp in the water. A sand loading plant was erected in 1915.

Production:

Year	Ore Stamped Tons	Copper Produced Pounds	Yield per Ton Pounds	Cost per Lb. ¢	Price Receive.	Net Profits
1920.....	321,664	13,610,324	42.42	.....	17.17c	$ 399,772.
1919.....	503,030	19,886,917	39.05	15.35c	18.67c	1,399,714.
1918.....	594,235	21,748,514	36.59	12.03c	24.75c	2,791,800.38
1917.....	776,036	27,550,343	35.50	10.40c	28.73c	5,050,171.57
1916.....	936,656	33,601,136	35.87	07.80c	25.28c	5,870,606.26
1915.....	923,743	33,407,599	36.17	06.30c	17.40c	3,709,049.02
1914.....	614,854	15,807,206	25.71	09.21c	13.38c	658,175.99
1913.....	421,849	12,080,594	28.64	10.71c	14.89c	504,767.61
1912.....	765,306	17,225,508	22.51	08.88c	16.16c	1,251,619.40
1911.....	734,392	15,639,426	21.29	09.63c	12.54c	454,588.61
1910.....	722,051	19,224,174	26.62	07.85c	12.74c	939,205.03
1909.....	753,908	18,005,071	23.88	08.45c	13.00c	816,637.55
1908.....	794,703	17,786,763	22.38	09.01c	13.39c	777,480.14
1907.....	708,685	16,489,436	23.26	11.76c	17.28c	909,383.88
1906.....	671,785	16,954,986	25.24	09.30c	10.06c	1,654,435.23

Total production, 1902-1920, is 341,669,308lb of copper, valued at $61,505,341.

The Champion is one of the largest and richest of Lake Superior mines and has been admirably managed. Operations were somewhat curtailed in 1919, and more so in 1920, but production continued even during 1921.

CHARCOAL IRON CO OF AMERICA — MICHIGAN

Address: H. H. Bingham, gen. mgr., Detroit, Mich. W. E. McRandle, supt., Bessemer, Mich. Rogers, Brown & Co., sales agents.

Officers: Frank W. Blair, pres.; F. W. Hutchings, v. p.-treas.; H. H. Bingham, v. p.-gen. mgr.; C. H. Havill, asst. sec.-treas.; A. E. La Bonte, asst. sec.

Cap. $8,056,600 in 521,725 pfd. shares and 283,935 com. shares; $10 par. Funded debt, $994,500 7% Gold debenture notes. Total assets, Dec. 31, 1920 were $15,162,924, with surplus, $1,852,175; June 30, 1921, total assets were $14,536,232 and surplus, $1,584,497.

Property: a 23-year lease on the Yale mine on Gogebic range. **Ore:** 3 grades, all soft red, one a Bessemer, the second non-Bessemer and the third silicious hematite. The best ore contains 57.49% iron, 0.020% phos. and 3.24% silica.

Development: by shaft. Ore is mined by caving to a depth of 1780'.

Production: 149,155 tons in 1916; 73,633 in 1917; 103,491 in 1918; 270,006 in 1919; 348,007 in 1920; 71,897 in first half of 1921. Company is the largest producer of pig iron, charcoal, acetate of lime and wood alcohol in the United States.

CHEROKEE COPPER CO. **MICHIGAN**

Address: J. A. Thomas, supt., Houghton, Mich. **Mine office:** Winona, Houghton county, Mich.

Officers: W. A. Hodgson, pres.; Linus Stannard, 1st v. p.; Deen L. Robinson, 2nd v. p.; Wm. D. Calverly, sec.-treas.; with J. H. Rice, B. F. Sparks and F. W. Nichols, directors.

Inc. April, 1910, in Michigan. **Cap.** $2,500,000; $25 par; issued, $1,750,000, of which 49,000 shares were given for lands, 5,000 shares went to the promoters, and 16,000 shares were sold to the public at $5. Paid in $5.50 per share; last assessment of 50c. paid March 26, 1917. Boston Safe Deposit and Trust Co., transfer agent; International Trust Co., Boston, registrar. Listed on Boston Curb. Annual meeting second Tuesday in April.

Statement for December 31, 1917, shows receipts of $22,227; previous surplus, $17,326. Expenditures were $27,066, of which $25,264 was spent for mining, leaving cash on hand $12,486. In August, 1919, there was $20,000 in the treasury.

Property: 880 acres, Sec. 2 and S. E. ¼ of Sec. 31, T. 51 N. R. 37 W., lying between the Bohemia and King Philip, 1 to 2 miles S. W. of the latter, formerly were owned by the **Penn Mining Co.**, and later by the ill-starred **Belt Mines Co., Ltd.** Land, entirely on the mineral belt, formerly included what is now the Lake mine of the **Lake Copper Co.** and carries upwards of a mile of the copper-bearing formation, presumably carrying the Evergreen belt. Diamond-drilling began in 1913. No. 6 drill-hole cut a cupriferous amygdaloidal bed of 32' width, of which 5' carried good copper.

The vein is amygdaloid to epidotal amygdaloid in character with general N. E. strike and dip of 62°, having barrel and shot copper in surface workings, and a width of 30' to 45'.

Development: by shaft, down 450', with openings at 110', 220', 320' and 420' levels, with drifts following the vein (N. E.-S. W.), from each station driven in 1917, for 653'. A fault-plane crosses shaft at No. 3 station; it dips 45° E.; the extent of disturbed ground is unknown.

Equipment: hoist, compressor, pumps, etc. Work suspended December, 1917.

CLARK MINE **MICHIGAN**

Office.: care Dr. Leon Estivant, owner, 47 Ave. de l'Alma, Paris, France. **Mine office:** Copper Falls, Keweenaw county, Mich. Fred W. Nichols, agt.

Property: 2,433 acres, includes mine formerly known as the Clark, Bell and Montreal, about 3 miles south of Copper Harbor, between Lake Fannie Hooe on the north and Breakfast on the south, including Lake Manganese. Mine, opened 1858, for copper, also carries a promising 2' of pyrolusite, average of assays, 1900, by Duparc of Geneva, giving 55.73% manganese and 1.36% copper. Was tested 1905, and again, 1910, by diamond-drills. Shipped about 1,200 tons of high-grade manganese ore. Was under option, 1910, to United States Smelting Refining & Mining Co. Fully described Vol. II.

Idle for years.

CLEVELAND-CLIFFS IRON CO. MICHIGAN

Offices: Cleveland, Ohio and Ishpeming Mich. M. M. Duncan, mgr.

Officers: W. G. Mather, pres.; M. M. Duncan, v. p.; G. G. Heer, treas.; S. L. Mather, sec., with T. H. Newberry, C. W. Bingham, S. Mather, J. H. Wade and H. A. Raymond, directors. C. J. Stakel supt.

Inc. May 9, 1891 in W. Va. **Cap.** $10,000,000; $100 par; 995,740 issued Reincorporated December, 1920 in Ohio. **Cap.** 400,000 shares, no par value, 398,296 shares issued.

Funded debt: authorized $3,500,000 Firts Collateral Trust Gold 6s; $175,000 outstanding, May, 1921; $72,000 Grand Island Steamship Co. First Gold 5s., due Dec. 1, 1921 and guaranteed by the Cleveland Cliffs Iron Co In June, 1920, company with Trumbull Steel Co. purchased all the common stock of the Trumbull Cliffs Furnace Co.

Dividends: 62½c. per share paid Jan. 25 and April 25, 1921; 35c. July 25, 1921. The old company paid 2½% quarterly.

Balance sheet dated Dec. 31, 1921 shows current assets, $28,033,412; total assets $63,549,005; current liabilities, $12,068,798; surplus, $63,549,005.

Property: iron mines in Michigan and Minnesota. For the Minnesota properties see Cleveland-Cliffs Iron Co., Minn. The Michigan properties include the following mines all in the Marquette range: Angeline, Adams, Austin, Athens, Barnes-Hecker, Bunker Hill, Cliffs shaft, Francis, Gwinn, Holmes, Jackson, Lake, Maas, Morris-Lloyd, Negaunee, Republic, Salisbury, Stephenson, Princeton, Mackinaw, Lloyd and Gardner.

The McClure power project was completed 1919, after 2 years' work, commenced in August, 1917. The dam on the Dead River, 7 miles west of Marquette, Mich., is the largest hydro-electric project in northern Mich. The dam is 500′ long, spillway 200′ long, height 50′ from foundation, and base 50′ wide, tapering to 4′ at top of spillway. It is of concrete construction throughout. A pipe-line 13,600′ long connects with the power-house; 10,000′ of this is of fir wood-pipe 7′ in diameter, the remaining 3,600′ is steel, 7′ in diameter.

The power-house built at the junction of Rainy creek and Dead river, is 90′ long, 45′ wide and 25′ high. Two 5,000 Kva. generators are coupled to 7,000 h. p. turbines. The transformers are outside the building; the current is received at 2,000 volts and stepped up to 30,000 volts for distribution throughout the company's mines. This plant is described in the Eng. and Min'g. Jour.," Sept. 13, 1919.

CLIFF MINING CO. MICHIGAN

Subsidiary of Calumet and Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p., and gen. mgr., with Q. A. Shaw McKean, R. C. Grew, W. E. L. Dillaway, and Walter Hunnewell directors; C. H. Bissell, sec.-treas.; Geo. L. Osgood, Jr., asst. sec.-treas.

Inc. Jan., 1910, in Michigan. **Cap.** $2,500,000; shares $25 par; issued, $1,500,000, $13 paid in. Is controlled through ownership of 28,785 shares, by Calumet & Hecla Mining Co. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Annual meeting, first Wednesday in April.

Assets and Liabilities:

	Current Assets				
	Cash & Accts. Rec.	U. S. Cert.	Supplies	Accounts Pay.	Surplus
1920.....	$50,817	.....	...	$1,176	$49,641
1919.....	5,373	$10,000	...	39	15,135
1918.....	16,209	10,000	...	137	17,071
1917.....	19,854	.....	$495	1,731	18,618
1916.....	20,954	.....	492	110	21,335

Receipts in 1920 were $37,103, of which $34,993 was from sale of real estate.

Property: includes both the Cliff and the South Cliff mines connected underground on the third level. The Cliff mine, 2 miles N. E. of the Ojibway, is the oldest mine in the Lake Superior district, opened 1846, closed 1870, again reopened 1872, and abandoned 1878, paying dividends,1849-79, of $2,518,620. The mine was opened on a fissure vein crossing the bedded formation at practically right angles, and was pretty thoroughly worked out before the property was abandoned. The main fissure vein had several feeders, and a number of independent fissure veins, including the West vein, which was rich in copper near surface, and the East Cliff vein, about an eighth of a mile east of the main vein. The Cliff ore was notably rich in native silver.

The Cliff carries the Kearsarge amygdaloidal bed for about 2 miles, and for practically unlimited depth, the shaft being a trifle less than 2 miles from the most northerly shaft of the Ojibway, which is the nearest opening on the Kearsarge lode. The Tamarack Mining Co., which owned the Cliff until 1910, secured a complete geological cross-section of the tract, in 1903-7 by diamond drilling, the location of the Kearsarge bed being proven by 12 drill-holes, the majority of which were said to show commercial values, and, in addition, the property carries about 20 other amygdaloidal beds, east of the greenstone bluff, which is such a prominent feature of the landscape rising to a height of several hundred feet. A 217' vertical shaft was sunk, 1910, entering the bed where the ground is considerably disturbed. Work in this shaft was abandoned, 1913, as the Kearsarge vein at this place proved narrow, dry and barren.

Five diamond-drill holes were put down during 1914 and 1915 to explore the beds eastward in the hope of finding a profitable vein towards the Eastern sandstone. The cross-section crossed the horizon of the Old Colony, Mayflower and St. Louis amygdaloid lodes and the Bohemia and St. Louis conglomerate lodes, but very little copper was disclosed by this work.

The Cliff was the first mine ever opened for native copper, and production, 1845, was 19,903 lb., which was the first commercial output of copper from Lake Superior. Total production, 1845-'82, was 38,054,340 lb. fine copper.

In October, 1919, company sold a mill-site of 346 acres on the northerly side of Keweenaw Point to the Seneca Corporation.

Equipment: includes a power house, with boilers, duplex hoist, and a 5-drill air-compressor. Buildings include a smithy, changing house, combination office and warehouse, boarding house and a number of dwellings. The mine is reached by the Keweenaw Central railway.

Owing to the unsatisfactory assays of the drill cores, property has been idle since 1915.

CONTACT COPPER CO. — MICHIGAN

Office: 70 State St., Boston, Mass. **Mine office:** Houghton, Mich.

Officers: Harry F. Fay, pres.; C. J. Morrissey, sec.-treas.; with W. A. Mosman, W. S. B. Cram and John G. Stone, directors. G. S. Goodale, supt., Houghton, Mich.

Inc. May 16, 1910, in Michigan. **Cap.** $2,500,000; $25 par; paid in $2.50. By vote of stockholders, March 21, 1918, the capital stock was reduced from $5,000,000 to $2,500,000 by redemption of 100,000 shares in treasury. Annual meeting, third Thursday in March. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Listed on Boston Curb.

Company is a reorganization of the Elm River Copper Co., whose shareholders were given the privilege of exchanging their stock for shares in the Contact Copper Co., share for share, if they subscribed for additional shares at $2 each, to the extent of 50% of their holdings in Elm River.

Practically 75% of Elm River stock was exchanged and the Contact Co. acquired title to all the real estate and personal property of the former company, which has been dissolved.

Report January 1, 1919, showed cash on hand, $4,450.

Property: 2,360 acres, in one tract, within the copper-bearing formation in Houghton county, Mich. The property extends along the strike of the copper belt for 16,900′, with a width across it of 11,600′, and bracing the horizon of all the copper bearing beds of the Keweenaw formation, between the Eastern Sandstone and the upper part of the Ashbed series.

Development: as the tract is deeply covered by drift, it has been explored by diamond drill work, a nearly complete cross-section being secured by upwards of 11,600′ of drill holes. Cores show copper in a number of different beds, but not in commercial quantities. On July 1, 1915, drilling was resumed in the S. E. ¼ of Sec. 11, to investigate the horizon believed to contain the so-called No. 8 Amygaloid opened on the neighboring Wyandot property and correlated with the Baltic lode on which all the mines of the Copper Range Co. are located. Up to March, 1916, about 5,271′ of drilling had been done and the lode definitely located at depths of 450′ and 950′, respectively, from the outcrop. In hole No. 20, 2,518′ of drilling was accomplished between March 1 and June 29, 1916. In hole No. 20 the lode was located between 1,878′ and 1,958′; in No. 21 between 641′ and 671′. In these 4 holes, the formation averages 35′ of uniformly favorable rock.

Equipment: includes a duplex hoist good for 1,000′, 2 Burt marine boilers and a 4-drill air-compressor. Water is taken from a dam by a Blake pump. Buildings include a carpenter shop, two-story warehouse, boarding house with accommodations for 100 men, school house and a number of dwellings.

In order to protect the company's cash, work was suspended in 1916 and no active mining exploration has been carried on awaiting the result of active diamond drill work on the ground north and south of the company holdings.

COPPER CROWN MINING CO. — MICHIGAN

Inc. July 18, 1902, in Michigan. **Cap.** $2,500,000; increased about 1911, to $3,000,000; $25 par; issued, 66,200 shares. Company in July, 1916, sold its property to the **Cass Copper Co.**, which see.

COPPER RANGE COMPANY — MICHIGAN

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Painesdale, Houghton county, Mich. Sales Dept.: 52 Broadway, New York.

Officers: Wm. A. Paine, pres.; F. W. Denton, v. p.; F. W. Paine, sec.-treas., with L. P. Yandell and R. H. Gross, directors; William H. Schacht, gen. mgr.; J. A. Ackroyd, asst. sec.-asst. treas. W. Parsons Todd, sales mgr., New York; John M. Wagner, purch. agent, Houghton, Mich. American Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Annual meeting, first Wednesday in May.

Inc. 1899, in Michigan. **Cap.** $10,000,000; increased 1915 from $2,500,000; shares $25 par; 394,363 shares issued December 31, 1920; reserved for exchange of 637 shares; treasury stock, 5,000 shares. The company is the successor of the Copper Range Consolidated, which December, 1901, took over 99,699 shares of that company's stock. On October 18, 1915, this holding company was formally dissolved and the shares exchanged for those of the Copper Range Co. Natl. Shawmut Bank, registrar; American Trust Co., transfer agent, both of Boston. There are about 7,000 shareholders. Listed on Boston Stock Exchange. Range of shares during 1920 was $48 ⅝ high and $25 low; in 1921, $41 and $25½.

Dividends: $1,536,086 in 1905; $2,304,810 in 1906; $2,304,810 in 1907; $1,536,740 in 1908; $1,536,930 in 1909; $1,537,340 in 1910; $1,357,104 in 1911;

$788,428 in 1912; $1,084,498 in 1913; $1,182,003 in 1915; $3,941,648, or $10 per share in 1916; $3,943,912, or $10 per share in 1917; $2,366,390, or $6 per share, in 1918; $2.50 per share in 1919; $1.50 in 1920; $1 on March 1, 1922; the total is $27,392,708.

Holdings consist of the entire assets of the Copper Range Consol. Co. Company's treasury holds: 50,000 shares of Champion Copper Co., or one-half the total issue; 97,231 shares Atlantic Mining Co.; 99,690 shares Tri-mountain Mining Co., and 42,443 shares Copper Range Railroad Co. The Baltic Mining Co., absorbed by the Copper Range Co., has been dissolved and the mine operated as the Baltic mine of the Copper Range Co. Although described separately, financial and other data relative to the Champion C. Co. are also included below.

Balance sheet for years ending December 31:

Assets—

	1920	1919
Cash at Boston	$ 396,922	$ 85,053
Cash and Supplies at mine	964,382	732,805
U. S. Bonds & Cert. of Indebt.	2,014,000	2,014,000
Copper on hand, since sold for	1,211,854	1,904,420
Copper delivered, not paid for	170,661	774,542
Michigan Smelting Co. stock	340,000	340,000
Balance due from U. S. Govt. as compensation for C. Range R. R. Co.	642,551	108,781
C. Range R. R. Co. bonds	870,000	870,000
Accounts receivable	110,130	133,323
Miscel. Securities	28,169	.....
	$6,748,672	$6,962,923

Liabilities:

Mine indebtedness	$ 130,398	$ 164,219
Accounts payable	319,907	34,118
One-half Champion	860,878	976,699
Excess of Assets	5,437,488	5,787,887
	$6,748,672	$6,962,923

There was a deficit of $4,839 from operations of all companies in 1920, compared with an operating income of $972,654 in 1919; $2,895,615 in 1918; $4,966,825 in 1917; and $6,078,189 in 1916. Federal income and excess profit tax, paid in 1918 for 1917 operations amounted to $711,905, taken out of the surplus carried from 1917 account.

Property: 23,517 acres, mainly in Houghton county. Mining companies controlled own an additional 12,240 acres. In 1916 company secured an option on 3,500 acres lying to the south from the St. Mary's Mineral Land Co. and bought for $50,000 scattered lands to the extent of 5,000 acres in Houghton and Ontonagon counties, from the South Range Mining Co. During 1917, company purchased 5,050 acres, surface and mineral rights, also the mineral rights on 2,000 acres. The price paid was approximately $50,000.

The company's original tract of 9,360 acres mineral and 441 acres non-mineral land, lies between the Baltic (800 acres) on the south and the Tri-mountain (1,351 acres) on the north. The Champion lies between the Baltic and the St. Mary's Mineral Land property. The Atlantic mine has been idle since the mine was wrecked by air blasts in 1911. The Baltic mines a highly mineralized amygdaloid bed 15'-60' wide, mined through three shafts more than 2,500' deep. The Champion works three separate amygdaloid beds mined by four shafts, all over 2,000' deep. The Trimountain output comes from the Baltic bed mined by 3 shafts, one 3,225' deep.

Development: new work in 1920 totaled 13,948', compared with 25,095' in 1919; 28,062' in 1918; 41,950' in 1917. During 1917, $57,364 was expended diamond drilling the lands under option from the St. Mary's Land Co., but no important discoveries were made.

Production: (Baltic, Trimountain and ½ Champion):

	Ore, tons	Copper lb.	Yield p. T., Lb.	Price rec'd	Cost p. Lb.	Net Profit
1921.....	.....	30,000,000*	.....	.....	.....	.....
1920.....	452,957	16,951,105	37.42	17.14c.	17.17	$ 4,839**
1919.....	614,342	23,082,498	37.57	18.67	15.35	972,654
1910-'19....	1,071,746	28,581,304	26.67	18.87	10.87	2,293,955

* estimated.
** Deficit.

The company's output was sold in 1917 for the highest average price ever received by any copper company, namely, 28.735c per lb. In 1918, despite the fact that much copper was sold at prices established by the Government, the high price received of 24.757 cents was due to fact that company books its sales well forward. Copper Range is an assured success, and worthy of all the praise that has been given it. It is the second largest producer of the Lake Superior district.

During 1921, Copper Range and its subsidiaries operated at 60% of normal capacity.

Copper Range Railroad Co.

Office: 82 Devonshire St., Boston, Mass. **Operating office:** Houghton, Mich.

Officers: Wm. A. Paine, pres.; F. W. Paine, sec.-treas.; G. H. Wescott, gen. mgr.; J. A. Ackroyd, asst.-sec.-asst.-treas., with John H. Rice, F. W. Denton, v. p.; Thos. S. Dee, Wm. D. Calverley, W. H. Schacht, and J. R. Stanton, directors.

Inc. 1899, in Michigan. **Cap.** $5,000,000; shares $100 par; issued, $4,244,300. Debentures outstanding, $2,280,000 first-mortgage 5% bonds. Company is authorized to issue bonds to extent of $20,000 per mile of completed main line, and $15,000 per mile of completed branch lines and sidetracks. Total cost of the road to the end of 1920 was $7,669,222.

Operating results have been as under:

Year	Revenue	Profit
1920*.....	.....	$94,940x
1919*.....	$1,002,912	117,030
1918*.....	1,171,804	100,880
1917.....	960,275	228,852
1916.....	930,606	324,131

*Operated by U. S. Government, 1918, 1919 and 8 months of 1920.
xLoss. About 75% of the revenue is derived from carriage of ore, mineral and freight.

The railroad has upwards of 100 miles of track, the 65-mile main line running from Calumet to McKeever, and connecting with the Keweenaw Central at Calumet; the Duluth, South Shore & Atlantic, Hancock & Calumet and Mineral Range railways at Hancock and Houghton, and the Chicago, Milwaukee & St. Paul railway at McKeever. The company also has track rights over 19 miles of the Chicago, Milwaukee & St. Paul railway, between McKeever and Ontonagon, with additional trackage rights of 73 miles over the same line, over which fast freights are operated between Calumet and

Channing, Mich. Track rights have been given the Chicago, Milwaukee & St. Paul over the Copper Range between McKeever and Houghton, and a direct passenger service, with exceptionally good equipment, is operated jointly by the Chicago, Milwaukee & St. Paul and Copper Range lines, between Chicago and Houghton. Spurs connect the main lines with all of the principal mines along the right-of-way.

The company owns a half-interest in a bridge crossing Portage lake, between Houghton and Hancock; also extensive water frontage on Portage lake, in the western part of Houghton, with general office building, shops roundhouse, warehouses and wharves for merchandise and coal. The coal wharf is equipped with modern unloading machinery, and has deep water alongside, capable of accommodating the largest freighters plying the Great Lakes. The Copper Range railway is a model small road.

Baltic Mine

Property: 800 acres, near the eastern limit of the Michigan copper belt, about 75 acres being on the eastern sandstone and non-mineralized. Holdings comprise all of Sec. 21 except the S. E. ¼, and W. ½ of Sec. 20, T. 54-N., R. 34 W. Lands are bounded on the north by the Wheel Kate and Sec. 16 of the Atlantic; on the east by St. Mary's Mineral Land Co., on the south by St. Mary's lands, lands of Hussey, Howe & Co., and the Trimountain mine; on the west by the Trimountain. Exchanged 39 acres, 1905, with the Atlantic mine, which will enable the Baltic to sink No. 5 shaft to much greater depth than otherwise possible. To the southward the Trimountain and Champion mines are opened on the same bed, which has a strike of N. 63° E., from Baltic shafts 2 to 5, and to the northward is the Superior mine, on the same bed. The dip of the bed averages about 73°, being the sharpest of any developed cupriferous bed in the Lake district.

Two beds, known as the main and west lodes, are mined, the main Baltic amygdaloidal bed is exceptionally strong, ranging 15 to 60′ in width, and so well mineralized that at most points it can be more or less thoroughly stoped from wall to wall. The great width of the stopes has brought about the use of a walling system, by which waste rock is built into dry walls along the drifts, thus saving timbering, while giving stronger walls than any timber could supply, and saving the cost of hoisting lean rock. This system has proven a success, and is now in general use in the Lake district, the credit being due Mr. Denton. A little melaconite is found in narrow fissures crossing the lode, these being too small to follow, but the black oxide ore mined in the stopes is saved in milling, with 35 to 40% copper as dressed, and smelts readily with the native copper mineral. The native copper of the Baltic is arsenical, and it is probable that some copper arsenides are mined and milled, as narrow arsenical fissure veins occur occasionally in the district south of Portage lake. While the finished copper is arsenical, it makes wire of great tensile strength.

Development: in 1917 totaled 14,519′; in 1918, 13,871′; in 1919, 11,010′; in 1920, 2,155′.

Shafts are numbered from South to North.

No. 1, the discovery shaft, located between Nos. 2 and 3, was sunk at a wrong angle, and was abandoned at depth of 219′.

No. 2, the southernmost shaft, 3,062′ deep, began production 1906. The surface plant at No. 2 includes a boiler house with two 250 h. p. boilers, and an engine house with an air-compressor reducing 4,000′ of free air per minute to a pressure of 70 lb per square inch, and a hoist with double-conical drum. The shaft rock house has a crusher operated electrically, and the shaft has concrete stringers.

No. 3 shaft, 1,170′ northeast of No. 2 and 3,755′ deep, has a steel shaft

rock house of the circular type, with 1,200-ton bins, equipment including a 16x18" engine, two 18x24" crushers and a large crusher operated electrically.

No. 4 shaft, 900' northeast of No. 3 and 2,982' deep, has a frame shaft rock house sheathed with steel, 36x71', with 17x31' wing, 88' high, with 1,400-ton rock bins and two 18x24" crushers.

No driving was done from the bottom of No. 3 and 4 shafts during 1919, as the ground was poor for a considerable distance. The lode was drilled and only one hole revealed good ore. In 1920, shafts 2 and 3 were sunk and drilling continued.

No. 5 shaft, the northernmost, 885' N. E. of No. 4 and 1,624' deep, has a rock house duplicating that at No. 4. Stoping was done on the 9th and 14th levels, inclusive, and drifts run to the Atlantic boundary. The ground was considerably disturbed in the upper levels, but is growing more settled at the bottom, and good showings are reported on the West lode. Hoist is duplex good for 1,500' depth. Shaft has been abandoned and ground tributary thereto is mined and ore hoisted through the No. 4 shaft.

Equipment: hand power cranes for handling mass copper have been installed at all shafts, and the mine has electric pumps. In 1915 installation of additional generator for underground haulage and construction of transformer house for new transmission line from stamp-mill was completed.

The compressor house, between shafts Nos. 3 and 4, is 36x58' in size, with concrete foundations, stone walls and steel roof, housing a compressor with capacity to reduce 4,000' of free air per minute to a pressure of 70 lbs. per inch. Adjoining is a boiler house of similar material, 49x76', with wing 12x62', having four 250-h.p. boilers and a 140' self-supported steel smokestack. This boiler plant supplies steam for shafts 3 and 4. A new boiler plant was constructed in 1916. Adjoining the boiler is a 360' coal trestle, of 5,000 tons capacity, underneath being a 5x8' concrete tunnel, through which coal is hauled in tram cars, on a down grade, by endless cable. The mine has a complete electric light plant. A considerable town has grown up about the mine, with well-built dwellings for employees on lands owned by the company. The property is served by the Painesdale branch of the Copper Range railroad.

The mill, on Lake Superior, one-half mile west of the Atlantic mill, went into commission, 1901, and was enlarged, 1907. The building is of structural steel, on stone foundation equipped with 4 simple heads of 500 to 625 tons capacity each, and 2 compound heads of about 800 tons capacity each, giving the mill a capacity of about 4,000 tons daily. Equipped with Wilfley tables, Woodbury jigs and Deister concentrating tables for treating the finer slimes. The mill has crushing rolls and a Huntington mill for regrinding, and a settling tank for slimes. Mineral carries about 60% fine copper. Power is furnished by a 500-h. p. 14x32" cross-compound engine, and a 180-h. p. auxiliary engine.

Adjoining the mill is a boiler house with five 250-h. p. boilers. Draft is secured by a set of duplex fans, driven by the mill engine, with a concrete smokestack 226' high and 8' in diameter. Behind the boiler house is a 25,000-ton coal storage yard, for the joint use of the Baltic and Atlantic mills, coal being brought to the boilers, through tunnels, by gravity. A 1,250-k. w. electrical plant, installed 1912, at the Baltic mill, supplied power for a number of regrinding mills at this and other stamp mills of the parent company.

Water for the Baltic and Atlantic mills is furnished by a $150,000 gravity dam across the mouth of Salmon Trout river. The entire steel structure is anchored to a 2" steel base plate, at the bottom of the concrete, by a large number of 1½, 2", and 2½" steel rods of 15 to 30' length. Water is taken from the dam about 20' below the crest by three 38" riveted steel pipes, one on the Atlantic and two on the Baltic side. Surmounting this structure is a trestle of the Copper Range railroad.

Production:

	Ore Stamped Tons	Copper Produced Pounds	Yield per Ton, Lb.	Cost per Pound, c.	Price Rec'd, c.
1908	764,117	17,724,854	23.19	08.28	13.39
1909	814,260	17,817,836	21.88	07.98	13.00
1910	781,419	17,549,762	22.46	08.32	12.74
1911	696,795	15,370,449	22.06	09.09	12.54
1912	652,433	13,373,961	20.50	10.94	16.16
1913	333,289	7,736,126	23.21	11.91	14.89
1914	324,433	7,001,945	21.58	11.17	13.38
1915	378,443	12,028,947	31.79	09.50	17.40
1916	369,287	12,425,804	33.65	10.85	25.28
1917	325,342	11,214,861	34.47	13.77	28.73
1918	.....	10,406,097	.....	.....	.....
1919	235,832	7,864,653	33.35	17.53	18.67
1920	175,357	6,613,918	37.71	18.02	17.12

The ultimate productive capacity of the mine cannot be predicted with safety, but the present milling capacity is equal to making nearly 25,000,000 lbs. fine copper yearly, and ultimately this output, or even a greater production, should be reached.

Trimountain Mining Co.

Company was ordered dissolved January, 1917, by Circuit Court, County of Houghton, but on appeal by dissenting stockholders the Supreme Court of Michigan, in March, 1918, reversed the dissolution order and company continues to operate as a separate corporation.

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Trimountain, Michigan.

Officers: W. A. Paine, pres.; F. W. Paine, sec.-treas.; J. A. Ackroyd, asst. sec.-asst.-treas., with J. R. Stanton, F. P. Son and F. W. Denton, directors. H. H. Schacht, gen. mgr.; John Jolly, supt.; Edw. Koepel, mill supt.; H. T. Mercer, engr.; Benj. D. Noetzel, clerk; Richard Bowden, mng. capt.; Ww. J. Richards, master mechanic.

Inc. 1899, in Michigan. **Cap.** $2,500,000; shares $25 par; paid in $20.

Controlled by Copper Range Co., through ownership of 90,690 shares of stock. Company owns $110,000 worth of Michigan Smelter Co. stock.

Dividends: $3 in 1913, $5 in 1908, $1.50 in 1910, $3 in 1912, $2 in 1913; $5 in 1918; $13 in 1919; none in 1920 and 1921. Total dividends, $3,250,000.

Financial statement: years ending Dec. 31:

	Total Revenue	Profit	Dividends	Surplus
1920	$ 653,847	$247,391	.....	$1,626,238
1919	1,074,338	51,303	$1,300,000	1,865,069
1918	1,380,984	338,533	500,000	3,127,821

Property: 1,120 acres, the E. ½ of Sec. 19, W. ½ of Sec. 20, N. ½ of Sec. 29, and N.E. ¼ of Sec. 30, all in T. 54 N., R. 34 W. The Baltic mine lies to the N. and the Champion to the S., with undeveloped lands to the E. and W.

Owing to a very heavy sand overburden the mine was opened by drop-shafts sunk through alluvium, with raises to surface on the angle of the dip of the stratified formation. The Baltic bed runs 15 to 50', with an average width of 25', on the Trimountain property. Heavy copper is found near the walls, and masses upwards of a ton in weight have been found, but values occur mainly disseminated in stamp rock.

The Trimountain shafts enter lean streaks or shoots, sometimes 500' in horizontal length, with flat northerly pitch or rake, underlain by copper ore. Lying parallel with and about 65' W. from the Baltic bed, is a wide amygdaloid, carrying some heavy copper and considerable ore . This bed has not yet been worked, but may be made available for production at some time in the future. The great width of the lode has led to a dry-walling with waste rock, which is used also for building underground chutes, which are roughly circular, with inner diameter of about 5' and are filled about with waste, as stopes are carried upward, three chutes being built at a sharp pitch, the wedging of the surrounding rock serving to hold the walls immovable. The saving in timbering brought about by dry-walling and building chutes of mine rock is large.

Development: No. 1 shaft, 210' north of the Champion boundary line, is sunk at an angle of 68°, with first level opened 168' below the collar, levels thereafter at 100' intervals. The upper levels tributary to No. 1 shaft have been worked out, and the shaft abandoned at depth of 2,284'. It now serves as a waste sand chute.

No. 2 shaft, 1,023' N. E. of No. 1, was 3,370' deep at the end of 1920, and a considerable improvement has been noted in ground below the 14th level, with the lower levels the best opened in this shaft. The shaft rock house, has 2,000-ton ore bins, and is equipped with an engine, steam hammer and two crushers. Ore is raised by a 2,500-h. p. direct-connected duplex hoist, with double-conical drum of 18' maximum diameter, capable of raising 6-ton skips from 1 mile depth.

No. 3 shaft, 1,027' N. E. of No. 2, sunk at an angle of 68° was 2,563' deep at the end of 1920. Beneath 60' of sand, the rock was found to be badly fractured and barren down to the 2nd level, only becoming solid and payable below the 14th level.

No. 4 shaft, the northernmost, 3,267' deep at the end of 1920, is the best shaft of the mine. Openings during 1919 and 1920 showed average ground, with improvement in the bottom drifts north. Sinking of shafts 2 and 4 was continued in both years.

New work covered 8,031' in 1918; 7,271' in 1919; 7,843' in 1920.

Equipment: the mine buildings near shafts Nos. 2 and 3, include machine and carpenter shops, smithy and warehouse. There is a 35-drill air-compressor at No. 2 shaft, with a condensing plant in a separate building. The power plant at No. 3 shaft includes a battery of water-tube boilers and a 4,500' air-compressor. The mine has electric pumps and works about 60 drills. The property is served by the main line of the Copper Range railway, which reaches all the shafts and principal shops. Mine has underground electric haulage on several of the levels.

The mine property has macadamized roads, a large boarding house, upwards of 100 dwellings, general store, hospital and a nurses' home.

Mill: the mill, at Beacon Hill, 2 miles west of Redridge, having been destroyed by fire, the mine output is treated in the Baltic mill. The mill boiler house has six 250-h. p. and two 200-h. p. boilers, the latter maintaining a steam pressure of 180 to 200 lb. per sq. inch. The pump house at the mill has a 20,000,000-gal. pump, taking water from a well connected with a tunnel running 1,960' to an intake crib in Lake Superior.

Production was begun January 4, 1902, with a leased head at the Arcadian mill, and with a return of 37 lbs. fine copper per ton, but fell off later to 27 lb., and still later production fell sharply to 18 lb. fine copper per ton. It is now 30 lb.

Production:

	Ore Stamped, Tons	Copper Produced, Lb.	Yield per Ton, Lb.	Cost, c. per Lb.	Price, c. Rec.	Net Profits
1920.....	116,768	3,532,025	30.24	17.12	25.52	(d)$247,391
1919.....	171,995	5,274,387	30.66	17.69	18.67	51,303
1918.....	.....	5,543,586	.....	.....	.....	.....
1917.....	264,655	6,278,097	23.72	15.22	28.73	848,241
1916.....	349,504	8,720,558	24.94	11.01*	25.28	1,236,048
1915.....	349,684	8,302,896	23.75	09.53	17.40	654,746
1914.....	277,251	5,048,306	18.21	12.21	13.38	58,639
1913.....	229,149	4,990,938	21.78	12.62	14.89	113,363
1912.....	366,663	6,980,713	19.04	11.73	16.16	308,472
1911.....	347,885	6,120,417	17.59	11.55	12.54	60,370
1910.....	317,299	5,694,868	17.95	12.17	12.74	32,250
1909.....	323,408	5,282,404	16.33	13.89	13.00	(d)47,841
1908.....	334,929	6,034,908	18.00	12.69	13.39	41,842

(d) Deficit.

The total copper to end of 1920 was 130,958,123 lb. As copper was produced at a loss, production was not pushed during 1919.

Champion Copper Co.

Owned jointly by St. Mary's Mineral Land Co., and Copper Range Company described under its own title.

Atlantic Mining Co.

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Painesdale, Houghton county, Mich.

Officers: Wm. A. Paine, pres.; F. W. Paine, sec.-treas., with Frank P. Son, F. W. Denton and L. P. Yandell, directors, J. A. Ackroyd, asst. sec.-asst. treas.

Inc. Dec., 1872, in Michigan; reincorporated, 1901, for 30 years. **Cap.** increased, 1902, to $2,500,000, shares $25 par; fully issued; paid in, $11.80. Last assessment was $2, October 11, 1909, the first in 30 years. Has paid dividends of $990,000, last in 1905. Owns $40,000 stock in Michigan Smelting Co. Boston Safe Deposit & Trust Co., registrar; American Loan & Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in March. The Atlantic Co. is controlled by Copper Range Co., through ownership of 97,231 shares of the capital stock. Receipts (rents, interest, etc.) for 1920 totaled $19,563, and expenditures, $11,205. The surplus was $416,511 at end of 1920; $357,719 in 1919; $337,577 in 1918 and $286,887 in 1917.

Property: 8,217 acres, including 1,351 acres of mineral lands, 4,760 acres of timber lands, and 2,106 acres miscellaneous lands, latter including the mill site and a valuable frontage on Portage Lake. Mineral lands are S. ½ of Sec. 4, except S. E. ¼ of S. E. ¼; N. ½ of Sec. 9; N. W. ¼ of Sec. 10 and Sec. 16, all in T. 54 N. R. 34 W. Principal holdings are the old Atlantic mine, 640 acres, including the mines known before 1872 as the South Pewabic and Adams, located about 2 miles south of Portage Lake and 4 miles southwest of Houghton, and the Sec. 16 tract of 640 acres. The mines, idle since 1911, are fully described, Vol. X of the Copper Handbook.

DAVIDSON ORE MINING CO. MICHIGAN

Office: 403 White Bldg., Buffalo, N. Y. **Mine office:** Iron River, Mich.

Officers: F. N. Beegle, pres., Geo. Davidson, v. p.; T. F. Hildreth, sec.-mgr.; L. R. Davidson, treas.; Rudolph Ericson, gen. supt.

Inc. 1910 in Michigon. **Cap.** $500,000; shares $25 par; 16,000 shares outstanding.

Property: 240 acres, includes the Davidson No. 1, 2, 3 and 4 mines, near Iron River. Ore is a soft, high grade non-Bessemer limonite, containing 52.35% iron, 0.41% phos. and 5.4% silica. Mining is by stoping to 550′ in No. 1; sub-level caving and shrinkage stoping to 340′ in No. 2; back stoping and shrinkage to 230′ in No. 3 and shrinkage stoping to 320′ in No. 4.

Equipment: includes 4 hoists, 3 compressors and steam shovel.

Production: in 1920 was 250,000 tons, compared with 262,048 in 1919; 113,779 in 1918; 223,990 in 1917; 164,248 in 1916; 152,430 in 1915; 122,567 in 1914, a total of 1,656,151 tons.

DOUGLASS COPPER CO. **MICHIGAN**

Office: 705 Sears Bldg., Boston, Mass. Property north of Allouez and west of Ahmeek holdings in Allouez township, Keweenaw county, Mich.

Officers: Charles J. Paine, pres.; George P. Gardner, v. p.; with R. S. Sheldon, C. C. Douglass, W. A. S. Chrimes, and A. S. Knight, directors. J. F. Dolloff, sec.-treas.

Inc. 1913, in Michigan. **Cap.** $2,500,000; shares $25 par; assessable; 50,000 shares given for land, making $10 paid in value; 17,902 shares owned by St. Mary's Mineral Land Co.

Property: 440 acres in E. ½ of Sec. 30 and W.½ of Sec. 29, embracing eleven 40-acre tracts formerly owned by the Sheldon Douglas and the Northey estates, and the St. Mary's Mineral Land Co. This tract covers the underlay, or deep extension of the Kearsarge lode into which the rich ore-shoot now worked in the Ahmeek, pitches. To open this ground a 3,300′ vertical shaft must be sunk.

DUNN IRON MINING CO. **MICHIGAN**

Office: First Wisconsin National Bank Bldg., Milwaukee, Wis.

Officers: E. G. Wilmer, pres.; C. N. Turner, v. p.; M. T. MacLaren, v .p.; H. J. Schlesinger, treas.; W. Saeger, sec; A. D. Chisholm, mgr.; A. E. Redner, supt. M. A. Hanna & Co., sales agents; J. P. McGuigan, purch. agent.

Inc. April, 1895 in Wisconsin. **Cap.** $25,000; shares $25 par. The capital stock is entirely owned by the Steel & Tube Co. of America, Wisconsin.

Property: the Palms mine on the Gogebic range. Ore is a hard non-Bessemer hematite, assaying 55% iron and 0.083% phos. It is mined to 1600′ by sub-slicing.

Production: in 1916, 529,751 tons; in 1917,481,465 tons; in 1918, 821,867; in 1919, 628,207; in 1920, 615,683, a total of 4,952,235 tons.

EVERGREEN BLUFF MINING CO. **MICHIGAN**

Dissolved. Property owned by **Mass Consolidated Copper Co.**

FEDERAL SYNDICATE COPPER CO. **MICHIGAN**

Mail returned from last address: Hosking Blk., Calumet, Mich.

Officers: A. C. Stielow, pres.; H. E. Murray, v. p.; Harry Olson, 2nd v. p.; Dr. P. D. MacNaughton, sec.-treas.; John D. Kerr, asst. sec., with P. L. de Voist and John R. Ryan, directors; Mortimer North, engr.

Inc. Oct. 12, 1916, in South Dakota. **Cap.** $1,000,000; shares $1 par; 152,272 issued on organization. The initial offering of stock May, 1917, was at 50c., changed June, 1917, to $1 a share.

Property: approximately 360 acres in T. 57 and 58, N. R. 31 W., being the Salem tract, formerly owned by the Federal Copper Co., south of the Phoenix shaft of the Keweenaw Copper Co. Lands cover a 1½ mile stretch across the strike of the copper lode and near the Phoenix, St. Clair and Eagle River properties of the Keweenaw Copper Co., with Ojibway lands on west and east. Lands are crossed by Kearsarge amygdaloid which dips 30° N. W., giving 292 acres underlain by this lode, whose copper content in this part of the range is as yet unprospected.

It was reported in 1917, that company, acting under name of Bear Lake Extension, had secured option on 2,000 acres, S. W. of Calumet, in T. 55, 56 R. 34, and in 1918, the Longyear-Michigan options in T. 56 R. 34 aggregating 1,240 acres, were said to have been absorbed by Federal. The Bear Lake Pool options on 1,360 acres in T. 56 R. 34, were later reported acquired by the Federal.

Equipment: includes compressor with 2 drills, and 1,000′ hoist. During 1917-1918, six diamond-drill holes were opened and four said to show commercial ore. Shaft down about 40′. No recent information available.

FORTUNE LAKE MINING CO., THE — **MICHIGAN**

Mine office: Crystal Falls, Mich.

E. W. Hopkins, mgr., Ironwood, Mich.; R. A. Bowen, supt. A. Bjork, asst. supt.; W. K. Carter, purch. agt.; Oglebay, Norton & Co., sales agents.

Property: the Fortune Lake mine on the Menominee range, Iron county. Ore is a non-Bessemer, carrying 50% iron, 0.6% phos. and 4% manganese. Mining is to be entirely by underground work.

FRANKLIN MINING CO. — **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Demmon, Houghton county, Mich. **Mill office:** Point Mills, Houghton county, Mich.

Officers: R. M. Edwards, pres.-gen. mgr.; H. M. Howard, v. p.; Henry Tolman, treas., with C. F. Moore, C. A. Hight, Sidney J. Jennings and T. S. Woods, directors. Albert L. Wyman, sec. Enoch Henderson, supt.

Inc. April 3, 1857, in Michigan; re-incorporated in 1887 for 30 years, and again in 1917. **Cap.** $5,000,000; par, $25; 166,519 shares issued; $19.20 paid in, including $2 on Aug. 12, 1920. **Cap. increased,** 1899 from $500,000 to $2,500,000, and again increased, November, 1908.

Unissued stock has been set aside for the purpose of acquiring the total capital, or 100,000 shares, of the Rhode Island Copper Co. Franklin has paid dividends of $1,240,000; last in 1894. Federal Trust Co., Boston registrar; American Trust Co., Boston transfer agent. Annual meeting third Wednesday in April. Listed on Boston Stock Exchange.

Revenue in 1919 totaled $192,822, and expenditures, $385,752, making a deficit of $192,930. Expenses at the mine were $331,037. Cash, copper, supplies and uncollected assessments at end of year were $289,085. Current liabilities, including notes for $221,000, were $255,745. Revenue in 1920 amounted to $138,776, and expenditures, $285,977, leaving a deficit of $147,200. Current assets, $414,844; current liabilities, $251,887.

Property: 3,280 acres of mineral property, and a 217-acre mill-site, with 1 mile of frontage on Portage lake. The old Franklin mine (described Vol. VIII), 160 acres, was sold, July, 1908, to the Quincy Mining Co., for $170,000, and Sec. 6, T. 55 N., R. 33 W., 640 acres, lying directly north of the Franklin Junior and west of the Rhode Island, was bought from St. Mary's Mineral Land Co., 1909, for 33,333 shares.

Property carries 2 miles of the strike of the Pewabic amygdaloid and other cupriferous beds of the Keweenawan series. In addition to the main tract, there are 3 other tracts of mineral lands, of 160, 480 and 640 acres. The company also controls, and is absorbing, the Rhode Island Copper Co., which has 800 acres immediately north of the Franklin Junior mine.

Development: early work was on the Franklin Junior property, where two parallel lodes, the Allouez conglomerate and the Pewabic amygdaloid, 500′ apart, have been worked. The amygdadoid worked prior to 1902, gave but 9.65lb copper per ton, and was abandoned in favor of the conglomerate until the latter, decreasing in width and value on the 2,000′ to 2,400′ levels, was abandoned and work resumed on the Pewabic in the Franklin, Jr. shaft (No. 1), sunk about 20′ in the footwall. The copper content being extremely low, mining was stopped, and only exploratory work done. In 1913, a crosscut was started eastward from the shaft at 3,200′ level to explore the entire eastern part of the company's holdings. At 550′ from the amygdaloid this crosscut entered payable ore in the Allouez conglomerate and drifts were started to prove the extent and copper content of the orebody. Work continued until August, 1914, and was resumed in July, 1915, the orebody being developed for 1,100′ on the 32nd level. It is opened for stoping on each level from the 27th down to the 39th, an average of 900′ on each level, or about 9,000′ of drifting, with a continuous raise, used as an ore-chute from the 2,700′ to the 3,700′ level, where ore is gathered by electric motor trains and carried to the shaft. Besides this main raise there is another for men and

supplies. No. 1 shaft is equipped with a steel circular ore-house (Edwards design), formerly used at No. 2 conglomerate shaft. On the 28th level a crosscut driven in 1915 connects the lode with the shaft, and a similar crosscut has been driven on the 37th level. The conglomerate shaft, bottomed at 2,400′ on the incline, has not been connected.

An extension of No. 27 and 22 levels S. from No. 1 shaft to a point under No. 2 shaft was completed in 1916. The conglomerate was much richer and wider than the average. The ground above this up to No. 17 level was untouched. No. 2 shaft, which had caved, was re-opened and repaired from the 4th level to the bottom of the 17th level, but work here was stopped in 1918 for lack of miners. Between No. 18 and 19 levels of No. 2 shaft there is estimated to be over 200,000 tons of good ore.

Mechanical haulage installed on No. 29, 30 and 31 levels greatly reduced costs.

A long crosscut on No. 32 level driven through the Kearsarge lode, stopped on the footwall side of the Wolverine sandstone, 4,542′ from the Pewabic amygdaloid. It passed through a thickness of 25′ of Calumet conglomerate at 2,150′, the 10′ Osceola amygdaloid at 2,820′ and the Kearsarge conglomerate, 40′ wide, at 3,380′ from the shaft, but all three lodes were devoid of any copper. Twenty-two other amygdaloids were also cut, 9 of them copperbearing, but only 2 rich enough to warrant exploratory drifts and raises; the remaining 13 were barren. Ore of sufficiently good grade to warrant further exploration was found on the footwall side of the Kearsarge amygdaloid.

During 1917, the 30th level was carried forward 540′, to a total of 1,460′ north of No. 1 shaft (on the Pewabic), and the best copper seen in the amygdaloid was opened. This level was driven 115′ farther in 1918, all with same copper content. Management believes this same condition will be found in the extension of north drifts on lower levels. Production in 1917 came almost entirely from the Allouez Conglomerate and No. 1 shaft; in 1918, 24.6% of the output came from the Pewabic lode and 75.4% from the Allouez lode.

New work amounted to 524′ in 1920; 579′ in 1919; 2,149′ in 1918; 1,916′ in 1917; and 8,023′ in 1916.

Ore extraction was stopped May, 1919, company announcing that development work only would be carried on until conditions improved and copper could be sold at a profit. Production was stopped May, 1919, and all work confined to developing the Pewabic amygdaloid at bottom of shaft which was sunk to the 39th level. This work was continued for 12 months when management announced that:

"Developments have proved a long stretch (650′) of good ground at the bottom or the 39th level on the Pewabic amygdaloid. It is undoubtedly better than any similar stretch heretofore opened. There are excellent grounds for the belief that the values will continue and probably improve as drifting north proceeds. This theory is corroborated by the fact that the 30th level is better at 1,600′ from the shaft than it is at 600′."

Before operations completely ceased, this opinion was corroborated by that of two disinterested mining men.

Equipment: includes a hoist with a 10-ton skip at No. 1 shaft, and has special air-compression cylinders, storing up energy, otherwise wasted in compressed air, the compressed air being mixed with steam, in the cylinders, as a prime motive force.

The mill is reached by the Mineral Range railroad. Equipment includes five 2-way heads, with 20x24″ cylinders, each capable of crushing 350 tons of conglomerate or 500 tons of amygdaloid rock daily. Each stamp is fed from a 1,000-ton ore bin, and equipped with hydraulic separators, which remove considerable heavy copper. All stamp mortars are on concrete foundations. The washing plant includes 8 classifiers, 20 roughing jigs, 15 finishing jigs, 32 Wilfley and 10 Overstrom tables. The jigs are of the Hodge eccentric type, with centershield copper discharges, obviating skimming. In 1918, an experimental regrinding plant, consisting of one 8′x48″ Hardinge mill, one

75-h. p. motor and 6 Wilfley tables, were set up. In 1919 the Hardinge mill ground tailings from the roughing jigs.

Power for the mill is supplied by a 16x32" engine, and steam is supplied by two 500 h. p. boilers. The boiler house has a self-supporting, brick-lined smokestack of 7' diameter, 165' high, on a 52' brick foundation. Water is furnished by a 15,000,000-gal. vertical compound pump, having 12x42" high-pressure and 42x42" low-pressure cylinders, with 47" stroke and plungers of 37½" diameter. Water is drawn through a 36" pipe line, running 200' under the rock to a crib protected by quarter-inch screens. The mill has a 5x12" duplex fire pump, with fire hose, and electric light. There is a 267' wharf at the mill site, equipped with coal hoist and sheds, with 18' of clear water alongside. The mill site has about 20 dwellings for employees.

Production: in 1903 the recovery of copper was 15.25lb per ton of ore stamped and in 1907 was only 11.48lbs., falling in 1909, to 9.47lbs. The largest yearly production ever made by the mine was 5,259,140lb fine copper in 1902. Recent production has been 4,206,085lb in 1905; 4,228,650 in 1906; 4,401,248lb in 1907; 3,703,421lb in 1908; 1,615,556lb in 1909; 966,353lb in 1910; 820,203lb in 1911; 1,710,651lb in 1912; 1,021,440lb in 1913; 93,283lb in 1914; 3,116,566lb in 1916; 3,155,574lb in 1917.

In 1918 production was 2,827,313lb of copper from 273,964 tons of rock; in 1919 (4 mos.), 1,062,879lb from 109,565 tons; no output in 1920 or 1921.

Costs were 24c. per lb in 1915; 18c in 1916; 24c. in 1917; 38c. in 1918; and 36¢ in 1919.

In June, 1920, all work was discontinued and in December, the pumps were pulled and mine was entirely closed.

Management has been excellent, but rock is low in grade, necessitating quantity production to make the mine profitable.

GLOBE MINING CO. **MICHIGAN**

Office: 15 William St., New York.

Officers: L. P. Yandell, pres., with R. D. Rickard, J. R. Stanton, Gerrit Smith of New York and W. H. Leggett, of Detroit, directors. F. G. Heumann, sec.-treas.

Inc. May, 1911, in Michigan. **Cap.** $78,250; $25 par; fully paid and issued.

Property: 3,200 acres, Secs. 1, 2, 3, 4 and 5, T. 53 N., R. 35 W., extending entirely across the Keweenawan trap formation, from the eastern to the western sandstone. Land lies next south of the Champion, and immediately north of the Challenge, carrying about 6,000' of the strike of the Baltic and all parallel beds. Mine was developed by the Copper Range Consolidated Co., under option, but option was relinquished, February 1, 1909, after expenditure of upwards of $500,000.

Development: diamond-drill borings, to locate the Baltic bed, gave some cores with excellent values, but disclosed a heavy overburden of sand and boulders, rendering it necessary to reach the solid rock by a vertical shaft. Work was begun 1905, but the first shaft was abandoned, owing to quicksand, and was replaced by a new vertical shaft, about 700' south of the Champion boundary. The shaft is telescopic, inside measurements of timbers at the collar being 13' 3"x23'3", with a second section below of 9x19' 6", and a third section of smaller size.

The shaft is 1,040' deep, with first level 356' below surface, and stations were cut at 100' intervals thereafter. The Baltic amygdaloidal bed was tested by diamond-drill boring, and by about 900' of drifting on the seventh level. This level about 1,000' below surface, showed a little copper in patches, but on the whole was unpayable. Work was suspended January 31, 1909, and property has been idle since. Notwithstanding the unfavorable results secured by the work done so far, the property is not devoid of promise.

GRATIOT MINING CO. **MICHIGAN**

See **Seneca Copper Corporation.**

HANCOCK CONSOLIDATED MINING CO. **MICHIGAN**

Office: Hancock, Mich.

Officers: John D. Cuddihy, pres.; Capt. Thos. Hoatson, v. p.; John H.

Hicok, sec.-treas., with Allen F. Rees, W. R. Thompson, and Capt. Jas. Hoatson, directors; Clyde E. Weed, gen. mgr.; Daniel Fisher, clerk.

Inc. June 11, 1906, in Michigan. **Cap.** $5,000,000; shares $25 par; issued, 2,500,000; fully paid with $3 assessment levied March, 1915, payable $1 each, in May and Sept., 1915, and Jan., 1916. Old Colony Trust Co., Boston, Mass., registrar; State Street Trust Co., Boston, transfer agent. Stock listed on Boston Exchange. Annual meeting, third Wednesday in June.

Debentures: $500,000 bonds authorized in June, 1920.

Company began business with $1,000,000 and paid $552,623 for its property.

Operations for years ended Dec. 31:

	Copper Sold	Ass'mt., Interest etc.	Mining Exp. (a)	Int. & Taxes	Lake M., S., & Ref. Co., St'k etc.	Net Profit
1919....	$ 180,858	$257,151(b)	$ 145,521	$44,105	$210,957(c)	$37,336
1918....	917,092	.....	776,819	59,044	33,678	47,551
1917....	1,142,454	.....	1,056,541	54,421	.....	31,492
1916....	755,946	119,256	705,778	53,268	12,467	103,688

(a) Includes smelting, freight, marketing, etc. (b) Includes sale of land and machinery (c) includes $208,604 payment on notes.

Current assets including investments and inventories totaled $301,667, at the end of 1919; current liabilities were $261,101, including loan account of $256,024.

Property: 725 acres of mineral territory, immediately west and south of the old Quincy mine, in T. 55 N., R. 34 W., including the original Hancock mine, 136 acres, set aside, 1859, by the Quincy Mining Co., which reserved the mineral rights to the Pewabic bed. The Pewabic bed, on lands other than original Hancock tract of 136 acres, is owned by the Hancock Consolidated. Lands carry the Pewabic, Quincy, West and Hancock or Sumner copper-bearing beds.

Perhaps the best part of the Quincy mine is tributary to No. 7 shaft, which is immediately north of the Hancock boundary.

In June, 1916, approximately 75 acres were sold to the Quincy Mining Co. for $226,000. In part payment thereof the Hancock was granted the right to use Quincy No. 7 shaft and one stamp of the Quincy mill. Operations were carried on under this agreement during 1916, 1917, and part of 1918, but the tonnage hoisted from the shaft did not warrant the expense of its upkeep. In June, 1919, company sold 128 acres, which includes the shaft, to the Quincy Mining Co., for $244,585.

The old Hancock mine, opened 1859, was closed June 1, 1885, on account of the low price of the metal, after producing 5,709,384 lb. fine copper. The Hancock or Sumner amygdaloidal bed averaged about 12' in width below the fifth level, to a depth of 1,052', where the mine was bottomed.

The property carries the upper half of the Michigan series of cupriferous traps and conglomerates, and has 4 known copper-bearing beds, the Pewabic being the most important. The property also carries the underlay, but not the outcrop, of the 3 copper-bearing beds of the Quincy, these being the Quincy to the eastward, apparently of little value, followed by the Pewabic, which is the main bed of the Quincy and the so-called West lode of the Quincy. The known copper-bearing beds outcropping on the Hancock property are the Hancock or Sumner, mined in the old Hancock mine, and now known as No. 1 lode, lying about 1,100' west of the Pewabic; the old West bed, now known as No. 2 lode lying about 300' west of No. 1, and the New West bed, now known as No. 3 lode lying about 75' west of No. 2. Company also owns lots 6 and 7, Sec. 28, for a mill site.

Development: No. 1 shaft is the old main 3-compartment shaft of the Hancock mine. It has a remodeled wooden shaft rock house, with a hoist good for 2,000' depth.

The new and main 5-compartment working shaft known as No. 2 is 2,200′ N. W. of No. 1. It is vertical, with dimensions 9′6″x29′6″, being the second largest in the Lake Superior district, and is 4,360′ deep. This shaft intersects No. 3 bed at a depth of 2,038′, the bed here showing a pitch of 37°, compared with 47° in the upper workings, this flattening of 10°, at depth, corresponding to a similar flattening shown to the northeast in the No. 7 shaft of the Quincy. The No. 4 lode is intersected by the shaft at a depth of 3,105′; it is 17′ thick and carries payable ore. In 1917, 74%, and in 1918, 62% of the ore from this shaft came from this vein.

Ground below the 53rd level, 4,000′ below the surface, is reached by 2 subsidiary shafts sunk from the 49th level, connecting with the No. 2 shaft through chutes on the 53rd level and through drift connections on the 49th level.

In 1917, diamond-drilling disclosed some lodes to the south of the big fault which crosses the property and crosscuts were driven to these lodes on the 53rd and 49th levels. The 53rd level crosscut was advanced 611′ east in 1918, cutting 2 mineralized veins, the first one narrow, the second, called No. 3 east vein, showed good mineralization. The 49th level crosscut was advanced 428′ cutting 2 veins, called No. 1 and No. 2 east; both showed fair mineralization.

Considerable drifting has been done on both No. 2 and No. 3 beds, No. 3 being opened by a winze from the 10th to 18th levels, with drifts on the 9th to 18th levels, inclusive, several of which are more than 1,000′ long. No. 2 shaft has loading stations on the 13th, 18th, 23rd, 27th, 34th, 39th, 44th, 49th and 53rd levels, to which rock broken will be sent by chutes from the levels above.

No. 2 shaft has an ore-house that is the most modern in the Lake Superior district. The building has a total height of 128′, with working floor 60′ above the ground. The bins are of 1,000 tons capacity each.

Work in 1917 showed mineralization to be of fair commercial grade. Work stopped on No. 2 west vein due to narrowness and a poor hanging wall. Stoping on No. 4 vein was carried from 53rd to 38th levels. Development work in No. 2 shaft totaled 7,472′ in 1917 and 4,971′ in 1918. In No. 7 shaft work amounted to 2,489′ in 1917 and 611′ up to May, 1918, when shaft was closed.

Equipment: includes two 50-ton crushers and a smaller one for waste rock. The 2 large crushers are fed by 2 steel traveling-belt picking tables. Each machine has a 50-h. p. induction motor and each picking table has a 10-h. p. induction motor. Two men per shift are expected to do all work on the crushing floor.

The main engine-house at No. 2 shaft is equipped with 2 hoists, main engine being a Sullivan-Corliss direct-connected hoist, operating 2 skips in counter-balance, with capacity to hoist 8 tons of rock from a depth of 4,000′, at a steam pressure of 150 lbs.; There also is a Sullivan first-motion hoist.

The steel compressor house has an electric traveling crane, 13-drill and 16-drill air compressors and a 35-drill tandem-compound air compressor. The boiler-house has 2 batteries of 4 return tubular boilers, each 72″ in diameter and 18′ long.

Buildings at No. 2 include a machine-shop, smithy, office, changing house and a number of dwellings. The main plant at No. 2 shaft is reached by a spur of the Mineral Range railway. Company employs about 200 men when running full time.

Electric haulage was installed in lower levels of No. 2 shaft, 1917.

Production:	Ore Milled Tons	Copper Produced, lb.	Yield per Ton, lb.	Estimate cost per lb.	Received per lb.
1918.....	227,049	3,041,514	13.40	25c	24.299c
1917.....	302,725	4,005,882	13.223	26	28.229
1916.....	203,112	2,824,934	13.9	20	28.093

The ground opened, while by no means as rich as some in the Lake Superior district, is of fair average value and with exceptionally good equipment and an able and experienced management, the Hancock promises to make a successful low-grade mine.

Mine suspended operations in Feb., 1919, but pumps were kept in commission so that work could be resumed in 30 days. By December there were 10 drills at work. The first shipment of 1,700 tons of ore, from the east veins, made in Feb., 1920, yielded 0.75% copper. While results on No. 44 level were encouraging, operations were suspended early in 1920, and little but pumping has been done since.

HANNA & CO., M. A. **MICHIGAN-MINNESOTA**

Office: 1300 Leader-News Bldg., Cleveland, Ohio.

Partners: L. C. Hanna, M. Andrews, H. M. Hanna, Jr., F. B. Richards, Wm. Collins, R. F. Grant, J. D. Ireland and L. C. Hanna, Jr. Operated as a partnership and does not furnish reports for publication.

Agents for the following operating companies: Virginia Ore Mining Co., Virginia, Minn.; Consumers Ore Co., Buhl, Minn.; La Rue Mining Co., Nashwauk, Minn., American-Boston Mining Co., Diorite, Mich., Richmond Iron Co., Palmer, Mich., Hollister Mining Co., Crystal Falls, Mich.; Wakefield Iron Co., Wakefield, Mich.; Hanna Ore Mining Co., Virginia and Hibbing, Minn. Also operates vessels of 8,915 average tonnage on the Great Lakes.

HAYES MINING CO. **MICHIGAN**

Office: First National Bank Bldg., San Jose, Cal. **Mine office:** Ironwood, Mich.

Officers: E. A. Hayes, pres.; J. O. Hayes, sec.-treas.; with M. B. Hayes, C. L. Hayes, directors. Robt. King, supt.; L. R. Davidson & Co., White Bldg., Buffalo, N. Y., sales agents.

Inc: 1899, in Wisconsin. **Cap.** $1,000,000; $25 par; all issued. No bonds. Annual meeting in May. Transfer office: San Jose, Cal. Dividends to March, 1919. Total $266,600, or $66.65 per share.

Property: the Ashland mine, 120 acres, at Ironwood, Mich., first opened in 1884. Developed by inclined shaft 2,120' deep, with many miles of workings. As water is troublesome at certain seasons, large pumps are operated.

Ore: two grades of red hematite are produced, known as Globe, a hard and soft non-Bessemer and Ashland, a soft Bessemer ore. Average analyses for 1919, of all shipments, samples dried at 212° Fahr. Ashland ore: iron, 62.10; phos., 0.035; silica, 8. Globe ore: iron, 57.25; phos., .067; silica, 13.

Production: totals 6,436,652 to end of 1919. Annual shipments were 82,715 tons in 1916, compared with 38,164 tons in 1917, with 48,802 tons in 1918 and 36,359 tons in 1919.

HEMLOCK RIVER MINING CO. **MICHIGAN**

See Pickands, Mather & Co., in Minnesota.

Office: Western Reserve Bldg., Cleveland, Ohio.

Officers: H. G. Dalton, pres.; Wm. McLaughlin, v. p.; C. H. Munger, sec. mgr.; E. P. Williams, treas.; C. E. Lawrence, Palatka, Mich., gen. supt.

Inc. April 1884 in Michigan. **Cap.** $500,000; $25 par.

Property: the Porter (formerly Amasa Porter) and Warner mines. 240 acres, on the Menominee range, near Amasa, Iron county. Both produce non-Bessemer hematites, assaying 50% iron and 0.142% phos. Mining is by top-slicing.

Production: at the Porter mine was 116,148 tons in 1917; 65,148 tons in 1918; 46,802 tons in 1919 and 36,005 tons in 1920, a total of 428,286 tons. The Warner mine yielded 74,814 tons in 1917; 78,855 tons in 1918; 77,028 tons in 1919 and 89,344 tons in 1920, or 368,289 tons in all.

HOLLISTER MINING CO., THE — **MICHIGAN**

Office: Crystal Falls, Mich. E. E. Hunner, mgr.; Alfred Martin, gen. supt. M. A. Hanna & Co., sales agents.

Property: the Carpenter, Monongahela and Ravenna mines, on the Menominee range. After producing 296,421 tons, the Ravenna is idle. The Monongahela is being developed and shipped 66,000 tons in 1919. The Carpenter produces a non-Bessemer ore, carrying 50% iron and 0.516% phos. Mining is by slicing and stoping to 500'.

Production: 1,625,107 tons to end of 1919; in 1917, 269,387; in 1918, 384,148; in 1919, 396,224 tons.

HOUGHTON COPPER CO. — **MICHIGAN**

Address: F. W. Nichols, Houghton, Houghton county, Mich.

Officers: Chas. J. Paine, pres.; Geo. P. Gardner, v. p.; with W. Cameron Forbes, Jas. P. Edwards and Fredric W. Nichols, directors; J. F. Dolliff, sec.-treas.

Inc. Jan. 8, 1910, in Michigan. **Cap.** $2,500,000; shares, $25 par; assessable; 67,000 issued; $8 paid. Is controlled by St. Mary's Mineral Land Co., through ownership of 37,222 shares of the 67,000 shares outstanding. Old Colony Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Listed on Boston Curb.

Operations during 1919 showed a deficit of $1,933 and in 1920, $2,908, leaving liabilities, Dec. 31, 1920, $19,892.

Property: 23 acres of surface rights, with mineral rights to 160 acres owned in fee, being the N. W. ¼ of Sec 14, T. 54 N., R. 34 W., lying E. of the Isle Royale mine and adjoining the Superior mine. Diamond drilling was begun March, 1910, in the horizon of the Baltic-Superior bed, showing 2 cupriferous amygdaloidal beds, the Superior and East lodes, 17' and 20' wide respectively, with dip of 51°, separated by about 83' of trap and conglomerate, the lower bed overlying another conglomerate at a distance of about 150', these strata corresponding exactly with the Baltic formation. Maximum operating depth is figured at 2,800'.

Development: by 620' incline shaft, sunk 60' in the footwall, beneath the lode and a winze sunk 513' below the 620' level, disclosing rich copper rock in the Superior lode. The shaft has been lined with concrete for depth of 300'. Winze cuts the Superior vein at 1,133' where it is 40' wide and shows pay ore on both foot and hanging wall with about 10' of poor rock between.

During 1917 a drift from the Superior mine was extended 350' into the property on the 19th level. In 1918, 908' of drifting and crosscutting on the 19th level, disclosed copper in both the Superior and West lodes, thus opening ground 700' below the lowest previous development.

Total workings amount to about 7,000'.

Equipment: includes a small power plant, and a 16-drill electric air-compressor. There are necessary buildings, including an office, change-house and warehouse, all of wood.

Due to the world war the mine was closed down from September, 1914, to July, 1915. Operations were again suspended in September, 1917, but exploratory work continued to August 1918, since when nothing has been done.

Production:

	Tons Ore milled	Lb. Min. prod.	Lb. Min. p. t.	Lbs. Ref. Copper	Lbs. Cu. p. t. Rock
1917.....	15,628	291,500	18.6	179,012	11.45
1916.....	19,444	365,880	18.8	204,274	10.55
1915.....	14,656	258,900	19.5	156,766	10.69

Sale price for 1915 was 22.2c per lb.; for 1916, 29.21c; 1917, 28.14c.

The property, though small for the Lake Superior district, is considered promising and management good. Before sinking the shaft to the 18th level, management is awaiting developments in the adjacent Superior mine.

HULBERT MINING CO. **MICHIGAN**

Address: Albert S. Bigelow, pres., 199 Washington St., Boston, Mass. W. A. S. Chrimes, sec.-treas.; Fred W. Nichols, agt., Houghton, Mich.

Inc. about 1865, in Michigan. **Cap.** $1,000,000; shares $25 par; all issued.

Property: 1,640 acres of mineral land, in Houghton and Keweenaw counties, Mich., undeveloped; part of the surface rights have been sold, but mineral rights reserved. No mining done since organization.

HUMBOLDT COPPER CO. **MICHIGAN**

Address: Copper Falls, Keweenaw county, Mich. Thos. Hoatson, pres.; C. A. Wright, sec., Calumet, Mich.

Inc. 1863, in Michigan. **Cap.** $1,000,000; shares $25 par. Amount paid in, $252,814. Is controlled through ownership of 5/6 of the outstanding stock by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March. Listed on Boston Stock Exchange.

Balance sheet for year ended Dec. 31, 1920 gives assets, $258,703, including $162,217 for development and $93,720 for real estate; cash on hand, $163 and bills payable, $5,870.

Property: Secs. 16 and 21, T. 58 N., R. 31 W., on the mineral belt, about midway between the Arnold and Phoenix mines, lying north of the greenstone, with the Eagle River and Natick mines to the south. The mine, opened 1853, though never a producer has a 300′ shaft sunk on the Ashbed, which as at the Arnold, has occasional bunches of rich ground.

In May, 1914, diamond-drill holes were bored through a portion of the hanging wall and across the lode. Holes 12 and 13 intersected the copper bearing part of the lode at 489 feet and 364 feet, below the surface. No. 15 cut this same formation at 713′ from surface, and disclosed vein matter of workable width with payable values in both the upper and lower portions of the amygdaloidal flow.

Equipment: includes an engine house, compressor building, smithy, warehouse and 4 dwellings. Idle since 1915.

HUSSEY-HOWE MINING CO. **MICHIGAN**

Address: care C. A. Senecal, Lake Linden, Mich., or Wm. H. Rea, Farmer's Bank Bldg., Pittsburgh, Pa.

Officers: Wm. H. Rea, pres., with Geo. W. Howe, C. G. Hussey, F. B. Nimick and G. H. Childs, all of Pittsburgh, directors.

Inc. 1911, in Michigan. **Cap.** 100,000 shares; $25 par; 54,000 shares issued, fully paid; 45,000 going to owners for property; 9,000 sold for development.

Property: 320 acres, bounded by Indiana and Bohemia ground, includes N. E. quarter Sec. 22 and N. W. quarter Sec. 23, T. 51, R. 37 W., in Ontonagon county. Property shows outcrop of the Eastern sandstone and 100′ west of it, an amygdaloid vein, supposedly the Baltic lode. This shows copper carbonates and oxides over a width of over 100′ resembling the Baltic outcrop at the Champion, 25 miles N. E. As the dip is 60 to 65°, the property contains a valuable area for workings.

IMPERIAL MINE **MICHIGAN**

See **Michigan Iron Land & Lumber Co.**

INDIANA MINE **MICHIGAN**

Address: John M. Thomas, owner, Milwaukee, Wis. G. A. Richards, supt., Iron Mountain, Mich.

Property: on the Menominee range, opened in 1882. The product is a low-phosphorus (0.007 to 0.013%) low-iron (35.73 38.39%) and highly silicious (36.40 to 38.25%) ore, mined by steam shovels to depth of 180′. Electrically equipped.

Production: 46,480 tons in 1917; 58,401 tons in 1918; 14,018 tons in 1919; the total is 233,502 tons.

INDIANA MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Dee. Bldg., Houghton, Mich.

Officers: R M. Edwards, pres. and gen. mgr.; Sidney J. Jennings, v. p.; Henry Tolman, treas., with C. F. Moore and C. A. Hight, directors; Albert L. Wyman, sec.; Thomas Bennet, supt.

Inc. Aug. 11, 1909, in Michigan. **Cap.** $2,500,000; $25 par; issued 80,000 shares; paid in $12.50. Last assessment March 1, 1917. Listed on Boston Stock Exchange. State Street Trust Co., Boston, transfer office; Federal Trust Co., Boston, registrar. Annual meeting, third Thursday in April. Company gave 60,000 shares to owners of land for property and offered 36,000 shares, August, 1909, for public subscription.

Revenue in 1919 totaled $619, and expenditures $10,639, leaving a deficit of $10,020. Cash assets, including $15,547 uncollected assessments, were $22,187, and current liabilities, $44,416; profit and loss account $380,904. In 1920 total income was $3.07, and expenditures, $8,882, leaving a deficit of $8,879. Current assets amounted to $5,476; notes payable, $30,000; acct's pay., $16,928; taxes, 1918-20, $5,184; profit and loss, $389,783.

Property: 1,200 acres bought from the Indiana Copper Co., in 1909 the tract lying N. E. of the Lake and N. of the North Lake mines in Secs. 21, 27 and 28, T. 50 N., R. 37 W. The property was worked on a small scale before the mill burned in 1864, but the old openings are inaccessible and no work has been done thereon by the present company. The lands are heavily timbered and can supply mining timber for a considerable time. Ample water is available from the Fire Steel river. Transportation is furnished by a spur of the Copper Range railway, and the Mineral Range line is within a short distance.

Geology: the lands cover a considerable distance along the Evergreen belt of copper-bearing amygdaloid beds and a number of unidentified cupriferous beds lying between the Evergreen belt and the eastern sandstone. The southeastern part of the tract is in the horizon of the Lake amygdaloidal bed. The Indiana ground though covered with a heavy overburden of sand, hampering drilling operations, has been tested by extensive diamond-drill borings.

No. 2 drill hole disclosed phenomenally rich copper rock in a bed immediately beneath a 400′ conglomerate. The ore has been called sandstone, and conglomerate but there is little question that it is an altered felsite; the rock consists essentially of quartz and light-colored mica, with secondary infiltrations of calcite and small irregular grains of disseminated native copper. The even size of the quartz grains, with their interlocking texture, indicates an igneous origin. There are indications that the 40′ of rich felsite rock and a second zone of about 25′ width, are parts of a single bed of approximately 265′ width, the second zone of 25′ being near the center of the wide bed. No. 5 hole and No. 9 hole both cut felsite carrying heavy copper, apparently a continuation of the same orebody.

Development: ground was broken Jan., 1911, near No. 2 drill hole for a vertical shaft, the overburden at this point being about 110′. The shaft is cylindrical, of 17′ outside diameter, lined with steel and concrete, with inner dimensions of 8x12′, and is 1,492′ deep, on the N. edge of a large intrusion of felsite. Where fissured or fractured this rock carried native copper (mass).

Development on the 1,400′ level and on 1,150′ level did not locate No. 2 hole, but found No. 9 hole at 100′ from its proper position. The work shows that the orebody cut by No. 2 hole was not of great size or regular trend.

In 1916, No. 2 shaft, an incline, was started in the S. W. quarter of Sec. 21 to cut one of the South Lake amygdaloid lodes. A year later this shaft was down 310′, and 1,496′ of exploratory work had been done on the 300′ level. This work was believed to be in the horizon of the main system of Ontonagon county lodes, but as no conglomerate was encountered the posi-

tion of the crosscut in the geological section could not be definitely fixed. Enough copper was found, to warrant exploration, but not of commercial value when opened. Due to rising costs, work was suspended in 1918.

IRON MOUNTAIN IRON & CHEMICAL CO. **MICHIGAN**

Address: M. E. Richards, mgr., Iron Mountain, Mich.

Inc. 1921, in Michigan. Company is erecting a charcoal pig-iron furnace and by-product plant at Iron Mountain.

ISLAND COPPER CO. **MICHIGAN**

Office: Suite 3300, 120 Broadway, New York, N. Y. **Mine office:** Houghton, Mich.

Officers: Thos. F. Cole, pres. Henry P. Paull, v. p.; Frederick W. Nichols, sec.; F. R. Kennedy, treas., with Joseph B. Cotton, George G. Barnum, Geo. A. Tomlinson, E. R. Grochau, and Julius H. Barnes, directors.

Inc. March 8, 1909, in Michigan. **Cap.** $1,000,000; $25 par; $7 paid in; issued 26,750 shares. Last assessment of $1 per share called August 1, 1918. Annual meeting, first Tuesday in June.

Balance sheet of January 1, 1920, showed assets totaling $198,797; including property, $146,783; cash, $1,822; accounts receivable, $6,000; investment and miscellaneous $44,192. Liabilities included $11,547 bills payable.

Property: on Isle Royale, over 94,100 acres out of a total of 125,000 acres on the island, includes the former holdings of the Isle Royale Land Corporation, Ltd., and the Island Mining Co. Average cost of this property to the company was $1.56 per acre. Present company has never done any exploratory work for mineral. Property fully described in Vol. XI, Copper Handbook.

ISLE ROYALE COPPER CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **General office:** Calumet, Mich. **Mine office:** Houghton, Michigan.

Officers: R. L. Agassiz, pres.; Jas. MacNaughton, v. p.-gen. mgr.; with E. C. Lewis, E. B. Dane, G. R. Whitten and C. O. Whitten, directors. Clarence H. Bissell, sec.-treas.; G. L. Osgood, Jr., asst. sec.-asst. treas.; Jas. E. Richards, mine supt.; A. G. Andrew, Jr., mill supt.

Inc. March 14, 1899, in New Jersey, as a merger of the Isle Royale Cons. Mining Co. and Miners' Copper Co. **Cap.** $3,750,000; shares $25 par. Is controlled through ownership of 33,187 shares of outstanding stock by the Calumet & Hecla. Old Colony Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Listed on Boston Stock Exchange. Company owns 18,836 shares of the Lake Superior Smelting Co. Annual meeting, first Wednesday in April, at 243 Washington St., Jersey City, N. J.

Balance sheet, years ended Dec. 31:

Assets—

	Property	Mineral Deposits	Invest.	Cash	Other Cur. Ass.	Total
1920	$9,402,726	$8,396,458	$ 388,672	$ 23,073	$2,022,162	$20,234,092
1919	9,665,194	8,390,458	362,229	27,483	2,128,988	20,580,352
1918	2,559,687	.....	362,402	180,326	1,714,716	7,265,514
1917	4,750,000	.....	1,306,689	270,760	2,377,906	8,419,296
1916	2,288,927	.....	192,144	150,043	1,551,796	6,513,799

Liabilities—

	Stock	Current	Depr. & Depl. Reserve	Mineral Deposits. Surp.	P. & L.	Total
1920	$3,750,000	$362,040	$7,550,000*	$8,396,458	$ 175,594	$20,234,092
1919	3,750,000	293,201	7,550,000*	8,396,458	590,693	20,580,352
1918	3,750,000	760,710	.....	270,760	2,484,044	7,265,514
1917	3,750,000	713,941	1,306,689	270,760	2,377,906	8,419,296
1916	3,750,000	778,286	856,829	.....	1,128,683	6,513,799

*Surplus account.

Net current assets at end of 1920 were $1,863,270.

Income Account

	Revenue	Oper. Prof.	Const., Tax. etc.	Deprec. Depl.	Dividends	P. & L.
1920..	$1,934,456	$ 567,669*	$112,716	$348,740	.....	$331,645—
1919..	1,739,870	301,159	21,234	477,190	$150,000	261,663+
1918..	3,700,477	1,219,404	828,052	.....	375,000	16,352+
1917..	2,835,589	1,224,708	657,520	.....	600,000	32,812—
1916..	3,262,624	1,396,655	104,628	.....	750,000	542,027+

*Net loss.

Annual report for year ended Dec. 31, 1921, shows loss of $383,369. Copper production from Jan. 1 to March 31 amounted to 2,491,000 pounds at a cost of 20.57, including 3.46c. per pound for depreciation and depletion. This with the copper on hand on the first of January, 1921, made a sales supply of 10,663,284 lbs., of which 6,607,163 lbs. were delivered and paid for during the year at an average cost of 13c. per pound. Net current assets at close of the year amounted to $1,336,557.

Dividends: $1 per share was paid March 31, 1913; $5 in 1916; $4 in 1917; $2.50 in 1918, $1 in 1919; none in 1920 and 1921; a total of $13.50 a share or $2,025,000.

Property: 3,520 acres and an 80-acre millsite. Mineral lands include the old Isle Royale, Grand Portage and Huron mines, the Dodge and Frue prospects, the mineral rights in the Montezuma tract of about 200 acres purchased, 1913, for $100,000, and sundry undeveloped tracts. The Hussey-Howe tract of 280 acres, lying N. E. of the Superior, supposed to carry the extension of the Baltic bed, was bought, 1907, for $220,000. Lands include all of Secs. 1, 2 and 11, and parts of Secs. 3, 9, 10 and 15, T. 54 N., R. 34 W.; also 160 acres in Sec. 6, T. 54 N., R. 33 W., 40 acres in Sec. 31, T. 55 N., R. 33 W., and 160 acres in Sec. 36, T. 55 N., R. 34 W., embracing a compact tract carrying about 2½ miles of the strike of copper-bearing beds.

Geology: the Isle Royale has 3 parallel amygdaloidal beds, with strike of N. 32° E. and average dip of 56°, of which 2, the Isle Royale and Portage beds, have been extensively opened, the latter lying approximately 200' W. of the former. The shafts are on the Isle Royale, but the Portage bed is opened on many levels by crosscuts. East of the amygdaloids is the "Mabbs vein," lying near the Eastern sandstone, 4 to 7' wide and rich in mass and barrel copper, but deficient in stamp rock. It was opened to a depth of about 250' by John and Austin Mabbs, about 1875, and has been tested to some extent by the present owner. There also are unidentified and unexplored copper-bearing amygdaloids lying W. of the Portage bed and occasional narrow fissure veins carrying arsenical copper ores.

The 3 old mines included in the present Isle Royale tract produced 48,452,590 lb. fine copper, under primitive conditions, at a net aggregate loss of about $2,500,000. The old Isle Royale and Grand Portage mines were opened in 1853 and the Huron in 1855. The history of these 3 mines is given in detail in Vol. II.

Development: considerable diamond-drilling has been done. Underground openings were 19,106' in 1912; 13,626' in 1913; 9,694' in 1914; 14,446' in 1915; 17,455' in 1916; 19,271' in 1917; 12,409' in 1918; 10,475' in 1919; 12,009' in 1920.

No. 1 shaft, 1,614' deep, near the northern boundary, was gutted by fire in December, 1903, and temporarily abandoned. About 2 miles of drifts had been opened on this shaft. During 1914-16, shaft was retimbered preparatory to sinking and exploring the Portage lode, but no sinking had been done up to 1921. The drifts indicated that about 45% of the ground would be available for stoping.

No. 2 shaft, with 3 compartments, 2,280' S. W. of No. 1, is 3,650' deep, or 62' below the 33rd level. Drifting in 1917-1918 was in the West lode, and showed that 55-60% of the ground may be available for stoping. It has a

combination shaft ore-house, with Portage Lake crushers. The engine-house is equipped with a hoist capable of raising 6-ton skips from a depth of 6,000'.

No. 3 is merely a site for a shaft, to reopen the old Huron mine.

The new shafts, No. 4, 5, 6 and 7, are all on the Isle Royale bed, at the southern end of the property, and have several miles of workings showing considerable heavy copper, No. 4, 5 and 6 being connected by drifts on the upper levels. These shafts are unconnected with the former workings, in shafts No. 1 and 2.

No. 4 shaft, about 3,100' S. of No. 2, is 78' below the 21st level, or 2,773' deep, developing stamp rock of average grade. Equipment includes a duplex-cylinder hoist, operating in balance good for 1 mile depth, a 35-drill air-compressor, and a cylindrical steel shaft rock house having cylindrical ore bins 42' in diameter and 32' high. In 1917, electric pumps were mounted in levels No. 1, 8 and 17 and in 1918, storage-battery locomotives were installed on No. 11, 12, 13 and 14 levels. All north drifts from the 1st to the 11th level, inclusive, connect with the Huron workings.

No. 5 shaft, about 5,100' S. of No. 2 in Sec. 2 was started 1906, and was 103' below the 20th level, or 2,640'deep by 1921. It is sunk in the footwall, and is equipped with 32x72" hoist, operating in balance, installed in 1920 in a new concrete engine house; a new boiler house was also erected. Electric pumps are in use on the 1st, 6th and 16th levels, and storage-battery locomotives were installed on levels No. 10, 11, 12 and 13.

No. 6 shaft, about 7,300' S. W. of No. 2, near the center of Sec. 11, has 3 compartments and was 73' below the 22nd level, or 2,700' deep, December, 1920. The levels are opened at 100' and 120' intervals. On surface there is a circular steel shaft ore-house, similar to that at No. 4. The plant at No. 6 includes a brick engine house, with hoist, operating in balance, and 45-drill air-compressor, a steel boiler house, with 6 boilers, electric pumps on the 1st, 3rd, 9th and 17th levels, and storage-battery locomotives on levels No. 10, 12, 13 and 14.

No. 7 shaft, 2,400' S. of No. 6, was started in 1913, and was bottomed in foot-trap 113' below the 9th level, or 1,249' deep, when is was indefinitely closed. The north drifts down to level No. 7 have been holed to corresponding drifts from No. 6 shaft. The south drifts have been driven 1,200' or midway to the point selected for No. 8 shaft.

"A" shaft, started September, 1908, on the Hussey-Howe tract, is 972' deep, with the first plat cut at depth of 350'. A 205' crosscut, at depth of 474', discloses only the bed in which the shaft is sunk. On the 3rd level, at depth of 714', a drift was run S. to within 50' of the Houghton Copper Co. boundary, disclosing a fair amount of amygdaloidal rock, not carrying copper in promising quantities. "A" shaft is supposed to be sunk on the Baltic bed, but there is very great doubt as to whether the shaft really is opened on the northern extension of the Baltic, and failure to locate the twin Baltic bed, within a distance of 205' in the crosscut on the 474' level, accentuates this doubt.

The Sec. 12 shaft, begun October, 1905, and discontinued January 1908, at depth of 812', also was sunk in search of the Baltic bed and drifts and crosscuts were opened in 4 directions, without securing satisfactory results. The shaft was sunk in a badly disturbed amygdaloidal bed, practically barren of copper.

A shaft was started, 1904, in Sec. 10, but was discontinued because of the heavy overburden, and a diamond- drill substituted, the drill-cores showing an amygdaloidal bed of which about 5' in width carried copper in fine grains.

Sinking was continued in shafts 4, 5, and 6 during 1920, and of the new ground opened 50 to 70% was found to be available for stoping. The Isle

Royale mill treated the entire output except for a small tonnage sent to the Osceola mill.

Surface equipment: the main plant at No. 2 shaft, includes No. 2 engine house, a compressor house having a 35-drill 2-stage air-compressor; a 44x72′ boiler-house, with a 16x72′ coal-storage addition and a 3,000-ton coal trestle, having four 150 h. p. 84″ horizontal boilers, taking water from a dam 300x500x6′. The machine shop is of steel, on stone foundations. The company has a private telephone system. There are about 150 dwellings on the company's lands.

At No. 5 shaft a new collar was put in and a change-house erected in 1917. At No. 7, a timber frame ore-house, equipped with 24x48″ crusher and operated by a 100 h. p. motor, was put into commission.

The Isle Royale railway, owned by the company, connects the mine and mill with about 5 miles of main line, having easy grades. Equipment includes 35-ton, 55-ton and 60-ton locomotives, and forty 40-ton steel ore cars, equipped with airbrakes.

The Isle Royale mill-site at Point Mills, at the mouth of Pilgrim river, has nearly 1 mile of frontage on Portage lake. The old mill burned, Dec. 24, 1914. A new 2,000-ton mill, with 3 stamp heads was in operation, August, 1915. The mill cost $220,000 and has three 300-ton orebins and 3 stamps, having circular mortars and ⅝″ screen openings. The stamps rest on concrete bases, 20′ thick, and are fitted with steeple-compound steam cylinders, and have a maximum daily capacity of 700 to 750 tons each. The dressing floor has 78 rough jigs, 6 finishing jigs and 55 Wilfley tables to treat slime. There are rolls with fixed bearings to regrind coarse gravel from the mortars.

The mill has a complete machine-shop on the second floor, power being furnished by a 600 k. w. mixed pressure turbo-generator, taking steam from five 200 h. p. boilers in a boiler house at the rear of the mill. There is a 32x600′ wharf, with deep water alongside, with appliances for unloading coal and general freight and for the dispatch of mineral in scows to the Dollar Bay smelter, 2 miles across Portage lake.

Water is furnished the mill by a 16,000,000-gal. pump, especially designed to handle muddy water, having a triple discharge into a 30″ riveted steel water main, running 2,200′ from pump house to mill, the pump being located some distance from the mill, to obviate stamp sand clogging the intake. Three 100 h. p. boilers furnish power for the pumps, fuel being taken from a large coal trestle at the rear of the pump house boiler rooms. A dam near the mill supplies feed water for the boilers. Because of reduced mine output the No. 2, or Hubbell, mill was closed down in 1919.

Production: has been as follows—

Year	Tons Ore Treated	Lbs. Cu. per Ton Ore Stped.	Mine Cost per Ton (a)	Lb. Cu. Produced	Total Cost per Lb. Cents	Rec'd per Lb. Cents
1921*	116,576	21.37	.....	2,491,000	.....	12.86
1920	591,971	17.94	$2.73	10,621,801	20.10	18.61
1919	724,667	17.95	2.35	13,007,647	15.80	18.60
1918	974,508	15.9	2.14	15,442,508	16.80	24.46
1917	922,160	14.6	2.02	13,480,921	15.74	26.87
1916	925,419	13.4	1.53	12,412,111	15.75	25.86
1915	680,270	13.7	1.45	9,342,106	14.94(b)	18.36
1914	474,349	13.9	1.49	6,601,235	13.05	13.16

1913.....	314,679	13.2	2.12	4,158,548	18.81	15.29
1912.....	531,105	15.4	1.54	8,186,957	11.89	16.66
1911.....	457,440	16.4	1.47	7,490,120	10.85	....
1910.....	520,860	14.5	1.42	7,567,399	11.84	....

(a) Includes mining, transportation, stamping and taxes.

(b) Includes nearly 2c per lb. extraordinary construction expense.

* Three months.

The Isle Royale is a low-grade mine, but has earned substantial profits. Due to some improvement in the ground worked and by more careful selection, the quality of the ore has been substantially raised during the past 5 years. This, with an increased production, made possible by the development campaign begun some years ago, should permit Isle Royale to better meet abnormal conditions.

Beginning with 1921, 3 shafts only were operating, and on April 1, the mine and plant were completely closed down.

JONES & LAUGHLIN ORE CO. MICHIGAN

Office: Jones & Laughlin Bldg, Pittsburgh, Pa Mark Elliott, gen. mgr., Virginia, Minn; C. T. Kruse, gen. supt.

Property: the Forbes mine, in the Iron River district, Iron county, contains a yellow, non-Bessemer hematite. Developed by 275′ shaft. First opened in 1912; shipments commenced 1913. Produced 367,455 tons up to January, 1917. The Breitung Hematite mines on Marquette range, Marquette county, were acquired in 1921 from the Breitung Hematite Mining Co. Ltd. The mines were opened in 1901 and 1905, and are credited with total production of 1,631,532 tons to end of 1919.

JUDSON MINING CO. MICHIGAN

Address: Alpha, Mich. E. E. Hunner, mgr.; Alfred Martin, supt.; M. A. Hanna & Co., sales agents.

Inc. 1912, in Michigan. **Cap.** $750,000; shares $10 par; all issued.

Property: Judson mine with 80 acres iron ore land having 2,000,000 tons hematite ore blocked out. Ore runs 50% iron and 0.5% phosphorus.

Development: by 580′ incline shaft and 7,000′ of workings.

Equipment: includes hoist 2,200 cu. ft. compressor, 1,000 gal. electric pump, motor tramway and a steam shovel.

Production in 1917, 60,235 tons; in 1918, 195,938 tons; in 1919, 106,869 tons; 532,180 tons to end of 1919.

KEWEENAW COPPER CO. MICHIGAN

Office: Calumet State Bank Bldg., Calumet, Mich. Mine near Mandan, Keweenaw county, Mich.

Officers: Thos. F Cole, pres.; Spencer R. Hill, v. p.; Capt. Thos. Hoatson, 2nd v. p.; C. A. Wright, sec.-treas., with A. L. Warner, and G. G. Hartley, directors.

Inc. March 11, 1905, in Michigan. **Cap.** $10,000,000; shares $25 par; issued 213,871 shares; $20 paid in. Last assessment of $1 per share levied July, 1917. Stock listed on Boston and Duluth Stock Exchanges. Controls, through stock ownership, the **Phoenix Consolidated Copper Co., Meadow Mining Co., Humboldt Copper Co., Keweenaw Central Railroad Co.** and **Washington Copper Mining Co.**. Has about 2,300 shareholders.

American Trust Co., Boston, registrar; Old Colony Trust Co., transfer agent. Annual meeting, second Monday in March.

General Balance Sheet, December 31:

Assets—	1918	1919	1920
Real Estate	$1,405,275	$1,405,298	$1,405,280
Investments	1,702,611	1,724,201*	1,724,200
Acct's Rec.	415,214	410,963	416,543
Dev. Exp., etc.	725,364	735,013	734,783
Cash	27,236	14,680	10,070
Mat. & supp.	5,549	2,072	2,012
Total	$4,281,249	$4,292,227	$4,292,890
Liabilities—			
Capital stock	$4,277,420	$4,277,420	$4,277,420
Acct's Pay.	166	.....	.....
Interest	3,663	13,991	14,889
Misc. Rev.	.....	817	581
Total	$4,281,249	$4,292,227	$4,292,890

*This includes $219,833 of Anaconda Copper Mining Co's 6% bonds.

The Keweenaw Central Railroad Co. is a reconstruction of the old Lac La Belle & Calumet railway. The entire capital stock issue, $400,000, reduced from $730,000 in 1918, is owned by the Keweenaw Copper Co. The railway company has $500,000 bonds, not issued, and ended 1920 with accounts and bills payable of $386,464, of which $267,001 is due the Keweenaw Copper Co. The railway, with about 20 miles of main line, spurs and branches, cost $692,346, and runs from Centennial, a northern suburb of Calumet, where connection is had with the Copper Range line, to the Phoenix shaft. The road consisted of about 40 miles of track, but in 1918, company sold the equipment and rails of the Mandan—Lac La Belle branch, because this equipment was not suited for the heavy duty that would be imposed whenever commercial rock was mined in considerable quantities. The proceeds of the sale, $225,000, was invested in Liberty bonds.

Property: 25,195 acres, mainly mineral lands, heavily timbered, in 3 main groups, carrying the strike of the Keweenawan mineral belt for about 14 miles, including practically all of the amygdaloidal and conglomerate cupriferous beds of the district, as well as numerous copper-bearing cross fissures. Lands are in T. 58 N., of Rs. 27, 28 and 29 W., and include the tracts formerly owned by the Aetna Copper Harbor, Empire, Girard, Hanover, Keweenaw, Mandan, Medora, Pennsylvania & Boston, Resolute and Vulcan companies, in addition to lands controlled through stock ownership in subsidiary corporations.

The company's lands carry nearly 2 miles of water frontage on either side of the Montreal river, including Fish cove, 1 mile east of the river's mouth, which might be made a fair harbor at comparitively small expense. The lands include 5 miles of the course of the river, on both banks, and with other holdings, give the company the entire water-frontage of Mosquito lake, making possible the development of a great water power, with a hydro-electric installation at the mouth of the river. There is a mill site on Bete Gris bay, at the mouth of the Montreal river, having about 5 miles of water frontage.

The company also owns the Lac La Belle, or Mendota, ship canal, 1 mile long, connecting Lac La Belle with Lake Superior. This canal has a 14′ channel and leads to a splendid haven that should be made a harbor of refuge.

The **Medora** mine, opened about 1860, had 3 old shafts, about 100′ apart, deepest 140′. The Medora amygdaloidal bed traversing lands of the company for about 4 miles, lies immediately under the Allouez conglomerate, and outcrops several hundred feet north of the Montreal river bed. The Medora lode about 12′ in average width, is a soft chocolate-colored amygdaloid, carrying considerable prehnite, calcite and quartz, in connection with fine stamp

copper and occasional heavy copper, a 30" paystreak along the footwall carrying some barrel work, the bed as a whole being bunchy.

The Medora tract also carries other copper-bearing beds, among these being the Medora fissure vein, outcropping about 225' E. of No. 1 shaft, but making into the shaft at depth. About 100' S. of the Medora amygdaloid is another bed carrying copper in small quantities, and to the northward are the Wolverine amygdaloid, of about 15' width, and the Allouez conglomerate, lying about 280' N. of the Medora bed, at surface. The mine was reopened and developed to a depth of 1,700' and length of 1,800', with about 2 miles of workings before work was stopped September, 1909. The Medora workings are fully described in Vol. VIII.

The **Empire** mine carries the Medora bed, about 3 miles E. of No. 1 shaft, and some trenching and test pitting, done 1906-07, on the Empire tract, showed a bed of about 15' width, carrying some copper at surface. The Empire also carries the Montreal river amygdaloid, on which the Manitou did considerable work.

The Medora-Mandan-Resolute tract of 2,440 acres carries the Kearsarge bed under practically its entire territory. The shaft on the Kearsarge bed, known as No. 2, is about a mile S. of the old Medora workings, and was 1,355' deep when abandoned, 1911.

The company owns a diamond-drill outfit and has made extensive borings, securing a cross section of the Medora, Mandan, Resolute and Empire tracts. Operations, 1912-1914, were confined to exploratory work in the horizon of the Ashbed lode, and the first drill-hole located a copper deposit of considerable promise, early in 1913, at a depth of about 500'. Mine has been idle since May 28, 1914.

Development: in 1917, operations were conducted on the Phoenix mine only. Fifty-three diamond-drill holes, aggregating 3,063', were put down for exploratory purposes and the shaft sunk to depth of 1,616'. The 5th, 6th and 10th levels showed fair copper. In 1917, 41,148 tons was stamped, yielding 9,248 lb. refined copper per ton.

Due to scarcity of labor and increasing costs, operations were suspended on December 1, 1917. Company was reported considering the sale of its timber-land or cutting the lumber itself. In either case, there would be a large return.

KEWEENAW LAND ASSOCIATION, LTD. **MICHIGAN**

Office: Room 33, No. 87 Milk St., Boston, Mass. **Operating office:** Marquette, Mich.

Officers: A. B. Emmons, chairman; Nathaniel Wilson, sec.; Dudley S. Dean, treas.; John M. Longyear, gen. agt.

Is a land corporation, holding 400,000 acres, mainly timber lands, but with some mineral lands, partly on the Keweenawan copper belt, in the upper peninsula of Michigan, taken over from the Lake Superior Ship Canal, Railway & Iron Co.

LAKE COPPER CO. **MICHIGAN**

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon county, Mich.

Officers: Wm. A. Paine, pres.; John H. Rice, v. p.; Robt. H. Gross, sec.-treas., with William F. Fitzgerald, Reginald C. Pryor, William S. Rooney, F. Ward Paine, directors. Elton W. Walker, mgr.; James McKie, supt.

Inc. Nov. 27, 1905, in Michigan. **Cap.** $2,500,000; shares $25 par; $5 paid, fully issued. Shares are listed on the Boston Stock Exchange. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting third Tuesday in June.

Financial statement for fiscal year ending April 30, 1921, showed, receipts, $112,385, of which $7,704 was interest; $44,567 cash in banks; $50,000 from sale of U. S. Certificates of indebtedness; $10,114 from sale of supplies, rents, etc. Expenditures were $103,949, including $90,000 for U. S. Certificates of

indebtedness; cash on hand, $8,436. Total assets, $205,129 in cash, Liberty bonds and copper on hand; acct's payable, $3,000; excess of assets, $202,129.

Property: 2,010 acres, comprising the S. E. ¼ of Sec. 29, S, E, ¼ of Sec. 30, N. W. ¼ of Sec. 32, and E. ½ of Sec. 31, T. 51 N., R. 37 W., includes 1,150 acres of mineral land, 680 acres of timber lands and 180 acres of cutover lands.

The company's first work was done on the Knowlton and Butler beds, principally on the Knowlton amygdaloid, on which there were old shafts of 170′ and 300′, latter having been deepened to 600′ by the present company. There was also a 90′ shaft on the Tresidder bed, 1,000′ E. of the Knowlton, sunk in 1865, whose cost was paid for from the copper extracted. Though considerable copper was taken from the Knowlton bed, exploration work was soon transferred to Virgin territory, at the southern end of the property, a wise move, as demonstrated by the outcome. Considerable diamond-drilling on this as well as on the Adventure and adjoining lands, indicate that the Lake mine should have several other promising amygdaloid beds, all in the same general horizon as the Lake bed now being opened.

Geology: the strike of the Lake amygdaloid near the shaft is N, 6° E., with dip of about 35° W. It was at first thought that the Lake bed was a fissure vein, but this was disproved by the disclosure of parallel strata, including a conglomerate lying about 400′ thereunder. The Lake lode is a typical Lake Superior amygdaloidal trap flow, but exceedingly wide for a copper-bearing bed, ranging from 50 to 100′. The hanging-wall or trap is fairly well defined, but the footwall is extremely irregular, there being no marked line of separation between copper rock and trap. The Lake bed appears to carry 3 well-defined shoots of enriched copper ground, raking northward with depth. An unsuccessful attempt was made to locate the northerly extension of the Lake bed by 3 diamond-drill holes, but it is now known that the lode turns W. and passes into South Lake ground. Thirteen diamond-drill holes, aggregating 1,628′, have been bored. The northernmost bottom workings of the mine show a deflection to the westward, with a strike, at the extreme north, of N. 15° W., which corroborates the hypothesis of Dr. L. L. Hubbard, that the Lake bed is the third and the East lode, the fourth bed from the top in the series of 4 amygdaloid beds cut by the drill holes of the South Lake. There are two other lodes only 50′ W. of the Lake with commercial ore. For order and description of the Knowlton, Butler and other lodes of the Evergreen belt, see Mass Copper Co., in this book and section.

The mine is operated by a 1,500′ incline shaft, ore being extracted from all levels from the 2nd to the 11th. The lode is bunchy containing very rich spots and some mass copper, but the general average is about 2%, equivalent to 25 lb. of refined copper.

The Knowlton shaft was unwatered August, 1916, in order to mine ore from the Knowlton lode, which, though narrow, shows good copper values wherever opened. From this shaft the Butler and Evergreen lodes are reached by a 900′ cross-cut, the Evergreen being cut late in 1918. Four test runs of ore averaged 26 lb. per ton. Management expects to resume operations here when mine is reopened.

Development: the mine has about 3,500′ of workings, a very large proportion of the drifts being in neither the footwall nor the hanging-wall, giving a rather poor idea of the actual copper content of the bed. New work during fiscal year ended April 30, 1919, totaled 1,204′ compared with 2,813′ for 1918.

Equipment: includes a 32x72″ duplex-cylinder double-conical-drum hoist, capable of lifting 10-ton loads from depth of a mile; old 6-drill and 15-drill air-compressors, taken from the equipment of the old Belt mine, and a new 50-drill 2-stage cross-compound air compressor, in a steel compressor house. Mine structures include a machine-shop, smithy, office, boarding house, and a change-house at the Lake shaft. There are a number of dwellings and

many old houses at the Belt location. The property is reached by the Copper Range railway, which passes through the old Belt location, with a 1½ mile spur to the shaft, and a siding has been built to within 500' of the shaft by the Mineral Range railway, giving the mine the advantage of competitive railway rates.

Production: fiscal year ending April 30. Work resumed in May, 1915, after a 2-year shutdown.

	Tons Ore Stmpd.	Mineral Lb. per Ton	Lb. Cu. Ore	Lb. Cu. Produced	Cost per Lb.	Rec'd per Lb.
1919(d)....	.....	.....	23.13	717,403	.....	.....
1918.....	63,191	2,246,970	23.13	1,461,893	25.63(c)	25.57
1917.....	70,440	2,346,970	21.14	1,489,247	20.00(c)	29.726
1916(a)....	59,848	2,511,216	26.42	1,581,071	15.622(b)	20.149
1914.....	.....	.....	14.95	275,647	.....	15.074
1913.....	83,109	2,153,128	15.39	1,300,562	19.5(c)	.....

(a) Did not produce during first 3 months. (b) Includes 1.036c. charge due to resuming operations. (c) Approximately. (d) Did not produce during last three months.

On February 1, 1919, all operations were suspended due to labor conditions, high costs and low copper prices.

The management is both experienced and capable, and the mine, though small, is most promising.

LAKE MILLING, SMELTING & REFINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. Works office: Point Mills, Houghton county, Mich.

Officers R. L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; Geo. G. Endicott, sec.-treas., with H. F. Fay and D. L. Dean, directors.

Inc. 1891, in Michigan. **Cap.** $2,500,000; shares $25 par; fully issued; $11.85 paid in. Stock distribution is as follows: Allouez Mining Co., 36,164 shares; Centennial Copper Mining Co., 16,164 shares; Hancock Cons. Mng. Co. 10,000 shares; Isle Royale Copper Co., 18,836 shares; Superior Copper Co., 18,836 shares.

Works: company owns 2 mills; one called the **Centennial-Allouez** mill, is at Point Mills, on the shore of Portage lake, on land adjoining the Franklin mill-site. The mill was built by the Arcadian Copper Co., and was bought, 1904, by the Centennial Copper Mining Co., and later transferred to the present corporation. The mill of 4,000 tons daily capacity is equipped with 6 Nordberg stamps and crushing rolls to treat oversize material. Two additional stamp units have been planned. Power is furnished by a 600 h. p. cross-compound engine, and water is supplied by a 15,000,000-gal. pump. A 30,000,000-gal. pump has been ordered. In 1918, company installed a mixed flow pressure turbine to operate a 2,000 k. w. electric generator. A boiler-house containing 8 boilers was completed in 1915; a new addition was completed in 1917 to house the 4 boilers necessary to run the two new stamps.

The other mill, known as **Lake No. 2,** at Hubbell, has 4 stamps and treats all the ore from the Allouez Mining and Centennial Copper Mining companies' workings. A tailing pumping plant which started operating early in 1919, pumps tailings far out into Torch lake. This was erected jointly by the Osceola, Lake and Calumet & Hecla. Both mills have been closed since 1919.

LAKE SHORE MINING CO. **MICHIGAN**

Idle several years. See Volume XIV.

LAKE SUPERIOR DEVELOPMENT CO. **MICHIGAN**

Office: care Clyde Mackenzie, sec., Houghton, Mich. Jos. Croze, pres.; Jos. W. Selden, treas.

Property: 400 acres, held under option, the N. ½ of Sec. 25, and S. ½ of S. W. ¼ of Sec. 24, T. 57 N., R. 32 W., about ½ mile E. of the Gratiot

and about 1½ miles of the Ojibway. Lands are on the Keweenawan formation. Drilling done in 1910-11 gave encouraging results and company officials hope to resume operations at some future time.

LAKE SUPERIOR IRON & CHEMICAL CO. **MICHIGAN**

Described Vol. XIII. Name changed to **Charcoal Iron Co. of America**, which see.

LAKE SUPERIOR SMELTING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **General office:** Calumet, Michigan. **Works office:** Dollar Bay, Houghton county, Mich.

Officers: R. L. Agassiz, pres.; with F. L. Higginson, W. Hunnewell, J. F. Perkins and Jas MacNaughton, directors. C. H. Bissell, sec.-treas., Jas. MacNaughton, gen. mgr.; Henry D. Conant, supt.

Inc. July, 1891, in Michigan. **Cap.** $1,200,000; shares $25, fully paid and issued. Is controlled through ownership of 25,000 shares, by the Calumet & Hecla Mining Co., and by the Osceola Cons. Mining Co., which has 50,000 shares, and the Isle Royale Copper Co., which has 8,000 shares.

Balance Sheet—Years ended December 31:

Assets—

	Real Estate	Mchy. & Equipt.	Mdse., Mat. In Process	Cash & Accts. rec	Total
1918.....	$1,044,446	$535,515	$137,113	$193,454	$1,910,528
1917.....	1,044,446	416,000	163,546	157,865	1,781,857

Liabilities—

	Cap. Stock	Accts. & Notes Payable	Reserves	P. & L.	Total
1918.....	$1,200,000	$370,890	$132,010	$207,628	$1,910,528
1917.....	1,200,000	391,839	103,437	86,581	1,781,857

The smelter has 11 reverberatory furnaces and 3 refining furnaces. There is a mechanical ladling and casting device having an 1,100-lb. ladle, and a casting machine with molds linked into an endless belt, dumping over sprockets into cooling tanks, whence the ingots are delivered mechanically by cleat elevators to inspection and loading platforms.

The smelter treats ore from the Osceola, Isle Royale, Ahmeek and Centennial mines. The company also owns the dismantled smelting plant at Hancock, Michigan. Idle since May, 1919.

LA SALLE COPPER CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton county, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr., with W. Hunnewell, T. N. Perkins, D. S. Dean, F. L. Higginson, and Lindsley Loring, directors. G. G. Endicott, sec.-treas.; H. L. Bennett, asst-sec.-asst.-treas.; Ole Hallingby, supt.

Inc: Dec., 1906, in Michigan. **Cap.** $10,000,000; $25 par; issued 302,977 shares. Old Colony Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Listed on Boston Stock Exchange. Company absorbed the Caldwell Copper Co. and controlled the Tecumseh Copper Co., through ownership of practically the entire issue, giving 1 1-3 shares of La. Salle for 1 of Tecumseh, and bought the entire property of the Tecumseh. May 11, 1910, for $1,648,000. Is controlled, through ownership of 152,977 shares, by the Calumet & Hecla Mining Co. The Calumet & Hecla contributed $1,000,000 cash to the company's treasury, taking pay in stock, and agreed to loan $750,000 additional cash, as needed. Annual meeting, second Tuesday in April.

Operations—Years ended December 31:

	Total Receipts	Oper. Exp.	Taxes Reserve	Deprec. Reserve	Inc. in Cur. Ass.	Excess Cur. Ass.
1920.....	$28,014	$80,796	.....	$39,805	$44,804*	$321,242
1919.....	158,440	205,545	.....	32,887	37,736*	366,046
1918.....	485,013	407,956	$8,800	24,359	92,615	403,781
1917.....	454,486	311,558	8,676	.....	135,351	308,842

* Decrease.

Report for year ended Dec. 31, 1921, shows a profit of $2,602. No copper was produced during the year. On Jan. 1, 1921, company had on hand 42,117 pounds of copper, of which it sold during the year 20,875 pounds at an average price of 13.2 cents per pound, leaving 21,242 pounds on hand at the close of the year, inventoried at 14 rents a pound. Net corrent assets on Dec. 31, 1921 were $331,885, of which cash and government securities amounted to $327,794.

Property: 2,360 acres. The Tecumseh and Caldwell contributed 560 acres each and 540 acres were furnished by the Calumet & Hecla, St. Mary's Mineral Land Co., Sheldon & Douglas Estate, and other interests, these lands being put into the company on a novel basis of valuation, figured upon zones of 2,500′ depth on the dip of the Kearsarge bed, allowance being made for decreased land values on zones carrying the underlay at increased depths. There are 4 shafts, 2 on the Tecumseh and 2 on the Caldwell tract. The property carries the strike of the Keweenawan formation for about 2½ miles.

Development: property has been prospected by diamond-drilling, more than 30 diamond-drill holes having been bored on the Tecumseh and Caldwell tracts, a few years ago.

The first work at the Tecumseh mine was done on the Calumet conglomerate, many years ago, when a 1,000′ shaft was sunk that found no payable ore. During the second era of activity, 1889-1902, a shaft was sunk 2,300′ on the Osceola amygdaloid, but this bed, being found practically barren of copper, work was abandoned.

An arrangement was made in 1916 with the Osceola Consolidated, whereby levels No. 42 and 45 S. of No. 6 shaft, Osceola mine, were extended into La Salle ground. The ground was fair for the most part, but some sections were of no value. Work was discontinued in 1917, because expenditure of sinking shaft was not warranted. But in 1919, Osceola began mining this ground on a royalty basis under a 10-year contract; up to the time of closing down, 24,419 tons of ore were extracted.

La Salle No. 1 shaft, sunk on the Kearsarge bed, has 3 compartments, 2,146′ deep, and shows the Kearsarge lode to be 8′ to 12′ thick, but characterized by irregularly distributed values. The quantity of workable ground is limited and the work done in 1918, was with the idea of mining that ground as soon as possible and abandoning the shaft, which was done in March, 1919. Equipment: includes 250 h. p. boiler and 18x24″ hoist.

La Salle No. 2 shaft, 2,637′ deep, is located about 1,700′ S. of No. 1 and of the same size, shows a bed of workable thickness, but without much copper. A branch of the Mineral Range railroad was built to the shaft in 1913. Development at end of 1919 and 1920 was confined to 25th level south, but ground proved too lean to warrant stoping. The power plant has a 125 h. p. boiler, an 18x24″ hoist good for 2,500′ depth, and a 15-drill air-compressor.

No. 5 shaft, 1 mile S. of No. 1, is 1,450′ deep, shows a poorly-defined bed, with unsatisfactory copper content. Work was discontinued in 1910.

No. 6 shaft, sunk at a point 1,500′ S. W. of No. 5, was abandoned in 1909, at depth of 882′. The surface equipment was removed to No. 2 shaft.

The Kearsarge bed is comparatively thin in the Tecumseh tract, ranging from 7 to 11′, with an average thickness of about 9′

Total development work amounted to 141′ in 1913; 1,123′ in 1914; 1,127′ in 1915; 3,107′ in 1916; 2,146′ in 1917; 1,532′ in 1918; 1,545′ in 1919; 1,177′ in 1920.

Production:

	Tons. Ore Treated	Lb. Cu. Per Ton Ore Stpd.	Lbs. Cu. Produced	Mining Cost Per Ton	Net Cost Per Lb. Cents	Rec'd Per Lb Cents
1920.....	3,430*	17.41	59,713	.....	19.62	18.76
1919.....	32,995	10.33	340,719	$2.55	31.21	18.13
1918.....	176,423	10.339	1,832,665	1,893	21.96	24.34
1917.....	185,014	10.38	1,919,775	1.87	20.14	28.45
1916.....	144,829	9.53	1,380,352	1.79	19.96	25.68
1915.....	80,959	9.67	782,493	.....	.....	.....
1914.....	45,509	11.88	540,731	.....	.....	.....
1913.....	2,221	19.76	43,906	.....	.....	.....

* Not including that treated by Osceola.

The 1919 annual report stated that "the ground opened thus far on the Kearsarge lode is of too low grade to warrant mining, except during periods of abnormally high prices of copper ....," unless the 25th level should disclose rock of much better grade. Results on this level being unsatisfactory, the pumps were pulled in November, 1920 and mine closed.

LAURIUM MINING CO. **MICHIGAN**

Completely absorbed by the **Calumet and Hecla Mining Co.**, which see. Described Vol. XIII.

LONGYEAR-MICHIGAN EXPLORATION CO. **MICHIGAN**

Address: J. M. Longyear, Jr., Marquette, Mich.

Property: had options on 1,240 acres of land in Sections 26, 27, 34 and 35 T. 56 R. 34, near Calumet, Houghton county. Several diamond-drill holes, made in 1916, failed to show ore. Options reported taken over by **Federal Syndicate Copper Co.**, which see.

LORETTO IRON CO. **MICHIGAN**

Office: 1400 Fulton St., Chicago, Ill.

Officers: J. Ward Amberg, pres.; D. F. Brenner, v. p.; J. H. Amberg, sec.; T. J. Amberg, treas.; C. H. Baxter, supt., directors. M. A. Hanna & Co., sales agents.

Inc. in Illinois. **Cap.** $400,000; $10 par; all issued. Is a close corporation.

Property: 280 acres leasehold on Menominee range at Loretto, Dickinson county, Mich., opened up in 1892. Main orebody averages 10-40' in width and is about 1,000' long with an overburden of above 25'. Ore varies greatly in iron content, but averages about 55% iron and 0.06% phos.

Development: to vertical depth of 900'. Mining is by top-slicing.

Production: 174,173 tons in 1916; 193,949 tons in 1917; 155,891 tons in 1918; 82,259 tons in 1919; total is 2,344,553 tons.

MARQUETTE IRON CO **MICHIGAN**

Name changed from Breitung Iron Co., July, 1918.

Office of president: 7 Hanover St., New York, N. Y.; W. P. Pattison, gen. supt., Negaunee, Mich.

Officers: E. N. Breitung, chairman; J. W. Dougherty, pres.-mgr.; F. E. Fenton, v. p.; J. W. Peddle, sec, with C. G. Breitung, directors

Inc. May 4, 1917, in Delaware, as **Breitung Iron Co.** **Cap.** common stock, 150,000 shares, no par value, and preferred stock, $3,000,000, 7% cumulative, par value $100. Outstanding: common, 90,000 shares; preferred, $2,000,000. The preferred is convertible share for share into common stock at option of holders. Redeemable at option of corporation at $110 per share and accrued dividends. Privilege of conversion up to thirty days, prior to date fixed for redemption. No bonds, but $1,174,000 first lien, convertible 7% secured notes were outstanding Dec. 31, 1920. The unissued common stock, 60,000 shares, is reserved to provide for conversion of the first lien 7% notes and preferred stock. After July, 1921, 10% of surplus earnings (pfd. dividends having been paid for each year) shall be applied to

the redemption of preferred stock at $110 and accrued dividends. Quarterly dividends payable on first of Jan., April, July and October. Empire Trust Co., New York, transfer agent.

The various subsidiary companies and their locations are given below, together with the percentage of capital stock of each one held by the Marquette Iron Co., other than directors' qualifying shares.

Names of Subsidiary Operating Companies	Location	Iron Ore Range	% Capital Stock Owned
Mary Charlotte Mng. Co	Negaunee, Mich.,	Marquette Range..	95%
Juliet Iron Co.....	" "	" " ..	100%
Lucky Star Mng. Co....	" "	" " ..	70%
Washington Iron Co.....	Humboldt "	" " ..	51%
Breitung Iron Co.....	Wilde, Ont., Can.	Algoma Range ..	90%

Under date of April 1, 1917, the American Appraisal Co. of 120 Broadway, New York, N. Y., appraised the properties of the subsidiaries, as follows: Property assets permanent equipment and development: $1,227,563; mineral lands and leases, $7,078,250; investment in ships, $325,259; total, $8,631,073. Current assets, $1,324,698. Less: current liabilities, $422,978; Bonds and long term notes of two subsidiaries (less sinking fund for retirement of bonds, $95,950), $1,104,050. Total net assets, exclusive of good will, going value etc., $8,428,743. The Appraisal company states that these values are very conservative.

The Marquette Co. reports that since this appraisal was made the ships have been sold for more than the amount carried on the books, the bonds and notes of subsidiaries reduced, Jan. 1, 1921, to $200,000, and that through a subsidiary, it has acquired by deed and stock ownership title to 95% of the lands occupied by Mary Charlotte Mining Co., Breitung Hematite Mng. Co. and Juliet Iron Co.

Property: over 1,300 acres in one solid tract in the Negaunee district of the Marquette Iron Range in the Lake Superior region, and properties in other districts. Of this area, 1,000 acres are known to be in the iron formation.

Subsidiary Companies

Mary Charlotte Mining Co.

Mine office: Negaunee, Mich. C. B. Dunster, mgr., Cleveland Ohio.; W. B. Pattison, supt., Negaunee, Mich. E. N. Breitung & Co., sales agents.

Property: the Himrod and Mary Charlotte No. 1 and 2 mines on the Marquette range, Marquette county, developed to 640' in depth. Ore is mined by caving and stoping. Mine has been worked since 1903. Ore assays from 54.50 to 59% iron and 0.095% phosphorus.

Production: 247,854 tons in 1917; 273,650 tons in 1918; 231,420 tons in 1919; total production, 3,377,337 tons.

Breitung Hematite Mining Co., Ltd.—holdings sold to Jones & Laughlin Co. in 1921.

Juliet Iron Co. holds 50-year lease on 960 acres in the Negaunee Basin iron formation and adjoins the Breitung No. 1 mine on the south, and almost surrounds the Breitung Hematite No. 2 mine and the Mary Charlotte; practically undeveloped except by shallow workings that show producing prospects. From one tract of 80 acres, known as the Milwaukee-Davis, 400,000 tons were produced. Mine idle since 1916, but company plans comprehensive drilling and developing in near future.

Lucky Star Mining Co. owns in fee 50 acres northeast of Breitung Hematite; property is crossed by a very rich orebody. Drill holes show more than 4,000,000 tons. A shaft has been sunk to within 200' of the ore, and company reports that it should soon be producing.

Washington Iron Co. owns in fee and operates the Barron mine in the Humboldt district of the Marquette range. Has 4 grades of hard gray non-Bessemer specular and magnetite ores, which are concentrated before shipment. No. 2 ore assays 56.83% iron, 0.136% phosphorus and 15.47% silica. Since 1908 property has produced 350,000 tons. There are 1,120 acres situated in the iron formation with considerable reserves showing in the small portion prospected.

MASS CONSOLIDATED MINING CO. **MICHIGAN**

Office: 79 Milk St., Boston, Mass. **Mine office:** Mass, Ontonagon county, Mich.

Officers: John W. Linnell, pres.; Theo. O. Nicholson, v.-p.; Wilfred A. Bancroft, sec.-treas.; Elton W. Walker, supt., with Francis L. Maguire, John S. White, Jas. B. Hill, T. S. Woods, and E. S. Martin, directors.

Inc. 1899, in Michigan. **Cap.** $2,500,000; shares $25 par; issued, 97,317 shares, assessable, all paid. $8 paid on organization, balance in installments. Last assessment $1 per share, April 15, 1921. Listed on Boston Stock Exchange. Old Colony Trust Co., Boston, transfer agent. American Trust Co., Boston, registrar. Annual meeting, second Thursday in March.

Balance Sheet, Years ending Dec. 31:

	Receipts	Net Profit	Prev. Assets	Divi. Inc. Tax, Etc.	Bal. of Cash Assets
1920..	$ 27,339	$ 48,403(a)	$149,667	.....	(b)$ 3,645
1919..	429,845	146,106(a)	295,773	.....	149,667
1918..	796,638	25,599(a)	321,372	.....	295,773
1917..	1,062,319	181,631	449,255	$309,514	321,372
1916..	1,255,896	430,528	213,361	194,634	449,255

(a) Loss. (b) shows depreciation in value of 1,626,973 lb. copper on hand of $97,618.

Construction, 1918, cost $11,269; 1917, $83,782; 1916, $94,556.

Dividends: initial dividend paid, Aug., 1916, with total for 1916 of $194,634. In 1917, $3 per share paid, amounting to $291,951. None since.

Property: about 5,500 acres, lying in a very irregular but fairly compact tract, Secs. 33,34 and 35, T. 51 N., R. 38 W., in Sec. 4, 5, 6, 7, 8, 9 and 16, T. 50 N., R. 38 W., and in Sec. 1, T. 50 N., R. 39 W., holding being bounded on the N. by the Union, Adventure and farm lands, on the E. by the Adventure and Toltec, and on the S. by various lands, and on the W. by the Flint Steel, Adventure and St. Mary's Mineral Land Co. Holdings include 4 old mines, the Ridge, Evergreen, Mass and Ogima, also 2 old prospects, the Merrimac and Hazard, joint production of which, under previous managements, was 11,131,023 lb. fine copper. These 5 properties are described, in detail, in Vol. II, Copper Handbook.

Timber and surface rights on 600 acres were sold for $25,000 early in 1920.

The Mass tract carries the outcrop of six of the copper bearing amygdaloid beds of the Evergreen belt, for about 1½ miles. The outcrops vary greatly in width, but average about 10', showing a sharp bend in the strike, which varies from N. 32° E., on the north, to N. 37° E. at the southern boundary. The dip of the beds varies from 38° at the Ridge to 47° at the old Mass mine. The copper-bearing beds are as follows, from north to south:

1. Knowlton. Carries heavy copper and stamp rock.
2. Mass. Lies 140' south of the Knowlton, and carries a little heavy copper and stamp rock (milling ore).
3. North Butler. Lies about 75' south of the Mass bed, is wide and fairly mineralized in places.
4. Butler. Lies about 200' south of the North Butler, is 12' to 35' wide, carrying mainly stamp copper with occasional heavy copper.
5. Ogima Lies about 100' south of the Butler. Carries mainly stamp

copper with some barrel-work, being 5′ to 10′ wide and showing some good ground.

6. Evergreen or Ridge. Lies about 250′ south of the Ogima and is one of the best beds of the property, ranging 4 to 40′ in width and usually being richest where widest. It is very bunchy, but shows some excellent stopes, yielding mass copper and stamp-rock of good grade.

7. New Mass. This bed, which is the lowest of the series of the Evergreen belt and brings the number of cupriferous beds to 7, corresponding with the number in the adjoining Adventure property, lies about 120′ under the Evergreen bed and was opened by crosscuts from "A" shaft on the 15th and 18th levels. The bed averages about 12′ in width, carrying considerable epidote and is very showy, but the copper is exceedingly fine, most of it being of a flaky nature, very deceptive to the eye. A mill test of ore from this bed in 1909 gave a recovery of only 18 lb. of mineral per ton.

Development: the Mass has underground workings on all its copper-bearing beds, and ore is hoisted through the nearest shaft, workings on each level being connected by crosscuts. The Mass carries the outcrop of the copper-bearing beds of the Evergreen belt for about 1½ miles. Shafts "A" and "B" are connected on the Butler lode down to and including the 10th level. The mine as a whole is notably rich in mass copper and carries silver values, but the ground is exceedingly bunchy, ranging from very rich to absolutely barren. Ore is sorted underground, bringing the average content of stamp rock to 16.51 lb. per ton. About 50% of the rock broken is hoisted, and about 25% of the recovery is in mass copper.

"A" shaft, 1,757′ deep, with two compartments, sunk on the Evergreen bed has been abandoned.

"B" shaft, 875′ S. W. of "A" has 3 compartments, and is bottomed at 1,857′. Levels are at variable intervals; those at considerable intervals permit a larger saving in drifting through poor ground and sub-levels can be run where needed.

"C" shaft, 2,148′ S. W. of "B" and 1,554′ deep with a plat cut on the 14th level, is the old Ogima shaft, sunk on the Butler bed, but the Evergreen bed is opened by a 400′ crosscut on the 3rd, 5th and 7th levels. Some high-grade ground was opened on these and on the 9th levels west on the Butler bed.

Company will sink a new shaft 1,800′ west of "C" as soon as labor conditions permit.

Considerable diamond-drilling has been done south from the Evergreen bed into the horizon traversed by the so-called Adventure lodes, cut by diamond drills on the Adventure property, and also north of the Knowlton bed. Diamond-drilling was done in 1910 in the N. E. ¼ of Sec. 5, to test amygdaloidal and conglomerate strata outcropping at that point, which is quite a distance under the hypothetical horizon of the so-called Adventure lodes, with distance to the eastern sandstone undetermined.

Development: during 1918 totaled 2,280′, compared with 4,364′ in 1917. Results underground were satisfactory in both years, but development and production were restricted due to labor shortage. Grade of copper produced was: 1916, 16.51 lb.; 1917, 16.29 lb.; 1918, 17.33 lb.; 1919, 15.86 lb. Work done on No. 5 level shows the Evergreen lode to be well mineralized as far west as "C" shaft in virgin ground. Drifting and crosscutting in 1917 revealed good ore from this Evergreen lode, and there seems little doubt that a new mine has been opened at this end of the property, and that it can be operated through "C" shaft.

In 1918, the Butler lode produced 127,491 tons, and the Evergreen 59,866 tons, compared with 163,310, and 74,733, respectively, in 1917.

The shaft ore-house at "B" is equipped with a steam hammer, Good Roads crusher, and a 50x24″ engine; "C" shaft has a steel ore-house; both have been equipped with devices permitting automatic handling of ore.

The central power-house has a 24x48″ duplex hoist, good for one-half

mile depth. The power plant includes a 50-drill 2-stage cross-compound air-compressor, a 20 k. w. dynamo for electric light, and three 335 h. p. water-tube boilers. During 1918 an air-compressor, with capacity of 2,550 cu. ft. free air per minute, was installed.

In addition to the usual mine buildings, there are about 90 good dwellings. The company also has a town site, Mass City, a village with a number of hotels and business houses, which is the terminus of the Mineral Range railroad, and a station on the C., M. & St. P. railway.

The Mass mill is at Keweenaw bay, on an arm of Lake Superior, at the junction of the Mineral Range and Duluth, South Shore & Atlantic railway, 16 miles S. of Houghton and 34 miles N. E. of the mine. Equipment includes 2 stamps, 1,350 tons daily capacity.

The mill boiler-house contains 3 water-tube boilers. Ashes and cinders are washed into the lake through a launder.

The pump house has a 16,000,000-gal. Nordberg vertical pump, connected with a tunnel running 300' under the bed of the bay to the intake.

Production: begun 1899, with an output of 42,800 lb. fine copper, gradually increased to 2,576,447 lb. in 1903 decreasing thereafter, through loss of the Evergreen bed. Recent production has been as follows: 2,007,950 lb. copper in 1905; 2,106,738 lb. in 1906; 2,078,677 lb. in 1907; 1,766,930 lb. in 1908; 1,723,436 lb. in 1909; 1,321,885 lb. in 1910; 1,326,898 lb. in 1911; 2,045,006 lb. in 1912; 1,213,545 lb in 1913; 2,955,952 lb. in 1914; 4,638,452 lb. in 1915; 4,752,588 lb. in 1916; 3,984,616 lb. in 1917; 3,403,827 lb. in 1918; 1,797,000 lb. in 1919.

Ore stamped in 1919 totaled 123,780 tons; in 1918, 196,456 tons: in 1917, 244,671 tons, and in 1916, 287,900 tons.

Cost of refined copper in 1918 was 23.82c. and price received 24.34c. per lb., compared with 19.81c. and 26.23c. in 1917. The 1919 cost was 27.83c., and price received 19.46c.

The Mass Consolidated has conquered every sort of misfortune that befal's mines and through the acquisition of the Evergreen Bluff property was placed in a better mining position than ever before. The experience of 17 years has given a thorough knowledge of the vagaries and possibilities of the 7 cupriferous beds of the Evergreen belt; though bunchy, two of the number are of real promise, the Evergreen and Butler. It is probable that other beds can be worked occasionally, but the future of the mine appears to depend on these beds. There also is the possibility of locating and developing other and richer beds to the southward of the main workings, in the horizon of the Lake and Adventure beds.

Management is both progressive and experienced.

The mine was closed down early 1920.

MAYFLOWER MINING CO. **MICHIGAN**

In February, 1917, company was consolidated with the Old Colony Copper Co., under title of **Mayflower-Old Colony Copper Co.** (which see), on a share for share basis. Described, Vol. XII.

MAYFLOWER-OLD COLONY COPPER CO. **MICHIGAN**

Address: 70 State St., Boston, Mass. **Mine address:** Geo. S. Goodale, supt. Houghton, Mich.

Officers: H. F. Fay, pres., with R. L. Barstow, G. E. Clarkson, G. P. Gardner, W. A. Mosman, C. J. Paine, and F. W. Nichols, directors; C. J. Morrissey, sec.-treas.

Inc. March 5, 1917, in Michigan, as a consolidation of the Mayflower Mining Co. and Old Colony Copper Co. Stock of new company was exchanged on a share for share basis.

Cap. $5,000,000; shares $25 par; 200,000 shares issued; $14 paid in. Last assessment of $1 paid February 6, 1922. No funded debt. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting, third Wednesday in March. Listed on Boston Stock Exchange.

Receipts during 1919 were $109,993, nearly all from the assessment. With the balance from 1918, there was available, $133,760. Expenditures totaled $118,937, of which $99,386 was for mining. Balance forward to 1920 was $14,823, plus $128,000 received to March on account of assessment. At the end of 1920 the treasury had $140,000. Financial statement for fiscal year ending March 1, 1921, showed: receipts, $178, 783; expenditures, $121,948; balance, $71,658, with $23,091 due on unpaid assessments.

Property: 2,044 acres on Mineral range, near Calumet, Houghton county, comprises Secs. 7, 8, 17 and 18, T. 56 N., R. 32 W. Lands are south of the Kearsarge mine and east of Wolverine, South Kearsarge, and Calumet & Hecla mines. Prospecting was begun on the Mayflower in 1899 and continued for 5 years.

Development: by the new 1,750′ working, or No. 1 shaft, with 2,099′ of new mine openings in year ended March 1, 1921. This work included 616′ of drifting, 1,302′ of crosscutting and 170′ of raising. The property was extensively drilled for a number of years and large ore reserves located. The older workings are fully described in Vol. XIV of this book.

Operations in 1921 were satisfactory, showing the beds to have a reverse dip and solving the faulting. In 1922, drifts were run both N. and S. on the 1,400′ level, in good ore and systematic mining work is to be planned.

The new shaft opened the lode from 1,403′ to 1,456′ and from 1,690′ to 1,712′. The upper orebody showed a strongly amygdaloidal material, carrying finely disseminated copper. The lower occurrence resembles the upper physically, but is of higher grade. At a depth 1,730′, the copper disappeared.

In the Old Colony mine a cross-section was secured, 1899-1901, by a tunnel driven about 3,000′ and by diamond-drill borings eastward to the western end of the tunnel; this cross-section showed upwards of 75 amygdaloidal and conglomerate beds, a number of which carried a little copper in the drill cores and where cut in the tunnel.

Diamond drill and exploratory work in the Mayflower and Old Colony mines show the Mayflower to be a big, well-mineralized amygdaloid bed, proven for a distance of 6,000′, and for a depth of 1,500′. This lode lies on the extreme eastern side of the copper range, near the eastern sandstone.

Thirteen holes on the Mayflower and 10 on the Old Colony, ground show commercial ore and were sufficiently promising to warrant shaft sinking, provided both companies shared the expense, and as the most satisfactory way of dividing the expense was a consolidation of both companies, this was accomplished in 1917.

Equipment: includes 15 dwellings, boiler house, change-house and an engine-house, containing hoist and compressor.

McKINNEY STEEL CO. **MICHIGAN, MINNESOTA**

Office: Perry Payne Bldg., Cleveland, Ohio. **Mine office:** Virginia, Minnesota.

Officers: Price McKinney, pres.; J. E. Ferris, sec.; Donald B. Gillies, gen. mgr.

Currently believed to be a re-organization of Corrigan, McKinney & Co., which was dissolved in 1917. Said to be operating, or to control, the following properties:

Baker Mine.

Located in Sec. 21, T. 43, R. 32, Menominee range, Mich. Ore: is a soft, Bessemer hematite. First opened in 1909.

Production: totals about 267,107 tons.

Colby Mine.

Located in Sec. 16, T. 47, R. 46, Gogebic county, Mich. Ore: soft, blue Bessemer and non-Bessemer hematites, assaying 53.79 to 53.98% iron, 0.039 to 0.047% phosphorus and 5.89 to 6.15% silica. Mined by underground method.

Production: 423,553 tons in 1916; 353,880 in 1917; 324,731 in 1918; 268,129 in 1919; total 5,215,823 tons

Commodore Mine.

Located Sec. 9, T. 58, R. 17, near Virginia, St. Louis county, Minn. Ore: soft, blue Bessemer and non-Bessemer hematites, assaying 51.83 to 57.32% iron, 0.048 to 0.032% phosphorus and 7.67 to 6.01% silica. Mined by open pit system.

Production: 1916, 579,285 tons; 1917, 405,827 tons; 1918, 244,247 tons; 1919, 359,086 tons; total 6,421,911 tons.

Dunn Mine.

Located in Sec. 1, T. 42, R. 33, Menominee range, Mich. Ore: is a soft brown, non-Bessemer hematite, mined by underground methods.

Production: none since 1915. Total is 2,208,511 tons.

Great Western Mine.

Located in Sec. 2 1, T. 43, R. 32, Menominee range, Mich. Ore: is a soft, non-Bessemer hematite, mined by underground methods.

Production: has been irregular since 1882. Largest output was 311,218 tons in 1906. Only 42 tons in 1919; total is 2,198,025 tons.

Ironton Mine.

Located in Sec. 17, T. 47, R. 46, Gogebic county, Mich. Ore: soft, red Bessemer and non-Bessemer hematites, assaying about 51.38% iron, 0.248% phosphorus and 4.96% silica. Ore mined by underground system. First shipment, 1886. New electric hoists and compressors were installed during 1920.

Production: 1916, 148,200; 1917, 244,517; 1918, 184,627; 1919, 212,207 tons; a total of 2,202,207 tons.

Richards Mine.

Located in Sec. 36, T. 43, R. 33, Iron Co., Mich. Ore: soft brown non-Bessemer hematite, assaying 51.22% iron, 0.566% phosphorus and 6.47% silica. Mined by underground system. First shipment, 1914.

Production: 1914, 7,069 tons; 1915, 92,807 tons; 1916, 29,381 tons; 1917 43,890 tons; 1918, 56,087 tons; 1919, 111,116 tons; a total of 386,522 tons.

Stevenson Mine.

Leased from Great Northern Iron Ore Properties, Minn.

Located in Secs. 7, 8 T. 57, R. 15, near Hibbing, St. Louis county, Minn. Ore: soft, blue Bessemer and non-Bessemer hematites, assaying about 54.73% iron, 0.047% phosphorus and 7.19% silica. Mined by open pit system. First shipment, 1900.

Production: 349,960 tons in 1916; 345,265 tons, 1917; 323,514 tons, 1918; 73,416 tons in 1919; a total of 13,945,402 tons.

Odgers Mine.

Located in Sec. 30, T. 43, R. 32, Menominee range. Ore is a non-Bessemer hematite, assaying 53% iron and 0.0468% phosphorus.

Production: 257,637 tons in 1918; 100,061 tons in 1919; and 580,543 tons to date. After 6 months idleness, operations resumed, Oct. 1921.

St. James Mine.

Located in Sec. 3, T. 58, R. 15, near Aurora, St. Louis county, Minn. Ore: soft, blue non-Bessemer hematite, showing 50.88% iron, 0.068% phosphorus and 7.90% silica. Mined by underground system.

Production: 184,885 tons in 1917; 242,301 tons in 1918; 78,704 tons in 1919; a total of 541,956 tons.

St. Paul Mine.

Located in Sec. 24, T. 57, R. 22, near Keewatin, Itasca county, Minn. Ore: soft, blue non-Bessemer hematite, assaying about 50% iron, 0.50% phosphorus and 7.58% silica. Mined by open pit system.

Production: 181,852 tons. Only small shipments reported since 1913.

Tobin Mine.

Located in Sec. 30, T. 43, R. 32, Iron county, Mich. Ore: soft, red,

non-Bessemer hematite, assaying 52.75% iron, 0.470% phosphorus and 6.31% silica. Mined by underground system. First shipment, 1901.

Production: 1916, 146,113 tons; 1917, 188,590 tons 1918, 202,775 tons; 1919, 97,674 tons; totaling 3,132,347 tons. Operations resumed, Oct., 1921.

Tully Mine.

Located in Sec. 36, T. 43, R. 35 W., Iron county, Mich. Ore: soft, red, non-Bessemer hematite, assaying 55.60% iron, 0.347% phosphorus and 5.50% silica. Mined by underground system. First shipment in 1910.

Production: 1916, 236,300 tons; 121,426 tons in 1917; 125,087 tons in 1918; 134,141 tons in 1919; a total of 950,116 tons.

MEADOW MINING CO. — MICHIGAN

Is controlled by the Keweenaw Copper Co. **Office:** C. A. Wright, sec.-treas., Calumet, Mich. Mine near Copper Falls, Keweenaw county, Mich.

Inc. 1898, in Michigan. **Cap.** $1,500,000; $25 par; 81,520 outstanding Dec. 31, 1918; 37,500 shares were given in payment for property. Is a reorganization of the Meadow Mng. Co., inc. 1863, under special Michigan charter.

Balance sheet for 1920 gives assets as $87,068, including $44,830 for development and $36,578 for real estate. Cash amounted to $2,242 and accounts payable, $5,457.

Property: 364 acres, adjoins the Humboldt and Phoenix mines and carries the Ashbed lode, which was first opened 1851, with a little mining previous to 1860. Where the Ashbed is crossed by transverse fissures, bunches of ore occur and such places usually show pits made by prehistoric miners. Fully described Vol. II, Copper Handbook.

Idle many years.

MICHIGAN COPPER MINING CO. — MICHIGAN

Office: 15 William St., New York. **Mine address:** Theo. Dengler, gen. mgr., Rockland, Ontonagon county, Mich.

Officers: L. P. Yandell, pres.; F. G. Heumann, sec.; R. E. Graver, treas. Directors: L. P. Yandell, C. D. Lanier, J. S. Dunstan, W. A. Paine and A. M. Low.

Inc. June 15, 1898, in Michigan. **Cap.** $2,500,000; $25 par; fully issued; $24 paid in. Last assessment levied July 1, 1918, was $2 per share, equal to $200,000. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in May. Listed on Boston Stock Exchange.

Financial statement, years ending Dec. 31:

Year	Copper Sales	Total Income	Operations	Taxes, etc.	Profit	Excess of Assets
1920.....	$202,025	$208,180	$298,960	$43,398	$155,593(a)	$332,654
1919.....	300,010	312,673	375,883	62,161	—125,371	177,061
1918.....	290,933	445,782	291,184	27,788	126,810	52,068
1917.....	8,878	105,864	130,856	44,142	—69,134	.....

(a) Excess of liabilities.

Property: the Minnesota, Rockland and Superior mines, 4,870 acres of mineral territory, 1,466 acres of timber and miscellaneous lands and a 150-acre mill site, giving total holdings of 6,686 acres.

The main tract is 3 miles east and west by 4½ miles north and south, in addition to which there are 4 scattering tracts to the westward, one of 40 acres, two of 80 acres each and one of 160 acres, all carrying the outcrop of the Calico amygdaloid. The Superior mine produced 567,331 lb. fine copper, 1856-69 and 1876-79. The Rockland, lying next east of the Minnesota, was operated 1853-70, making 6,210,309 lb. fine copper from the Minnesota contact vein which averaged about 2' width and carried considerable silver in that mine. The old Minnesota mine, opened 1847, closed 1870, made 34,-

704,668 lb. fine copper and paid dividends of $1,820,000. The Minnesota mine is fully described in Vol. II, Copper Handbook.

Geology: the Michigan company's tracts carry the following known copper beds of the Evergreen belt, Calico, Contact, Minnesota, Branch, North Contact, Knowlton, Mass, Butler, Ogima, North Amygdaloid and South Amygdaloid, and presumably the other parallel beds, in addition to various other unidentified copper-bearing beds of the Keweenawan series. The Knowlton, or northernmost of the Evergreen belt of parallel beds, lies about 1,000′ south of the old Minnesota shafts and the 7′ amygdaloidal bed supposed to be the Butler, opened to some extent in Peninsula bluff 2,000′ south of "B" shaft, shows some heavy copper and stamp rock. There are 3 old shafts on the Butler bed and a tunnel cutting several parallel copper-bearing strata. There also are cupriferous amygdaloidal outcrops north of the Calico bed on which no work has been done.

Development: mine has 3 shafts on the Calico bed and about 10 miles of workings. "A" shaft is 2,133′ deep; "B" is bottomed at the 14th level and "C" at the 11th level. The lode grew steadily poorer with depth and showed a tendency to pinch, being only about 5′ wide on the 16th level of "A" shaft, though well charged with copper. The mine was closed down in 1910, when the property was turned over to tributors, who continued to scram the mine with some profit to themselves and the company until May, 1913, when all work was stopped.

In July, 1915, work was resumed at the old "E" shaft, and continued to date. During 1917 this was enlarged from 2 to 3 compartments and sunk to a depth of 873′. Drifting south of the shaft encountered the Evergreen, Butler and Ogima lodes, all showing commercial values. Results from other development work were reported as most encouraging.

It was said in 1919, that a new shaft was to be sunk east of "E" shaft.

New work in 1919 amounted to 4,117′, against 2,919′ in 1918, mostly on the Butler lode on Nos. 4 and 7 levels.

All work was suspended in Oct., 1920.

Equipment: rockhouse, hoist, compressor, 1,000-ton orebin, machine-shop, smithy, carpenter shop, warehouse, office and change-house.

The mill, construction of which was begun April, 1906, is about 1 mile north of the Mass mill, on Keweenaw bay, with ample water frontage. Construction was suspended in 1907, after about $175,000 had been expended.

The Baltic mill treated ore during 1919-20.

Production lb. copper: 1900-1905, 6,113,500; 2,875,341 in 1906; 2,665,404 in 1907; 3,000,206 in 1908; 1,979,305 in 1909; 36,682 in 1910; 327,773 in 1911; 162,590 in 1912; 90,000 in 1916; 35,400 in 1917; 1,177,176 in 1918; 1,697,107 in 1919; 1,075,492 in 1920.

The mine has thus far proved a disappointment, largely because limited funds have restricted the necessary exploratory and development work. Recent developments have been rather promising. The property is very fully described in Vol. X of the Copper Handbook.

MICHIGAN IRON LAND & LUMBER CO. **MICHIGAN**

A subsidiary of Ford Motor Co., Detroit, Mich.

Inc. 1921, in Mich., by Henry Ford, Edsel B. Ford and Clara J. Ford, to acquire holdings of the Michigan Land & Iron Co., controlled in England. **Cap.** $2,000,000; $200 par; 10,000 shares issued and owned by the Ford family.

Property: covers 32,000 acres of timber and mineral lands in Baraga, Houghton and Iron counties, and includes the Imperial mine on Marquette range, Baraga county, credited with production of 1,000,000 tons of ore averaging 52% iron.

MICHIGAN SMELTER CO. **MICHIGAN**

Office: 82 Devonshire St., Boston, Mass. **Works office:** Houghton, Houghton county, Mich.

Officers: Wm. A. Paine, pres.; L. P. Yandell, v. p.; F. W. Paine,

sec.-treas.; Frederick I. Cairns, supt., and F. W. Denton, directors; John Mugford, asst. supt.

Inc. 1903, in Michigan. **Cap.** $500,000; $25 par. The entire stock issue is owned by 6 mining companies, the Copper Range group holding 12,000 shares and the Stanton companies 8,000 shares, holding in shares being as follows: Champion, 4,400 shares; Trimountain, 4,400; Baltic, 3,200; Mohawk, 3,200; Wolverine, 3,200; Atlantic, 1,600. No dividends have been paid, profits having been turned back into improvements. Annual meeting, second Monday in January.

Works: company owns and operates the Michigan smelter, 3 miles west of Houghton, near the old Atlantic stamp mill, with frontage on Portage lake. It was designed by Frank Klepetko, and is the largest and most modern smelter in the Lake Superior district, with a capacity of 90,000,000 lb. fine copper yearly. Arsenic is also recovered, and sold as an insecticide.

The plant is terraced throughout, permitting automatic handling of material. The copper ore (locally rock), is delivered in 40-ton bottom-dumping steel cars by the Copper Range railroad, which also hauls away the refined copper for shipment from the Copper Range wharves in Houghton.

The 3,000-ton storage bins hold 10 days' supply for the works. Concentrate, or in Lake Superior terms, mineral, is dehydrated in rotary dryers by water gases from the furnaces, taken to the furnaces in tram cars and dumped into hoppers on the charging floor. Coal trestles, on an upper level, hold 15,000 tons of hard and soft coal, with tunnels underneath through which fuel is taken in tram cars, descending by gravity to the furnaces and boiler rooms. There also are separate storage bins for charcoal, sand and limestone.

The reverberatory furnace buildings, have three 5-ton traveling cranes and 6 furnaces. Alternating with the larger reverberatories are one 300-h. p. and two 200-h. p. Stirling water-tube boilers, heated by waste gases from the furnaces. After leaving the boilers the gases are drawn through a 6x8′ subterranean flue, with arched roof, up the hill to a 150′ smokestack, with base 100′ above the furnace building.

A pulverized coal plant for firing the reverberatories was erected early in 1921.

The blast-furnace building has 2 cupola furnaces. Blister copper is cast, mechanically, in molds upon a circular casting table, cooled in water, and carried by a link elevator to the loading platform. Slags are carried mechanically to the sampling mill and reduced in a 30-ton crusher of 1,000 tons daily capacity for re-smelting. The slag from the final fusion is granulated by water and discharged through launders to low ground northward.

The combination machine-shop and power house has a complete equipment driven by an independent engine, and a 300-h. p. Nordberg horizontal tandem-compound engine, driving a 200-k. w. generator, actuates the rotary blowers for the blast furnaces. Electric power is used for operating the drying plant, cranes, casting machinery and lighting. There are 3 specially designed Jeffrey electric locomotives.

Miscellaneous buildings include office, laboratory, warehouse, barn, etc. Water is obtained from the old Atlantic dam, on Cole's creek, through a 4,300′ flume with capacity of 5,000 gals. per minute, leading to a 50,000-gal. storage tank, 100′ above the works, giving good pressure at all points. The plant is well planned and well handled.

MINERAL MINING CO. **MICHIGAN**

Office: Iron Mountain, Mich.

Officers: E. F. Brown, gen. mgr.; J. A. Monroe, supt.; Pickands, Mather & Co., sales agts.

Inc. May 7, 1904, in Wisconsin. **Cap.** $100,000; shares $100 par; 90,000

issued. Annual meeting, first Tuesday in May. Company is a close corporation.

Property: the Osana, Wauseca, Nanaimo and Breen iron mines near Iron River, Mich. The Nanaimo and Breen have been idle since 1908. The Osana yields a non-Bessemer limonite, carrying 50% iron and 0.42% phosporus. It is mined by sub-level, caving and stoping to 428'. The Wauseca produces a non-Bessemer hematite, employing similar systems to a depth of 398'. A new steam plant and hoist were erected at this mine during 1920.

Production: the Nanaimo yielded 373,765 and the Breen 74,425 tons. The Osana mine produced 171,000 tons in 1917; 201,098 tons in 1918 and 137,579 tons of ore in 1919, a total of 1,418,738 tons. The Wauseca has yielded 111,087 tons.

MINONG COPPER CO. **MICHIGAN**

Office: 122 Winder St., Detroit, Mich. Louis O. Broadwell, pres.; Hugh A. McPherson, sec.

Inc. Dec. 16, 1874. **Cap.** $1,000,000; shares $25 par.

Property: 1,455 acres in Secs. 22, 23, 26, 27, 34 and 35, T. 66 N., R. 35 W., lying at the head of McCargo's Cove on the Isle Royale, shows a line of ancient pits, largest 400' and about 1½ miles long. Idle since about 1881.

MOHAWK MINING CO. **MICHIGAN**

Office: 15 William St., New York. **Mine office:** Kearsarge, Keweenaw county, Mich. **Mill office:** Gay, Mich.

Officers: L. P. Yandell, pres.; R. E. Graver, treas.; F. G. Heumann, sec. Directors: L. P. Yandell, J. S. Dunstan, C. D. Lanier, W. A. Paine and F. W. Denton.

Inc. Nov., 1898, in Michigan. **Cap.** $2,500,000; shares $25 par; all issued; assessable; paid in $18. Stock listed on Boston Exchange. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Annual meeting, last Tuesday in March. Company owns $80,000 worth of Michigan Smelting Co. stock. Mohawk held 20,000 shares of Gratiot Mng. Co. stock, but sold them in Nov., 1920, to the Seneca company. Range of shares during 1920 was $71⅛ high and $43½ low; in 1921, $54 high and $50 low.

Dividends: formerly paid semi-annually, but are paid quarterly since August 1, 1918. Payable Feb., May, August and Nov.; $5 in 1906; $9 in 1907; $2.50 in 1908; $3 in 1909; $2 in 1910; $1.75 in 1911; $3.50 in 1912; $5 in 1913; $1 in 1914; $6 in 1915; $17 in 1916; $20.50 in 1917; $10 in 1918; $5 in 1919; $5.50 in 1920; $1 in Feb. 1922. The grand total is $9,775,000.

Income account for 1920 shows: gross receipts, $1,679,101 and expenses of $1,046,340, compared with income of $2,530,991 and expenses of $1,559,025 in 1919. Mining profit was but $177,262 in 1920, contrasted with $598,822 in 1919; $1,033,690 in 1918 and $2,063,591 in 1917, which figures represent net profit.

Working capital Dec. 31, 1920, was: cash, $54,659; accounts and bills receivable, $403,134; loans, $161,200; Liberty Bonds, $1,068,150; copper on hand, $378,507 and supplies at mine, $289,862. Current liabilities at same date were $242,321.

Property: 800 acres, in an irregular tract, having its axis on the strike of the Kearsarge amygdaloid bed, in Secs. 27, 28, 33 and 34, T. 57 N., R. 32 W., about 4 miles N. E. of Calumet, with the Ahmeek and Seneca mines on the north and Ahmeek to the west. Also owns a millsite of 140 acres and town of Gay on Torch Lake, near Dollar Bay, with a long strip of shore on each side.

Geology: property contains the Kearsarge amygdaloid bed, which is from 15' to 18' in average width, as at the Wolverine, and in the upper workings carries about the same percentage of copper, but the lower workings are not so rich. The Kearsarge is crossed at approximately right angles by a number of narrow fissure veins, with nearly vertical dip, that

yield mass copper and in addition there are 3 cross-fissures carrying copper arsenides, including mohawkite, keweenawite, mohawk-whitneyite, and stibio-domeykite, the first two being peculiar to this district and first found in this mine. The fissures carrying mohawkite range between 3" to 3' in width, are well mineralized where crossing the amygdaloidal bed and for a short distance on either side, the mohawkite and allied arsenides occasionally occurring massive, but commonly being disseminated in an arenaceous gangue. The copper arsenides decrease with depth, and recent production has been small. There also are other cupriferous amygdaloidal beds in the stratified series that may be prospected later.

Development: by 6 shafts, 4 of them operated, with miles of underground workings, new work in 1920 being 7,764', compared with 9,006' in 1919; 9,253' in 1918; 13.134' in 1917; 15,224' in 1916, and 15,627' in 1915. The 4 operating shafts are of uniform size, 8x18' inside of timbering, with solid cribbing through the overburden and with identical equipment. The skipways in the shafts, are laid with concrete stringers which prove very satisfactory. The mine is equipped with electric signals and operates about 65 power drills.

No. 1 shaft, about 1,500' south of the northern boundary, is bottomed at the 25th level and is 2,693' deep. No. 1 hoist, in the central power-plant at No. 2 shaft, operates two 4-ton skips in counterbalance. No. 1 shaft has a combination shaft-rock house, equipped with a 12x24" engine and crushers. The new openings continue to show the necessity of selective underground working. Driving S. on No. 25 level was underway in Jan., 1921.

No. 2 shaft is 2,364' deep. Like No. 1, it had good ore near surface with impoverishment at depth, followed by improvement below the 12th level. The power plant at No. 2 shaft, serving both No. 1 and 2, includes an engine house and boiler house. Hoists are double-conical-drum duplex-cylinder engines, good for 6,000' depth, each handling two 4-ton skips in counterbalance. The boiler house has locomotive firebox boilers with foundations for 3 additional boilers, and the engine house has 2 air compressors, of 40 drills aggregate capacity. Shaft was not operated during 1918.

No. 3 shaft, 1,600' deep, is abandoned.

No. 4 shaft is 2,579' deep, developing good copper content from surface. Equipment includes a steel shaft rock house with 3 crushers and a steam hammer. The engine house has a double-conical-drum hoist, good for 6,000' depth. A compressor plant at No. 4 shaft has two compressors.

No. 5 shaft is 1,874' deep. Equipment includes a new all-steel shaft rock house and a Bullock hoist good for 2,000' depth.

No. 6 shaft, the southernmost, is about 2,600' south of No. 5 and 2,600' from the Ahmeek boundary, commanding about three-fourths of a mile of the strike of the Kearsarge bed under about 160 acres, or approximately as much ground as the entire Wolverine mine. This shaft, located about 60' in footwall rock, is 1,554' deep, and can be sunk to a maximum of 4,000'. Mechanical haulage was installed on No. 8 level in 1916, and two 4-ton trolley locomotives were put in operation in 1918.

New openings at No. 4, 5 and 6 shafts in 1919 and 1920 continued to show same excellent mineralization as in previous years.

Several storage battery and trolley locomotives are used in the mine, also scrapers in the stopes and loaders on the levels.

The mill, near the mouth of the Tobacco river, on Traverse bay, Lake Superior, opposite the mill of the Wolverine, is 178x206' in size, of steel frame sheathed with iron, on foundations of sandstone. A steel trestle, 350' long and 50' high, leads into the mill, loaded cars being pulled up the incline by a winding engine. The mill has 4 stamps, all compounded, giving a daily capacity of 2,800 to 3,000 tons. The mill has a Chilean mill and 3 sets of auxiliary crushing rolls, with fixed bearings, to reduce oversize material from the mortar boxes of the heads, this averaging 20 to 25% of rock stamped. Mineral from the wash discharges automatically and is

sluiced into the basement, there shoveled into 1½-ton mineral cars, having 14-mesh perforated steel bottoms that allow the drainage of water, after which the cars are weighed, then lifted by a cage elevator and dumped into bins. The bin house has 4 compartments, each with cement floor and steam-pipes underneath, for drying the remaining moisture from the wash. The mineral is taken from the bin house, in self-dumping steel mineral cars to the Michigan smelter at Houghton for reduction. Tailings from the mill are dewatered, then raised by bucket elevator, and stacked by belt conveyor, some distance from the mill. To utilize exhaust steam from stamps of the Mohawk and Wolverine mills, a 1,250-k. w. turbo-generator has been installed, and shows a marked saving in coal.

In 1918 a concrete building 42'x42'x18' on a concrete foundation 12' high was built to accommodate this turbine which will furnish power to drive all the mill machinery in addition to three 7,000 gallon electrically-driven centrifugal pumps which are to be installed at the old pump-house, thereby eliminating the present pumping boiler plant.

Water for both the Mohawk and Wolverine mills is furnished from a joint pump house, standing near the Tobacco river, from which water is taken. The pump house has at present a 20,000,000-gal. triple expansion pump, supplemented by a 9,000,000-gal. pump, giving an ample water supply for both mills.

A 30x300' wharf, on Traverse bay, a short distance from the mill, with 14' of clear water alongside, is fitted with coal hoists and storage sheds, ample for the needs of both mills. Employs about 700 men.

Yield of fine copper, per ton of rock stamped, averaged 15.79 lb for the decade ended 1912.

Production:

	Tons Ore Hoisted	Cost per Ton Hoisted	Tons Ore Stmpd.	Cost per lb. Cu. Ton Stmpd.	per Ton	Ref. Cu. lb.	Cost Cts.	per lb. Cts.(a)	Sell. Price Cts.
1921	.....	.....	.....	.....	.....(d)	9,443,361	.....	.....	.....
1920	446,036	$2.44	434,988	$2.50	23.61	10,269,824	10.59	17.54	19.08
1919	.....	.....	560,734	.....	22.93	12,857,392	8.94	13.98	17.91
1918	465,603	2.204	454,293	2.259	23.73	10,781,041	9.521	14.641(c)	24.73
1917	.....	.....	605,202	.....	20.35	12,313,887	9.25	12.06	27.94
1916	700,412	1.47	664,547	1.54	20.82	13,834,034	8.52	8.85	25.28
1915	865,029	1.16	829,789	1.20	19.15	15,882,914	7.21	7.48	17.00
1914	665,852	1.21	649,649	1.24	17.08	11,094,859	8.23	8.58 (b)	12.47
1913	395,100	1.53	366,458	1.64	15.76	5,778,235	10.42	13.22 (b)	15.36
1912	868,841	1.34	787,941	1.47	15.22	11,995,598	9.67	10.61	16.08
1911	902,859	1.294	802,548	1.406	15.07	12,091,056	9.33	10.399	12.63
1910	906,243	1.267	802,537	1.433	14.22	11,412,066	10.076	11.441	13.00

(a) Includes construction. (b) Includes strike. (c) Includes cost of depreciation, depletion, smelting, freight, taxes, etc. The actual cost of operating was 11.2c. (d) 11 months.

Finlay, in 1911, estimated 176,000,000 lbs. extractable copper, and a further life of 15 years. Our estimate made in 1915 was 260,000,000lb and a life of 23 years. In May, 1920, the company engineers estimated 247,424,984lbs copper, or a yield of 13,000,000 lb annually for 19 years. Total production to Nov. 31, 1921, was 200,514,829lbs.

The Mohawk, while a lower grade mine than was anticipated at the beginning, is a fine property, having an assured future with the benefit of strong, honest, competent and thoroughly economical management. The copper on hand was almost all sold at end of 1920.

MULOCK MINE — **MICHIGAN**

Described in Vol. XIV.

MUNRO IRON MINING CO. — **MICHIGAN**

Office: Iron River, Mich.

Officers: W. A. Rogers, pres.; Hugh Kennedy, v. p.; W. S. Rogers, sec., Erie county Bank Bldg., Buffalo, N. Y. G. L. Woodworth, mgr. Is a close corporation.

Property: includes the Chicagoan, Munro, Rogers and Hiawatha mines,

the last named one mile S. of Iron River; the Rogers, 3 miles E. of Iron River; the Chicagoan, 6 miles E. of Iron River, and the Munro at Norway, Mich.

Development: by shafts, 400 to 1,200′ deep and about 30,000′ of workings.

Production: 1913, 316,019 tons; 1914, 293,296 tons; 1915, 323,464 tons; 1916, 427,182 tons; 1917, 426,819 tons; 1918, 376,988 tons; 1919, 312,737 tons; 1920, 404,689 tons. Company reports about 1,000,000 tons of ore blocked out.

The Beaufort mine on the Marquette range is also operated, but recent shipments are from stockpiles.

NATICK COPPER CO. **MICHIGAN**

Office: Leopold Bldg., Houghton, Mich. Mine near Copper Falls, Keweenaw county, Mich. F. W. Nichols, resident mgr.

Property: 200 acres, the N. E. ¼ and E. diagonal ½ of E. ½ of N. W. ¼ of Sec. 28, T. 58 N., R. 31 W., surrounded by holdings of the Frontenac Copper Co. Property was explored in early days, but has been idle many years.

NATIONAL MINING CO. **MICHIGAN**

Idle. **Mine address:** Rockland, Ontonagon county, Mich.

Officers: B. T. Morrison, pres.; Harry Highley, sec.-treas.; Chas. M. Baker, Harry M. Howard and W. S. Warn, directors.

Inc. 1848, in Michigan; rechartered 1878. **Cap.** increased later to $2,500,000; shares $25 par; issued, $1,875,000, and rechartered 1908. Listed on Boston Stock Exchange. Paid dividends, 1861-72, of $320,000, and levied a 40c. assessment 1909. The company has no debts.

Property: 1,852 acres, with the Michigan mine on the north and east and the Victoria on the south and west, carries the western continuation of the contact vein of the old Minnesota mine, now owned by the **Michigan Copper Mining Co.** When work was begun, the property showed the relics of ancient mining operations, including a shaft of 50′ depth, timbered and scaffolded, with a nearly continuous sheet of copper extending down one side. The company had troublesome litigation with the old Minnesota company over the title to 115 acres of land, the National finally winning. Idle since 1893.

NATIVE COPPER CO. **MICHIGAN**

Idle since 1855.

Officers: at last accounts, Ashley Watson, pres.; Chas. E. Adams, sec.-treas.; Ashley Watson, Frederick Hoitt and Frank L. Van Orden, directors.

Inc. 1849, and reincorporated March 29, 1880, in Michigan. **Cap.** $1,000,000; $25 par; assessable; fully issued. Annual meeting, first Wednesday in March.

Property: 480 acres, being the S. ½ of Sec. 3 and N. W. ¼ of Sec. 10, T. 58 N., R. 30 W., all on the Keweenawan trap belt. A little work was done, 1852-55, on a fissure vein crossing the Ashbed. Assessments levied total $39,000.

NAUMKEAG COPPER CO. **MICHIGAN**

Office: 61 Broadway, New York. **Mine office:** Houghton, Mich.

Officers: J. Parke Channing, pres.; Sam A. Lewisohn, v. p.; E. H. Westlake, sec.-treas.; Herman Cook, asst. sec. Directors: J. Parke Channing, Adolph Lewisohn, I. J. Sturgis, F. L. Van Orden, Theo. L. Herrmann, J. H. Susmann and Chas. J. Paine, Jr. J. Harry Reeder, supt.

Inc. March 21, 1912, in Michigan. **Cap.** $5,000,000; $25 par; 102,000 shares issued; $10 paid in on 31,628 shares; $10.50 on 70,372 shares. Last assessment 50c. a share due Nov., 1919. U. S. Mortgage & Trust Co., New York, registrar. Annual meeting, third Wednesday in March. Listed on Boston Curb.

From 1912 to end of 1919, $246,432 had been spent on property, and $57,767 for general and administration expenses. No report issued since

1919. Balance sheet at end of 1920 showed: cash, $1,326; compared with $18,551 in 1919; $28,426 in 1918; $84,297 in 1917.

Property: 1,200 acres, in Secs. 34 and 35, T. 55 N., R. 34 W., and Sec. 3. T. 54 N., R. 34 W. just west of Houghton, on the south shore of Portage lake, carries practically all of the Ashbed amygdaloidal beds, including the Atlantic and the Quincy-Pewabic lodes.

Development: property but slightly explored under former owners, whose efforts were sporadic and unimportant. Operations by present company were begun July 10, 1912, in the horizon of the Hancock lodes. Drill borings yielded good showings of copper at depth of 513′ in what is presumed to be an extension of Hancock No. 3 lode, and again at a depth of 1,301′ where a 6″ streak of coarse copper was encountered.

In 1914, the main, or Dakota Heights adit on the old Pewabic lode was extended 126′, encountered the lode at 100′, and drifts No. 2-A north and south were continued for 70′ and 63′.

This work showed a lode, 6-8′ wide, opened for 700′ and showing copper ore, but not of commercial value. During 1915 exploratory work on the Pewabic lode showed considerable copper on the No. 2 North drift. A 200′ winze was sunk from this drift and 1,602′ of drifts and crosscuts driven from the lower level. No beds of value were found in the southern part of the property.

In 1916, all exploration was confined to workings from No. 4 adit at N. end of property. No. 2 drift was put out 352′ on the old Pewabic lode, showing no copper. Work from No. 4 E. crosscut disclosed nothing worth further exploration, save the bed in which the breast of crosscut is in.

In 1917, main shaft was sunk 47′ to the 400′ level. "A" shaft sunk 107′ to adit level for ventilation, but the shaft and 250′ of drifting along the bed showed less mineralization than was indicated by diamond-drill cores. During 1918 work at the main shaft was pushed on the 400′ North drift, crosscut No. 2 W. was driven 450′, excellent copper showing in spots. An incline shaft was sunk 1,027′ from adit level. The showing at 1,000′ was so inferior to either the adit or the 400′ levels that work was abandoned in that section. Because of discouraging work in north end of property, company started to explore south.

In 1919 results of exploration work on the Pewabic lode at a depth of 1,000′ were so discouraging that all work was stopped, January, 1920. It was then decided to crosscut the entire Pewabic series, starting from a point 3,234′ from the portal of the 3,634′ adit level. In September, 1920, work was suspended indefinitely.

Equipment: includes hoist, compressor, pump and electric power. Is a legitimate mining speculation, backed by the Lewisohn interests.

NEGAUNEE MINE — **MICHIGAN**

Address: M. M. Duncan, mgr.; G. R. Jackson, supt., Ishpeming, Mich. **Sales agents:** Cleveland-Cliffs Iron Co., and Pickands, Mather & Co., Cleveland, Ohio.

Property: in sections 5, 6, T. 7, R. 26, in Marquette county, Mich. Has been worked since 1887.

Development: ore mined by caving system to vertical depth of 1,086′.

Ore: two grades: Negaunee, a soft, red, Bessemer hematite, containing 54.38% iron, 0.043% phosphorus and 6.72% silica; and a non-Bessemer, assaying 52.30% iron, 0.083% phosphorus and 6.72% silica. Moisture is 11% in both.

Production: 573,760 tons in 1917; 501,965 tons in 1918; 411,296 tons in 1919; a total of 7,663,308 tons.

NEVADA MINING CO. — **MICHIGAN**

Described in Vol. XIV. Property now owned by **Hemlock River Mining Co.**

NEW ARCADIAN COPPER CO. **MICHIGAN**

Fully described in Vol. XIII. Merged November, 1919, with New Baltic Copper Co., to form the **Arcadian Consolidated Mining Co.**, which see.

NEW BALTIC COPPER CO. **MICHIGAN**

Fully described in Vol. XIII. Merged November, 1919, with New Arcadian Copper Co., to form the **Arcadian Consolidated Mining Co.**, which see.

NEWPORT MINING CO. **MICHIGAN**

Mine now operated by **The Steel & Tube Co. of America**, which see. Described in Vol. XIV.

NEW YORK CONSOLIDATED MINING CO. **MICHIGAN**

Charter expired and corporate existence of company wound up by F. W. Nichols, Receiver, Houghton, Mich.

Property sold to J. H. Rickard, trustee, 1917.

NORRIE-AURORA MINE **MICHIGAN**

Fully described in Vol. XIV. Owned by Oliver Iron Mining Co.

NORTH LAKE MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Operating office:** Shelden Bldg., Houghton, Mich.

Officers: R. M. Edwards, pres. and gen. mgr.; S. L. Powers, v. p.; Henry Tolman, treas., with A. C. Paine and T. S. Woods, directors; A. L. Wyman, sec.

Inc. Aug. 26, 1908, in Michigan. **Cap.** $2,500,000; $25 par; fully issued; $10.50 paid in. Assessment, No. 3, of 50c. levied March 6, 1918.

Company paid $144,000 for 360 acres of land, bought of St. Mary's Mineral Land Co., one-half in cash and one-half in 9,000 shares of stock at $8, beginning business with $300,000 cash in the treasury. The company suffered heavily by the failure of S. R. Dow & Co., Sept., 1912, losing $160,188 in cash and interest, unlawfully borrowed by its former president, S. R. Dow, and at the end of 1912 was $19,000 in debt. This indebtedness was wiped out by an assessment of $1 per share, levied April 18, 1913. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, third Thursday in April.

Annual reports show:

Year	Assessments	Other Inc.	Exp.	Prev. Bal.	Curr. Bal.
1920.....	$1,829	$2,057	$12,614	$4,461	$8,729*
1919.....	.....	1,256	15,685	11,224	4,461
1918.....	50,000	184	35,098	26,310	11,224
1917.....	.....	387	55,264	28,567	26,310
1916.....	100,000	333	56,188	15,556	28,567

*Deficit.

Current assets at end of 1920, totaled $5,772; liabilities, $27,728, exclusive of $1,331 for taxes and $30,500 for notes payable. Profit and loss, $497,415.

Property: 1,120 acres, in Secs. 28, 29, 32 and 33, T. 51 N., R. 37 W., lying immediately north and east of the Lake Copper Co. Property was supposed to carry about 7,000' of the strike of the Lake amygdaloidal bed, but apparently the Lake bed curves to the westward, rather than to the east. Property also carries the copper-bearing series of the Evergreen belt of amygdaloidal beds, and various other unidentified cupriferous strata. The company's lands are crossed by the Fire Steel river, and are traversed by both the Mineral Range and Copper Range railways.

Development: exploratory work has been thoroughly and systematically planned and carried out, the preliminary work consisting of diamond-drilling to give 2 complete cross-sections, of about 8,500' and 9.500', respec-

tively, to determine the strike and dip of all the strata on the property. These sections are about 1,000′ apart, and the contact of the Keweenawan series with the eastern sandstone has been definitely located by drilling.

Fifteen diamond-drill holes were put down to depths of 200′ to 2,000′. Several cupriferous amygdaloidal beds were disclosed, and No. 6 and 8 conglomerates have been correlated as extensions of No. 1 and 2 of the Adventure series of lodes. No. 1 bed, of about 33′ width, showed 10′ charged with copper, but No. 2 bed was lean. Formations above No. 8 conglomerate bed are practically unexplored, and excepting drill holes Nos. 3 and 7 remain untouched. An 800′ vertical shaft was started July, 1913. At 300′ depth a crosscut to the N. W. cut No. 8 conglomerate. A 200′ winze, 30° incline, was sunk and 100′ gained in depth. On the 400′ level exploratory work to develop lodes cut on South Lake property was continued, but no commercial rock was found. At a distance of 1,050′ N. W. of the shaft the crosscut broke into the overburden.

Crosscuts at right angles to the general trend of the formation were driven in both directions from the shaft on the 800′ level. In Dec., 1918, the S. E. crosscut was 1,576′ long and the N. W. crosscut was 1,969′ long. The S. E. crosscut penetrated a lode which showed 2 to 8″ of rich brick copper, and considerable fine copper. In September, the Butler lode was cut by the N. W. crosscut and a 30′ drift on the lode shows considerable copper; but operations were suspended at end of 1918 until more favorable cost conditions prevail.

Equipment: includes a hoist good for 1,200′ depth, small air-compressor, boarding house, and all mine buildings.

The North Lake is an exploration company, but in view of the encouraging results secured by diamond-drill borings on this and adjoining properties, is considered promising.

ODANAH IRON CO. **MICHIGAN**

Address: Cleveland, Ohio. W. P. Chinn, asst. gen. mgr.; Pickands, Mather & Co., Cleveland, O., sales agents; L. M. Hardenburgh, supt., Ironwood, Mich

Property: the Cary and Windsor mines, on Gogebic range, Iron county. Ores are hard, reddish-purple Bessemer and non-Bessemer hematites, assaying 54.50% iron and 0.060% phos., and 49.05% iron and 0.054% phos., respectively.

The mine is worked to vertical depth of 1,322′ by underground sublevel stoping system.

Production: totals 4,283,488 tons.

OGLEBAY NORTON & CO. **MICHIGAN**

Office: E. W. Hopkins, Ironwood, Mich.

Business: company acts as sales agents for the following iron companies: Bristol Mng. Co., Brule Mng. Co., Castile Mng. Co., Commonwealth Iron Co., Fort Henry Mng. Co., Fortune Lake Mng. Co. and Montreal Mng. Co., all separately described herein.

OJIBWAY MINING CO. **MICHIGAN**

Office: Suite 3300, 120 Broadway, New York City. **Mine office:** Calumet, Mich.

Officers: Thos. F. Cole, pres.; Thos. Hoatson, v. p.; Jos. B. Cotton, v. p.; Frederic R. Kennedy sec.-treas.; Henry Paull, auditor, above with G. A. Tomlinson, Walter B. Congdon, E. R. Grochau and Saml. Brenner, directors. Wm. J. Uren, mgr.

Inc. June 1, 1907, in Michigan. **Cap.** $2,500,000; $25 par; assessable; issued 84,000 shares, $15.50 paid. Last assessment, 50c., paid August 1, 1918. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Listed on the Boston Stock Exchange. Annual meeting, first Tuesday in June.

Balance sheet dated Dec. 31, 1920, showed: total assets, $1,305,488, in-

cluding investments, $48,037; securities, $19,265; cash, $682; accounts receivable, $348; supplies, $6,805; profit and loss, $72,766. Liabilities: accounts payable, $603; suspense, $2,824.

Property: 2,520 acres, in T. 57 N., R. 32 W., Keweenaw county, bounded on the north by the Cliff and on the south by the Seneca. Owns in fee, 1,940 acres and mineral rights to 580 acres.

The Kearsarge bed, located 1904, on the Miskwabik tract, about 4 miles N. E. of Mohawk No. 1 shaft, was proven by 5 bore holes drilled across the formation at intervals of 1,200'. Four of these holes gave good cores, being especially rich toward the northern limits of the tract. The holes showed the Kearsarge amygdaloidal bed to be divided into 7 layers of amygdaloid and trap, immediately above the geological horizon of the Wolverine sandstone, the different cores each showing copper from either one or more of four horizons. Drilling indicated that copper values alternate from bed to bed, or layer to layer, if the cupriferous zone of the Ojibway be considered a single strata; only two of the amygdaloidal layers being well mineralized in a given cross-section, as a rule.

Development: by two 3-compartment shafts. No. 1, or north shaft, 1,500' from the northern boundary of the property, is 2,051' deep, disclosing copper from grass roots. Developments in this shaft show that the Kearsarge stratum is split in two, having distinct beds of 20' and 13' respectively, separated by 13 to 15' of trap. The 1,600' and 1,700' levels show good ore.

No. 2 shaft, 1,116' S. W. of No. 1, is sunk about 90' in the footwall, and is 1,954' deep, disclosing very little copper ground above 800', though a material betterment is noted below that depth, and a very marked improvement is noted below 1,500' depth. This shaft is sunk in unusually firm ground, requiring very little timbering.

The mine is equipped for development to a depth of 2,000'. Development has been systematic, but the former management planned making a mine upon 5-drill cores, which, as has been proven, gave rather too favorable an indication of the richness of the lode.

Work was suspended June 30, 1913, and date of resumption of operations is uncertain.

OLD COLONY COPPER CO. **MICHIGAN**

By vote of stockholders, Feb. 26, 1917, company was consolidated with the Mayflower Mining Co., on a share for share basis, under the title of **Mayflower-Old Colony Copper Co.**, which see.

ONECO COPPER MINING CO. **MICHIGAN**

Office: 70 State St., Boston Mass. **Mine office:** Hancock, Mich.

Officers: John D. Cuddihy, pres.; C. J. Morrissey, sec.-treas.; preceding, with F. L. Maguire, J. E. Fitz Gerald, Jr., directors; John L. Harris, gen. mgr.

Inc. Dec., 1898, in Michigan. **Cap.** $2,500,000; $25 par; $5.50 paid in; issued 70,000 shares June 9, 1913. Levied a 50c. assessment, Jan. 15, 1906, a $1 assessment, Feb. 21, 1910, and a $1 assessment, Oct. 10, 1912. Annual meeting, third Thursday in March. Stock listed on Boston Curb. Company its own transfer agent; Federal Trust Co., Boston, registrar.

Property: 800 acres in Houghton county, all on the Keweenawan copper formation, in Secs. 2, 10 and 11, T. 56 N., R. 33 W., forming a main tract of 640 acres, and a smaller tract of 160 acres, adjoining diagonally, on the N. E. corner. The property lies east of the Franklin Junior and Rhode Island mines, but is separated therefrom by a quarter mile of intervening lands.

Development: the mine was opened in 1862, and exploring work done 1890 and 1898. Present company began sinking June 26, 1899, putting down a 500' shaft. Drifting on the upper levels showed a bed of fair width, carrying a little copper, and the shaft cut a narrow fissure, rich in copper, this being of much interest because it is one of the few productive cross veins found in the Portage Lake district. The bed on which the shaft was sunk

has been variously identified as the Isle Royale, Grand Portage and Kearsarge amygdaloids, but is now termed the Oneco amygdaloid.

Work was suspended 1900 until Aug., 1909, when a diamond drill campaign was begun, 10 drill-holes being bored, cutting the Oneco bed and an unidentified amygdaloidal bed, called the Torch Lake or Tomahawk lode, about 1,200′ west of the Oneco, cores from both beds showing more or less copper. Drill holes were bored to depth of 1,000, to 1,700′, locating the eastern sandstone and giving 2 complete cross-sections ,2,700′ apart.

The mine was reopened Nov. 1910, drifting resumed on the 4th level, the shaft sunk to a depth of 1,250′, and extensive drifting done on the 9th, 10th, 11th and 12th levels, both north and south, which showed the vein to be 10 to 20′ wide and well mineralized. Mine has been idle since 1914, due to lack of funds.

ONONDAGA COPPER CO. **MICHIGAN**

Address: Houghton, Michigan.

Officers: Reginald C. Pryor, pres., treas and gen. mgr.; C. H. Lang, v. p.; Wm. Duffnay, sec., with Ward B. Smith and D. L. Robinson, directors.

Inc. April 22, 1912, in Michigan. **Cap.** $3,750,000; $25 par; $4 paid; issued, 99,955. Stock listed on the Boston Curb Exchange. State Street Trust Co., Boston, transfer agent; Commonwealth Trust Co., registrar. Balance, Dec. 31, 1916, $33,130.

Property: 10,230 acres in Ontonagon county, Mich., near the White Pine mine of the Calumet & Hecla Co. The formation, a fine-grained sandstone, has been exposed by surface trenching at several points and found to carry flake copper in considerable quantity. The metal appears to be patchy, but as the ore frequently averages 10% where cross-faults occur, a commercial average may reasonably be expected.

Development: has been confined to diamond-drilling. The first hole completed in Jan., 1913, has a depth of 1,912′ and is apparently in the horizon of the Isle Royale-Arcadian lode. Hole No. 2 is 1,500′ deep. Hole No. 5 driven in 1913 to 2,000′ depth failed to reach the contact. In 1914 holes Nos. 6, 7, 8 and 9 were drilled, making a complete cross-section from the S. E. corner of Sec. 14 to the N. W. corner of Sec. 4. None of the lodes cut in the holes gave cores showing copper in commercial quantities. Owing to financial conditions work was discontinued Sept. 21, 1914. Drilling near the northern boundary was again started July, 1915, each hole exploring the territory farther south. In the extreme S. E. corner the lode was located at 1,100′ depth, but had no copper. In 1916, drilling gave cores from the lode in several places, but revealed no commerical values, so operations were stopped, and management awaits results of development on neighboring properties.

OSCEOLA CONSOLIDATED MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **General office:** Calumet, Mich. **Mine office:** Osceola, Houghton county, Mich.

Directors: Wm. H. Dwelly, E. V. R. Thayer, J. M. Longyear, Wm. D. Calverley, D. S. Dean, E. B. Dane and J. T. Burnett.

Officers: E. V. R. Thayer, pres.; R. L. Agassiz, v. p.; C. H. Bissell, sec.-treas.; G. L. Osgood, Jr., asst. sec.-treas.; James MacNaughton, gen. mgr.; Frank H. Haller, supt.; A. Lincoln Burgan, mill supt.

Inc. 1873, in Michigan, and reincorporated 1903 for a term of 30 years. **Cap.** $2,500,000; $25 par; issued, $2,403,850. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Annual meeting, second Wednesday in April. Controlled by the Calumet & Hecla Mining Co., through ownership of 33,560 shares. Range of shares during 1920 was $58 high and $22.50 low; in 1921, high $32, low $27.50.

Dividends: 98 dividends paid from 1878 to Dec. 31, 1920, aggregate $17,765,375. Recent dividends were $2 in 1904; $4 in 1905; $16 in 1906; $7 in 1907; $2 in 1908; $14 in 1909; $8 in 1910; $7 in 1911; $12 in 1912; $7.50 in

1913; $3 in 1914; $11 in 1915; $19 in 1916; $14 in 1917; $10 in 1918; $3 in 1919, $1 in 1920; none since June, 1920.

Net Earnings: (after allowing for taxes and construction.)

1908.....	$667,105	1912.....	$1,163,288	1916.....	$2,776,160
1909.....	1,070,645	1913.....	381,967	1917.....	1078.743
1910.....	758,586	1914.....	353,677	1918.....	487,915
1911.....	664,628	1915.....	1,610,860	1919.....	91,321

Income Account, years ended December 31:

	Total Income	Expenses	Taxes and Construct.	Dividends	Surplus for year	Total Surplus
1920..	$1,484,896	$1,588,517	$ 32,005	$ 96,150	$777,515*	$2,600,367
1919..	1,506.135	1,393,576	21,238	288,450	565,635	3,053.435
1918..	4,082,236	2,878,282	716,038	961,500	19,136	2,652,970
1917..	3,494,468	1,716,843	698,882	1,346,100	267,357*	2,410,190
1916..	5,065,134	2,222,916	66,058	1,826,850	949,309	2,677,547

* Deficit.

Current Assets and Liabilities.

Assets.

	Cash	Accts. Rec.	Liberty L. Bonds	U. S. Certif.	Copper on hand	Supplies	Total
1920	$ 366,985	$ 983,564	$255,800	$	$ 783,109	$338,742	$2,728,202
1919	295,681	926,515	255,800	350,000	1,098,814	320,621	3,247,431
1918	721,596	1,007,861	412,950	500,000	546.924	285,365	3,474,696
1917	1,505,475	534,238	317,500	.....	499,441	335,719	3,192,373

Liabilities.

	Accounts Payable	Reserve for Taxes	Surplus	Total
1920.....	$127,835	$	$.....	$2,600,367
1919.....	193,896	.....	3,053.435	3,247,431
1918.....	160,844	166,799	2,652,970	3,474,696
1917.....	229,779	552,404	2,410,190	3,192,373

As to December 31, 1921, Osceola had a net surplus of cash and quick assets amounting to $2,314,003, **Osceola** produced no copper in 1921. The company had on hand January 1, 1921, 5,533,927 pounds of copper valued at 13 cents a pound. It sold 5,125,664 pounds of copper during the year at an average price of 12.83 cents a pound, leaving 408,263 pounds of copper on hand December 31, 1921, valued at 14 cents. Including the selling and delivery cost for the copper sold of .59 cents per pound, the loss on the copper sold was 1.245 cents a pound, or $63,652. By revising the valuation of the remaining inventory to a 14-cent basis this loss was reduced to $59,570, which, together with $421,291 maintenance cost on the property while closed down, provided a total loss of $480,861, which was reduced to $426,440 by net "other income." The company added to its capital assets the sum of $77,616 through plant construction, etc., and charged back $21,828 in adjustment of depreciation accounts, making the actual decrease in the balance of current assets for the year $482,228.

Property: 2,120 acres, in 4 separate tracts, also an extensive millsite, in Houghton county, and miscellaneous lands in Houghton and Keweenaw counties, includes the Osceola, North Kearsarge, South Kearsarge and Tamarack Junior mines.

Mining operations were curtailed at all mines in 1920 and production was finally stopped in Nov., 1920, but resumed late in 1921.

New openings amounted to 1,297′ in 1920, compared with 3,135′ in 1919; 1,219′ in 1918; 3,898′ in 1917; 5,121′ in 1916.

The **Osceola** mine proper, 720 acres, south of the Calumet & Hecla was opened 1873, on the Calumet conglomerate; this bed proving unremunerative, work was begun on the Osceola amygdaloidal bed, parallel and 730′ east of the Calumet conglomerate. The Osceola amygdaloid has a strike of approximately N. 39° E., and is opened by six shafts numbered from north to south. Crosscuts to the Calumet conglomerate, at various depths showed no ore and diamond drilling to locate and test the Kearsarge amygdaloid was also disappointing.

The 4 northernmost shafts of the Osceola mine proper are abandoned. No. 5 Osceola shaft, 700′ S. E. of No. 3, is 4,667′ deep. No. 6 Osceola shaft, formerly known as the Opechee, 1,300′ S. W. of No. 5. is 4,734′ deep. This shaft shows some good stopes, especially on the lower levels in the southern drifts, toward the Tecumseh mine.

Some work was done at No. 3 shaft in 1916, but stopped 1917, awaiting an improvement in labor and mill conditions. Mining was limited to No. 6 shaft, where the 46′ level was the most active and most productive. A new level was opened above the 38th in very good ground for 500′. No. 42 and 45 were driven into La Salle ground. The Auxiliary shaft 1,800′ S. of No. 6 was operating between No. 43 and 46 levels. Rope haulage was used to tram ore from this new shaft.

Osceola mined 230,517 tons of 14.11 lb. copper ore in 1918, which compares with 203,288 tons of 12.38lb ore in 1917 and 225,030 tons of 14.89lb ore in 1916. In 1919 this branch supplied 150,233 tons of 15.74 lb. copper ore and in 1920, 93,383 tons of 17.9lb ore at a cost of $3.27 per ton.

The compressor house is equipped with a 50-drill, 2-stage cross-compound air-compressor. Two trolley-type locomotives were ordered in 1918 for this section of the mine.

Water is secured from Lake Superior through a 1½-mile line of 6″ pipe, connecting with a stand pipe at the Tamarack mine, leading to a 130,000-gal. concrete reservoir between Osceola shafts Nos. 5 and 6.

The **North Kearsarge** mine, 1,120 acres, lies north of the Wolverine, with which it has underground connections. Extensive diamond drilling, 1905-1907, showed considerable good stamp rock in the foot and hanging walls, at points where the main bed was impoverished. The Kearsarge amygdaloidal bed ranges 16 to 20′ in width, in this mine, and has proven very bunchy, though of very good average grade. The southern workings approaching the Wolverine, have shown improvement, but the mine is richest near the Ahmeek, to the north.

No. 1 North Kearsarge shaft is 4,229′ deep and has a hoist good for 6,500′ depth, operating two 6-ton skips in balance. No. 2 North Kearsarge shaft was abandoned at depth of 2,400′, some years ago.

No. 3 North Kearsarge shaft, 1,825′ N. E. of No. 1, is 3,403′ deep and develops a large area of good ground, especially in the northern drifts. No. 4 North Kearsarge shaft, begun 1907, sunk 75′ in the footwall, is 1,761′ deep. The shaft is lined with concrete for 185′ from surface, and has large loading bins just below the 10th and 13th levels, to which rock is milled through chutes, from the levels above. Equipment of the rock house includes two 24 by 36″ crushers driven by an electric motor. The steel-frame boiler-house at No. 4 has three 84″ boilers, with room for 2 additional. During 1917 and 1918, four storage-battery locomotives with 5-ton cars, were installed on No. 15, 16 and 18 levels.

The North Kearsarge surface plant includes a stone compressor house and a 30-drill compressor at No. 1 shaft, combination machine and carpenter shops, warehouse and office, all of wood.

Electric haulage was installed early in 1919 on levels No. 31 and 32, shaft No. 1, and levels No. 34 and 35, shaft No. 3. Electric pumps were installed in 1921.

North Kearsarge contributed in 1918, 745,722 tons of 12.60 lb. copper ore, which compares with 691,263 tons of 12.54 lb. ore in 1917, and 651,079 tons of 14.23 lb. ore in 1916.

In 1920, this mine supplied 291,508 tons of 15.38 lb. copper ore at a cost of $2,92 per ton, compared with 465,034 tons of 13.72 lb. copper ore at a cost of $2.01 in 1919.

New work amounted to 2,971′ in 1919; 501′ in 1918; 2,547′ in 1917; 4,325′ in 1916.

The **South Kearsarge** mine, 160 acres, lying south of the Wolverine and east of the Centennial was known formerly as the **Iroquois.** Development was begun September, 1899, and the best stopes are toward the Centennial line, the Kearsarge bed averaging about the same width as in the North Kearsarge and Wolverine mines, and being remarkably uniform in copper values. This mine is practically worked out. There are about 100,000 tons in the pillars and arches yet to be mined, which will be a slow operation, with comparatively high costs.

In 1920, this mine supplied 71,091 tons of 18.45 lb. copper ore at $2.79 per ton compared with 124,107 tons of 16.75lb copper ore at a cost of $2.25 p. t. in 1919. In 1918, mine yielded 218,728 tons of 14.96 lb. copper ore, which compares with 343,254 tons of 14.28 lb. ore in 1917, and 408,572 tons of 17.06 lb. ore in 1916. About 180,000 tons came from the shaft pillars in 1917 and 1918.

No. 1 Sonth Kearsarge shaft, the northernmost, is 2,820′ deep, and practically at the boundary. The shaft rock house cares also for rock from No. 2 shaft, with which it is connected by an 1,100′ trestle. Two skips are operated in balance. No. 2 S. Kearsarge shaft is 1,992′ deep.

The **Tamarack Junior** mine, 120 acres, lying between the Centennial and Calumet & Hecla, has 2 vertical shafts, on the Calumet conglomerate, No. 2 being 3,360′ deep, with 12 levels opened. The Tamarack Junior has been idle since 1903, and is dead, so far as the conglomerate is concerned, with indifferent prospects of finding other workable cupriferous beds on the tract.

Rock is transported from the various mines to the mills by the Hancock & Calumet railway, a branch of the Duluth, South Shore & Atlantic system.

Mill: is built in 2 sections, the main section being 176x213′, of steel frame, with 4 steeple-compound stamps. These stamps, which are now in very general use in the Lake Superior district, were invented by Bruno Nordberg as the result of years of experimentation. The stamps have circular mortars, with ⅝″ screens, and hydraulic separators, about 20% of the copper from milling coming from the mortar discharges and separators. The older section has 3 stamps with circular screens having ⅝″ openings. and is otherwise a duplicate of No. 2 mill.

The wash departments of the 2 mills are equipped with classifiers, jigs, Wilfleys, crushing rolls and Hardinge mills.

A complete automatic sprinkler system for fire protection was installed in 1917 and a plant to pump the tailings further into Torch lake was put into operation in 1919. This plant was built jointly by the Osceola Consolidated Mining Co., the Lake Milling, Smelting & Ref. Co. and the Calumet & Hecla Mg. Co.

During 1919 and 1920, ore from Allouez, Centennial and Isle Royale mines was treated in this mill, resulting in economy to the four companies with a slight profit to the Osceola. The steel boiler-house, adjoining the mills and furnishing power for both, has three 250 h. p. 72″ boilers, delivering steam at 150 lbs. pressure, and nine 250 h. p. 84″ boilers operated under 105 lbs. pressure, all of the locomotive-firebox type.

The power plant has an Allis-Chalmers Corliss engine, operating a 100

k. w. Morgan-Gardner d. c. generator, furnishing current for 220-volt incandescent enclosed arc lamps.

The joint pump-house of the Osceola and Tamarack mines has two 40,000,000-gal. triple-expansion pumps having 22", 40" and 60" cylinders, with three 30" horizontal plungers of 52" stroke and 42" discharge. Water is taken through an 8' tunnel, running 1,275' under Torch lake, with 3" intake holes, guarding against clogging by ice.

Production:

	Tons Ore Treated	Lbs. Cu. per Ton Ore Stpd	Cost per Ton (a)	Lb. Cu. Produced	Cost per Lb. Cts.	Rec'd per Lb. Cts.
1920.....	455,982	16.37	$2.97	7,465,773	24.18	18.61
1919.....	739,364	14.6	2.21	10,824,331	18.08	18.65
1918.....	1,194,967	13.3	1.78	15,919,647	17.67	24.41
1917.....	1,237,805	13.0	1.63	16,084,958	13.86	27.89
1916.....	1,284,681	15.2	1.36	19,586,501	11.69	25.73
1915.....	1,361,089	14.5	1.18	19,731,472	10.03	18.19
1914.....	1,108,447	13.5	1.29	14,970,737	10.79	13.14
1913.....	735,044	15.4	1.60	11,325,010	12.30	15.50
1912.....	1,246,557	14.8	1.23	18,413,387	10.36	16.63
1911.....	1,246,596	14.8	1.14	18,388,193	9.28	....
1910.....	1,217,720	15.9	1.28	19,346,566	9.37	....

(a) Includes mining, transportation, stamping and taxes per ton of rock.

The total cost per pound in 1918 includes depreciation and depletion amounting to 3.07c per lb., but not taxes, about 4c per pound.

Mining costs per ton, at each mine vary, as shown below:

	Osceola	North Kearsarge	South Kearsarge
1920.....	$3.27	$2.92	$2.79
1919.....	2.81	2.01	2.25
1918.....	2.10	1.69	1.74
1917.....	2.14	1.55	1.48
1916.....	1.84	1.30	1.18

Osceola is a low-grade mine whose profitable operation is ensured by the efficient management of the Calumet & Hecla control.

PACIFIC COPPER CO. — MICHIGAN

Office: Leopold Bldg., Houghton, Houghton county, Mich.

Officers: Geo. P. Gardner, pres.; Chas. J. Paine, Jr., sec.-treas., with W. Cameron Forbes, Chas. E. Perkins, Nathaniel H. Stone, J. E. Thayer, Jr., T. N. Perkins, Walter Hunnewell and R. R. Goodell, directors; F. W. Nichols, agent.

Inc: Aug., 1890, in Michigan. **Cap.** $1,250,000; $25 par; issued, 20,000 shares, $10 paid, and 20,000 shares, $2 paid. Is controlled, through ownership of 20,000 shares, $10 paid, by St. Mary's Mineral Land Co. Ended 1920 with $3,561 cash on hand and $28,000 in Liberty Bonds.

Total receipts since 1890, $100,273; total disbursements, $96,713.

Property: 820 acres, the N. W. ¼ and the S. W. diagonal half of the S. W. ¼ of the N. E. ¼ of Sec. 4, and Sec. 5, T. 54 N., R. 34 W. Land lies just N. W. of the Atlantic mine, and supposedly carries the northern extension of the Atlantic Ashbed, on which a little exploratory work was done previous to organization.

Of the $40,000 originally raised by sale of 20,000 shares, one-half was spent in prospecting work. The timber on the lands has been sold at various times and 140 acres sold to the Naumkeag Copper Co. From these sales and interest on funds, company has distributed $40,000 cash and 4,000 shares of Naumkeag Copper Co. stock to its stockholders.

No mining done since 1900.

PENN IRON MINING CO. **MICHIGAN**

Address: Vulcan, Mich. Wm. Kelly, mgr., M. A. Hanna & Co. sales agts.

Inc. in Michigan. **Cap.** $150,000; $25 par; all issued.

Property: in Menominee range, Dickinson county, includes the Cyclops, Norway, East and West Vulcan, Brier Hill and Curry mines. Developed to depth of 1,500′ by vertical shafts. Ore: Bessemer and non-Bessemer hematites, varying from 57% to 39% iron. Reserves estimated by company at 1,200,000 tons, January, 1919.

The Cyclops, Curry, Norway and Vulcan have not produced since 1892. The others yielded 459,764 tons in 1917; 210,632 tons in 1918; 160,485 tons in 1919. Total production of all mines is 11,950,592 tons.

Operations have been gradually curtailed until in 1921, the West Vulcan was reported to be the only producing mine.

PEWABIC CO. **MICHIGAN**

Office: 910 Wells Bldg., Milwaukee, Wis.

Officers: G. D. Van Dyke, pres.; W. D. Van Dyke, sec.-treas., with N. P. Hulst, J. H. McLean and D. G. Kerr, directors. E. F. Brown, mgr.; W. G. Monroe, supt.

Inc. Jan. 1, 1887, in Wisconsin. **Cap.** 8,000 shares; $1.25 par, all issued. Is a close corporation. Liquidating dividend was declared in 1919, reducing par value of shares from $25 to $1.25.

Owns the Pewabic and Walpole iron mines at Iron Mountain, Dickinson county, Mich. On April 1, 1918, operations were suspended until more favorable conditions permit mining the low grade ore.

Production: the Pewabic yielded 9,359,339 tons to the end of 1918; in 1918, 113,999 tons.

PHOENIX CONSOLIDATED COPPER CO. **MICHIGAN**

Controlled by Keweenaw Copper Co.

Office: State Bank Bldg., Calumet, Mich. Mine near Phoenix, Keweenaw county, Mich.

Officers: Thos. F. Cole, pres.; Spencer R. Hill, v. p.; C. A. Wright, sec.-treas., with G. G. Hartley, A. L. Warner and Thos. Hoatson, directors.

Inc. April 1889, in Michigan. **Cap.** $2,500,000; $25 par; all issued; $18.50 paid in. Last assessment $1, October 1, 1917. Is controlled by the Keweenaw Copper Co., through ownership of about 98% of the share capital, acquired by an exchange of shares on the basis of 10 shares of Phoenix for 1 share of Keweenaw.

Report for year ended December 31, 1920, showed assets of $1,872,756, which includes real estate $505,256, development and exploration $1,277,031, cash $660, investments, $8,168; accts. receivable, $933; Liabilities consist of capital stock $1,850,000 and $22,125 liability insurance fund.

Property: 2,505 acres, carrying 5 different fissure veins, on which more or less mining has been done, at various times. The old Phoenix mine, included in the consolidation, is famous for having produced the largest mass of native copper ever found, weighing upwards of 500 tons. The Phoenix fissure, on which work was begun 1846, was opened to a depth of only about 90′, yielding considerable mass copper and silver. There also are possibilities on the Ashbed lode, which has been slightly developed by an exploratory tunnel. The mine has extensive openings and a modern equipment and was worked for 6 years without success, until closed down June 15, 1905.

Diamond drilling on the Ashbed lode, 1910, gave encouraging results and a resumption of this work late in 1913, after several years of idleness, showed fair copper ore.

In 1917, diamond-drill holes, aggregating 3,063′, were put down, besides 1,410′ of underground work. The shaft is 1,616′ deep. In 1916, the "Old

Phoenix" fissure was explored by a crosscut northwards to the hanging wall of the Ashbed lode; it is not mineralized, excepting where it cuts the lode.

Equipment: at power plant at No 1 shaft includes 3 boilers, 2 air-compressors, hoist and pumps. The mill contains 7 Wilfley tables.

Operations suspended December 1, 1917, due to high operating costs and labor shortage.

PLYMOUTH MINING CO. MICHIGAN

Address: Western Reserve Bldg., Cleveland; Ohio. L. M. Hardenburgh, gen. supt.; A. Matthews, Jr., Verona, Mich., local supt. Under direction of Pickands Mather & Co., 600 Western Reserve Bldg., Cleveland, Ohio.

Property: owns and operates a lease on the Plymouth iron mine, on the Gogebic range near Wakefield, Gogebic county. Property carries soft, non-Bessemer hematite, containing 53% iron, 0.077% phosphorus, and 3.23% silica.

Development: by open-pit system. In May, 1919, company was employing 355 men.

Production: started in 1916, 330,427 tons; 1917, 656,473; 1918, 821,867 tons; 1919, 498,842, a total of 2,309,401 tons.

Company also subleased the Mikado mine of the Verona Mng. Co. on the Gogebic range and mined 1,141,618 tons. Idle since 1919. The Pilgrim mine on the Gogebic range was opened in 1919 and yielded 286 tons.

QUINCY MINING CO. MICHIGAN

Office: 52 Broadway, New York. **Mine and works office:** Hancock, Houghton county, Mich.

Officers: Wm. Rogers Todd, pres.; W. Parsons Todd, v. p.; Jas. L. Bishop, Chas. J. Devereaux, Wm. M. Belcher, J. F. Morse, and Walter P. Bliss, directors; W. A. O. Paul, sec.-treas.; F. J. McLain, asst. sec.-treas.; Chas. L. Lawton, gen. mgr.; Alex. Laist, smelter supt.; Ralph Hayden, mill supt.

Inc. March 30, 1848, under special charter from the state of Michigan. **Cap.** $3,750,000; shares $25 par; issued, $2,750,000. Original cap., $500,000; reincorporated March 6, 1878, for 30 years more with cap. $1,000,000, increased, 1889, to $1,250,000, again increased, 1896, to $2,500,000, and once more increased, 1906, to $3,750,000. Re-incorporated 1908 for a third term of 30 years. Old Colony Trust Co., Boston, transfer agent. American Trust Co., Boston, registrar. Shares are listed on the Boston Stock Exchange. Annual meeting, first Wednesday in June.

Comparative Statement: assets and liabilities exclusive of real estate, mine plant and supplies in use.

	Cash. Cu., Invest's	Accounts Rec.	Total	Accounts Pay	Add. Supplies At Mine	Add. Supplies At Smelt.	Excess Assets
1920	$1,913,799	$121,971	$2,035,770	$1,352,545	$1,196,040*	.....	$1,879,265
1919	2,551,061	234,958	2,786,019	1,233,002	866,650	$100,340	2,520,007
1918	2,380,849	263,330	2,644,179	467,440	554,640	71,745	2,803,124
1917	2,512,676	530,377	3,043,053	403,055	485,665	67,219	3,192,882
1916	1,824,784	624,799	2,449,584	246,417	404,283	56,164	2,663,615
1915	1,018,381	626,283	1,644,664	282,861	271,035	32,118	1,664,956
1914	736,617	152,795	889,412	255,620	229,912	33,827	897,531
1913	406,633	53,110	459,733	110,179	352,998	44,386	746,938

*Includes smelter acc't.

	Metal Sales	Total Income	Expenses	Net Income	Dividends	Profit or Loss
1920	$3,210,112	$3,232,605	$4,218,665	.....	$110,000	.....
1919	3,861,998	3,922,631	3,506,034	$416,597	440,000	—$23,403
1918	4,857,085	4,938,560	4,075,515	863,044	935,000	— 71,956
1917	6,350,500	6,402,836	3,893,569	2,509,267	1,980,000	+529,267
1916	5,400,874	5,421,835	2,663,176	2,758,659	1,760,000	+998,659
1915	3,983,958	3,999,745	2,126,071	1,873,674	880,000	+993,675
1914	2,054,622	2,063,650	1,858,057	205,593	55,000	+150,593
1913	1,921,198	1,940,128	1,863,968	76,160	412,500	—336,340
Total (1862-1919)	102,835,403	106,045,559	76,633,053	29,412,507	26,892,500	2,520,007

Dividends: Quincy paid its first dividend in 1862, and profits have been disbursed to shareholders in every succeeding year except 1866 and 1867, giving the company a continuous dividend record of 49 years, from 1868 to date, rendering it the oldest dividend- paying American copper mine, and second only to the Tharsis Sulphur & Copper Co., Ltd., which has a record of continuous dividends since 1867, or 1 year longer than the Quincy's record. Recent dividends, by years, have been as follows: 1900-1 36%; 1902, 28%; 1903, 22%; 1904, 20%; 1905, 24%; 1906, 50%; 1907, 54%; 1908, 18%; 1909, 16%; 1910, 20%; 1911, 16%; 1912, 21%; 1913, 15%; 1914, 2%; 1915 32%; 1916 64%; 1917 72%; 1918 34%; 1919 16½%; 1920 4%; none since March, 1920. The grand total is $412.75 per share, or $27,002,500.

A table of statistics, production, costs, etc., 1864-1905, is given in Vol. X., of The Copper Handbook.

The year 1918 marked Quincy's 70th anniversary. During this time it paid its stockholders $26,452,500 in dividends and still had $2,803,124 cash surplus; this is equivalent to a profit of 4⅓c on each of 613,596,622 lb. copper produced, and sold at an average price for the entire 7 years of 16.1300c. equal to $98,973,406.

Property: is very extensive, the management having adopted the policy, many years ago, of expansion of territory as opportunities offered Acquisitions include a purchase of the Arcadian Copper Co., 1907, at a price of $750,000; the old Franklin mine, 1908, at a cost of $170,000, and the acquisition, 1910, of Sec. 14 and the N. E. ¼ of Sec. 22, of 800 acres, from St. Mary's Mineral Land Co. bought for $600,000; 80 acres under and to the S. of shaft No. 2 were bought from Hancock Mining Co., July 1915, for $226,250. In June 1919, company purchased 140 acres from the Hancock Mining Co., for $251,823. This parcel adjoins the original 80 acres.

The holdings of the Quincy now include lands formerly held by the Pewabic, Franklin, Mesnard, Pontiac, Arcadian and St. Mary's, in order named, from south to north.

History: property carries the Pewabic bed and a number of parallel copper-bearing amygdaloids, from the Hancock mine, on the northern shore of Portage lake, to the boundary of the Franklin Junior mine, or about half way from Hancock to Calumet. Through the territory lately acquired shafts No. 2, 6 and 8 can be sunk to practically unlimited depth.

The mine was opened 1848, on the Quincy amygdaloid, a bed lying some distance west of the Pewabic, but the Quincy bed was abandoned 1856, when the Pewabic amygdaloid was opened. There is a footwall branch, known as the Pewabic East lode, underlying and parallel with the main bed, which occasionally yields good returns. The so-called West branch, about 300′ west of the Pewabic bed, has been opened by shafts No. 2, 4 and 7 through crosscuts on different levels and considerable stamp rock has been stoped therefrom. About 1,000′ west of the Pewabic bed is the Hancock amygdaloid, which is narrow but fairly mineralized. and which yielded an average of 21 lb. fine copper per ton, after reasonable selection, when worked in the old Hancock mine, this figure being materially above the present average return from the Pewabic bed.

The Pewabic amygdaloidal bed, on which all shafts are sunk, has a strike of about N. 30° E., with an average dip of 52 to 54° at surface, flattening in the lowest workings at depth of more than a mile to approximately 37° 30′, the shafts following the dip of the bed on catenary curves. The Pewabic averages about 20′ in width in the upper workings, but is materially narrower at the bottom. The lower workings show decreased copper values with much less heavy copper than above, but the ore is more uniform in value. Part of the decrease in copper returns is due to mining rock that formerly would have been left as worthless and practically the entire Pewabic bed is now mined. There are copper courses, or shoots, that rake to the north with depth.

The Pewabic bed has good walls and the mine requires comparatively little timbering. Dry-walls are built of waste rock, in wide stopes, saving the expense of hoisting waste and also the cost of timber. Shafts are sunk mainly in the footwall. The Pewabic rock now runs 19 lb. fine copper a ton, with some silver. Previous to about 1890, about 40% of the copper was secured in masses. In 1912 the proportion of mass copper was about 15%; company reports approximately the same percentage to date. The southernmost drifts of the Quincy are about 3,000′ below mean water datum of Portage lake, while the northernmost workings at No. 8 shaft are fully 2 miles from the southern breasts.

Fire doors have been installed and every precaution is taken against fire. Miners are carried to and from work in man cars holding 30 men each, and hoisting cables are inspected frequently, with every care taken to prevent accidents.

The mine has a complete electric underground traction plant, tram lines averaging about 1,800′ each in length with gradients of 1.5% towards the shafts. The equipment includes 20 electric trolley locomotives, each hauling 4 or 5 three-ton rock cars at a speed of 6 to 8 miles per hour, 1 man caring for each train. In 1918 4 storage-battery locomotives were installed.

Tram cars are unloaded into 500-ton storage bins, built on the hanging-wall side of the shafts. This system of storage obviates the loss of time by either the tram lines or skips, and adds about 25% to the hoisting capacity of the mine, the property being equipped with hoisting and rockhouse capacity for production of over 4,000 tons daily. About 200 rock-drills are used in sinking, drifting and stoping, and extensive use is made of the diamond drill for exploratory and preliminary development work.

The Quincy has been much troubled by air-blasts, violent disturbances brought about by the settling of super-incumbent rock in the scores of miles of worked-out openings, causing violent compression of the air elsewhere throughout the mine. The most serious disturbances from air blasts, which are practically artificial earthquakes, felt for only a few miles distance upon surface, were experienced in February, 1906, and March, 1914, and there seems reason to fear that these troubles will prove intermittenly continuous for the balance of the mine's life. The air-blasts, while unpleasant, have caused more alarm than damage.

Development in recent years has been as follows:

	1920	1919	1918	1917	1916
New openings.....	16,700′	23,897′	24,580′	26,900′	29,910′
Shaft-sinking.....	369′	675′	428′	499′	547′

New work averages slightly over 5 miles yearly, the mine having approximately 125 miles of workings.

Owing to the acquisition of adjoining mines, the Quincy shafts are numbered irregularly and are described herein in order of occurrence, from south to north, rather than in order by number.

No. 7 shaft: the southernmost planned and sunk by John L. Harris, leaves surface at an angle of 53° and is bottomed at an angle of 37° 30′. The shaft was sunk 4,000′, in 18 months, through refractory rock, this phenomenal speed being rendered possible by sinking and raising in 5 sections simultaneously. The shaft is bottomed at the 71st level, at a depth of about 6,500′. Operations were suspended at this shaft on June 1, 1918.

Equipment: includes duplex hoist, with a 22′ 6″ straight-face drum, raising 8-ton skips; a 1,300-gal. bailer, a centrifugal feed-water heater being attached to one cylinder of the hoist, and a 100-drill 2-stage compound air compressor. The boiler house has four 250-h. p. water-tube vertical boilers, nine 100-h. p. locomotive firebox boilers, and a powerful fire pump.

The Franklin mine lies next north of No. 6. The Quincy bought the old Franklin mine, 160 acres, for $170,000, taking possession December, 1908, and closing the mine immediately. It is doubtful if the old shafts ever will be used by the Quincy.

No. 8 shaft the Mesnard, 4,168′ north of No. 6, is at the 71st level. It was sunk 205′ in 1920 and has 28,000′ of active openings extending from 51st to 69th level. Levels in this shaft were opened at 135′ intervals and former numbering made the 24th level of No. 8 correspond with the 42d level of No. 6. This lode was poor in the upper levels, but the lower workings, while by no means up to the Quincy average of some years ago in quality of ore developed, show a bed wider and better mineralized than above, and the ground is of very satisfactory and profitable average, the improvement that began on the 10th level being very marked below the 20th level. The present average of the lode at the Mesnard shaft is nearly up to the present average of the older workings. This shaft is connected with the workings to the south, which at this depth are at 200′ intervals, from the 41st, which was the first to pass under the old Franklin mine, to the 63rd inclusive. Shaft started production in 1907.

The power-house at No. 8 has a 32x72″ duplex-cylinder engine with double conical drum, of 12′ 6″ minimum and 18′ 6″ maximum diam., good for 6,000′ depth, and a 65-drill 2-stage cross-compound air compressor. The boiler room has ten 250-h. p. boilers. There is a large changing house of reinforced concrete at this shaft, and many well-built houses for employees.

No. 2 shaft is 8,360′ deep. It lies 585′ north of No. 4 shaft, and has about 48,000′ of active levels extending from the 51st to the 81st. Equipment includes a 1,300-gal. bailer for raising water and 30 to 40 power drills are operated normally. The 82nd level of this shaft produced a great deal of mass copper during 1920, one piece weighing 24 tons.

Stamp ore from the shaft is dumped onto grizzlies, with wide bars, smaller material falling into circular bins, whence it passes by gravity to the crushers and thence into the main ore house bin. The smaller mass copper passes through the grizzly bars, is picked out by workmen and dropped into a chute carrying it to a steam hammer, there also being a chute for waste rock. The grizzlies allow large pieces of ore to fall into a bin of reinforced concrete in front of the steam hammer, where broken and sent to the main ore-house bin through a chute, while mass copper is dropped into a steel tube leading to a circular steel bin, which loads into railroad cars through chutes with pneumatic gates.

No. 2 shaft has a special crushing plant for waste rock, between the collar of the shaft and the rock-house. Poor ore is dumped into a circular bin and drawn by gravity to a crusher, going thence to circular storage bins, from which it is drawn off into wagons or railroad cars for use in railroad ballasting, road building and concrete work. There are similar crushing plants at the other main shafts, except No. 7.

The surface equipment of No. 2 shaft is very heavy, including two 60-drill cross-compound 2-stage air-compressors. A handsome concrete building was erected to house a new hoisting engine completed late in 1920 and described in the Eng. & Mng. Journal of Dec. 11th. It is of Nordberg design and is the largest in the world. The engine weighs 882 tons, is 60′ high, high pressure cylinders are 32″ and low-pressure 60″ diam., with 62″ stroke; the 2 cylindro-conical drums carry 10,000′ of 1⅝″ rope each; the load is 10 tons and speed is 3,200′ per minute. Every safety device known is attached to the hoist. It is probable that the hoisting plant at No. 2 will be removed to No. 8 and the equipment at No. 8 will be installed at No. 9.

No. 6 shaft, 1,928′ north of No. 2, below the 77th level, being sunk to the 78th, and has about 30,000′ of active openings extending from the 59th to 77th levels. This shaft yields Quincy's highest grade ore.

No. 9 shaft; 2,600′ north of No. 8 is the old 100′ Pontiac shaft, given a concrete collar and cut down to 3-compartment size. The shaft is 2,900′ deep, and at 2,600′ cuts a drift from No. 8, giving ventilation; it is not in operation.

To the north of the Pontiac shaft there is a long stretch of ground, bought of the Arcadian Copper Co. and St. Mary's Mineral Land Co., carrying the extension of the Pewabic bed and available for later development. The surface plant of the Quincy is very complete. Miscellaneous buildings at the mine include a large warehouse, general office, several hundred dwellings at the mine location and a considerable number of houses at the mills.

Water for boilers and portable use at the mine location is taken from Portage lake, the pumps forcing water for a mile against a static head of 640′.

The company's private rail line, the Quincy & Torch Lake, built 1890, is 6 miles long, touching at all shafts and shops at the mine and at the boiler house, wharves and coal sheds at the mill. This line is connected with the Mineral Range, Hancock & Calumet and Copper Range railways. Equipment includes several locomotives, freight cars and nearly 150 hopper cars for rock, the latter having automatic couplers and air brakes.

Storage-battery locomotives have been added, and are very successful.

Stamp-mills: at Mason, on Torch lake, 6 miles from the mine, have 8 stamps, with combined capacity of about 5,500 tons daily, the stamps giving an average duty of about 700 tons. Two 36″x8′ Hardinge ball-mills were added in 1916. In 1917, steel balls were substituted for pebbles in these mills. In 1918, 2 additional buildings were added to house 5 Marcy ball-mills and 240 tables for re-washing and re-grinding coarse tailings. The addition to No. 1 mill is 123′x215′ and to No. 2, 91′x132′. Automatic fire sprinklers have been installed in both mills.

The Mills: No. 1 mill, of wood, has five 2-way stamps, taking steam at 100lbs. pressure. There is a mill for regrinding raggings, and the dressing machinery includes 92 jigs, and 32 Wilfley tables.

No. 2 mill, 630′ north of No. 1, has 3 heads, each set on foundations of heavy timbers and concrete, surmounted by a bottom plate of 22 tons, a middle plate of 18 tons and a top plate of 18 tons, all of solid iron castings, above which are the mortar boxes of the stamps. The stamps have 1″ revolving screens for the mortar boxes, with hydraulic discharges, as have the launders leading from the mortars these yielding about 60% of the copper secured. Finishing jigs and slime tables have been replaced by 24 Wilfley tables, 8 for each stamp, assisted by 3 Standard concentrators. Each stamp has 12 rough jigs, 6 Wilfleys for finishing and 2 Wilfleys and 1 Standard table for slimes. There is a settler from which slimes are taken to the Wilfley tables. Regrinding is done by a Chilean mill, with 3 jigs and 3 Wilfleys as auxiliaries. By the adoption of hydraulic discharges and other improvements the capacity of the stamp-heads has been increased about 25%, while changes in the wash have given an increased capacity of 30%, with labor costs reduced 25% and loss in tailings cut down 40 to 50%. About 35% of the present product of the mill is No. 3 grade mineral, carrying very fine copper.

The mill power-house at No. 2 mill, has four 250-h. p. vertical water-tube boilers. There is an electric light plant.

The mill and pump-house has a 20,000,000-gal. centrifugal pump, and A 20,000,00-gal. triple expansion pump, and the old pump house has 3 pumps with combined capacity of 21,000,000 gal. daily. Water is taken from a 7x7′ 6″ tunnel, driven 100′ under the bed of the lake. A 6x6′ 6″ tunnel 440′ long, connecting mills, boiler houses and pump houses, carries both water and steam pipes.

Tailings at the mills amount to millions of tons, and various experi-

ments on reconcentration have been conducted at intervals since 1902. The companies that have attacked this project have bankrupted themselves with monotonous regularity, notwithstanding which, the successful results being secured at the regrinding mills of the Calumet & Hecla offer promise that the Quincy sands also may be retreated profitably at some future time. In November, 1919, it was reported that the company was to spend $500,000 on a plant for the treatment of this sand.

Smelter: this was blown-in Dec. 1, 1898. It is at Ripley, on the shore of Portage lake, opposite Houghton, just east of Hancock and only a half-mile from the mine. Remodeling of the mill was started in September, 1919. Smelter treated 23,000 tons of mineral in 1918.

One building has four 40-ton reverberatory furnaces, and a second building has 60-ton and 120-ton reverberatories, the latter having an automatic casting machine. On arriving at the reverberatory building the trucks carrying mineral are lifted by electric cranes and contents dumped into the furnaces, which are top-charged. An overhead trolley in the main building permits handling large bars and cakes, and a trolley dipping system is used for casting. Slags are trammed, in 3,000-lb. pots, to a 30' hydraulic elevator which raises the ladles and dumps their contents over the end of a trestle. The cupola building has 1 blast furnace only, for reverberatory slags. A briquetting plant has 2 boiler-iron retorts for briquetting low-grade mineral before smelting. Miscellaneous buildings at the smelter include an engine house, casting house, cooper shop, office, laboratory, machine shop, 50x100' warehouse, and a coal-shed.

During 1920 the smelter was improved by adding a 16 x 32' reverberatory, a 300 h. p. boiler, a 22' casting machine, 12½-ton motor crane for charging the furnace, a 6-ton crane for the casting plant, etc. Altogether, the enlarged smelter has a total daily capacity of 230,000 lbs. of copper, compared with 55,000 lbs. in the past.

Social conditions of employes have not been forgotten, company maintaining dwellings, club house, library, etc.

Production has remained nearly constant for several years, but was seriously lessened by the labor strike of 1913. Silver production during 1918 was 13,982 troy ounces of metal about 80% pure and 20,800 troy ounces of alloy 12-20% pure. Profit on silver in 1918 totalled $54,680

Recent Production:

	Tons Ore	Lb. Mineral Produced	Ref. Copper Lb.	Lb. Cu. per Ton Ore	Cost (a) per Lb.	Sell Price
1920..	34,167,620	19,216,070	.....	23.75	....	16.27¢
1919..	32,800,590	19,476,320	.....	20.28	17.08¢	19.37
1918..	1,174,147	31,970,969	19,948,965	16.99	18.7	24.07
1917..	1,280,837	35,785,490	22,195,577	17.33	15.6	28.6
1916..	1,204,026	33,864,280	21,065,612	17.5	12.4	25.5
1915..	1,269,000	34,251,765	22,054,813	17.38	9.42	18.01
1914..	.....	22,612,460	15,356,380	....	11.51	13.29
1913..	804,645	18,161,575	12,184,128	15.11	13.65	15.59
1912..	1,309,258	30,040,360	20,634,800	15.76	11.09	16.24
1911..	1,382,524	32,550,440	22,252,943	16.1	10.17	12.72
1862-1919..	633,072,942					

Total production, 1862-1919,.....633,072,942

(a) Includes mining expense, smelting transportation, etc., and taxes paid in Michigan.

The 1921 production is estimated at 15,000,000 lb. copper.

No dividends in the near future appear likely, owing to the inability of the managment to reduce operating costs to a basis assuring fair profits on present copper prices.

This condition may be attributed to three causes:
(1) High coal prices.
(2) High powder cost.
(3) Failure of other commodities to drop appreciably.

Quincy has readjusted its wages in conformity with the Lake Superior scale paid by other mines in Michigan, and while costs of fuel and explosives have been lowered somewhat from the war peak, they have not dropped proportionately with the price of copper itself. The principal item is coal, to the high price of which must be added the increased freight rate.

The past year resulted in another deficit for Quincy, but its production capacity was raised to a rate of 30,000,000 pounds a year. It operated, however, at slightly better than 50% capacity and with one mill produced in the neighborhood of 15,000,000 pounds of copper.

Quincy raised its yield to about a 22-pound average in 1921 of which three pounds were due to regrinding. The company now regrinds a large part of its tailings. The tailings dump now contains 25,000,000 tons of material, containing possibly four pounds of copper per ton.

Management has followed an unswerving policy of expansion so that Finlay's 1911 estimate of a life of 7 years with production of but 200,000,000 lb. of copper, has been altered by additional acreage purchased since that year, making probable the production of over 1,000,000,000 lb. more copper and a further life of more than 50 years. The company has the longest record of continuous annual dividend payments of any American copper mine, and when normal conditions return bids fair to continue disbursing large profits for another generation.

RHODE ISLAND COPPER CO. **MICHIGAN**

Subsidiary of the Franklin Mining Co.

Office: 60 Congress St., Boston, Mass. **Mine Office:** Demmon, Houghton county, Mich.

Officers: R. M. Edwards, pres.; Henry Tolman, treas.; with S. J. Jennings, H. M. Howard, Carl F. Moore and C. A. Hight, directors. A. J. Wyman, sec.

Inc. Dec. 9, 1898, in Michigan. **Cap.** $2,500,000; $25 par; paid in $10.50. Assessment No. 2, of $1, was payable January 14, 1907, and assessment No. 3, of 50c, was payable June 15, 1910. The Franklin Mining Co. owns 99,524 shares, or 99%, acquired by exchange of 3 shares Rhode Island for one of Franklin. Annual meeting, third Wednesday in April. No bonded debt. American Transfer Co., Boston, transfer agent.

Annual report for 1917 showed rents $806, advanced by Franklin Mining Co., $15,791, total receipts, $16,597. Expenses amounted to $4,619 at mine, $1,295 taxes, balance being interest and incidentals. The 1919 report of the Franklin Mng. Co showed under "Assets"—Rhode Island Copper Co. acct., $212,596; R. I. C. Co. stock, $388,595.

Property: 800 acres, immediately north of the Franklin Junior mine. The ground has been explored by extensive diamond-drill work, showing cores from the Mesnard epidote, Allouez conglomerate, Pewabic amygdaloid, Kearsarge amygdaloid, and other copper-bearing beds. All the formations lying between the Kearsarge amygdaloid and the Calumet conglomerate were drilled by a series of holes, the Calumet bed showing traces of copper. The first cores from the Kearsarge bed showed copper in encouraging quantities from a bed of about 19' width.

Development: No. 1 shaft, 500' deep, is sunk on the Pewabic amygdaloid. This lode is 8 to 10' thick, of which 2 to 3' near the hanging wall is well mineralized but spotty in the 4 levels opened.

No. 2 shaft, 1,227' deep, has 10 levels, with a 125' winze below the 10th. The workings are north of the shaft, except on the 8th, 9th and 10th levels, the latter 2,400' long. The 8th level south develops a stretch of copper ground toward the Franklin Junior, and a 1,400' drift on the 8th level north showed 25 to 75' stretches of payable ground. The Rhode Island property

is being developed by the Franklin Mining Co., where at a depth of about 2,000′, the Pewabic bed averages 8 to 10′ width.

The Albany & Boston, or Allouez conglomerate, has been opened by crosscuts on the 500′ and 1,000′ levels, but the result was discouraging. A 250′ crosscut on the 10th level, about 1,100′ south of No. 2 shaft, has disclosed an amygdaloid bed of some promise. The east crosscut on the 8th level, at depth of 1,000′ cut 2 apparently valueless beds, one being the Mesnard epidote. The East lode, about 5′ wide, carries a little copper, but nothing of promise. The West lode, 96′ from the Pewabic, is 7 to 9′ wide, carrying occasional bunchy copper. The 4 amygdaloidal beds lying between the West lode and the Allouez conglomerate have been tested by N.-S. drifts, 3 proving barren.

Equipment: includes a frame shaft house at No. 2, with an engine house having hoist capable of raising 2-ton skips from a quarter mile depth, and a 12-drill air compressor. Buildings include a machine shop and smithy, warehouse and 15 dwellings.

The Rhode Island is idle and the plan of developing at greater depth through the north drifts of the Franklin is a good one, since the Pewabic bed to the south of the Rhode Island has shown great improvement below a depth of 2,000′ in both the Mesnard shaft of the Quincy and the main shaft of the Franklin.

RICHMOND IRON CO. **MICHIGAN**

Address: Palmer, Mich. E. E. Hunner, mgr.; John Huhtala, supt., M. A. Hanna Co., Cleveland, Ohio, sales agents.

Property: the Empire and Richmond mines on Marquette range, Marquette county, Mich. Ore is a silicious, hard, red-hematite assaying 39% iron, 0.045% phosphorus, and 36.81% silica. Both mines are worked by steam shovels.

Production: since 1896, about 1,700,000 tons. The Richmond has produced 2,029,407 tons of ore in the 4 years, 1916-20 and the Empire, 476,815 tons in the same period.

ROLLING MILL MINING CO. **MICHIGAN**

Office: 1500 Alworth Bldg., Duluth, Minn. R. S. Archibald, mgr., Negaunee, Mich.; Edward P. Scallon, gen. supt., Crosby, Minn.; C. K. Quinn & Co., sales agents. Operated by Jones & Laughlin to end of 1918 and taken over by C. K. Quinn & Co. in 1919.

Property: the RollingMill mine on Marquette range, near Negaunee, Marquette county, opened in 1872. Ore is a non-Bessemer hematite. The mine is worked by underground and open pit steam shovel methods.

Production: 1,552,382 tons in 1918; 116,389 tons in 1919; total is 1,942,783 tons.

ST. LOUIS COPPER CO. **MICHIGAN**

Out of business. Assets transferred to **Calumet & Hecla Mining Co.** For description, see Vol. XII.

ST. MARY'S MINERAL LAND CO. **MICHIGAN**

Offices: Room 503, 120 Exchange Place, Portland, Me. and Houghton, Houghton Co., Mich.

Officers: Geo. P. Gardner, pres.; Nath. H. Stone, v. p.; Chas. J. Paine, sec.-treas., J. F. Dolloff asst. treas., with John E. Thayer, Jr., W. Cameron Forbes, Albert S. Bigelow, Thos. N. Perkins, Charles E. Perkins, N. H. Stone and G. H. Russell, directors, Fredric W. Nichols, resident agt.

Inc. March 4, 1901, in New Jersey. **Cap.** $5,000,000; $25 par, issued, $4,000,000. Controls through ownership of entire stock issue, except founders' shares, the St. Mary's Canal Mineral Land Co., a corporation incorporated 1863, in New York, to acquire 180,000 acres of land given by the State of Michigan for the construction of the first ship canal at Sault ste. Marie. These lands in Houghton, Ontonagon and Keweenaw counties, formerly included the tracts on which the Calumet & Hecla, Baltic, Trimountain, Champion, Ojibway and other mines have been developed. Com-

pany has about 1,000 shareholders. Shares are listed on the Boston Stock Exchange. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting, first Wednesday in March, in Jersey City, N. J.

Income of the company consists mainly of dividends from the Champion Copper Co., with a small but steady revenue from sales of land, timber and wood and occasional but irregular large receipts from sales of mineral lands.

Revenue in 1919 totaled $296,612 and expenditures, $200,058. Cash on hand amounted to $95,954; Liberty Bonds, $300,000; notes and accts. receivable, $205,566 and the securities listed below.

Revenue in 1920 amounted to $425,103 and expenses, $131,903. Cash on hand was $69,154 at end of 1920.

Receipts in 1921, were $204,822; disbursements, $197,076; cash balance, Dec. 31, $76,899.

Share assets of the company December 31, 1921, were 50,000 shares Champion Copper Co.; 20,165 shares La Salle Copper Co.; 79 shares Hancock Cons. Mng. Co.; 20,000 shares Pacific Copper Co.; 37,222 shares of Houghton Copper Co.; 2,000 shares Ojiway Mining Co.; 208 shares Copper Range Co.; 640 shares St. Mary's Mineral Land Co.; 8,340 shares Naumkeag Copper Co.; 17,902 shares Douglass Copper Co.; 10 shares Amphidrome Co.; 100 shares D. A. Stratton Co.; 3 shares Mayflower-Old Colony Copper Co.

In addition to these holdings, cash, bonds, and amounts receivable total $746,143.

From 1863 to 1900 the old company paid cash dividends of $2,200,000, and also paid stock dividends of 1 share of Tamarack, 1884; 1 share of Iroquois, 1890; 1¼ shares of Baltic and one-half share of Winona, 1898; 1 share of Old Colony and 1½ shares of Trimountain in 1899.

Dividends: (of the present company)—

1903	$1	1913	$3
1904	1	1914	0
1905	2	1915	8 (b)
1906	4	1916	19
1907	5	1917	14
1908	0	1918	5 (c)
1909	1	1919	4
1910	1 (a)	1920	2 (d)
1911	3	1921	1
1912	3		

(a) Not including Franklin stock distribution equivalent to $4.

(b) Not including North Lake and Hancock stock distributions equivalent in cash to $2.59 a share.

(c) Including $1 per share from depletion Champion ore reserves. Not including Winona and Mayflower-Old Colony distribution, which amounted to 36 shares of Winona Copper Co., and 16 shares of Mayflower-Old Colony Copper Co., for each 100 shares of St. Mary's Mineral Land Co., stock held. Stockholders entitled to fractional shares were paid 2½ for each share of Mayflower-Old Colony stock and 1½ for each share of Winona stock.

(d) from depletion of Champion ore reserves.

Total dividends since organization amount to $13,720,000, or $87.75 per share.

Property: Dec. 31, 1921, consisted of 92,175 acres freehold, with mineral rights to 14,969 acres additional, property being scattered along the Lake Superior copper belt, with principal holdings on the South Range, S. W. of Houghton, in Houghton and Ontonagon counties.

A total of 6,362 acres was sold during 1919, plus the surface rights to

160 acres; in 1920, 10,802 acres and 390 acres respectively. In 1921 sales were 1,123.99 acres wood and timber, and 172 acres surface rights.

The company, since its reconstruction in 1900, has refused to sell its mineral lands outright, preferring to join with other land holders in the formation of new companies, taking pay for its lands in shares, on a pro-rata basis, or partly in shares and partly in cash. This policy has involved heavy outlays for exploratory and development work, but has resulted in giving the company a half interest in a new mine, the Champion, which is capable, alone, of furnishing funds to St. Mary's company for both dividends and development work elsewhere and a continuance of this policy must result in time in making St. Mary's Mineral Land Co. the part or sole owner of a number of fine mines. Owing to the great extent of its lands, located mainly on the Keweenawan copper belt, stretching along the mineral range for scores of miles, the landed holdings of the company are of great potential value. The management is vigorous and far-seeing.

SENECA COPPER CORPORATION **MICHIGAN**

Offices: 11 Broadway, New York, and W. J. Uren, gen. mgr., 3 Calumet State Bank Bldg., Calumet, Mich. Mine near Mohawk, Mich.

Officers: J. Parke Channing, pres.; F. R. Kennedy, treas.; O. B. Van Sant, v. p.; Robt. Linton, v. p.; Fred B. Cole, v. p., with R. N. Atwater, Jr., Geo. A. Tomlinson, T. F. Cole, F. de C. Sullivan, P. A. Clark and W. F. Bartholomew, directors, E. J. McNamara, sec. **Operating Staff:** W. J. Uren, gen. mgr., J. M. Broan, supt.

Inc. Dec. 28, 1916, in New York. **Cap.** increased to 350,000 shares in June, 1921; all issued; of no par value. Bankers' Trust Co., N. Y. and Commonwealth Trust Co., Boston, transfer agents. Central Union Trust Co., N. Y. and United States Trust Co., Boston, registrars. Listed on Boston and New York Stock Exchanges. High for 1921, 25⅛; low, 12¾. Annual meeting 2nd. Tuesday in February.

Debentures: $500,000 of 8%, 5-yr. convertible bonds, due April 15, 1925. Shareholders could subscribe in the ratio of $100 of bonds for each 40 shares held, subject to call at any time at $110 and interest.

Corporation was formed to acquire control of the Seneca Mng. Co.'s stock held by the Calumet & Hecla Mng. Co.; 11,207 shares of this stock (par $25 of which $10.05 was paid in) was acquired January, 1917 for 44,828 shares, minority stockholders being offered the same terms of 4 shares of new corporation stock for $60 cash per share. Company now owns all the 20,000 shares of Seneca Mng. Co.'s stock, that company being dissolved.

Income Account—Years ended December 31:

	Interest Received	Expenses	Surplus for year
1918.....	$17,784	$ 8,635	$9,509
1917.....	30,772	22,849	7,923

Balance sheet for 1919 showed current assets of $315,759 and liabilities of $51,372. On May 1, 1920, the respective figures were $649,615 and $55,945, the latter exclusive of the funded debt of $500,000. The 1921 report showed cash in treasury, $830,000.

In June, 1919 company purchased an 80% stock ownership in the Gratiot Mng. Co. holdings and in Nov., 1920, the remaining 20% interest was bought. The holdings comprise 600 acres lying south and east of the Seneca property and carry the Kearsarge amygdaloid lode. In October, 1919, Seneca acquired from the Cliff Mng. Co., a millsite on north side of Keweenaw point consisting of 346 acres, the purchase including a railway right-of-way across Section 34. In May, 1921, company purchased the 10,000 share interest in the Lake M., S. & Ref. Co., owned by the Hancock which gives the use of 2 stamp heads of 1,000 to 1,200 tons per day capacity.

Property: the **Seneca** tract of 1,880 acres, located just north of the Mohawk and Ahmeek mines, carries the Calumet, Keweenaw, and Allouez

conglomerates and the Osceola, Kearsarge and other amygdaloidal beds. The Gratiot tract, 600 acres, adjoins the Seneca and carries the outcrop of the Kearsarge lode.

Development: the Seneca main shaft is steel and concrete lined, sunk vertically for a distance of 1,320', from which point it continues on a curve which cuts and passes through the Kearsarge lode at about 1,650' in depth. Shaft has been continued to 2,640' point and levels have been opened at depths of 128' apart.

Laterals 1 to 5 inclusive, driven to the South, have reached Ahmeek mine boundary. Laterals 3 to 7 inclusive are being developed to the north in a heretofore unexplored section of the Kearsarge lode; they are showing consistently good vein matter and compare favorably with the adjoining Ahmeek and Mohawk properties on the same lode.

The equipment is devised to reduce costs and promote high efficiency and is the best that can be obtained.

The property is now well opened and nearing the producing stage. No. 1 shaft is constructed for rapid hoisting of large tonnages and to handle 5,000 tons rock daily. To facilitate this, laterals are equipped with underground electric locomotives.

Gratiot mine is being opened with a double compartment shaft, capacity 2,000 tons daily, now 1,521' in depth, from which developments have been carried to the Mohawk mine boundary, approximately 1,064'. There is a distance between Seneca No. 1 shaft and Gratiot No. 2 shaft of 4,000' on the vein, which promises sufficient tonnages for many years' operations.

There has been expended in purchase and development of mine, including the Gratiot property, a little over $4,000,000.

Production: during 1920, regular monthly shipments of rock obtained from lateral development work were shipped to Copper Range mill for stamping, and to Michigan Smelting Co. for refining. Returns therefrom gave an average of 23.722 lb. refined copper per ton stamped. Returns for 1921 were 14,397 tons rock stamped, yielding 466,323lb copper, or 32.381b of copper per ton of rock.

The corporation continued its development campaign throughout the year 1921 and developments at lowest depth of shaft show some of best copper rock in Lake Superior district.

J. Parke Channing in January, 1922, estimates: the main or Kearsarge lode, if mined to a depth of, 500', on its dip beneath the entire 900 acres, will yield approximately 600,000,000 lb. copper, with an annual production of 20,000,000 lb. copper at a cost of 9½¢ per lb., sold in New York.

Gratiot Mining Co.

Office: 11 Broadway, New York City. Operating **office:** Calumet, Mich.

Officers: E. J. MacNamara, pres.; E. W. Brown, sec.-treas.; with E. H. Eckhoff, C. M. Wilson and J. R. Deering, directors.

Inc. Feb. 16, 1906, in Maine. **Cap.** $300,000; $3 par, fully paid. In 1919 the Seneca Copper Corp'n purchased the property, paying $25,000 cash, with additional payments to extend over a number of years. Old Colony Trust Co., Boston, registrar.

Property: 600 acres, the N. W. ¼ of Sec. 26, N. E. ¼ of Sec. 27, S. E. ¼ of Sec. 23, and S. E. ¼ of Sec. 22, except the N. W. ¼ of the N. W. ¼, T. 57 N., R. 32 W. Property lies S. and E. of the Seneca and N. and E. of the Mohawk, carrying the Kearsarge amygdaloidal bed under about 175 acres, to a maximum depth of about 2,700'. Extensive drill borings were made before the shafts were started. The Kearsarge bed averages about 12' in width, with strike of N. 42° E., and average dip of 33 to 36° with the horizon, and its copper contents are painfully low.

Development: by two 3-compartment shafts, exact duplicates, sunk at an angle of 36° on the Kearsarge bed. Levels are opened at 100' intervals. No. 1 shaft, about 1,500' from the Seneca boundary, is 1,971' deep, having a

bed up to 18′ in maximum width. Drifting has been done on the alternate odd numbered levels from the 1st to 9th, inclusive.

No. 2 shaft, 1,475′ S. W. of No. 1, and 1,800′ N. of Mohawk No. 1, is 1,520′ deep, and drifting has been done on the 2nd, 3rd, 5th and 7th levels, the best showing being on the 5th.

Property is served by a 2¼-mile spur of the Mineral Range Railway, built north from the Mohawk mine.

Production: begun July, 1910, was 28,552 tons of ore yielding 265,869 lb. fine copper, and in 1911, was 1,347 tons ore, yielding 14,275 lb. fine copper, or about 9.3 lb. copper per ton ore milled. The mine was shut down on April 3, 1911.

SENECA MINING CO. **MICHIGAN**

Inc. March 23, 1860, in Michigan. **Cap.** $500,000; shares $25 par. A subsidiary of the Calumet & Hecla Mining Co., was dissolved October 10, 1918, all its property being conveyed to the **Seneca Copper Corp.**, which see.

SHELDEN & COLUMBIAN COPPER CO. **MICHIGAN**

Address: care J. H. Rice, Houghton, Mich.

Property: lies next north of the Isle Royale mine and includes mineral rights under many private residences, near Portage Lake. An important discovery of sheet copper was made September, 1915, in an unidentified lode opened in excavating a cellar in this tract. Described in Vols. I and II of Copper Handbook. Idle for years.

SOUTH LAKE MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass **Mine office:** Houghton, Mich.

Officers: R. M. Edwards, pres.-gen. mgr.; Arthur C. Paine, sec.-treas.; preceding, with Thos. S. Woods, E. C. Robinson and Geo. E. Davis, directors.

Inc. Feb. 25, 1880, in Michigan. as the **Aztec Copper Co., reincorporated** Aug. 12, 1909, under present title and corporate existence extended for 30 years from Feb. 25, 1910. **Cap.** $5,000,000, increased Dec. 11, 1917, from $2,500,000; par $25; assessable; 104,863 shares issued; $9.60 paid in. Last assessment $2, paid Mar. 22, 1920. American Trust Co., Boston registrar, Federal Trust Co., Boston, transfer agent. Annual meeting, 1st Tuesday in March. Listed on Boston Stock Exchange.

Of the total issued stock 40,000 shares were given to the old stockholders share for share, 20,000 were offered and taken by the same stockholders at $2 per share and 10,000 shares were offered to holders of record May, 1913, at $6.60, but were largely taken by the underwriters; 10,000 shares more were offered in March, 1915, and an additional 10,000 in October, 1915, at $5, both of these last offerings being practically all taken by shareholders. In April, 1916, 10,000 shares more were offered to the stockholders at $7.75 per share.

January 2, 1918, the 100,000 new shares authorized by the increase in capitalization of record were offered to stockholders of record at $2 per share, at the rate of one additional share for each held.

Current liabilities at end of 1919 exceeded assets by $150,316 and at end of 1920, by $104,835, amounting to $109,648. Receipts from all sources were $60,715 and disbursements amounted to $32,855 in 1919; in 1920, total receipts were $68,249 and disbursements, $22,768.

Property: 500 acres of mineral lands, being the W. ½ of Sec. 31 and S. W. ¼ of Sec. 30 T. 51 N., R. 37 W., adjoining the Lake mine on the east, and the Adventure on the West.

History: work was begun on the property in 1862, though the name Aztec was originally given because the extensive prehistoric workings were thought to have been the work of the Aztecs. A 16-lb. stone hammer was taken from the old workings.

The mine had a stamp mill in early days, and produced 756,853 lb. fine copper, of which 100 tons was secured in a single mass. Exploratory work

was done, 1905-06, on the Knowlton bed of the Evergreen series, by the Aztec-Algomah Development Co., and diamond-drilling was begun Sept., 1909, continuing until March, 1911, when suspended because of adverse financial conditions. Borings were begun at the base of Evergreen bluff near the foot of the Evergreen belt, thence working southward toward the eastern sandstone. Eight drill-holes were put down at various points on the property.

Exploratory drilling having shown copper rock in five holes, four of them at the corners of a 200′ square, actual mine development work was determined upon. The holes showed that the beds run N. 70° W. and dip at about 56°. The drill-cores and recent underground work were carefully studied by A. C. Lane in 1916, who reports that of the four lodes cut by this work, No. 2 lode, or possibly a cocbination of number 1 and 2 lodes, is the Lake lode, mined by the Lake Copper Co., and that lodes dipping north in the 300′ crosscut, north of the South Lake Shaft, are identical with, and the same as those dipping south on the 600′ crosscut south of the shaft. This means that the veins fold over, dipping both N. W. and S. E., and that a vertical shaft can reach both limbs of the V-shaped fold.

A 600′ vertical shaft, started 1912, opened up No. 1, 3, and the Butler lode, all north of the shaft. Ore was mined from all 3 lodes in 1917, and principally from the Butler, in 1918. A connection with the Lake mine on the sixth level gives good ventilation. Owing to the long distance ore has to be trammed, stoping will not be started until mechanical haulage is installed. The Butler lode is opened at 3 levels, viz., by crosscut into bluff from shaft collar, 300′ and 600′ level.

The tract north of the mine acquired in 1918, permits mining on the Butler lode to a depth of 5,000′, and carries the Knowlton lode, that is well mineralized and worked in the Lake Copper Co. ground.

New work in 1918 amounted to 573′ which compares with 2,520′ in 1917. Operations were suspended in July, 1918 due to labor shortage and high production costs.

Equipment: includes a steel shaft-rock-house with a 5-drill air-compressor.

Production: commenced May, 1916, and to end of 1917, 63,368 tons sent to the Franklin mill, yielding 754,433 lb. of refined copper, or 11.03 lb. per ton. In 1918 to July, 7,694 tons were stamped, producing 226,141 lb. copper or 28 lb. per ton. Company has a decidedly promising property.

SOUTH RANGE MINING CO. **MICHIGAN**

Out of business. Property sold, 1917, to **Copper Range Cons.**, which see.

SOUTH SIDE MINING CO. **MICHIGAN**

Liquidated, and final dividends paid 1916. See Vol. XIII.

SPRING VALLEY IRON CO. **MICHIGAN**

See Vol. XIV.

SUNDAY LAKE IRON CO., THE **MICHIGAN**

Office: Cleveland, O. **Mine address:** L. M. Hardenburgh, gen. supt., Hurley, Wis., or W. J. Davies, local supt., Wakefield, Mich. Pickands, Mather & Co., sales agts.

Property: the Sunday Lake mine, on Gogebic range, Mich. **Ore:** hard, purple Bessemer and non-Bessemer hematites assaying 53% iron, 0.040 to 0.091% phosphorus and 11% silica. Mining is by sub-level stoping to depth of 1,494′.

Production: 2,660,945 tons to end of 1919. In 1917, 198,144 tons; in 1918, 131,425 tons; in 1919, 184,550 tons

SUPERIOR COPPER CO. **MICHIGAN**

Controlled by the Calumet & Hecla Mining Co. through ownership of 50,100 shares.

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. **Mine address:** Houghton, Mich.

Officers: Rodolphe L. Agassiz, pres.; James MacNaughton, v. p. and gen. mgr., with C. F. Ayer, Walter Hunnewell, directors; G. G. Endicott, sec.-treas.; H. L. Bennett, asst sec.-asst. treas.

Inc. July 23, 1904, in Michigan. **Cap.** $2,500,000; shares $25 par; fully issued and $1 paid. Listed on the Boston Stock Exchange. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in April. Company owns 18,386 shares of the Lake Milling, Sm. & Ref. Co.'s stock.

Operations, years ended December 30:

	Total Receipts	Ex-penses	Assm'ts Taxes and Const. Res.	Surp. for year	Inc. in Res. for Depr. & Depl.	Bal. Curr. Assts.
1920.....	$ 51,107	$ 35,946	$166,451	(a)$138,793	$ 12,497	$400,651
1919.....	146,233	204,677	34,544	71,623	21,366	539,444
1918.....	520,523	468,743	33,945	17,835	115,482	622,609
1917.....	483,877	269,782	59,115	54,980	.....	489,293

(a) deficit

Dividends: initial dividend of $1 paid Oct., 1916; $1 paid April, 1917. Total dividends, $200,000.

Property: 400 acres, carries about 6,000′ of the strike of the Baltic amygdaloidal bed, between the Isle Royale and Atlantic mines, embraces Sec. 15, of T. 54 N., and R. 34 W. The tract has room for 3 or 4 shafts, and has a light overburden, the bed being proven by trenches at intervals of 1,000′, showing an amygdaloid of 35 to 40′ average width, with extensive carbonate stains, due to weathering, and a little fine copper near surface. The property has been trenched to the eastern sandstone.

The mine has two workable copper lodes, the Baltic, locally known as the Superior, and the West lode, discovered in 1911, a formation independent of the Superior, 14 to 30′ thick, which, however, cannot be stoped until the Superior lode is mined. On the Superior lode all ground above No. 15 level has been stoped out.

Development: by 2 shafts, sunk in the footwall of the lode, insuring solid ground, but necessitating crosscuts at each level. Owing to the great width of the copper-bearing stratum, it is necessary to crosscut along the bed at 100′ intervals. The Superior mine is opened on the northern extension of the Baltic amygdaloid bed, though some call this the Superior lode, not being satisfied that the correlation is correct. The Baltic bed, in the Superior mine, carries copper impregnations in the footwall, always an evidence of strong mineralization, and there is a conglomerate bed under the foot that carries a small amount of copper. The milling ore is remarkably deceptive in appearance, as the copper oxidizes readily, and when it has been broken a few weeks, appears lean, unless a fresh fracture shows its true nature. As a triangular tract of land intervening between shafts No. 1 and 2 is owned by others, they cannot be connected above the 12th level. The mine has about 11 miles of workings, underground work for 1920 totaling 1,061′ and 1,864′ in 1919, compared with 2,564′ in 1918, 2,502′ in 1917, 5,136′ in 1916, 4,199′ in 1915, and 2,654′ in 1914.

No. 1 shaft, 3,104′ deep, is 1,200′ from the northern limit of the property; it develops the Superior lode on all levels, and the West lode from the 12th to 31st inclusive.

No. 2 shaft, 2,540′ S. W. of No. 1 and 2,400′ from the southern boundary, sunk 40′ in the footwall, at an angle of 53°, is 20′ below the 18th level or 1,628′ deep.

Over 3,000′ of drifting on the lode on the 31st. level having disclosed but one oreshoot, now stoped out, and the results of diamond drill work

and crosscutting being disappointing, the mine was closed down in 1920 and is not to be reopened.

Production:

Year	Tons Ore Stamped	Lb. Cu. per Ton	Cost per Ton	Lb. Cu. Produced	Cost per Lb., cts.	Rec'd per Lb.,cts.
1920.....	9,549	33.81	.....	322,871	14.65	.....
1919.....	27,267	20.68	$6.605	565,935	31.57	13.67
1918.....	106,213	15.78	2.682	1,676,446	23.29	24.22
1917.....	129,587	16.99	2.50	2,201,672	16.88	29.39
1916.....	185,315	16.38	2.07	3,034,656	14.61	24.67
1915.....	212,051	18.23	1.88	3,866,484	12.29	18.125
1914.....	191,628	16.79	1.75	3,217,635	12.43	12.645
1913.....	130,826	22.87	2.36	2,992,765	12.86	15.387
1912.....	172,322	22.76	2.33	3,921,974	12.75	16.45
1911.....	162,599	19.90	2.39	3,236,233	15.31	12.70
1910.....	140,514	22.64	2.69	3,181,041	14.29	12.63
1908-09.....	16,835	22.22	.....	374,077	.....	.....

TAMARACK MINING CO. **MICHIGAN**

Out of business. Property sold for $3,600,000, equal to $60 per share, to Calumet & Hecla Mining Co., on April 1, 1917. For history and description of property, see Vol. XII.

THOMAS FURNACE CO., THE **MICHIGAN**

Address: John M. Thomas, pres., 740 Kinnickinnic Ave., Milwaukee, Wis. G. A. Richards, mgr.; M. A. Hanna Co., sales agts.

Property: the Morgan mine, on the Gogebic range, opened in 1920 to depth of 300'. Production to commence as soon as rail connection is made. Company also operates the Indiana mine on the Menominee range, Dickinson county. The ore is hard, red, hematite assaying 35-39% iron and 0.007% phosphorus. Worked by open pit milling system to vertical depth of 180'.

Production: 14,018 tons in 1919 with total output of 233,502 tons.

TOLTEC MINE **MICHIGAN**

Idle many years. **Office:** care J. M. Longyear, Marquette, Mich. Owners, Gogebic & Ontonagon Land Co. and Galen L. Stone, of Hayden, Stone & Co., Boston.

Mine at Greenland, Ontonagon county, Mich., 960 acres, carries the underlay of the Evergreen belt and the Calico and adjacent beds of the Michigan.

Production: 1851-1860, was 413,443 lb. fine copper. Some diamond-drilling was done in 1908.

TORCH LAKE MINING CO. **MICHIGAN**

Idle. **Office:** 12-24 Exchange Place, Boston, Mass. **Mine office:** Leopold Bldg., Houghton county, Mich.

Officers: Thatcher Loring, pres.; Chilton Cabot, sec.; F. W. Nichols, agent.

Inc. in Michigan. **Cap.** $500,000; shares $25 par; assessable.

Property: 1,280 acres, Secs. 35 and 36, T. 56 N., R. 33 W., lying east of the Tecumseh mine of the La Salle company and about midway between Calumet and Lake Linden. The property was partially prospected, 1889-1900, by diamond-drill.

TOWNSITE MINING CO. **MICHIGAN**

Office: Youngstown, Ohio.

Officials: Francis J. Webb, gen. mgr., care Republic I. & S. Co., Duluth, Minn. H. C. Jussen, supt.

Inc. Jan. 10, 1918.

Property: the Townsite (or Norrie) mine, on the Gogebic range, in which an interest is held by the Republic I. & S. Co. thru the Oliver Iron

Mining Co. A Bessemer hematite, carrying 53% iron, is mined by slicing to a depth of 300'.

Production: 25,970 tons in 1917, 83,428 tons in 1918; 80,203 tons in 1919; a total of 189,601 tons.

TREMONT & DEVON MINING CO., LTD. **MICHIGAN**

Office: First National Bank Bldg., Hancock, Mich. Mine at Victoria, Ontonagon county, Mich.

Officers: H. L. Baer, pres.; W. M. Gibson, v. p.; Chas D. Hanchette, sec.-treas. with Claude Cooper, W. M. Gibson and Robt. T. Dunstan, directors, at last accounts.

Inc. Dec., 1908, in Michigan. **Cap.** $250,000; shares $25 par; 6,000 issued; two 10c. assessments levied to date.

Property: 680 acres, freehold, including the old Tremont and Devon mines, adjoining and directly W. of the Victoria, carrying about 1¼ miles of the strike of the Keweenawan copper formation, and apparently in the horizon of the western extension of the Lake bed.

In Feb., 1916, the E. J. Longyear Co. did some diamond-drilling. Three holes were put down; the first cut an unidentified lode lying above the Forrest lode; the third is said to have shown good values in the Victoria lode. No recent information.

TRIMOUNTAIN MINING CO. **MICHIGAN**

Office: 82 Devonshire St., Boston Mass. **Mine office:** Trimountain, Mich.

Fully described under **Copper Range Co., Mich.**, which see.

UNION COPPER LAND & MINING CO. **MICHIGAN**

Office: 70 State St., Boston, Mass.

Officers: Harry F. Fay, pres.; Harold H. Anthony, Ezra H. Baker, Samuel Carr and Albert B. Merrill, all of Boston, and John G. Stone, of Houghton, Mich., directors; C. J. Morrissey, sec.-treas.

Inc. 1863, in Michigan; charter extended in 1893. **Cap.** $2,500,000; $25 par; 80,000 issued; $2.06 paid in. Old Colony Trust Co., Boston registrar; American Trust Co., Boston, transfer agent. Stock listed on Boston Stock Exchange. Annual meeting, fourth Thursday in March.

Cash on hand Jan. 1, 1921, $47,884, principally derived from timber sales, 1914-'20.

Dividends: in 1899, 50c. per share and⅛ share of stock of Old Colony Copper Co., in 1907, $2, and in 1908, 50c. per share; none since.

Property: 4,279 acres of land, carrying both surface and mineral rights, and 2,087 acres additional of mineral rights only, divided into 200 or more tracts in Keweenaw, Ontonagon and Gogebic counties, Mich. Company is primarily a land-holding corporation, although its charter empowers it to carry on mining operations as well, and it has from time to time investigated various tracts to determine their mineral value. Greater part of the land is heavily timbered, valued in 1910, at $125,000.

In 1910-11 exploratory work was done by diamond drill on 320 acres of land, lying W. of the Allouez and North Kearsarge mines, with satisfactory results, especially on the Quincy-Pewabic amygdaloid, which showed well in copper. The Allouez conglomerate was cut; also several other beds carrying copper.

VERONA MINING CO., THE **MICHIGAN**

Office: Western Reserve Bldg., Cleveland, O. Pickands, Mather & Co., sales agts.

Officials: C. H. Munger, gen. mgr.; W. P. Chinn, asst. gen. mgr.; W. A. Rose, chief mng. engr.; W. H. Gallagher, chief mech. engr.; C. E. Lawrence, gen. supt., Palatka, Mich.; W. G. Hanson, Palatka, Mich., supt. of Baltic, Bengal and Caspian mines.

Property: the Baltic, Bengal, Fogarty and Caspian iron mines on the Menominee range. The Baltic and Caspian ores contain 50% iron and 0.421% phosphorus; the Bengal, 35% iron, 0.324% phosphorus and 18%

manganese. The Mikado mine on the Gogebic range, is subleased to the Plymouth Mng. Co.

Production: for 1918, '19, and '20, totaled 2,708,386 tons from the Baltic; 1,339,955 tons from the Bengal; 4,203,386 tons from the Caspian and 655,422 from the Fogarty.

VICTORIA COPPER MINING CO. MICHIGAN

Office: 60 Congress St., Boston, Mass. **Mine office:** Victoria, Ontonagon county, Mich.

Officers: Fred H. Williams, pres.; Chas D. Hanchette, v. p.; Jas. P. Graves, treas.; with Willard S. Martin and A. W. Chesterton, directors; Sydney S. Millett, sec. and transfer agent; Staff: George Hooper, supt.; Chas. D. Hooper, mill and power supt.; A. R. Penberthy, clerk and purch, agt.

Inc. Jan. 16, 1899, in Michigan. **Cap.** $2,500,000; $25 par; all issued; paid in, $15. Last assessment No. 7 of $1, payable May 25, 1921. Shares listed on the Boston Stock Exchange. First National Bank, Boston, registrar. Company's secretary is transfer agent. Annual meeting, fourth Monday in February.

Income Account—Years ended December 31:

	Receipts				
	Copper Sold	Other Inc.	Expenditures	Prev. bal.	Balance
1920.....	$137,908	$ 9,215	$305,540	$262,385	$103,967
1919.....	39,153	223,445	299,456	299,242	262,385
1918.....	305,644	84,678	358,917	267,836	299,242
1917.....	343,508	119,129	392,412	197,611	267,836
1916.....	293,298	176,930	384,898	112,280	197,611

Current assets of $217,475 at end of 1920 include, $162,544 copper on hand. Operations in 1920 resulted in a loss of $116,753. Total expenditures for 1920 were $305,540 and receipts but $147,123, reducing surplus from $262,384 to $103,967 at end of 1920.

Property: 2,389 acres mining lands, in Sec. 19, 20, 29, 30 and 31, T. 50 N., R. 39 W., and Secs. 24, 25 and 36, T. 50 N., R. 40 W. This tract has an extreme E.-W. width of 2 miles, and a N.-S. length of 2¾ miles, lying just W. of the Ontonagon river. It is practically all on the mineral belt, only about 100 acres lying on the eastern sandstone. The tract may carry the western extension of the amygdaloidal bed under development by the Lake Copper. Co. Neighboring mines, all idle for many years, are the West Minnesota on the N., National on the E., and Tremont-Devon on the W. The lands are well timbered, with an inexhaustible supply of good sandstone for building purposes. Nearest raidroad is the C. M. & St. P., at Rockland, 3 miles distant.

The first known attempt at Lake Superior copper mining was made in the winter of 1770-'71, on what is now the Victoria property. In 1849, the property, known then as the Cushin, was opened on a line of prehistoric pits containing masses of native copper, one weighing upwards of a ton. The name was changed, 1850, to Forrest, and property reorganized, 1858 as the Victoria Mining Co. Under these titles the property made 373,279 lb. fine copper at a loss of about $180,000. The mine was operated regularly, on a small scale, 1849-'55, and thereafter spasmodically. It was unwatered 1883, but remained idle until work was begun March 1, 1899, by the present company.

Geology: the Forrest amygdaloid bed, on which the mine is opened, is 5 to 80' wide, averaging about 12', but of very irregular width and dip, and very bunchy in content. The average strike is N. 66° E., and dip 61° N. W., the lode having about 2 miles of outcrop on Victoria lands. The formation is much disturbed at surface, the bed being irregular in dip, but widening at

depth, with more regular walls. The lode is low grade, but fairly regular in copper contents, with best value near the hanging wall.

Considerable diamond drilling has been done N. of the Forrest bed, a total of 15,292′ of holes having been drilled, in 2 cross-sections disclosing several beds that may warrant future attention.

Development: the old mine was opened by 5 shafts, deepest, 300′, located at irregular intervals, with levels spaced at 55 to 65′.

The Victoria, or, No. 2 shaft, which was chosen for new operations, was enlarged to 2 compartments, and a third compartment was added, 1916. 16″ E. of the skipway. The two skips work in balance. The shaft is 2,910′ deep, bottomed at the 28th level. Levels between the 4th and 24th have been opened at regular intervals of 100′; below the 23rd at intervals of 150′, with drifting on all levels, The total openings tributary to No. 2 shaft were 69,368′ on Jan. 1, 1920.

The productive part of the mine tributary to Victoria or No. 2 shaft is on the Forrest bed, an epidotal amygdaloid having an average width of 4′ to 12′, widening to 80′, at one point. Walls are quite regular, but where crush zones occur, the mineralization extends into the walls, giving an occasional maximum of 50′ width of ore. The footwall bed underlying the Forrest, at a depth of 2 to 12′, is well mineralized in places, carrying occasional masses from 100 lb. to 3 or 4 tons in weight, but is very bunchy, copper occuring mainly on the foot, with considerable epidote on the hanging. Underlying this epidotal bed, at a distance of 60′, is a 6′ amygdaloid showing much epidote and allied minerals, with a little milling ore. Stopes opened on all levels from the 4th to the 22nd inclusive, give fairly uniform results.

The copper shoot developed by this shaft is 1,000 to 1,500′ wide, with a slight rake to the S. W. The ore stoped is low in average grade, but fairly regular in contents, with main values in stamp copper. All levels down to the 17th are connected by winzes, giving ventilation and safety.

	New drifts	New work	Cu. Fathoms stoped
1920	1,080′	1,382′	3,694′
1919	1,708′	1,982′	5,963′
1918	2,447′	2,847′	5,833′
1917	3,113′	4,090′	8,526′
1916	1,350′	3,806′	10,755′

Openings on No. 11, 23, 24, 26 and 27 levels east in 1919 were in fair to very good ground. No. 27 yielded mass copper and ore up to 60′ wide, one mass weighed 14 tons and another 15 tons.

Operations in 1920 were limited to production of such ore as could be mined at least cost and development work was all but stopped to offset expense of keeping mine open and men employed.

Openings on the property totaled 78,034′ or about 14½ miles, Jan. 1, 1921. Development work was resumed, January, 1922.

No. 6 shaft, 3,455′, E. of No. 2, started December, 1919 develops the eastern end of the property already explored by diamond-drill work; it has three compartments with two skipways, designed for 6-ton skips. The shaft is 1,172′ deep and has 2,593′ of workings in generally poor ground.

The mine also has crosscut tunnels, 419′, 150′ and 724′ long, the longest showing the contact between the Keweenawan trap beds and the eastern sandstone and cutting several amygdaloidal beds on which drifting, in the past showed encouraging copper mineralization.

Equipment: No. 2 shaft has a new shaft house, equipped with a duplex 32x72″ cylinder, with conical drum, hoist, good for 5,000′, and a 5-ton traveling crane for handling skips, man-cage and timber.

Equipment is sufficient to take care of exploration to a depth of 5,000′, the present depth being 2,835′.

The rock-house has storage-bins for stamp ore and waste, with chutes, loading gates and air lifts, and there is a pneumatic hammer for mass copper. The boiler house is for heating purposes only.

Buildings at No. 2 shaft include machine and carpenter shops, smithy, concrete changing house, hospital, warehouse, general store, mine office, boarding house, 76 dwellings, sawmill, lathe, shingle and planing mill. There is also an amusement hall for motion pictures.

Mill: the stamp-mill, on the bank of the river near the power plant, has a single 24x24" Allis-Cuyahoga stamp. The stamp of 650 tons daily capacity, has 5/8" mortar screens, and all oversize above 3/16" is run to a set of 16x36" Traylor rolls. The washing floor contains 22 jigs, 5 Wilfley tables, 6 card tables, 1 standard table, hydraulic separators and settling tanks. In 1917, 15 new concentrating slime tables were installed. Machinery is driven by a 12x12" piston-valve engine. A 12x36" engine was installed in 1918. The mill started June, 1906, shows tailing losses of only 0.1 to 0.15% copper with an extraction of 81%. Mineral (concentrate) was formerly smelted by the Calumet & Hecla Co., but is now smelted at the Quincy smelter at Ripley. Three boilers at the stamp mill insure power when the water supply is low. The mine and mill are connected by a 4,800' tram line, in two sections, the upper with 6%, and the lower with a 12% grade. A stationary double-sheave hoist, at the top of the incline, serves to pull the empty cars up the steeper grades, but otherwise trains are operated by gravity, in counterbalance.

Hydraulic Plant: a large water power has been developed from Glenn Falls, on the W. branch of the Ontonagon river, about a mile from the mine, at a cost of $251,603. This is the best natural water power of the Lake Superior copper district, the stream dropping about 110' on the company's property, by a series of small falls, between which are numerous rapids, with sandstone bottoms. The company utilizes 72' of this drop. Power is developed by means of a dam, canal and hydraulic air-compressor.

The dam is 225' between abutments, has an extreme height of 24', is 14' wide at the bottom and 8' at the top, and has a 320' main section with wings of 100' and 160', giving a total of 580', built with an arch upstream. It is provided with two 44' flush gates, for drainage and flushing out silt, a log chute, waste weir and sand fence.

The canal diverting water from the dam is 4,800' long, 10' deep at the head gates, with a bottom slope of 1" in 100'. At the end of the canal opens out in a forebay, at the extreme end of which the compressor shafts are located. The canal is equipped with drainage gates, slush gates, overflow weirs and submerged measurement gates.

The 3 intake shafts of the compressor are 5' in diameter, spaced 19' from center to center. The shafts were sunk through solid sandstone, by means of 5" preliminary holes, bored to the required depth of 343', then enlarged from 5" to 5' in diameter.

The shafts, lined throughout with concrete, formerly drew air through 5,000 special 3/4" tubes. This proved unnecessary as the water falling down each shaft sucks air with it and this air is carried through 280' of air chamber cut in the rock at the bottom of the shaft. A water seal at the intake end is formed by 3/4" steel shells firmly concreted into the bottom of the shaft, which is 16x18' in section, sunk at 72°, with a vertical depth of 271', 21' and maximum of 26' height, having a maximum capacity for 80,264 cu. ft. of compressed air. The water seal at the upflow end is formed by an arch of rock, 40' long, below which a tunnel 10' high leads to the upflow shaft, which is 16x18' in section, sunk at 72°, with a verical depth of 271', leading to surface, where the water is again discharged into the river. The power head developed is 72', and the pressure head 271', giving a maximum air compression of 117 lbs. per sq. inch. Imprisoned air, carried down the shafts by suction and swept along the tunnel in bubbles, by the rush-

ing water, is released in the chamber where the constant accession of bubbles causes compression, escape backwards being prevented by the ⅜" steel shells connected in the shafts. The chamber, known as the compressor, is connected with a 12" pipe line to mine and mill. Extra pressure is relieved by a safety or blow-off pipe.

The Taylor hydraulic-pneumatic plant was completed in March, 1906, furnishes 4,000 to 5,000 h. p. under a full head of water, and has shown an efficiency of 82% under test. It is the largest single-unit air compressor in existence and the fifth installation of the sort in the world. It is possible to operate 1, 2 or 3 of the inlet shafts if so desired, with corresponding variation of energy developed, but only one unit is in regular use. The compression is automatic, practically isothermal, and the air as delivered is unusually dry.

An extensive topographical and hydraulic survey of the company's lands and the watershed shows that an average of 15,000 h. p. can be developed on the western branch of the Ontonagon river, but the expense of development necessarily will be large. During the drought of 1910, the water supply fell far below normal and additional storage for water was secured on the western branch of the Ontonagon, near the outlet of Lake Gogebic.

Production:

Year	Tons Ore Stamped	Lb. Cu. per Ton	Cost per Ton (a)	Copper Produced, Lb.	Cost per Lb., Cts.
1920	61,031	16.5	$...	1,060,829	.....
1919	89,206	13.9	3.37	1,245,590	24.04
1918	106,730	14.3	3.12	1,533,536	22.18
1917	137,286	11.8	2.63	1,612,640	22.43
1916	146,690	11.3	2.16	1,661,832	18.40
1915	133,984	11.1	1.46	1,499,695	15.66
1914	139,862	10.6	1.41	1,486,242	16.0
1913	137,163	10.4	1.42(b)	1,428,693	16.5
1912	131,955	9.3	1.32	1,224,911	17.41
1911	126,894	10.2	1.20	1,303,331	13.01
1910	122,497	9.0	1.17	1,164,564	13.04
1908	118,605	9.0	1.48	1,062,218	17.09
1909	109,015	11.8	1.56	1,290,040	14.34
1907	95,035	12.7	1.71	1,207,237	15.8
1906	39,185	13.9	....	546,334	18.7

(a) Mining and Milling. (b) High cost due to the labor strike and high footage, 7,428' of development.

Copper carried over from 1919, 977,440 lb., sold at 18.163¢ per pound, leaving unsold metal, 1,180,955 lb. on Dec. 31, 1920.

Tonnage costs are low, but finished copper costs are high, owing to the exceedingly low average tenor of the rock stamped which contains only about 0.65% copper. Costs would be ruinous, and the mine hopeless, were it not for the great advantage that the property enjoys through the cheapest power that is had by any copper mine in this or any other district. The company's holdings are extensive, exploratory work is being conducted with vigor, and the management has displayed both courage and good judgment in its operations.

WAKEFIELD IRON CO., THE **MICHIGAN**

Address: J. D. Ireland, 1300 Leader-News Bldg., Cleveland, O. **Operating office:** Crystal Falls, Mich.

Officers: H. M. Hanna, Jr., pres.; M. Andrews, v. p.; J. D. Ireland, v. p.; C. N. Hickok, treas., with F. B. Richards, L. C. Hanna, Jr. and Benton Hanchett, directors. Geo. M. Humphrey, sec.; E. E. Hunner, gen. mgr.; G. E. Frederickson, pur. agt.

Inc. 1912 in Mich. **Cap.** $2,000,000; $25 par; all outstanding. Funded debt—$1,200,000 6% serial gold notes dated Dec. 1, 1919.

Dividends: 10% in 1914; 10% in 1915; 25% in 1917; 12½% in 1918; 7% in 1919; 35% in 1920; none since.

Property: the Wakefield mine, at Wakefield, Mich., on Gogebic range, Gogebic county, Mich., first opened in 1913. Ore: two grades of ore, the "Andrews," a soft, red non-Bessemer hematite, carrying iron natural 53%; phosphorus, .077%, and silica, 4.11%; 2nd, the "Duane," a dark brown to blue-black hematite carrying iron natural, 52%; phosphorous, 0.074%; silica, 4.06%, and manganese, 2.25%.

Mining is by open pit and by underground work to depth of 400'.

Production: 1913, 15,260 tons; 1914, 313,050 tons; 1915, 651,300 tons; 1916, 1,061,730 tons; 1917, 1,144,411 tons; 1918, 1,130,432; 1919, 603,966 tons; 1920, 980,000 tons; total to date, 5,800,152 tons.

WASHINGTON COPPER MINING CO. **MICHIGAN**

Office: Calumet, Mich. Mine near Delaware, Keweenaw county, Mich.

Officers: S. R. Hill, pres.; Thos Hoatson, v. p.; Chas A. Wright, Jr., sec.-treas., with Thos F. Cole, and G. G. Hartley, directors.

Inc: 1884 in Michigan. **Cap.** $2,500,000; shares $25 par; issued $1,500,000. Is controlled, through ownership of a majority of issued stock, by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March.

Property: 1,050 acres, on the western shore of Mosquito lake, on which desultory work has been done at intervals in the past. Idle since 1901.

WASHINGTON IRON CO. **MICHIGAN**

Address: W. B. Pattison, supt., Negaunee, Mich. C. B. Dunster, mgr.; E. N. Breitung & Co., sales agts

Property: the Washington mine on the Marquette range, Marquette county, opened in 1860. The ores, carrying 50% iron, are hard, non-Bessemer, specular and magnetite, extracted by stoping to 730'. **Production:** has been irregular.

WEST CHAPIN MINES CO. **MICHIGAN**

Operates an iron mine at Iron Mountain, Dickinson county, Mich.

WEST MINNESOTA MINING CO. **MICHIGAN**

Defunct. John Coughlin, receiver, 68 Devonshire St., Boston, Mass.

Inc. about 1864, in Michigan. **Cap.** $500,000; shares $25 par. Was an old and long inactive company owning 550 acres lying mainly W. of the Ontonagon river. Property sold May, 1916, to F. W. Nichols of Houghton, (¼ interest) and T. W. Cole, (¾ interest.) Sale ordered because company's charter had expired.

WETTERHORN LAND CO. **MICHIGAN**

Idle since 1913, and probably out of business. Owned 760 acres, in Secs. 21 and 22, T. 51 N. R. 42 W., Ontonagon county, Mich.

WHEALKATE MINING CO. **MICHIGAN**

Address: R. C. Pryor, mgr., Houghton, Mich.

Officers: N. F. Leopold, pres.; R. R. Goodell, v. p.; R. C. Pryor, sec.; A. F. Leopold, treas., with J. H. Rice, directors.

Inc. 1902 in Michigan. **Cap.** $50,000; $25 par; all issued and paid.

Property: 240 acres in and adjoining village of South Range, Mich. Company only conducts a real estate business. Part of its mineral rights sold to the South Range Copper Co.

WHITE PINE COPPER CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **General office:** Calumet, Mich. **Mine address:** Ontonagon, Ontonagon county, Mich.

Officers: R. L. Agassiz, pres.; Jas McNaughton, v. p.-gen. mgr., with D. S. Dean, Fred'k Ayer, Jr., J. M. Longyear, F. L. Higginson and Q. A. Shaw McKean, directors; G. G. Endicott, sec.-treas.; H. L. Bennett, asst. sec.-asst.-treas.; Thos. H. Wilcox, supt.

Inc. 1909. **Cap.** $5,000,000; $25 par; in 150,000 common shares and 50,000 5% cumulative preferred shares; issued 85,320 common and 10,000 preferred. Is controlled by the Calumet & Hecla Mng. Co., through owner-

ship of 10,000 shares of preferred stock and 42,602 shares of common stock. Annual meeting, first Tuesday in April.

Company bought and retired 24,759 shares preferred stock in 1917-18.

Operations for years ended December 31:

	Total Receipts	Oper. Exp.	Taxes Divs., etc.	Surplus for year	Pfd. Stock Decrease	Balance Curr. Assts
1920.	$280,643	$319,268	$207,863	$246,488*	.....	$240,000
1919.	458,225	535,677	.....	193,815*	.....	360,834
1918.	850,156	724,649	30,028	95,479	332,814	402,040
1917.	897,935	455,850	73,925	368,160	472,336	509,733

* Loss.

A dividend on preferred shares, equal to $116,676, was paid Jan. 2, 1917.

Property: the White Pine mine and surrounding land, formerly owned by the Keweenaw Association and others. The White Pine mine, 80 acres, is in Sec. 5, T. 50 N., R. 42 W., 3 miles E. of the Nonesuch mine at the extreme south end of the Keweenawan mineral belt. The other property was paid for by stock. A 9 mile railroad line connecting the property with the Chicago, Milwaukee & St. Paul R. R., was completed in Dec., 1915.

Geology: the tract shows eruptive rocks with interbedded sandstone and conglomerates of the secondary Keweenawan series. It also holds what F. E. Wright called epidote veins which are epidotal melaphyrs crossing the face of the cliffs parallel to the sandstones, but showing evidence of faulting and crushing. There is a second set of minor, nearly vertical epidote veins which, unlike the first, are barren of copper. The sandstone beneath the melaphyr is a fine-grained, dark red, almost quartzite rock that is jointed and has numerous calcite veins and occasional threads of malchite which extend down a few feet from the contact. The sandstone is, however, usually concealed by talus from the cliffs. Native copper also occurs in a very fine-grained sandstone-conglomerate, which is said to run from 5 to 10%. The dip of the bedded formation is towards the S. E., varying from 8 to 35°. The so-called Nonesuch formation consists of 2 parallel beds of sandstone running from 4 to 8′ in thickness and separated by a 5′ bed of slate, the entire copper-bearing ground having a width of about 40′. The beds carry considerable finely disseminated native copper which is as a rule very flaky. This formation is badly faulted and ground is said to have been thrown so that the payable lode abutted directly against the unpayable one. Besides the 2 veins described, there is a third which lies about 45′ back in the footwall.

Development: by 4 shafts. The No. 2 temporary shaft was 1,584′ deep and had about 4,756′ of openings, Jan. 1, 1920. It connects with the old White Pine shaft. This shaft is vertical for 581′, has 392′ of curve and 605′ of 45° underlay. A new hoist was installed in 1918. The main working shaft (called No. 3), located between the two temporary shafts (No. 1 and 2), is incline 1,090′ deep, with about 9,666′ of workings. It is equipped with 5-ton skips.

The No. 4, an inclined shaft, west of No. 1 shaft, sunk in the hanging at a considerable distance above the lode, is 977′ deep and has about 14,560′ of workings. It is equipped with 5-ton skips. New workings totaled 3,578′ in 1918; 3,478′ in 1917; 5,288′ in 1916. The rock is soft and can be mined and crushed cheaply.

New work amounted to 1,244′ in 1920; 549′ in 1919; 3,578′ in 1918; 3,478′ in 1917; 5,288′ in 1916. At No. 3 shaft, stoping on the 2nd, 3rd 4th and 5th levels on the Third lode yielded rich rock; the stopes from No. 4 shaft on the three upper levels are also in good ore.

Equipment: includes a power plant and compressor at the mine. A 750-k. w. electric turbine on Iron river, 1½ miles from the mine and mill, supplies water for the mill.

Mill: company has a 1,000-ton mill equipped with gyratory crushers, rolls and Hardinge mills instead of the steam stamps common in the Lake Superior copper country. Concentration is effected on Wilfley tables and the tailings saved, as future regrinding and leaching will undoubtedly be used in reclaiming the copper content

A 600-ton flotation plant was erected in 1917, near the working shafts and connects with them by means of trestles over which rock is transferred from the shaft rockhouses to the crushing plant at the mill. Two pebble mills were converted to ball mills for finer grinding and 2 Dorr thickeners, 3-tray type, each 40' in diameter added.

Production:

	Tons Ore Treated	Lb. Cu. per Ton	Mine Cost per Ton	Lb. Cu. Prod.	Cost per Lb.	Rec'd per Lb.
1920	93,260	19.85	$3.797	1,850,787	23.12c	18.69c
1919..	84,008	23.56	3.841	1,979,268	23.61c	18.74c
1918..	194,568	16.83	2.984	3,273,680	22.48c	24.30c
1917..	212,889	19.11	2.365	4,067,529	14.99c	28.30c
1916..	188,890	22.27	2.082	4,207,449	12.70c	25.26c
1915..	114,039	24.76	2.182	2,824,145	16.54c	18.353c

1915 production is for 8 months only.

Mine costs include mining, transportation, stamping and taxes per ton of rock treated; 1918 cost per lb. includes 2.64c. per lb. for depreciation.

Property is decidedly promising and its life has been lengthened by the flotation plant, which will reduce tailing losses and make available both lower grade ore and rock in which the copper is in an extremely fine state of subdivision.

WHITE PINE EXTENSION COPPER CO. MICHIGAN

Office: F. L. Smith, 1905 Dime Bank Bldg., Detroit, Mich.

Officers: F. L. Smith, pres.; Angus Smith, v. p.; A. W. Brechting, sec.-treas., with J. R. Stanton and H. H. Campbell, directors.

Inc. June, 1915, in Michigan. **Cap.** $3,750,000; $25 par; assessable; issued 85,640 shares, 85,000 of which have been paid in at $10. American Trust Co., Boston, transfer agent; Boston Safe Deposit and Trust Co., registrar. Listed on Boston Stock Exchange. Annual meeting, first Tuesday in March.

Due to labor conditions and high costs, all mining operations were suspended on May 28, 1918, and mine was closed down August 7, 1918.

Balance sheet dated March 15, 1921, showed: Assets—good will, franchises, etc., $600,000; bills and acct's rec., $16,000; inventories, $42,339; cash, $20; P. & L., $322,876. Liabilities—include capital stock, $856,540; bills and acct's pay., $124,655; adjusted credits, $40.

Property: 1,440 acres mineral land in the White Pine district, Ontonagon county, 5 miles west of the White Pine property of the C. & H. Mng. Co. The company owns the leases and exclusive mining rights for 50 years, paying a sliding scale royalty. These leases were purchased from F. L. Smith of Detroit, and associates who received 60,000 shares of stock in payment for their lands and the development work done prior to June 1, 1915.

The property is similar to that of the White Pine Copper Co. in that it shows sandstone and soft shales and slates. Considerable copper glance was found during diamond drill exploration work, the copper in the core of one hole showing glance only, no native copper being present.

All work was discontinued in 1918 and surface equipment sold to Michigan Iron Land & Lumber Co. in 1921. For results of exploratory work done, see Volume XIV.

WICKWIRE MINING CO. MICHIGAN

Address E. C. Bowers, Buffalo, N. Y. H. Duff, supt., Iron River, Mich. J. M. Riddell, engr.

Property: the Virgil and Wickwire iron mines on the Menominee range, Iron county, Mich. **Ore:** yellow-brown and red-brown non-Bessemer hematite, the former containing 51.04% iron 0.396% phosphorous and 6.32% silica. Ore mined by sub-stoping, to 273′ in the Virgil and slicing and caving to 313′ in the Wickwire.

Production: the Virgil yielded 40,321 tons in 1918 and 174,803 tons to the end of that season. The Wickwire has been idle since 1917. Total amount produced, 129,111 tons. The Cardiff mine was being developed in 1920. It has a 560′ shaft, concreted to the bottom and also has electric and steam power, 2 Nordberg hoists, a 1,300 cu. ft. I. R. compressor, shops, change-house, etc.

WILMOT MINING CO. **MICHIGAN**

Described in Vol. XIII. Probably out of business.

WINONA COPPER CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Operating office:** Winona, Houghton county, Mich.

Officers: T. S. Woods, pres.; Alfred B. White, v. p.; A. C. Paine, sec.-treas., with John C. Coughlin, Fred W Fisher, G. A. Braun and Geo. D. Baker, directors.

Inc. 1898, in Michigan. **Cap.** $2,500,000; shares $25 par; increased 1911 to $5,000,000; issued 166,667 shares, fully paid. Last assessment of $1 was paid July 2, 1914. The company, in 1911, acquired the property of the King Philip Copper Co., issuing 66,667 shares of Winona stock therefor. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Listed on the Boston and Detroit Stock Exchanges. Annual meeting, last Tuesday in March.

Income Account—Years ended December 31:

	Copper Sales	Other Income	Expenditures	Prev. Surplus	Cu. Sold payt. not due	Balance of Assets
1919	$83,092	$5,893	$202,375	$1,301,362	$71,930	$1,414,752
1918	166,228	14,043	284,020	1,197,613(a)	.....	1,301,362
1917	355,624	16,000	480,162	330,045	79,602	301,110
1916	473,583	15,500	545,202	223,324	162,840	330,045

(a) Deficit. The books being readjusted to meet Governmental requirements.

Current assets at end of 1919, totaled $159,409, and liabilities including $50,000 notes, $79,548.

Company suspended operations May 15, 1920, and the mine was dismantled, which means the end of mining operations. The company sold all its timber to the Pampa Land Co., a newly formed concern, in 1921, but will sell power to the new company and rent its buildings, railway, etc.—retaining its land and mining rights. The property, etc., is very fully described in Vol. XIV, which see.

WOLVERINE COPPER MINING CO. **MICHIGAN**

Office: 15 William St., New York. **Mine office:** Kearsarge, Houghton county, Mich.

Officers: L. P. Yandell, pres.; R. E. Graver, treas.; F. G. Heumann, sec. Directors: L. P. Yandell, C. D. Lanier, W. A. Paine, J. S. Dunstan, and Theo. Dengler, gen mgr.; W. R. Bolley, supt.

Inc. 1890, in Michigan. **Cap.** $1,500,000; $25 par; $13 per share paid in. The company owns $80,000 stock in the Michigan Smelting Co. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Monday in August. Listed on Boston Stock Exchange. In August, 1919, stockholders voted for continuation of corporate existence for a further term of 30 years beyond date of present article of association which is July 28, 1920.

Financial Statement for fiscal year ending June 30:

	Receipts	Tot. Exp.	Profit	Div.	Surp. for Year	Total Surplus
1921....	$594,864	$732,562	$137,698*	.....	.....	$446,876
1920....	673,000	759,025	86,025	$90,000	$176,025*	.....
1919....	997,376	875,278	122,098	150,000	27,902*	847,812
1918....	1,074,491	737,711	336,780	570,000	233,220*	875,714
1917....	1,707,441	681,036	1,026,405	780,000	246,404	1,108,933
1916....	1,369,286	634,068	735,218	660,000	75,218	862,529
1915....	929,193	610,991	318,201	360,000	41,798*	787,311
1914....	484,061	402,936	81,075	.....	81,075	829,109
1912....	1,327,030	713,840	613,180	540,000	73,180	746,520

* Deficit.

Profit and loss surplus was $1,759,337 at end of 1917-18; $1,565,607 in 1918-19; $1,389,582 in 1919-20.

Dividends: the first dividend was paid Oct. 1, 1898, and 45 dividend disbursements, to Jan. 1, 1920, aggregated $10,350,000.

Property: 320 acres, 280 acres freehold, and 40 acres mineral rights, carries 3,100′ of the strike of the Kearsarge amygdaloidal bed, on which the mine is opened. Neighboring properties are the North Kearsarge (Osceola Cons. Mng. Co.), on the N., Mayflower on the E., Mayflower and South Kearsarge (Osceola) on the S., and Centennial on the W.

The Kearsarge bed averages about 16′ in width on the Wolverine property, and this mine was for many years the richest amygdaloidal mine in the Lake Superior district, second in richness only to the Calumet & Hecla among all Lake Superior copper mines. All shafts are sunk at an angle of 41°, and skip tracks are laid on crossties, in place of longitudinal stringers, following the plan introduced in the Calumet & Hecla. All levels, except the uppermost ones, are opened at 100′ intervals. Owing to the uniformity of the cupriferous bed, all levels from the 1st to the 23rd, inclusive are opened through the entire property, connecting all 4 shafts to the bottoms of No. 1 and 2, and connecting Nos. 3 and 4 only below the 17th level.

A new lease of life was given the mine by working the footwall rock of supposedly worked out stopes, throughout the mine. The total width of the lode is 15′ to 20′; in the original work only 12′ was mined, so there remains 3′ to 5′ of rock which contains about 18 lb. copper per ton.

For the year ended June, 1919, 35% of the total rock hoisted was secured by continuation of this re-working practice compared with 40% from similar work in year ended June, 1918.

Company was reported negotiating for the purchase of 640 acres from the Centennial or the Kearsarge properties. This would allow shafts to be carried to a depth of about 10,000′.

Development: to 43rd level, by four working shafts, with levels on the Kearsarge lode. In early days several parallel lodes were prospected, an exploratory crosscut being driven for 2,000′ across the formation on the 14th level, reaching the Kearsarge conglomerate on the W., where it was barren. Another exploratory crosscut, 1,600′ long, driven E. on the 28th level, intersects the Old Colony lode 1,489′ E. of the Kearsarge amygdaloid and cuts other cupriferous beds. A little drifting on the Old Colony lode failed to disclose payable ground. The West lode lying 80′ W. of the Kearsarge has been opened by several levels with some payable ore. The Wolverine lands also carry the Osceola amygdaloid, but it proved non-commercial in a 631′ shaft with drifts on 5 levels.

No. 1 shaft near the Kearsarge line, was abandoned years ago. No. 2 shaft, next S., is bottomed at 1,700′ and is used for handling men and supplies.

No. 3 shaft sunk in the footwall, is bottomed at the 39th level, total depth 4,005′. Sinking was stopped at the 39th level as the hoist had reached the

limit of its rope capacity. It is proposed to open and mine the remaining 100 below the 39th level by means of a winze 600' S. of the shaft. This inclined winze will eventually attain a depth of 700' in order to reach the boundary of the property.

Shafts No. 3 and 4 are connected by drifts down to and including the 33rd level.

No. 4 shaft sunk 45' in the foot, to guard against drawing, has reached the 43rd level, total depth 4,460', the bottom of the mine. This shaft was reopened in 1920 and pillars were being removed from No. 38 level upward. It yields 17 lb. per ton.

Development in 1918-1919 amounted to 1,259' which compares with 1,972' the previous year. All ground north of No. 3 shaft, from the 25th to the 40th levels, with the exception of about 90' of shaft pillars, was stoped out in 1919. Other openings showed a satisfactory grade. In 1918, levels No. 40, 41, 42 and 43 had practically reached the southern boundary, and drifting showed the levels to be well mineralized.

During 1920, old stopes above No. 40 level yielded fairly good ore.

Early in 1919, the South Kearsarge mine of the Osceola Cons. Mng. Co., discontinued pumping the lower levels. The Wolverine management was forced to connect from their 29th level to the South Kearsarge 23rd level, and cement in pipes with control valves and pressure gauges. The pumping facilities were doubled and a 1,400-gal. boiler installed in shaft No. 3. Company lifted 110,000 gal. of South Kearsarge water per day, in addition to its own. In 1920, Wolverine connected with the North Kearsarge, so that it is not now necessary to handle the water from the South Kearsarge.

Equipment: at No. 3 shaft duplicates that of the Mohawk mines. That at No. 4 includes a 14"x60" duplex-cylinder hoist with double conical drum having a maximum diameter of 18', capable of raising 4-ton skips from 1 mile depth, with a 1¼" steel cable. There are 20-drill and 22-drill compressors, and 3 water-tube boilers, with automatic stokers and fuel economizer.

Mine has electric pumps, 3 at No. 2 shaft, and two at shafts No. 3 and one at shaft No. 4, three pumps having an average lift of more than 1,000' each.

The principal mine buildings are at No 4 shaft, but there is a model changing house at No. 3 shaft. A telephone system connects underground pump stations and all buildings. The company maintains a 6-ward hospital and staff, and owns a large number of substantial dwellings, the location being exceptionally prosperous in appearance.

Rock is transported between the mine and mill by the Mohawk & Traverse Bay railroad, with a down-grade haul of 13 miles.

Mill is near the mouth of Tobacco river, on Traverse bay, Lake Superior, and adjoins the Mohawk mill, both being served by a single pump and managed by a joint superintendent. The mill has 2 Nordberg heads and uses Wilfley tables. Mineral from the heads and wash is sluiced to the basement through iron pipes, going to the works of the Michigan Smelting Co. at Houghton. A tailings plant provides for settling out the water and stacking the tailings 800' from the mill by belt conveyor.

The boiler-house contains a battery of 200 h. p. water-tube boilers, equipped with automatic stokers.

The pump-house, owned jointly by the Wolverine and Mohawk, has a 20,000,000,000-gal horizontal triple-expansion pump, with 18", 33" and 54" steam cylinders and 22" water plungers, with 36" stroke, besides an auxiliary 8,000,000-gal. triple-expansion water-end pump, with 3 plungers. The pump house is located on the river, near its mouth, the intake being protected by timber cribs running 300' into the lake to prevent clogging from floating bark and anchor ice.

Work was started, 1919, on an intake shaft and tunnel under the lake. Pump station was cut at 90' below lake level; shaft was 110' below lake level

and tunnel was driven 1,423′ to July, 1919. Estimated length to be 2,200′ where 30′ of water will be attained.

A concrete building, 42x42x18′ was constructed in 1918, to house a 1,250-k. w. capacity, 60-cycle, 3-phase, 2,200-volt mixed pressure turbine. This turbine will furnish power to drive all the mill machinery plus three 7,000-gal. electrically-driven centrifugal pumps to be installed at pump house, thereby eliminating present boiler pumping plant. This expense is being shared by the Mohawk Mining Co.

In normal times the average number of men employed at mine and mill was 370, but during 1919 the force averaged 30% below normal, and in 1918 20% below normal.

Recent Production: (fiscal year ending June 30).

	Tons Ore Hoisted	Cost per Ton	Tons Ore Stamped	Cost per Ton	lbs. Cu. per Ton	Mineral lbs.	Ref. Cu. lbs.	Cost per lb. (a)
1921	266,728	$2.241	263,053	$2.273	13.838	6,290,075	3,640,303	18.903c
1920	257,395	2.335	257,294	2.336	15.282	7,015,200	3,932,225	17.338
1919	298,279	2.117	298,089	2.118	15.306	7,339,025	4,562,617	15.905
1918	304,015	1.911	303,498	1.914	15.185	6,961,500	4,608,865	14.603
1917	354,899	1.54	352.845	1.63	16.59	8,753,945	5,856,889	11.62
1916	391,898	1.31	388,989	1.39	17.07	9,127,790	6,541,492	9.54
1915	403 219	1.28	397,614	1.30	18.23	9,734,850	7,250,866	8.43
1914	188,147	1.85	182,127	1.92	18.86	4,606,015	3,435,459	11.72
1913	403,514	1.53	388,502	1.62	21.49	10,782,405	8,350,312	8.665
1912	414,544	1.53	401.308	1.58	23.45	12,164,780	9,408,960	7.586
1911	400,296	1.59	388,476	1.64	24.75	12,227,500	9,617,168	7.542
1910	405,790	1.55	390,837	1.61	24.96	12,359,000	9,757,101	7.413

(a) Cost per pound includes construction, but does not include costs of depreciation, depletion and taxes, which amounted to 6.103c. in 1921; 4.711c. in 1920, 4.395c. in 1919, 4.324c. in 1918.

Company has produced to June 30, 1921, a total of 173,517,285lb of copper.

Rumors that Wolverine was trying to get options on certain blocks of land in the district, seem to indicate that the management is contemplating expansion. The relatively large resources, small share capitalization, and efficient organization certainly admit such a policy.

WYANDOT COPPER CO. MICHIGAN

Office: 68 Devonshire St., Boston, Mass. **Operating office:** Houghton, Mich. **Mine office:** Wyandot Mine, Houghton county, Mich.

Directors: Fred Hoitt, pres.; Ashley Watson, v. p.; Chas. E. Adams, sec.-treas., Joseph Dorr, and Frank L. Van Orden, mgrs; Louis La Rochelle, mng. capt.

Inc. Feb. 3, 1899, in Michigan. **Cap.** $2,500,000; shares $25 par; paid in, $13. Last assessment $1, levied August, 1917, payable 50c., Sept., 1917, and 50c., March, 1918. Has levied assessment of $500,000 since organization. Shares are listed on the Boston Stock Exchange. State Street Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Annual meeting, second Monday in May.

Balance sheet of March 31, 1920, showed $20,088 of current assets and $315 of current liabilities.; on March 31, 1921, current assets were $15,200 and current liabilities, $90.

Property: 1,065 acres, adjoining the Winona, in Secs. 16, 20 and 21, T. 52 N., R. 36 W. Exploratory work, begun Feb., 1899, was done in search of the Winona bed; later to locate the southern extension of the Baltic amygdaloid, after which attention was turned again to the Winona bed, and latterly to development of an amygdaloidal bed, the No. 8 lode, lying about 2,300′ E. of the Winona lode. The average strike of the Keweenawan formation on this land is N. 53° E., with an average dip of 65°, and the Wyandot lands carry the strike of the Keenawan bedded series for about 1¼ miles.

Development: by several shafts, No. 1, 1,000′ deep, sunk in the foot-wall of the Winona bed. No. 11 exploratory shaft is sunk 710′ on a stratum

paralleling the Winona bed, at a distance of 1,200'. This bed looked good when first opened, and diamond-drill cores were rich, but proved poor under development. A crosscut driven S. E. from the bottom of No. 11 shaft for 2,640', intersects 13 distinct amygdaloidal beds, Nos. 3 and 2 showing copper. Drifting done on No. 3 bed disclosed considerable mass and barrel copper, but No. 8 is the more promising.

Miscellaneous work of the past includes a 102' vertical shaft, sunk on a lean amygdaloidal bed, known as the Misery river bed, in Sec. 16, T. 52 N., R. 36 W., but nothing of value was developed. Some years ago a vertical shaft was sunk on lands held under option, near the W. quarter post of Sec. 28, T. 52 N., R. 36 W., to depth of 250', and crosscuts driven both E. and W. with about one-half mile of workings. This work crossed the horizon of the Baltic bed, but what was deemed the Baltic amygdaloid was found highly altered, and worthless, as was the whole country in the neighborhood.

Extensive exploration has been done, the ground carefully prospected by diamond drill, in Sec. 16 and 21, but trenching and pits showed only low grade material.

Recent prospecting has been centered in the No. 8 lode, 1,100' S. E. of the No. 11 shaft. This lode is opened by the long crosscut on the 700' level, and below this depth by a 115' winze, with about 800' of drifts on the 815' level, 400' of drifts on the 900' level and about 600' of drifts on the 1,000' level, the bottom of the winze, up to March, 1918. The showing on these levels has been varied but sufficient work has not been done to demonstrate fully the value of the lode.

Equipment: includes a steam plant with hoist, good for 1,000' and compressors of 12 drills aggregate capacity.

Two mill tests have been made, the first, in March, 1917, being on 1,605 tons, yielding 12.54 lb. copper per ton, with 5.26 lb. in the tailing; the second later in 1917, being on 654 tons, averaging 21.62 lb. copper recovered per ton.

The Wyandot company worked persistently and with skill for more than a decade to make a profitable mine, and, though not yet successful, has not exhausted the possibilities of its holdings.

Due to labor shortage and excessive costs, plus the fact that many stockholders neglected to pay the last assessment, operations were suspended in April, 1918.

MINNESOTA

The four iron ranges of this State supply 60% of the iron ore production of America, the total for 1920 being 39,453,173 tons and for 1919, 34,593,000 tons. The Mesabi is the most important area; its ores are mostly soft and hydrated hematite and limonite, and are found in shallow deposits in greenstone, but few mines being over 300 feet deep. Some of the mines are very large, yielding annually over 1,000,000 tons each.

In the Cuyuna range the iron-bearing formation rests on slate, under which is quartzite. Mining is done to a depth of below 1,400 feet. The ores are hard blue and red hematites in part manganiferous. The two latter ranges produce over 1,500,000 tons each yearly.

ADRIATIC MINING CO. MINNESOTA

Address: Pickands, Mather & Co., Sales Agts., Cleveland, O. R. M. Sellwood, mgr.; Wm. Mudge, supt.

Property: the Adriatic mine, on Mesabi range, St. Louis county, Minn.; opened in 1906. **Ore:** soft, red, non-Bessemer hematite, containing 49.31% iron, 0.067% phosphorus and 10.48% silica. Ore is mined by underground slicing to depth of 180'.

Production: 220,818 tons in 1916, 90,283 in 1917 and 37,189 tons in 1918, a total of 1,167,730 tons. Idle since 1919

ALGOMA MANGANESE CO. **MINNESOTA**

Absorbed by **Onahman Iron Co.**, which see. Described in Vol. XIV.

AMERICAN MANGANESE MFG. CO. **MINNESOTA**

Consolidation of the **Cuyuna-Mille Lacs Iron Co.** and **Cuyuna-Duluth Iron Co.**

Office: 352 Bullitt Bldg., Philadelphia, Pa. **Operating office:** Dunbar, Pa.

Officers: E. E. Marshall, pres.; R. Romeyn, v. p.; Wm. Selfridge v. p.; W. H. Locker, v. p.-treas., with W. E. Arnold, Reiner Hoch, E. E. Marshall, R. L. Taylor, M. E. Keith and A. G. Dickson, directors. W. E. Arnold, sec.-asst. treas.; R. M. Marshall, gen. mgr.-pur. agt., Dunbar, Pa.; R. Romeyn, sales mgr.

Inc. 1913, in Pennsylvania. **Cap.** $6,000,000 common, and $6,000,000 6% cum. preferred; par $50, all outstanding. In 1917, $1,250,065 com., and $2,189,410 preferred shares, also $1,021,000, 5% notes were issued to pay for purchase of the Costa Rica Manganese Mining Co. properties (see Vol. XIII). Funded debt, exclusive of above notes, outstanding on Dec. 31, 1920, totaled $1,217,484.

In 1917 there was a surplus of $912,199; in 1918, $337,544; a deficit of $919,488 in 1919 and $422,561 in 1920.

Company manufactures products, such as ferro-manganese and manganese pig-iron.

Property: Mille Lacs and Ironton mines on Cuyuna range, 375 acres of coal land and two blast furnaces at Dunbar, Pa.; also several thousand acres of mineral lands in Costa Rica.

The **Mille Lacs** mine, on Cuyuna range, near Ironton, Crow Wing county, Minn., produces a hard, manganiferous non-Bessemer hematite. Ore mined by underground system, to 205′ depth.

Production was 36,847 tons in 1915; 90,564 in 1916; 112,554 in 1917 and 158,075 tons in 1918, a total of 473,766 tons.

The **Ironton** mine, on the Cuyuna range, produces a hard, non-Bessemer hematite, carrying 50% iron, and mined to a depth of 340′. Electric pumps and haulage motors are employed on the main level.

Production: was 40,425 tons in 1914; 316 in 1915; 51,769 in 1916; 64,446 in 1917; 39,968 in 1918; 89,851 tons in 1919, a total of 289,711 tons.

AMERICAN STEEL & WIRE CO., THE **MINNESOTA**

Office: Cleveland, Ohio. S. F. Walsh, mgr.

Property: the Woodrow mine on Cuyuna range, opened in 1914. Ore is a non-Bessemer hematite, averaging 50% iron and 0.229% phosphorous. Mining is by slicing to a depth of 235′.

Production in 1915 was 34,383 tons; increased in 1916 to 50,454 tons. and in 1917 to 61,170 tons; in 1918, decreased to 41,924 tons, rising to 91,372 tons in 1919.

ARKO MINING CO. **MINNESOTA**

Office: 512 Andrus Bldg., Minneapolis, Minn.

Officers: F. E. Oberg, mgr.; H. I. Pearl, supt. and purch. agent.

Property: the Arko mine on the Cuyuna range, opened in 1918. Ore carries manganese and is mined to a depth of 108′. Assays give 41% iron, 0.268% phosphorus, and 11.7% manganese.

Production: 733 tons in 1918; 233 tons in 1919; 2,044 tons in 1920, a total of 3,060 tons.

ARTHUR IRON MINING CO. **MINNESOTA**

Owned by the **Great Northern Iron Ore Properties**, which see.

Office: E. E. Hunner, supt., 1st Natl. Bank Bldg., St. Paul, Minn.

Property: the Mississippi mine on Mesabi range, opened in 1910. Products are soft, brown. Bessemer and non-Bessemer hematites. Mining is done to a vertical depth of 133′.

Production: was 507,660 tons in 1914; nothing in 1915 and 16; 99,983 tons in 1917; 188,255 tons in 1918; 105,489 tons in 1919.

ASH IRON CO. MINNESOTA

Address: W. B. Congdon, 807 Lonsdale Bldg., Duluth, Minn.

Inc. in 1917, by W. B. Congdon, J. Wanless, C. A. Humbert, D. T. Adams and K. Todd. **Cap.** $500,000.

Property: a group of claims, held under lease, in Sec. 19, T. 46, R. 29, near Riverton, which is said to contain manganiferous ore. Idle.

BALKAN MINING CO. MINNESOTA

Address: C. H. Munger, gen. mgr., Western Reserve Bldg., Cleveland, Ohio. D. B. Cavan, supt., Belgrade mine, Gilbert, Minn. E. W. Leach, supt., Danube mine, Bovey, Minn.; W. J. Pekins, supt., Balkan and Judson mines, Crystal Falls, Mich

Property: the Belgrade mine, Mesabi range and the Balkan mine, Menominee range. In 1917, company acquired the Washoe property, 1 mile N. of Bovey, Minn., and N. E. of the Walker and Canisteo mines, Mesabi range, from the No. Pacific Ry. Co. Property was renamed the Danube. The Judson mine was acquired from the Judson Land Co. in 1920.

Production: from 1915-19 was 1,686,118 tons from the Belgrade; 1,056,707 tons from the Balkan and 244,383 tons in 1919 from the Danube mines.

BANGOR MINING CO. MINNESOTA

Controlled by Pickands, Mather & Co., Sales Agts., Cleveland, Ohio.

Address: C. H. Munger, gen. mgr., Western Reserve Bldg., Cleveland, Ohio.

Property: Bangor mine on Mesabi range, opened in 1910.

Ore: soft, red, non-Bessemer hematite, assaying 49.39% iron, 0.059% phosphorus, and 9.10% silica. Mined by underground slicing to 307' vertical depth.

Production: to date, 1,274,668 tons. Mine was idle in 1919-20.

BENNETT MINING CO. MINNESOTA

Is operated by Pickands, Mather & Co., Sales Agts., Western Reserve Bldg., Cleveland, Ohio. F. P. Botsford, gen. supt., and A. E. Schneider, local supt., Keewatin, Minn.

Officers: H. G. Dalton, pres.; C. S. Robinson, v. p.; C. H. Munger, sec.; with S. E. Bool, D. P. Bennett, C. A. Buck and J. C. Agnew, directors. E. P. Williams, treas.

Inc. 1917, in Minn. **Cap.** $900,000; $100 par.

Property: the Bennett mine, formerly owned by the Keewatin Mining Co., in Sec. 24 T. 57, R. 22, Itasca county, Minnesota, developed to 150' depth. The mine was opened in 1912. Product is a Bessemer and non-Bessemer hematite carrying about 2% manganese. Company employed 187 men in 1920.

Production (tons): 88,931 in 1913; 25,868 in 1914; 50,475 in 1915; 672,-57-17, opened in 1913. Ores carry 48.88% and 57.50% iron, and 0.051% to tons in 1920.

BOWE-BURKE MINING CO. MINNESOTA

W. W. Bowe, mgr., Pickands, Mather & Co., sales agents, Cleveland, O.

Property: the Morrow mine, on Mesabi range in St. Louis county, 4-57-17, opened in 1913. Ores carry 48.88% and 57.50% iron, and 0.051% to 0.060% phosphorus. They are mined by top-slicing to depth of 250'.

Production: total to end of 1919, 297,364 tons.

BUTLER BROS. MINNESOTA

Address: 639 Hamm Bldg., St. Paul Minn. Walter Butler, pres.; Emmett Butler, supt.

Producers of Bessemer and non-Bessemer iron ore from following mines on Mesabi range; G. N, North Uno, Harrison, Kevin, Margaret, North Harrison, Patrick, Quinn and Lamberton.

Analysis: Bessemer: 53.57% iron; 0.015-0.045% phosphorus; silica under 10%; non-Bessemer. 51.50% iron and silica under 10%.

Production: for 1918 and 1919 from all mines, 4,408,682 tons.

CHANDLER MINING CO. **MINNESOTA**

H. S. King, supt., Ely, Minn. Pickands, Mather & Co., sales agents.

Property: Chandler mine, operating since 1888. Ore is a hard, red, Bessemer hematite, carrying 60% iron, 0.043% phosporus, .13% manganese, and 8.79% silica. Mining is by underground method to 920′ vertical.

Production: highest was 808,359 tons in 1899, but yields have been irregular since 1907, being 171,594 tons in 1918, 48,274 tons in 1919 and 75,272 tons in 1920. The total output is 10,301,855 tons, including that mined by previous owners.

CHIPPEWA IRON MINING CO. **MINNESOTA**

Officers: F. W. Farnsworth, pres.; K. F. Williams, v. p.

Property: La Rue or Armstrong Bay mine, developed by 195′ shaft.

CLEVELAND-CLIFFS IRON CO. THE **MINNESOTA**

(See Cleveland-Cliffs Iron Co., Michigan.)

The principal properties in Minnesota are: the **Crosby, Fowler, Helmer, Meadow** and **Wade** mines in the Mesabi range, whose combined output was 483,632 tons of 50% ore in 1919.

COATES & TWEED **MINNESOTA**

Office: 307 Lonsdale Bldg., Duluth, Minn.

Company explores, operates and is sales agent for mines in the Mesabi, Cuyuna and Gogebic ranges in Minnesota and Michigan.

In December, 1920, company was interested in the following mines: York, Seville, Julia, Hillcrest, Portsmouth, Gordon, and Townsite, producing Bessemer and non-Bessemer ores and mined by both open pit and underground mining systems. The Gordon yields a manganiferous ore, of which 250,000 tons were sold in 1920.

CONS. VERMILLION AND EXTENSION CO. **MINNESOTA**

Office: 312 Sellwood Bldg., Duluth, Minn.

Officers: T. J. Walsh, pres.-treas.; J. M. Christie, v. p.; A. M. Oullette, sec., the president, M. C. Williams and Angus Cameron, directors.

Inc. Sept., 1911, in Minnesota. **Cap.** $900,000; $2 par; $620,000 outstanding, no bonds. Stock transferred at company's office. No dividends.

Property: consolidation of the Vermillion Steel and Iron Co. and the extension of the Vermillion Steel and Iron Co. Operates under 50-year leases.

Company estimated, June, 1917, 20,000 tons of ore in stockpile with production of about 200 tons a day. Developed tonnage, claimed, 1917, to be 600,000 tons at a depth of 440′. A sample from stockpile was said to assay 69.85% iron and 0.76% manganese. No recent returns received.

CONSUMERS ORE CO. **MINNESOTA**

Address: Leader News Bldg., Cleveland, O. M. A. Hanna & Co., sales agents.

Property: Frantz mine at Buhl; Hanna A. and B. mines at Mountain Iron and Yates mine at Kinney on Mesabi range, St. Louis county.

Ore: non-Bessemer hematite, assaying in Frantz, 51% iron; in A, 50% iron; and in B, 47% iron. The Hanna A mine is worked by open pit system to depth of 175′. At the Hanna B mine, ore is mined by steam shovel in an open pit.

Production: in 1919 was 129,377 tons, compared with an output in 1920 of 114,448 tons.

CORSICA IRON CO. **MINNESOTA**

Operated by Pickands, Mather & Co., Cleveland, Ohio. D. B. Cavan, supt., Gilbert, Minn.

Property: the Corsica mine, on Mesabi range, Minn., opened in 1901.

Ore: soft, red Bessemer and non-Bessemer hematite. Mined by underground slicing system to 342′ vertical. Employs 225 men.

Production: 384,692 tons in 1918; 340,588 tons in 1919; 323,725 tons in 1920; a total of 3,479,524 tons.

CRETE MINING CO. MINNESOTA

Address: C. H. Munger, gen. mgr., Western Reserve Bldg., Cleveland, O. Robert Murray, gen. supt., Hibbing, Minn.

Property: Albany mine on Mesabi range, opened in 1903. Also leasing the Utica mine from the Great Northern Iron Ore Properties.

Ore: soft, yellow, non-Bessemer, soft, red Bessemer, and soft, blue, non-Bessemer hematite. Mined by milling and underground slicing systems to 260′ vertical.

Production to date: 4,831,974 tons from the Albany and 3,999,524 tons from the Utica mine.

CUYUNA DULUTH IRON CO. MINNESOTA

Consolidated with Cuyuna Mille Lacs Iron Co. and described under **American Manganese Mfg. Co.**

CUYUNA MILLE LACS IRON CO. MINNESOTA

Consolidated with Cuyuna Duluth Iron Co. and described under **American Manganese Mfg. Co.**

CUYUNA MINNEAPOLIS IRON CO. MINNESOTA

Office: Ironton, Minn. W. H. Fetzer, mgr.; P. C. Merrill, supt.

Property: leased on S. W. ¼ S. E. ¼ sec. 23-47-29, known as the Ida May mine, on Cuyuna range, Minn. **Ore:** non-Bessemer and manganiferous showing 40% iron, 0.20% phosphorus and 16% manganese. Ore is mined by underground system.

Production: 20,000 tons in 1918, which was the first output. Pumps were pulled and the mine allowed to fill with water late in 1920. A dump of 18,000 tons of 15% manganese ore was sold.

CUYUNA REALTY CO. MINNESOTA

Offices: c/o N. P. Ry. Co., St. Paul, Minn.; and Ironton, Minn. Carl Zapffe, mgr., Brainerd, Minn. F. G. Priest, purch. agt.

Property: the **Feigh** mine on the Cuyuna range. Ore is a non-Bessemer hematite, carrying 56% iron, .30% manganese, and 0.226% phosphorus. Mining is by underground methods.

Production: 21,011 tons in 1919; 79,144 tons in 1920, and 100,155 tons to date.

DRAPER IRON CO. MINNESOTA

Office: Calumet, Minn.

Officers G. F. Murphy, gen. supt.; S. N. Vivian, supt.

Property: on the Mesabi range, opened in 1918. Ore is mined by steam-shovel and washed before shipment. It carries 55% iron, 0.034% phosphorus and 8% silica.

Production: 33,792 tons in 1919.

FAULT MINING CO. MINNESOTA

Office: Eveleth, Minn.

Officers: M. S. Kingston, mgr. Pickands, Mather & Co., sales agents.

Property: the Fault mine on Mesabi range, opened in 1917, producing soft, brown Bessemer and non-Bessemer hematites. Mining is carried on to a depth of 85′ by open cut and top slicing. Ore carries 49% iron, 0.052% phosphorus, and 7.40% silica.

Production in 1917 was 33,710 tons; in 1918, 133,266 tons and in 1919, 38,152 tons, a total to date of 205,128 tons.

FEDERAL CONSOLIDATED MINING CO. MINNESOTA

Office: 327 Palace Bldg., Minneapolis, Minn. L. F. Lammers, sec. and purch. agt.

Property: the Ajax mine, near Biwabik, on Mesabi range, Minn. **Ore:** a non-Bessemer showing 58.46% iron, 0.08% phosphorus and 1.61% manganese, is mined by underground system.

Production: 200,000 tons, to date. Operations reported resumed in 1920.

FEIGH MINE MINNESOTA

See **Cuyuna Realty Co.**

FORT HENRY MINING CO., THE **MINNESOTA**

Office: 1208 Hanna Bldg., Cleveland, Ohio; E. W. Hopkins, range mgr., Ironwood, Michigan. Oglebay, Norton & Co., sales agent; W. K. Carter, purch. agt.

Property: a lease on the Woodbridge mine on Mesabi range, opened in 1912, producing non-Bessemer ore carrying 58.55% iron, 0.065% phosphorus and .93% manganese. Mining is by slicing, to depth of 255'.

Production: to date (1920); 1,522,651 tons.

The lease was abandoned in 1921 and the equipment dismantled and moved.

GLORIA MINING CO. **MINNESOTA**

Office: 301 Alworth Bldg., Duluth, Minn. E. J. W. Donahue, mgr. and purch. agent.

Property: the Gloria mine on the Cuyuna range, opened in 1916. Ore carries 30% iron, 0.170% phosphorus, 13.80% silica, and 15% manganese, and is mined to a depth of 110'.

Production: mined 3,375 tons in 1918; ore shipped in 1919. The mine was closed in December, 1918, on account of metal market. Company was awarded $52,000 compensation by the War Minerals Relief Board, March, 1921.

GORDON MINING CO. **MINNESOTA**

See **Hillcrest Mining Co.**

Office: Lonsdale Bldg., Duluth, Minn. **Mine address:** Crosby, Minn.

Officers: A. B. Coates, pres.; R. R. Hill, v. p.; G. P. Tweed, sec.-treas.

Property: the Portsmouth mine, in Crow Wing county, which was leased and explored by the Hill Mines Co., prior to 1918. **Equipment:** includes 3 steam shovels, electric power and 3 locomotives.

Production: 186,259 tons in 1920.

GORHAM-GARBETT CO. **MINNESOTA**

Office: 627 First Ave., Minneapolis, Minn.

Officers: J. Pve, pres.; S. H. Wood, v. p.; C. F. W. Carlson, sec.-treas.; above with S. Bailey, S. F. Grover and R. W. McGarry, directors.

Inc. January, 1908, in Minnesota. **Cap.** $1,000,000; $1 par; 924,792 issued.

Dividends: 2% in 1917, and in 1918, 5½%.

Property: 360 acres of iron and manganese ore land on Cuyuna range, Crow Wing county, Minn., all leased on royalty plan. Lessees are the Iron Mtn. Mng. Co., Chas. W. Potts and associates. The Onahman Iron Co leased the Ferro mine, but in 1920 the Gorham-Garbett Co. bought in the property at sheriff's sale for $15,157.

GRAHAM IRON CO. **MINNESOTA**

Out of business since 1918. The mine (Knox) surrendered to the Northern Pacific Ry. Co.

GREAT NORTHERN COPPER CO. **MINNESOTA**

Idle since 1911. **Office:** 504 Globe Bldg., Minneapolis, Minn. Mine at Hinckley, Pine county, Minn. Fully described Vol. XI. Copper Handbook.

GREAT NORTHERN IRON ORE PROPERTIES **MINNESOTA**

Address: G. R. Martin, comptroller, First Nat'l Bank Bldg., St. Paul, Minn.

Inc. Dec. 7, 1906. Is a trust created by directors, and approved by shareholders of the Great Northern Railway Co. Trustees: Louis W. Hill, James N. Hill, Ralph Budd and E. T. Nichols.—Transfer office: 32 Nassau St. New York City. Bankers' Trust Co., New York City, registrar. Listed on New York Stock Exchange.

Shareholders of the Lake Superior Co., Ltd. (a subsidiary created to hold various securities and properties of the Great Northern Ry Co.), transferred to the trustees of the Great Northern Iron Ore Properties, shares in 10 iron ore mining companies, conservatively worth $1,738,400. Any dividends declared by the Allouez Bay Dock Co., or by Duluth, Superior & Western Terminal Co., up to Dec. 31, 1912, were to be paid to the trustees, to be applied by them to the uses of the trust.

When the trust was created, the trustees issued certificates of beneficial interest, amounting to 1,500,000 shares, to stockholders of the Great Northern Ry. Co., at the rate of one share of "Trustee's Certificates" for each share of stock of Great Northern Ry. Co. The trustees' income has come from dividends from stocks held and from interest earned. This revenue, less administration expenses, is distributed as dividends to holders of Certificates of Beneficial Interest.

Income Account—Years ended December 31:

	Receipts	Expenses	Distr'n*	Bal.	Prev. Bal.	Surplus
1920.....	$5,952,816	$97,960	$6,097,960	$145,144	$352,911	$207,767
1919.....	5,844,249	93,617	6,000,000	249,368	602,279	352,911
1918.....	4,594,725	72,222.	6,000,000	1,477,496(a)	2,079,775	602,279
1917.....	90,958	101,366	2,250,000	2,260,408(a)	4,340,183(b)	2,079,775
1916.....	2,178,548	89,663	1,964,663	213,884(b)	4,126,299(b)	4,340,183

(a) deficit. (b) surplus. * to cert. hold'gs.

1920..	19,514	$7.62	89,229	6,505	$10.88	$69.013	27,950	$9.08	$269,479
1913.....		296,940	5.70	106,443	49.00	102,997,916	88.43	5.52	942,988	3.47

Stocks held by Trustees, December 31, 1920:

Arthur Iron M. C. (a)	$50,000	Polk Iron M. Co. (a).....	$50,000
Fillmore Iron M. Co. (a) ..	50,000	Tyler Iron M. Co. (a)	50,000
Grant Iron M. Co. (a).....	12,000,000	Van Buren Iron Mg. Co. (a)	500
Harrison Iron Mg. Co. (a)..	50,000	N. Star Iron Co. of W. Va.(b)	587,900
Jackson Iron Mg. Co. (a)...	50,000	Leonard Iron M. Co. (c)..	100,000

(a) Entire issue. (b) Over 90.6% of entire issue. (c) 50% of entire issue.

The charter of the West Missabe Land Co., expired in 1917, and the Grant Iron Mining Co., was organized June, 1917, to acquire its properties.

Dividends: holders of Certificates of Beneficial Interest received per share in 1907, 1908 and 1909, $1 each; 1910, $1.50; 1911, 1912, 1913, 1914, 1915, 50c. each; 1916, $1.25; 1917, $1.50; 1918, $4; 1919, $4; 1920, $4; total $32,625,000.

Balance Sheet—Years ended December 31:

Assets	1920	1919
Current	$ 4,244,140	$ 6,426,384
Securities	5,319,357	4,958,192
Mine expenses.....	.....	.....
Mineral lands and leases	82,374,678	83,361,040
Advances	3,270,819	3,309,405
Deferred accounts	495,973	512,912
Office, res., equip., org. exp.....	40,180	.....
Totals	$95,745,149	$98,567,934
Liabilities		
Capital stock	$12,988,400	$12,988,400
Current liabilites	1,057,692	951,954
Deferred accounts	1,611,460	1,020,227
Surplus	80,087,596	83,607,353
Totals	$95,745,148	$98,567,934

Property: 65,091 acres of iron ore land in the Mesabi district, Minn. Through leases made in 1917 and in previous years, the 10 original companies disposed of their developed mines (except interests in the North Star, Hill and Walker mines, now idle). The principal leases were with the Interstate Iron Co., a subsidiary of Jones & Laughlin Steel Co., the Hanna Ore Mining Co., organized by M. A. Hanna & Co.; the Cleveland-Cliffs Iron Co. and the Mesaba Cliffs Iron Mng. Co., org. by the Cleveland-Cliffs. The

Interstate Iron Co. lease covers 3 mines, the net royalties ranging from 30c. to 75c per ton of ore extracted; the 1918 minimum was 924,000 tons. The Hanna Ore Mng. Co. lease covers 10 mines, and royalties range from 40c to $1.15 a ton. Leases call for mining operations on an increasing scale each year. Since July, 1917, the proprietary companies have withdrawn from active mining operations.

Reserves in all properties amount to about 291,000,000 tons.

Production—shipments and receipts are as under:

From old leases:

	1920	1919	1918	Total*
Shipments, tons	2,423,445	1,824,510	2,734,678	35,463,312
Receipts	$376,317	$316,741	$392,680	$5,606,061

* Since 1907.

Includes Mahoning, Stevenson, Leetonia (½), Utica and Sweeney (½) mines. Average royalty was 17.360¢ in 1919 and 15.528¢ in 1920.

From Arthur Iron Mining Co.: (a)

	1920	Total
Shipments, tons (from stock pile)	13,091	2,472,907
Receipts	$35,057	$3,860,598

Receipts from new leases, 1913 and subsequent years:—(b)

Shipments	4,066,154	15,107,620
Receipts	3,171,606	$10,854,156

(a) all business of a general character is carried on in the name of the Arthur Iron Co., which is the managing agent for all the other companies. Mining operations by the Arthur Mng. Co. ceased June 30, 1917 as all its properties were leased. The 1,380,082 tons of ore then on hand has been disposed of.

(b) Includes following mines: Dean, Dunwoody, Fay Harold, Harrison, Hill, Hill-Annex, Kevin, Leonard (½) Mace № 1 and Mace №2 (½), Mississippi, № Harrison, (½). № Uno G. N., Patrick (½), Smith, So. Agnew, So. Uno G. N. Thorne (90%) Wabigon (90%) Wade (90%) and Warren (½) mines.

HALE DEVELOPMENT CO. — MINNESOTA

Office: 408 Exchange Bldg., Duluth, Minn.

Officers: F. A. Day, pres.; A. H. Brown, v. p.; H. W. Cheadle, sec.-treas.

Inc. in Minnesota. **Cap.** $150,000; $10 par; 5,000 shares issued. Is a holding corporation. **Dividends:** $1.30 per share in 1920.

Property: 360 acres on Cuyuna range, Crow Wing county, Minn. Only 80 acres have been thoroughly explored, which portion is included in the **Wilcox mine.** These 80 acres were leased on a royalty basis to the Division Co. of Minneapolis, Minn. Idle.

HANNA & CO., M. A. — MINNESOTA

See same title under Michigan iron mines.

HANNA ORE MINING CO. — MINNESOTA

Office: Hibbing, Minn.

Officers: E. E. Hunner, mgr.; C. E. Hendrick, gen. supt., Eastern Mesabi; F. H. Cohoe, gen. supt., Western Mesabi. Company is a subsidiary of the M. A. Hanna Co., operating leases on Great Northern ore lands at Buhl, Virginia, Hibbing, and Chisholm, Minn.

The mines included in the leases are: the Fay, Leonard, Mesabi Chief, L & W, Enterprise, Harold, North Uno G. N., South Uno G. N., Wabigon No. 1, Wabigon No. 2, and Thorne. Total production in 1920 was 1,960,116 tons.

HECTOR MINE MINNESOTA

Mine exhausted. Described in Vol. XIV.

HILLCREST MINING CO. MINNESOTA

(See Gordon Mining Co.)

Office: Lonsdale Bldg., Duluth, Minn. **Mine address:** J. W. Van Evera, mgr., Crosby, Minn.

Officers: A. B. Coates, pres.; R. R. Hill, v. p.; G. P. Tweed, sec.-treas.

Property: E. ½ S E. Sec. 9-46-29; W. ½ N. W. ¼ of S. W. ¼ Sec. 10 and W. ½ S. W. ¼ of N. W. ¼ sec. 10, T. 46, N. R. 29 W., Crow Wing county. In April, 1919, company took over the Hillcrest mine on Cuyuna range formerly operated by the Hill Mines Co., Minn., first opened in 1918. Mine yields a soft, red, non-Bessemer hematite, assaying 50.59% iron, 0.208 phosphorus and 4.80% silica.

Development: by open pit and hydraulic stripping

Production: 645,927 tons to Jan. 1, 1919, most of this ore produced in 1917 and 1918.

HILL MINES CO. MINNESOTA

Office: Hill Bldg., Saginaw, Mich.

Officers: Roger R. Hill, pres.-treas.; J. G. Williams, v. p.; J. J. Quinn, sec.

Inc. Jan. 14, 1914, in Maine. **Cap.** $5,000,000, increased in 1917 from $500,000; $10 par; $1,177,840 issued.

Property: the Portsmouth mine was taken over, June, 1918, by the Gordon Mining Co., and the Hillcrest mine was taken over by the Hillcrest Mining Co., April, 1919.

HOBART IRON MINING CO. MINNESOTA

Address C. H. Munger, gen. mgr., Western Reserve Bldg., Cleveland, O. D. B. Cavan, Gilbert, Minn., and F. A. Kelley, Calumet, Minn., supts. Pickands, Mather & Co., sales agents, Cleveland, Ohio.

Property: the Elba mine, opened in 1898, the Labelle, and the Majorca mine opened in 1917, all on Mesabi range.

Ore: at Elba, soft, red, Bessemer hematite; at Majorca, a soft, red non-Bessemer hematite. The mines are worked by underground methods. Company employs 225 men.

Production: (to date) 3,495,909 tons from the Elba; 698,016 tons from the Labelle; 757,901 tons from the Majorca mine.

Ore from the Majorca mine is washed before shipment. This mine is leased from the State of Minnesota, and company has to pay a royalty on all "wash" ores as crude ore.

HOCH MINING CO. MINNESOTA

Company out of business. The Algoma mine is now owned by **Onahman Iron Co.**, which see.

HOYT MINING CO. MINNESOTA

Officers: W. P. Chinn, asst. gen. mgr.; Robert Murray, gen. supt.; Pickands, Mather & Co., sales agents, Cleveland, Ohio.

Property: the Scranton mine on Mesabi range, in St. Louis county, 12-57-21. Ore is a soft, red, non-Bessemer hematite to be mined by open cut when preparations are completed.

Production: total, 521,841 tons; none since 1915. Reopened in 1919.

INLAND STEEL CO. MINNESOTA

Office: 38 S. Dearborn St., Chicago, Ill.

Officers: L. E. Block, chairman; P. D. Block, pres.; G. H. Jones, v. p.; E. M. Adams, v. p.-sec.; E. J. Block, v. p.; H. C. Jones, v. p.; J. W. Lees, v. p.; D. P. Thompson, asst. to president; W. D. Truesdale, treas. R. L. Wahl, gen. supt.

Inc. Feb. 6, 1917, in Delaware, as successor of an Illinois corporation of same name. **Cap.** $30,000,000; par $25; issued $25,175,175. First Trust

& Savings Bank, Chicago, transfer agent, Continental & Commercial Trust & Savings Bank, Chicago, registrar.

Bonded debt: $1,050,000; first mortgage, 6% gold bonds of old company being balance of $3,000,000 issue; due $150,000, each April 1st to 1928; also $4,091,000 extension and ref. mtgs., 6s, due July 1, 1942. Authorized $10,000,000, issued $5,000,000, of which $909,000 had been cancelled to January 1, 1921.

Income Account-years ended Dec. 31:

	Total	Interest	Fed. Tax. Res.	Dividends	Deprec.	Surplus
1916	$11,365,477	$375,450	$.....	$ 799,908	$ 539,240	$9,650,879
1917	21,240,784	436,550	8,500,000	1,999,820	1,769,167	8,535,247
1918	14,473,512	353,250	7,000,000	2,001,060	1,953,713	3,165,489
1919	6,830,146	340,980	.....	2,001,560	1,424,653	3,063,553
1920	6,066,560	325,110	.....	2,763,906	1,634,388	1,343,156

Balance Sheet, December 31:

Assets:	1919	1920
Land, buildings, etc	$37,563,699	$42,489,028
Investments	6,799,481	3,981,516
Current assets	14,875,953	14,429,570
Deferred charges	131,621	425,170
Totals	$59,370,754	$61,325,284
Liabilities:		
Capital stock	$25,019,500	$25,175,175
Bond, debt	5,621,000	5,291,000
Current liabilities	2,433,486	2,100,401
Interest accrued	20,250	18,000
Federal taxes Reserves	8,910,992	10,032,026
Surplus	17,365,526	18,708,682
Totals	$59,370,754	$61,325,284

Dividends: on stock of former company for 1911, 1912 and 1913, 10% per annum (i. e. 7% regular and 3% extra); 1914, 6¼% plus a stock dividend of 25% paid September, 1914; 1915, 6%; 1916, 8% ; 1917, 11%; 1918, 8% or at rate of 2% per quarter from June, 1917, to March 1920; since then 75c. per share on $25 par.

Property: valuable ore leases on 3 producing mines, the Laura, near Hibbing, on the Mesabi range; two, the Armour No. 1 and Armour No. 2 on the Cuyuna, at Crosby, Minn., with about 30 years' ore reserves at each mine. Furnaces are at Indiana Harbor, Ind.

In 1917, company purchased 2,000 acres of coal land near Dorseyville, Pa., and a lease on further ore lands from the Great Northern Iron Ore Co.

The Indiana Harbor furnace has a capacity of 1,000,000 tons steel per year. It has 3 modern blast furnaces, delivering molten metal to twelve 60-ton and ten 80-ton open hearth basic furnaces.

INTERNATIONAL HARVESTER CO. **MINNESOTA**

See **Wisconsin Steel Mines**, Minnesota.

INTER-STATE IRON CO. **MINNESOTA**

Subsidiary of Jones & Laughlin Steel Co.

Office: Jones & Laughlin Bldg., Pittsburgh, Pa.

Operating office: care Mark Elliott, gen. supt., Virginia, Minn.

Property: the Grant, Lincoln, and South Longyear mines on the Mesabi range in St. Louis county, under lease from the Great Northern Iron Ore Properties. Also the Columbia and Longyear mines, now idle. Operations

on the South Longyear were about to begin late in 1920. Ores are both Bessemer and non-Bessemer, that of the Lincoln containing 55.73% iron, 0.02% phosphorus and 9.88% silica. Top slicing and caving systems are employed to depth of 237'.

Reported that company is operating the Hill-Annex, adjoining the Hill-Trumbull, near Marble, Itasca county, and that a washing plant and concentrator are nearing completion. Hill-Annex is said to have a reserve of 22,000,000 tons of ore.

Production: totals 2,429,788 tons from the Grant mine and 4,607,371 tons from the Lincoln mine.

J. BENNETT SMITH MINING CO. **MINNESOTA**

Company controlled by R. D. Lacoe, Oceanside, San Diego county, Cal., who advanced most of the money for development. Former office, Kingston, Pa. **Mine address:** Pine City, Pine county, Minn.

Property: 500 acres of copper-bearing ground, along Snake river, a mile below Cross lake, in Pine county, Minn. The lands show the western extension of the Keweenawan copper-bearing beds of Lake Superior, the bedded formation having a strike of about N. 20° E., with dip of about 72° S.-E., showing the beds to be on the northern fold of the syncline.

Development: includes 560' shaft: also several shallow pits and shafts. Several of the amygdaloidal and conglomerate strata, showing native copper, have been proven by test pitting and diamond-drill borings. Company reports having expended about $50,000 on exploratory and development work since 1879. No recent returns available.

JOAN MINING CO. **MINNESOTA**

General office: 106 Providence Bldg., Duluth, Minn. **Mine office:** Ironton, Minn.

Officers: G. M. Fay, pres.-supt. S. J. Fay, v. p.; Marcus Fay, sec-treas., directors.

Inc. 1916, in Minnesota. **Cap.** $50,000; shares $100 par.

Property: 4 mines, the Joan Nos. 1, 2, 3 and 4, in the Cuyuna range, Crow Wing county, Minn.

Development: by shafts to 200' depth. Ore contains 27% iron, 0.120% phosphorus and 23% manganese.

Production: Joan No. 1 produced 5,338 tons from 1917 to end of 1919.

JONES & LAUGHLIN STEEL CO. **MINNESOTA**

See under **Michigan** for general statement.

JUNE LAKE IRON CO. **MINNESOTA**

Office: 22 Columbia Bldg., Superior, Wis. E. L. Johnson, gen. mgr. sec.-treas.

Inc. 1910, in Minnesota. **Cap.** $50,000; shares $10 par.

Property: 70.90 acres in Lot 3 and N. W. of S. W. Sec. 9, T. 46, R. 29, Crow Wing county, said to contain iron and manganese.

KINGSTON MINING CO. **MINNESOTA**

Address: No. Hays St., Eveleth, Minn.

Property: a lease on the Spring and Silverton mines, on the Mesabi range, in Sec. 11, T. 59, R. 14, St. Louis county, credited with production of 67,682 tons to 1910. Under development and a washing plant to be erected.

LA RUE MINING CO. **MINNESOTA**

Office: Virginia, Minn.

Officers: E. E. Hunner, mgr.; C. E. Hendrick, supt. M. A. Hanna & Co., sales agents.

Property: on Mesabi range, in Sec. 39 and 32. T. 57, R. 22, Itasca county, carrying 53% iron, 0.031% phosphorus, and 7.84% silica, is mined by open pit system to depth of 80'.

Production: 1902-1919, totals 2,928,158 tons.

LEETONIA MINING CO. **MINNESOTA**

Subsidiary of Jones & Laughlin Steel Co., Jones & Laughlin Bldg., Pittsburgh, Pa.

Mark Elliott, gen. supt., Virginia, Minn.

Property: the Leetonia mine, on the Mesabi range, leased from the Great Northern Iron Ore. First opened in 1920. **Ore:** soft, red, non-Bessemer hematite assaying 50.3% iron, mined by top slicing and caving and steam shovels to 182' depth. Also operates the Nassau mine on Mesabi range, St. Louis county, inactive from 1910 to 1918, when it produced 40,412 tons.

Production: 656,823 tons in 1916; 402,894 tons in 1917; 230,865 tons in 1918; 374,963 tons in 1919; 404,270 tons in 1920; a total of 7,328,815 tons.

LIBERTY MINING CO. **MINNESOTA**

General office: 106 Providence Bldg., Duluth, Minn. **Mine office:** Ironton, Minn.

Officers: M. L. Fay, pres.; C. E. Schulze, v. p.; G. M. Fay, sec.-treas.

Inc. 1917, in Minnesota. **Cap.** $100,000; $100 par.

Property: the Bonnie Belle iron mine, near Ironton, Cuyuna range, contains a high-grade non-Bessemer ore, assaying 60% iron, 0.115% phosphorus and 0.66% manganese.

Production: in 1918, 1,636 tons; to Sept., 1919, 33,276 tons. Company shipped by rail to Duluth, Minn.

LONGYEAR, E. J. & CO. **MINNESOTA**

Office: Minneapolis, Minn.

Officers: E. J. Longyear, pres.; John E. Hodge, v. p.; R. N. Dow, sec.; H. J. Lobdell, treas. L. D. Cooper, gen. mgr.

Inc. in 1911.

Company engages in the exploration and development of mineral lands by means of geological examinations, diamond core drilling and shaft sinking. Also owns a substantial interest in a large nickel-copper property, proven up by diamond drilling, near Sudbury, Ontario, Canada.

LYCOMING CO. **MINNESOTA**

Office: 708 Lonsdale Bldg., Duluth, Minn. Was a securities-holding company. Inactive and no assets.

MACE IRON MINING CO. **MINNESOTA**

Office: 709 Security Bldg., Minneapolis, Minn.

Officers: R. M. Bennett, pres.; O. B. Warren, sec. and gen. mgr.; J. A. MacKillican, supt., Hibbing, Minn. Pickands, Mather & Co., Cleveland, Ohio., sales agents. Operated as a close corporation.

Property: Mace No. 1 mine on Mesabi range, in St. Louis county, Minn., producing a high grade, direct shipping Bessemer iron ore, and developed by shaft 120' deep, operated by steam hoist.

Mace No. 2 mine, on Mesabi range, in Itasca county, Minn., producing high grade, concentrating Bessemer iron ore and developed by open pit system, worked with steam shovels and locomotives, etc.

Production: Mace No. 1, 1915, 120,888 tons; 1916, 163,352 tons; 1917, 122,500 tons; 1918, 66,405 tons; none in 1919; 50,088 tons in 1920; total 1,051,764 tons. Mace No. 2, 1916, 307,496 tons; 1917, 251,280 tons; 1918, 247,590 tons; 112,228 tons in 1919; 101,935 tons in 1920; total 918,655 tons. Ore from Mace No. 2 is concentrated at Harrison plant.

MAHNOMEN MINING CO. **MINNESOTA**

Address: Clement K. Quinn, pres.-mgr., 1500 Alworth Bldg., Duluth, Minn. E. P. Scallon, gen. supt., Crosby, Minn.

Property: on the Cuyuna range, first opened in 1915. The ores assay from 58% iron, and 5 to 20% manganese. Mining is done by open pit methods to depth of 250'.

Production: total, 1,000,000 tons.

MAHONING ORE AND STEEL CO. **MINNESOTA**

Office: Widener Bldg., Philadelphia. Cambria Steel Co. owns 50% of capital stock; Republic I. & S. Co. (q. v.) has an interest.

Property: Mahoning mine on Mesabi range, at Hibbing, Minn.; R. M. Marble, supt. **Ore:** soft, blue, Bessemer, and soft brown, non-Bessemer hematite, containing 51.18% iron, 0.037% phosphorus, and 2.39% silica. Mined by open pit system to 270' vertical depth.

Production: 2,215,788 tons in 1916; 2,525,145 tons in 1917; 2,019,481 tons in 1918; 1,217,167 tons in 1919; 1,704,871 tons in 1920; with a total of 31,269,889 tons.

MANGAN IRON & STEEL CO. **MINNESOTA**

Office: 805 Lonsdale Bldg., Duluth, Minn.

Officers: A. F. Gress, press.; P. Martin, v. p. and treas.; W. G. Whitney, sec.-mgr., with F. J. Sensonbrenner and C. A. Babcock, directors. Wm. Pascoe, supt., Ironton, Mich., E Schramm, pur. agt.

Inc. 1913, in Minnesota. **Cap.** $500,000; $1 par; non-assessable; outstanding $238,053.

Property: 80 acres including Mangan No. 1 mine on Cuyuna range, producing manganiferous ore. Developed by two shafts, 160' deep.

Equipment: 2 hoists, compressor, 3-000-gal. pump.

Production: 1917, 49,868 tons, 15% manganese; 1918, about 43,007 tons, 17% manganese; total output 125,804 tons. Company reports ore reserves of 500,000 tons. Mine closed down May, 1919 waiting improved market conditions.

MAPLE LEAF MINING CO. **MINNESOTA**

Address: Crosby, Minn.

Property: the Thompson mine, at Crosby on the Cuyuna range, on which lease was previously held by the Inland Steel Co., but surrendered in December, 1919. The mine has many years of reserves and has produced 1,019,381 tons of ore.

MARQUETTE ORE CO. **MINNESOTA**

Address: C. B. Dunster, mgr., Cleveland, O. W. B. Pattison, supt., Negaunee, Mich. E. N. Breitung & Co., sales agents.

Property: Maroco mine, on Cuyuna range, Crow Wing county, worked by open pit system. Ore is a soft, red non-Bessemer hematite. Initial shipments made in August, 1921.

McKINNEY STEEL CO. **MINNESOTA**

See under Michigan.

MERRIMAC MINING CO. **MINNESOTA**

Office: Crosby, Minn.

Officers: J. F. Murphy, gen. supt.; Thomas Turnbull, supt.; John A. Savage & Co., Duluth, sales agents.

Property: operates the Croft mine, near Crosby, Cuyuna range, Minn.

Ore: a soft, reddish blue Bessemer hematite assaying 53% iron. The caving system is used to depth of 333'.

Production: to date totals 499,314 tons.

MERRITT DEVELOPMENT CO. **MINNESOTA**

Office: 514 Plymouth Bldg., Minneapolis, Minn. Franklin W. Merritt, pres. and gen. mgr.

Property: operating Merritt mines, No. 1 and No. 2, in Cuyuna range, Minn., containing manganiferous ores showing 25 to 40% iron, 0.080% phosphorus and 12 to 25% manganese. Ore is mined by underground method. No. 4 shaft was producing 200 tons daily in 1920.

Production: in 1920, 22,000 tons shipped, said to have averaged 20% manganese.

MESABA-CLIFFS IRON MINING CO. **MINNESOTA**

Office: Hibbing, Minn.

Officers: M. M. Duncan, mgr.; M. H. Barber, supt. Sales agents, Cleveland-Cliffs Iron Co.

Property: the Bingham and Boeing mines on the Mesabi range opened in 1919. The Boeing is worked by open pit methods, using a 300-ton steam shovel. No production figures available. Also the Hill-Trumbull mine, former opened in 1910 and latter in 1919. A washing plant, with capacity of 80 cars per shift, is operated on silicious ore.

Production: of Hill-Trumbull to date totals 7,674,455 tons.

Year	Tons	Year	Tons
1915	998,649	1919	575,509
1916	552,104	1920	.....
1917	.....	1921	300,000
1918	559,074	To date	7,674,455

The North Star mine is being prepared for production.

MESABI IRON CO. **MINNESOTA**

Address: J. R. Dillon, 25 Broad St., New York. W. G. Swart, mgr., Babbitt, Minn. Fred A. Jordan, supt.

Officers: Charles Hayden, chairman of directors; D. C. Jackling, pres.; W. G. Swart, v. p.; J. R. Dillon, treas.; with J. D. Ryan, W. E. Corey, P. A. Rockefeller, C. M. MacNeill, Sherwood Aldrich, W. Hinkle Smith, A. C. Dinkey, S. W. Mudd, H. V. Winchell and J. C. Agnew, directors. Dwight E. Woodbridge and E. W. Davis, cons. engrs.

Inc. 1919, in Delaware. **Cap.** $3,000,000 of 8% cumulative, convertible preferred shares, $100 par; and 300,000 common shares of no par value; outstanding, 30,000 shares pfd. and 150,000 common. Equitable Trust Co., transfer agent; Guaranty Trust Co., registrar.

Property: 15,000 acres, carrying low-grade iron ore (magnetite) deposits in the eastern part of the Mesabi range, Minnesota. The crude ore is taconite, a mixture of chert and lenses of magnetite assaying 25 to 30% iron.

Preliminary investigations were started in 1913, and by 1915 a syndicate was formed to drill, develop, and make metallurgical tests on the ore. A 100-ton concentrating plantwas completed at Duluth by mid-1916 and operated until the end of 1918, producing several thousand tons of high-grade iron concentrate, desired by smelters. The Syndicate has spent $750,000 on this work, and finds that the problems resemble those of the disseminated (porphyry) copper deposits. A 3,000-ton daily mill, employing rolls, magnetic separators, and sintering plant, is being erected at Babbitt, 14 miles E. of Mesaba, near the mines on a branch of the Duluth & Iron Range Railroad, and it is hoped to start marketing an agglomerated concentrate, carrying 60% iron, and low in phosphorus, by 1922.

Mining will be by open cut methods. The deposit has little or no overburden. This appears to be a big and sane project, backed by men experienced in the treatment of low-grade copper and gold ores.

MESSABA-CUYUNA IRON LAND CO. **MINNESOTA**

Office: 506 Sellwood Bldg., Duluth, Minn.

Officers: D. D. Murray, pres.; C. W. Stilson, v. p.; P. L. DeVoist, sec.; J. Oreckoosky, treas., with W. B. Patten, directors.

Inc. 1912, in Minnesota. **Cap.** $250,000; $1 par; outstanding, 218,084.

Dividends: April, 1918, 10%; Sept. 1919, 3%; Feb. 1921, 3%; total, $35,000.

Property: 2,200 acres, on Mesabi and Cuyuna ranges, in St. Louis, Cook, Aitkin, Crow Wing and Cass counties, Minn., under lease to various companies. No ore has been mined, but company received $11,750 for royalties on "minimum output" basis. Lands contain manganiferous and iron ores. Developed by 150' shaft.

MOHAWK MINING CO. **MINNESOTA**

Officers: W. P. Chinn, asst. gen. mgr.; L. C. David, gen. supt. Pickands, Mather & Co., sales agents, Cleveland, O.

Property: the Mohawk mine, opened in 1906, on Mesabi range, in St. Louis county, 4-58-15. Ore is a soft, red, non-Bessemer hematite, carrying 49% iron; extracted by underground slicing to depth of 305' vertical.

Production: total to end of 1919, 2,110,927 tons.

MUTUAL IRON MINING CO. **MINNESOTA**

Office: 519 Providence Bldg., St. Paul, Minn. **Mine office:** Geo. Reilly, supt., McComber, Minn.

Officers: J. Coates, pres.; G. H. Rowe, v. p.; J. L. Dorsey, sec.-mgr.; T. B. Schultz, treas., with E. O. Olund, A. H. Beyers, M. C. Welch, John Miller, I. F. Green, J. C. Houck and W. D. Limeman, directors.

Inc. in Minnesota. **Cap.** $350,000; $1 par; outstanding 339,000.

Property: leased on the McComber mine, in St. Louis county, Minn., sub-leased September, 1918, to the **National Mining Co.**, which see.

NATIONAL MINING CO. **MINNESOTA**

Address: McComber, Minn.

Officers: J. B. Sullivan, pres.-gen. mgr.; A. F. McBride, v. p.; C. S. Bunnell, sec., with J. Hicks, directors.

Inc. 1918, in Minnesota. **Cap.** $500,000; $1 par; all outstanding.

Property: leasing the McComber iron mine, at McComber, St Louis county, developed by shafts 250' and 500' deep and by 1,300' of drifting. Three thousand tons of ore in sight.

Equipment: includes 2 steam hoists, 2 compressors and tramway.

Company commenced shipping in 1919; output to date about 25,000 tons of 60% ore.

NORTH AMERICAN IRON MINING CO. **MINNESOTA**

Address: C. M. Simpson, Shawnee, Okla.

Ground transferred to a new company in 1918. See Vol. XIV.

NORTHERN MINNESOTA ORE CO. **MINNESOTA-ARKANSAS**

Office: Deerwood, Minn.

Officers: C. W. Potts, pres.; L. Peterson, v. p.; C. M. Farney, sec. and treas.; with C. E. Updike, H. M. Miller. A. Murry, John Berg and R. S. Billingsley, directors. A. K. Knickerbocker, supt., Cushman, Ark.

Inc. March, 1917, in Minnesota. **Cap.** $700,000; $1 par; outstanding $460,000.

Property: 12 fee interests, totaling 520 acres, and leases on 320 acres known as Northland mine, 2 miles north of Cuyuna on Cuyuna range, Minn.

Development: by shaft 200' deep and 200' of workings. Method used, top slicing and selective stoping on manganese ore.

Equipment: includes two hoists, compressor and pump. Company started shipping in 1919, but after mining 5,000 tons, closed the mine and acquired 600 acres of manganese bearing land, 1½ miles E. of Cushman, Arkansas.

NORTHWESTERN IMPROVEMENT CO. **MINNESOTA**

Office: Ironton, Minn. E. E. Hunner, mgr. M. A. Hanna & Co., sales agents.

Property: the Feigh mine on the Cuyuna range, opened in 1917. Ore is a non-Bessemer hematite, carrying 51% iron and 0.247% phosphorus.

Production: 21,011 tons in 1919.

OLIVER IRON MINING CO. **MINNESOTA**

Company, a subsidiary of the U. S. Steel Corporation, is a close corporation, owning, controlling ond operating mines in Michigan, Minnesota and Wisconsin.

Office: Wolvin Bldg., Duluth, Minn.

Officers: W. J. Olcott, pres.; P. Mitchell, v. p.; G. D. Swift, sec.-treas.: J. H. McLean, genl. mgr.; O. C Davidson, gen. supt., Eveleth, Minn.; W. M. Tappan, gen. supt.; L. D. Davenport, chief eng.; L. R. Salsich mgr., Western Mesabi district, Hibbing, Minn. A. Y. Petersen, gen. supt., Coleraine district, Minn.; F. R. Mott, genl. supt., Virginia district, Minn.; Ver-

non Claypool, asst. supt., Chisholm district; W. W. J. Croze, geologist. D. E. Sutherland, asst. gen. supt.

The U. S. Steel Corp. owns all of the issued capital stock $1,200,000.

Production: in 1913, 26,037,585 tons; in 1914, 14,586,454; in 1915, 21,079,224; in 1916, 29,927,767; in 1917, 28,453,154; in 1918, 25,671,908; in 1919, 23,300,000; in 1920, 30,000,000 tons.

Employment is normally given to over 12,000 men, of whom 60% are Americans.

Of the 49 mines owned or controlled approximately 25 were inactive during 1920. The Carson Lake was abandoned early in 1920. The Queen and Stegmiller mines in the Marquette range and the Deacon in the Mesabi range have been exhausted. Lease on Zenith mine was taken over in 1919 by Zenith Iron Mng. Co., and in turn by the **Vermillion Mng.** (q. v.) in 1920.

Company also owns zinc mines at Shullsburg, Wis., equipped with a 300-ton roasting and separating plant, erected in 1916 Plant was operating in 1919.

OMAHA IRON CO. **MINNESOTA**

Address: 1019 Marquette Bldg., Chicago. Ill.

Officers: D. A. Dunn, pres.; W. A. McClaron, v. p.; L. M. Swindler, treas. Directors: W. P. Mars, D. A. Dunn, A. A. MacKay, W. A. McClaren and J. T. Paige. W. H. Squier, sec., mgr. and pur. agt.

Inc 1917, in Minnesota. **Cap.** $100,000; par $10. Presumably controlled by stockholders of the Onahman Iron Co.

Company bankrupt in 1920. Assets, $160,839; liabilities, $334,327.

Property: a lease on the Wilcox and Omaha mine, 240 acres, 7 miles N. E. of Brainard, on South Cuyuna range, Minn. Mine has been developed by 5 miles of underground openings and is said to have reserves of about 4,000,000 tons of non-Bessemer ore that assays 50.34% iron; .228% phosphorus, and .30% manganese.

Production: 1918, 41,000 tons; total to date about 200,000 tons.

ONAHMAN IRON CO. **MINNESOTA**

Office: Omaha, Nebraska.

Officers: W. A. McClaren, pres.; W. C. Fraser, mgr.; H. H. Hunner, supt.; W. H. Locker, sales agent.

Inc. 1913, in Nevada. **Cap.** $1,250,000; $1 par; 1,060,000 issued.

Dividends: paid 3 dividends amounting to 15% during 1917. Gross earnings in 1918 were about $442,000, all from ore sales. Earnings to April, 1919, about $1,043,391 gross. Company went into bankruptcy in 1920, and was to be reorganized in 1921.

Property: 200 acres of manganiferous iron ore land on Cuyuna range, Crow Wing county, Minn., including the Ferro and Algoma mines, the latter purchased for $536,649 in 1917, when the Algoma Manganese Co. was merged with the Onahman Iron Co. The Ferro mine reverted to fee owner, the Gorham-Garbett Co. and equipment was sold at sheriff's sale to satisfy mortgage against Onahman Co. for $14,000 on unpaid royalty. The Algoma yields ore carrying 33% iron, 0.082% phosphorus, 19.40% silica, and 17.15% manganese; and the Ferro, 30% iron, 0.073% phosphorus, 18.41% silica and 19.25% manganese.

Production: a total of 100,945 tons from the Algoma and 153,264 tons from the Ferro mines.

ONEIDA MINES CO. **MINNESOTA**

Office: 207 Fargusson Bldg., Duluth. Minn.

Officials: R. M. Sellwood, mgr.; Wm. Mudge, Jr., supt. Pickands, manager.

Inc. 1918, in Minnesota. **Cap.** $500,000; $1 par. Company was formed to take over all the assets and assume all debts, obligations and contracts of the Sultana Mines Co., issuing 301,070 shares to Sultana Mines Co., and offering Sultana holders, 90.321 new shares retaining in treasury 108,609

shares. The Sultana properties were appraised, 1918, at $309,710, as 903,210 Sultana shares were issued, the reorganization was equivalent to reducing outstanding shares to ⅓ the number.

Property: the Sultana mine, on Cuyuna range, in S. W. ¼ of S. E. ¼ of Sec. 3, T. 46 N. R. 29 W., Crow Wing county, containing ore suitable for basic pig iron and spiegeleisen. Dried samples assay 39.3% iron, 0.17% phosphorus, 8.45% silica and 13.43% manganese. Mined by sub-level slicing method to 130' depth.

Company also owns a lease on Clark mine, an undeveloped iron property in S. E. ¼ of N. W. ¼ Sec. 34, T. 47 N. R. 29 W., Crow Wing county said to contain a high-grade manganiferous ore, low in phosphorus and suitable for ferro-alloy manufacture. Both mines reported closed down.

Production: from Sultana, 35,169 tons in 1916. Idle since 1916.

ORIENTAL GRANITE & IRON CO. **MINNESOTA**

Office: 30 N. La Salle St., Chicago, Ill.

Officers: Edw. Romberg, pres.-treas.-mgr.; S. Romberg, v. p.; G. A. Hall, sec., with R. L. Benson, L. B. Lehman and H. J. Grannis, directors.

Inc. April, 1887, in Minnesota. **Cap.** $80,000; shares $2 par, 38,000 issued.

Owns the Spring iron mine on Mesabi range, in St. Louis Co., Minn., and other unexplored iron lands. Ore of the Spring mine reported to assay 51% iron, .034% phosphorus and 22% silica. Idle since 1910.

PALATINE MINING & DEVELOPMENT CO. **MINNESOTA**

Address: Palatine City, Minn.

Officers: Jos. Mierzynski, pres., 5251 Windsor Ave., Chicago, Ill.; Frank Wydra, sec.; Stanley Grzybowski, treas.; Jas. Ostrowski and Edw. A. Zolkowski, directors.

Property: 2,500 acres of iron-ore land in Cook county and a blast furnace at Port Arthur, formerly owned by the Atikokan Iron Co. Extensive diamond drilling planned.

PERKINS MINING CO. **MINNESOTA**

Office: 811 Sellwood Bldg., Duluth, Minn.

Officers: R. M. Sellwood, mgr.; Wm. Mudge, Jr., supt. Pickands, Mather & Co., sales agents.

Property: the Perkins mine on Mesabi range, opened 1919.

Production: 612,890 tons to end of 1919, varying from 18,509 tons in 1919 to 80,942 in 1917.

PICKANDS, MATHER & CO. **MINNESOTA**

Officials: C. H. Munger, gen. mgr., 600 Western Reserve Bldg., Cleveland, Ohio, and Sellwood Bldg., Duluth, Minn.; W. P. Chinn, asst. gen. mgr.; W. A. Rose, chief mng. eng.; W. H. Gallagher, chief mech eng.; C. P McClure, purch. agt., Duluth, Minn.

Company operates, controls, or is selling agent for a great number of mines in the Lake Superior region. The ore mined is a hematite, equal in quality to the average standard of Lake Superior ore. The properties include:

Mine	Operating Company	General Supt.	P. O. Address
Albany	Crete Mng.	R. Murray	Hibbing, Minn
Balkan	Balkan Mng.	C. E. Lawrence	Crystal Falls, Mich
Baltic Fogarty	Verona Mng.	C. E. Lawrence	Caspian, Mich.
Bangor	Bangor Mng.	L. C. David	Gilbert, Minn.
Belgrade	Balkan Mng.	L. C. David	Gilbert, Minn
Bengal	Verona Mng.	C. E. Lawrence	Caspian, Mich.
Bennett	Bennett Mng.	F. P. Botsford	Keewatin, Minn.
Cary	Odanah Iron	L. M. Hardenburgh	Hurley, Wis.

Mine	Operating Company	General Supt.	P. O. Address
Caspian	Verona Mining Co.	C. E. Lawrence,	Caspian, Mich.
Corsica	Corsica Iron	L. C. David	Gilbert, Minn
Danube	Balkan Mng.	F. P. Botsford	Bovey, Minn.
Elba	Hobart Iron	L. C. David	Gilbert, Minn
Majorca	Hobart Iron	F. P. Botsford	Calumet, Minn.
Mikado	Plymouth, Mng.	L. M. Hardenburgh	Verona, Mich.
Mohawk	Mohawk Mng.	L. C. David	Gilbert, Minn
Plymouth	Plymouth, Mng.	L. M. Hardenburgh	Verona, Mich.
Rowe	Pittsburgh S. Ore.	W. P. Chinn	Riverton, Mich.
Russell	Bennett Mng.	F. P. Botsford	Keewatin, Minn.
Scranton	Hoyt Mng.	R. Murray	Hibbing, Minn
Sunday Lake	Sunday Lake Iron	L. M. Hardenburgh	Wakefield, Mich.
Utica	Crete Mng.	R. Murray	Hibbing, Minn.
Warner	Hemlock Riv. Mng.	C. E. Lawrence	Amasa, Mich.
Windsor	Odanah Iron	L. M. Hardenburgh	Hurley, Wis.
Porter	Hemlock	C. E. Lawrence	Amasa, Mich.
Zenith	Vermilion Mng.	Kenneth Duncan	Ely, Minn.
Judson	Balkan Mng.	C. E. Lawrence	Alpha, Mich.
Brotherton	Brotherton I. M.	L. M. Hardenburgh	Wakefield, Mich.

Total production in 1920 from all mines was 4,702,194 tons.

PITT IRON MINING CO. **MINNESOTA**

Address: C. E. Moore, gen. mgr., Virginia, Minn.; R. M. Rice, purch. agt.

Property: Miller and Wacootah mines on Mesabi range, St. Louis county, Minn. **Ore:** soft, brown, non-Bessemer hematites, containing in Miller, 49.28% iron, 0.07% phosphorus, 0.62% manganese; in Wacoptah, 49.25% iron, 0.090% phosphorus and 0.69% manganese. Ore is mined by shafts to 212' at Miller and stripping to 200' at the Wacootah.

Production in 1919, 310,140 tons at Miller mine, compared with 329,151 in 1918; 312,875 in 1917, and 252,404 in 1916, a total of 4,027,585. At the Wacootah mine the 1919 production was 86,326 tons, compared with 174,342 tons in 1918; 73,908 in 1917 and 101,970 in 1916, a total of 971,379 tons.

PITTSBURGH IRON ORE CO. **MINNESOTA**

Office: Virginia, Minn. E. E. Hunner, mgr.; F. H. Cohoe, gen. supt. **Sales agents:** M. A. Hanna & Co., Cleveland, Ohio.

Property: the Brunt mine, on Mesabi range, St Louis county. **Ore:** soft, red, non-Bessemer siliceous hematite, assaying 49% iron, 0.049% phosphorus and 8.50% silica. Mined by open pit method to 110' depth.

Production: to end of 1919, 1,486,411 tons.

PITTSBURGH STEEL ORE CO. **MINNESOTA**

Address: Riverton, Minn. C H. Munger, mgr.; W. P. Slaughter, supt.; C. P. McClure, pur. agt., 700 Sellwood Bldg., Duluth, Minn. Pickands, Mather & Co., sales agents.

Property: the Rowe mine, on Cuyuna range, Crow Wing county. Ore is a soft, brown non-Bessemer, requiring washing and crushing: assays 48% iron, 0.189% phosphorus and 8% silica. The mine was worked out during 1920 and the lease surrendered. Total production, 783,349 tons.

PROVIDENT IRON CO. **MINNESOTA**

See Volume XIV.

QUINN, CLEMENT K. & CO. **MINNESOTA**

Office: Alworth Bldg., Duluth, Minn.

Officers: C. K. Quinn, pres., Duluth, Minn. E. P. Scallon, supt., Crosby, Minn.

Property: Mahnomen mine at Ironton; Madrid mine at Virginia; Pearson mine at Nashwauk; Wisstar mine at McKinley, and Rolling Mill mine at Negaunee, all separately described. Annual production totals 1,000,000

tons. Company acquired an option on the Atikokan iron mine, 125 miles W. of Port Arthur, Ontario, in 1921.

REPUBLIC IRON & STEEL CO. MINNESOTA

See same title in U. S. section of this volume.

ROGERS, BROWN ORE CO. MINNESOTA

Office: 111 W. Washington St., Chicago, Ill.

Officers: H. J. Schlesinger, pres.; A. D. Chisholm, v. p.-gen. supt.

Property: the Susquehanna iron mine, on the Mesabi range, Minn. Opened in 1906. Also the Kennedy mine on the Cuyuna range, opened in 1907, worked by slicing and caving to 362', and the Meachem mine on the Cuyuna range, opened in 1909.

Ore: Bessemer and non-Bessemer, assaying 48-50% iron. Mined by stripping method, to depth of 190'. Shafts are lined with steel.

Production: to end of 1919 totals 6,324,358 tons from the Susquehanna mine; 1,795,887 tons from the Kennedy, and 49,457 tons from the Meachem mine.

ROLLING MILL MINING CO. MINNESOTA

Address: R. S. Archibald, mgr., Alworth Bldg., Duluth, Minn. Edw. P. Scallon, gen. supt.; Clement K. Quinn & Co., sales agents.

Property: Rolling Mill mine on Marquette range, produces soft, brown-Bessemer hematites. Mined by underground methods to depth of 786'.

Production: in 1919, 116,380 tons; total, 1,668,771 tons.

RUTLAND MINING CO. MINNESOTA

Office: Eveleth, Minn.

Officers: M. S. Kingston, mgr.; Pickands, Mather & Co., sales agents.

Property: the Aad mine, opened in 1917. Product is a soft, red non-Bessemer hematite, extracted by underground top-slicing. Ore carries 49.16% iron and 6.48% silica.

Production: for 1918 and 1919, totals 112,189 tons.

SACHEM IRON CO. MINNESOTA

Office: 704 Lonsdale Bldg., Duluth, Minn.

Officers: H. C. Dudley, pres.-treas.; A. L. Agatin, sec. Bowe-Burke Mining Co. acts as manager and sales agent.

Property: the Burns mine, Mesabi range, opened in 1917. **Ore:** soft, red, Bessemer hematite, carrying 53-54% iron; .028-.034% phosphorus; 7.5% silica, and non-Bessemer carrying 49-51.50% iron; .049-.060% phosphorus and 5.4-6.6% silica.

Production: total to date, 223,215 tons.

SAGAMORE MINE MINNESOTA

See **Savage & Co., John A.**

SAVAGE & CO., JOHN A. MINNESOTA

Office: Crosby, Minn. and Alworth Bldg., Duluth, Minn. J. F. Murphy, gen. supt.; Clark Henry, supt.

Property: the Sagamore mine on the Cuyuna range, in Sec. 19 T. 46 R. 29, Crow Wing county, opened in 1919. The ore mined by open pit methods is a manganiferous hematite, carrying 39% iron, 0.251% phosphorus, and 11% manganese.

Production: 86,398 tons in 1919.

SEAFIELD EXPLORATION CO. MINNESOTA

Office Ironton, Minn.

Officers: Wm. Seafield, pres.; H. M. Stetson, sec.-treas.

Inc. March, 1908. **Cap.** $8,000; $100 par.

Company does exploration work only.

SECTION THIRTY MINE, INC. MINNESOTA

Succeeds Section Thirty Mining Co.

Address: G. A. St. Clair, Sellwood Bldg., Duluth, Minn.

Property: Section Thirty mine on the Vermilion range, Lake county, Minn. Ore is a hard, blue Bessemer and non-Bessemer hematite, containing 59.85 and 55.67% iron, 0.044 and 0.080% phosphorus and 7.13 and 11.14%

silica, respectively. Ore is crushed, and cargo analyses show 63% iron in Bessemer and 58.6% in non-Bessemer.

Worked by open pit and sub-stoping methods to 650′ vertical.

Production: from 1915 to end of 1919, totals 1,295,538 tons.

SECTION THIRTY MINING CO. **MINNESOTA**

Address: G. A. St. Clair, Sellwood Bldg., Duluth, Minn.

Succeeded by **Section Thirty Mine, Inc.**, and company to be dissolved.

SHADA MINING CO. **MINNESOTA**

Address: 1500 Alworth Bldg., Duluth, Minn. Clement K. Quinn, mgr.; E. P. Scallon, gen. supt.

Property: Pearson mine at Nashwauk on the Mesabi range, contains Bessemer and non-Bessemer hematite, assaying 60% iron and 8% silica.

Production: total to date, 102,300 tons of concentrate.

SHENANGO FURNACE CO. **MINNESOTA**

Address: E. J. Maney, gen. mgr., Chisholm, Minn.

Property: Shenango, Tioga, Webb and Whiteside iron mines, on Mesabi range, St. Louis county, opened in 1904, 1916, 1905, and 1910, respectively.

Ore: all four produce soft, brown Bessemer and non-Bessemer hematites, containing 53.23, 50, 53.52, and 50.85% iron; 0.041, 0.039, 0.051, and 0.088% phosphorus; and 4.75, and 10.97, 6.13, and 7.49% silica, respectively. Ore is mined by underground and open-pit methods to 300′ in the Shenango; underground to 200′ in the Tioga; underground and stripping to 250′ in the Webb mine, and underground to 250′ in the Whiteside. Company also owns the South Tenor mine, an undeveloped property. The old Virginia mine was reopened in 1920. Reserves are estimated at 4,000,000 tons.

Production: to end of 1919, totals 12,085,218 tons.

SOUTH CHANDLER MINE **MINNESOTA**

Address: B. M. Pattison, lessee, Sellwood Bldg., Duluth, Minn. W. J. Mudge, supt.

Property: an iron mine on Vermilion range, St. Louis county, that was worked in 1888, abandoned 1905 and reopened 1913, mainly working ground already worked.

Ore: a hard red Bessemer hematite, containing 54% iron, 0.042% phosphorus, and 11.22% silica.

Mining by slicing system, to 800′ vertical.

Production: 30,534 tons in 1919, and 464,830 tons to date.

STAMBAUGH IRON CO. **MINNESOTA**

Office: Chisholm, Minn.

Officers: J. S. Lutes, mgr., Duluth, Minn.; C. H. Claypool, supt.

Property: the Billings mine on the Mesabi range, yielding a soft non-Bessemer hematite, carrying 57% iron, .85% manganese, and 0.050% phosphorus. Underground methods are practised.

Production: 23,918 tons in 1919; none since.

SULTANA MINES CO. **MINNESOTA**

Company dissolved 1918, and all assets taken over by the **Oneida Mines Co.**, which see. The directors of the Sultana comprised the first directorate of the Oneida. The transaction was a reorganization, cutting down the outstanding stock to one-third.

SYRACUSE MINING CO. **MINNESOTA**

Formerly operated the Hudson mine on the Mesabi range, now exhausted. See Vol. XIV.

TOD-STAMBAUGH CO., THE **MINNESOTA**

Address: C. A. Thompson, v. p., Cleveland, Ohio. J. S. Lutes, mgr. for Cuyuna range mines. Sales agents for the following iron mines:

Property	Range	Mining System	Ore	Iron Contents %	Prod.* Tons
Biwabik	Mesabi	Open pit	Bessemer and non-Bessemer	55 to 50 52	395,109
Dean-Itasca	Mesabi	Open pit	Bessemer and non-Bessemer	51 ..	448,003 .....
Dunwoody	Mesabi	Open pit	non-Bessemer	50	535,930
Morton	Mesabi	Underground		50	.....
North Eddy	Mesabi	Underground	non-Bessemer	49	72,854
Pennington	Cuyuna	Open pit	non-Bessemer	51	100,981
Warren	Mesabi	Open pit	non-Bessmeer	52	159,150
Zimmerman	Menominee	Underground	non-Bessemer	51	198,649

* Approximate 1919 production.

The Biwabik, opened in 1893, has produced 12,793,623 tons; the Dean-Itasco, 3,067,817 tons; the Morton, 141,262 tons; the North Eddy, 468,846 tons; the Zimmerman was opened in 1907 by the Spring Valley Iron Co., and was taken over by the Tod-Stambaugh Co. in 1918; total production to December, 1919, about 1,480,459 tons.

During 1920, company secured a 50-year lease on a property 2 miles W. of Grand Rapids. The deposit can be exposed by hydraulicking; the ore will be concentrated. Company has been prospecting for a possible extension of the western Mesabi range.

UNION ORE CO **MINNESOTA**

Address: Youngstown, Ohio. Francis H. Webb, gen.-mgr., care Republic I. & S. Co., Duluth, Minn. William White, supt.

Republic I. & S. Co. holds a 50% interest.

Property: the Union mine, on Mesabi range, St. Louis county. **Ore:** two grades, soft red and blue Bessemer and non-Bessemer hematites, assaying 50 to 56% iron, 0.039 to 0.063% phosphorous and 6.23 to 8.42% silica.

VERMILLION MINING CO. **MINNESOTA**

Address: Kenneth Duncan, supt., Ely, Minn.

Subsidiary of Pickands, Mather & Co. Republic Iron & Steel Co. also has a substantial interest in the company.

Property: company acquired a lease on the Zenith mine from the Zenith Iron Mining Co. in Aug., 1920. Property is on the Vermillion range. Ore is a Bessemer hematite, carrying 58.46% iron and 5.52% silica. Operations are conducted to a depth of 1,100'. Reserves are over 2,000,000 tons.

Production: from 1916 to end of 1920, total, 5,934,296 tons.

Operations curtailed in 1921 and force reduced to 130 men.

VIRGINIA ORE MINING CO. **MINNESOTA**

Subsidiary of M. A. Hanna & Co.

General office: 1300 Leader News Bldg., Cleveland, O. J. D. Ireland, gen. mgr.; E. E. Hunner, mgr., 909 Fidelity Bldg., Duluth, Minn. C. E. Hendrick, gen. supt., Virginia, Minn. G. E. Frederickson, purch. agent, Duluth.

WAWBEEK MINING CO. **MINNESOTA**

Office: 1500 Alworth Bldg., Duluth, Minn. C. K. Quinn, mgr.; E. P. Scallon, gen. supt.

Property: the Madrid mine on Mesabi range, opened in 1912. Ore carries 53% iron, and is a soft, red-brown Bessemer hematite. Mining is by underground caving, to depth of 132'.

Production: 43,943 tons in 1917; 18,258 tons in 1918; 8,254 tons in 1919; a total of 193,365 tons.

WHITE IRON LAKE IRON CO. **MINNESOTA**

Address: R. F. Belleperche, sec., 402 Exchange Bldg., Duluth, Minn.

Officers: J. P. Labree, pres.; Jos. Trudel, treas., with C. M. Forest, F. P. Teepoorten, Jos. Lafortune, R. Hoch, directors.

Property: at Ely, idle several years.

WHITMARSH MINING CO. **MINNESOTA**

Address: G. H. Crosby, mgr., Duluth, Minn.

Property: the Huntington and Martin mines on the Cuyuna range, opened in 1918, yielding non-Bessemer hematites carrying 48% iron. Slicing and caving is practised to a depth of 190′ and 217′. No production figures obtainable.

WISCONSIN STEEL CO. **MINNESOTA**

Owned by the International Harvester Co. **Office:** 606 Michigan Ave., Chicago, Ill. **Mine office:** Nashwauk, Minn.

Officers: H. F. Perkins, gen. mgr.; B. W. Batchelder, gen. supt.; J. H. Williams, chief engr.; W. B. Edgar, purch, agt.

Cap. $1,000,000 ;fully paid; all owned by International-Harvester.

Property: all on the Mesabi range; the Agnew mine at Hibbing, St. Louis county; the Hawkins at Nashwauk and the Sargent at Keewatin, both in Itasca county.

Agnew Mine: 40 acres, opened in 1902, and containing a soft, red, non-Bessemer hematite assaying 48.51% iron and 0.058% phosphorus. Mined by underground system to 230′. **Hawkins Mine:** 160 acres, first opened 1902. Ore is a Bessemer hematite, assaying 55% iron and 0.04% phosphorus. Mined by open pit system to 123′ depth. Has an ore washing plant. **Sargent Mine:** first opened in 1918. Ore is a non-Bessemer hematite, assaying 57.61% iron and 0.065% phosphorus. Underground mining and open pit systems used, with a possible annual output of 200,000 tons. The property has been explored by diamond-drilling which showed ore estimated at 10,000,000 tons. The **Bruce** prospect at Chisholm has been abandoned.

Production: at the Agnew mine was 108,908 tons in 1917; 96,940 in 1918; 44,673 in 1919; total, 1,894,414 tons; at the Hawkins mine, 616,523 tons in 1917; 528,600 tons in 1918; 393,159 in 1919; total, 4,853,078 tons.

WISSTAR MINING CO. **MINNESOTA**

Address: C. K. Quinn, mgr., 1500 Alworth Bldg., Duluth, Minn.; E. P. Scallon, gen. supt., Crosby, Minn. C. K. Quinn & Co., sales agents.

Property: 40 acres, known as the Wisstar mine, near McKinley, Mesabi range. Property explored 1917 and development started in 1918. **Ore:** soft, brown, granular, non-Bessemer hematite, assaying 58% iron, 10% silica. Underground caving and slicing to 175′ is practised.

YORK IRON MINING CO. **MINNESOTA**

Office: Virginia, Minn.

Officers: A. B. Coates, pres.; G. P. Tweed, sec.-treas.; C. A. Myers, mgr.; John Sandberg, supt.

Property: the York mine, on Mesabi range, containing Bessemer and non-Bessemer hematites. Ore mined by open pit system, shows 55% iron, .04 to 0.05% phosphorus and 10% silica.

Development started 1917.

Production: to January 1, 1921, 469,000 tons.

ZENITH IRON MINING CO. **MINNESOTA**

Office: 811 Sellwood Bldg., Duluth, Minn.

Officers: R. M. Sellwood, gen. mgr.; Kenneth Duncan, supt.; Pickands, Mather & Co., sales agents.

On July 1, 1919, company took over a 50-year lease on the Zenith mine from the Oliver Iron Mng. Co. and in August, 1920, turned lease over to the Vermillion Mng. Co., which see, for description of property.

MISSOURI OKLAHOMA KANSAS

The mining companies of these three states are grouped together because with a few though important exceptions, the mines are in the Tri-State or Joplin field, which covers the adjacent parts of three states. This field ex-

tends northeasterly for fifty miles from Miami, Oklahoma, to Neck City, Missouri. It was formerly known as the Southwest Missouri or Joplin field, but with the increasing and at present preponderating importance of the Oklahoma portions of the field locally called the Miami district, the name Tri-State is more appropriate.

The ores consist of chert and altered limestone containing a small amount of galena and of zinc blende and their oxidation products. They occur in the irregular deposits of "broken ground' near the surface and in flat blanket deposits, or so called "sheet ground." The latter occurs in a cherty layer of the Boone limestone formations in which "runs" of ore 50 to 100' wide, and 5 to 15' thick, are sometimes a mile or two in length.

The principal orebodies are said to occur where cross fractures run out from the two main faults of the region, the main Miami fault with a throw of but 15 ft. being many miles long and some runs extending parallel to it.

Since the "runs" are practically level and at so shallow a depth that only a small amount of capital need be used for development and equipment, labor trouble is not a factor, the miners of to-day being often the operators of to-morrow.

Production from the Tri-State field for 1920 totaled 569,581 tons of concentrate—locally "ore"—which sold for $43,004,711. The bulk of this came from Oklahoma, the official figures being as follows:

Production for 1920:

	Kansas	Missouri	Oklahoma
Lead conc. tons.....	20,831	247,185	81,464
Lead metallic tons	16,788	165,114	65,394
Zinc conc. tons	113,148	48,864	407,569
Zinc metallic tons.....	61,073	24,509	219,727
Rec'd for lead conc.....	$2,005,517	$20,283,887	$10,463,040
Rec'd for zinc conc.....	$5,154,572	$2,842,564	$35,595,774

In the Missouri portion of the field 1,304,400 tons of ore was mined in 1920 that averaged 0.31% lead and 2.09% zinc, comparing with 1,114,300 tons in 1919 that averaged 0.32% lead and 2.9% zinc.

Kansas produced 1,704,700 crude tons of zinc ore carrying 3.98% zinc and 0.98% lead yielding 113,148 tons zinc concentrate of an average value of $45.30 per ton and 20,831 tons of lead concentrate that sold for $96.27 per ton.

ABBOTT, REBHOITZ & STEWARTY MINING CO. KANSAS

Was to build $25,000 plant at Baxter Springs in 1918, but did not.

ACME LEAD & ZINC CO. OKLAHOMA

Address: 209 C. C. Cole Bldg., Tulsa, Okla.; also Box 812, Picher, Okla.

Officers: C. C. Cole, pres.; J. R. Cole, Jr., sec.-treas.; L. Lockey, supt.; and John Wingfield, mill supt.

Inc. March 15, 1917, in Oklahoma. **Cap.** $200,000; $1 par.

Property: 40 acres S. E. of Picher, containing zinc-lead ore.

Development: by 170' and 210' shafts.

Equipment: includes two 250-ton mills, worked throughout 1921.

Mine and No. 1 mill reported under option to Federal M. & S. Co., at last account.

Production: 146,340 lb. blende concentrate for week ending Dec. 17, 1921.

ACME MINE MISSOURI

(Formerly Acme Lead & Zinc Co.)

Property near Lawton, Kansas, now owned by the Butte-Kansas Mng. Co., which see.

ADAMS-HICKS ZINC & LEAD CORPORATION MISSOURI

Address: Frisco Bldg., Joplin, Mo.

Officers: D. D. Adams, pres, Batesville, Ark.; Grover James, sec.; Abel Greene, supt.

Cap. $200,000.

Property: a 100-acre lease, 4 miles S. W. of Joplin, developed by 4 shafts, with fair ore reserves.

Equipment: includes a 200-ton mill driven by 4 gas engines. Idle part of 1919-1921.

ADIRONDACK MINING AND MILLING CO. — **MISSOURI**

Probably dead. Formerly operated in Joplin. See Volume XIV.

ADMIRALTY ZINC CO. — **OKLAHOMA**

Office: Douthat, Okla.

Officers: F. M. Aiken, pres.; J. S. Cosden, sec.; H. C. Williamson, treas.; W. B. Shackelford, gen. mgr., Baxter, Okla. M. B. Lawrence, mine supt.

Inc. 1915 in Delaware. **Cap.** $600,000.

Property: 4 mines, 120 acres at Douthat, Okla., and 40 acres in Cherokee county, Kansas. Shafts are down 220′ and open the usual type of 6 to 16% blende and galena ore. Four mills are treating 1,100 tons in 10 hours.

Company operated No. 2 and No. 3 mines throughout 1921, employing 140 miners. The same interests own the Sinden Zinc Co. mine at Cardin, closed since 1920, save for prospecting, and the Queen Esther mine north of Hockerville where electric hoists were installed in Dec., 1921, in readiness for a resumption of operations.

Equipment: includes hoist, 2 compressors, 4 electric pumps, tramway and 4 mills, with a daily capacity of 1,200 tons. Ore treated during 1915-16 amounted to 51,200 tons, concentrates averaging 62.50% zinc and 81.50% lead.

Production has been as follows: in 1915, 936,750 lb. zinc and 156,000 lb. lead; in 1916, 6,085,400 lb. zinc and 1,014,200 lb. lead. In 1921, 200,000 to 700,000 lb. zinc concentrate weekly.

AKSARBEN MINING CO. — **KANSAS**

Dead. Listed in Volume XIV.

ALAMO LEAD & ZINC Co. — **OKLAHOMA**

Offices: 401 Security Bldg., Dallas, Texas, and Quapaw, Okla.

Property: is N. W. of Quapaw. A 200-ton mill was erected in 1918, but has not worked regularly.

ALEXANDER LEAD & ZINC CO. — **OKLAHOMA**

Address: Orville Sneed, Miami, Okla.

Property: is near the Larsh mine, ½ mile N. W. of Cardin. A 500-ton mill was erected in 1918. Idle.

ALLEGHENY-WESTERN MINING CO. — **MISSOURI**

Address: P. C. Seddon, mgr., Gentry Apts., Joplin, Mo.

Inc. in West Va. **Cap.** $100,000.

Property: a lease and mill on 400 acres, in the Waco district.

Development: by 162′ shaft. **Equipment:** includes 250-ton concentrator, hoist and compressor. Twelve men employed.

ALLIED MINING CO. — **OKLAHOMA**

Address: L. B. Ellis, Wagoner, Okla.

Property: a lease and mill N. E. of Lincolnville, Oklahoma.

ALTON ZINC & TRADING CO. — **MISSOURI**

Address: Alton, Oregon Co., Mo.

Mined zinc carbonate and silicate ores, in 1920, from shallow workings, ores being cleaned in log washers.

AMALGAMATED ZINC & LEAD CO. — **MISSOURI**

Out of business since August, 1918. See Vol. XIII.

AMARILLO MINING CO. — **MISSOURI**

Address: care Amos Hatton, Webb City, Mo.

AMBER MINING CO — **KANSAS**

Dead. See Volume XIV.

AMERICAN SMELTING & REFINING CO. — **OKLAHOMA**

See in United States section of this volume for general statement. Company operates zinc smelters at Henryetta and Sand Springs.

AMERICAN TRIPOLI CO. MISSOURI

Address: P. B. Butler, Frisco Bldg., Joplin, Mo. Mine address: Seneca, Mo.

AMERICAN ZINC, LEAD & SMELTING CO. MISSOURI

See same company under United States section of this volume.

Address: H. I. Young, mgr., Carterville, Mo.

AMERICAN ZINC & SLATE CO. MISSOURI

Address: 126 Liberty St., New York City.

Works: at Picher, Okla., contain Mineral Separation plant. Mining properties near Joplin reported as closed down.

AMY T. MINING CO. OKLAHOMA

Dead. Former address, Ed Ballinger, supt., Miami, Okla.

ANALEE MINING CO. MISSOURI

Address: Wm. C. Lucas, atty., Kansas City, Mo., former president. Company defunct. See Vol. XIV for description.

ANDAYER MINING CO. KANSAS

Address: Bob Andrews, 5th & Moffett Sts., Joplin, Mo. Is a close corporation, consisting of four stockholders, with mines at Galena, Kansas. Company has no stock for sale and refuses to furnish a report of operations. The mine was the only one in the district that operated steadily during 1919, producing about 40 tons of blende (60% metal) per week.

ANNA BEAVER MINING CO. OKLAHOMA

Subsidiary of **Metals Exploration Co.**, Hobart Bldg., San Fransico, Calif.

Address: Cardin, Okla. L. L. Fillins, district mgr., Baxter Springs, Kansas.

Officers: Bulkeley Wells, pres.; S. J. Burris, Jr., mgr.; A. D. Snodgrass, sec.-treas.

Inc. Feb., 1917.

Property: a lease on 2 mines, 180 acres N. of Cardin. Cages are used instead of buckets for hoisting, which is an innovation here. Developed by 3 shafts.

Equipment: includes 2 modern mills with total daily capacity of 1,200 tons.

Production: was 222 tons of blende weekly in 1921.

ANNAPOLIS LEAD CO. MISSOURI

Address: A. J. Meir, mgr., Annapolis, Mo.

Principal shareholders: F. M. Strickland, St. Louis, Mo.; D .G. Cook and C. F. Dana of Vessie, Mo. and J. A. Nolan of Webster Groves, Mo.

Inc. in Missouri. **Cap.** $2,500,000.

Property: on the Missouri Pacific R. R. near Annapolis, in Iron county. In 1919 and 1920, a ¾-mile spur line was constructed and a 3-compartment shaft was sunk 400′ to open the lead ore revealed by 79 drill-holes. A 500-ton mill was to be constructed during 1921.

ARISTA MINING CO. MISSOURI

Address: W. J. Forbes, mgr., Sarcoxie, Mo.

Property: a lease on 140 acres, 5 miles west of Sarcoxie and a 125-ton concentrator. Shipped 33,020 lb. blende in November, 1921.

ARKANSAS Z. & S. CORP'N ARKANSAS

Address: L. Vogelstein, 42 Broadway, New York City. Company's smelting plant near Van Buren, Arkansas, sold in 1920 to American Metal Co., together with entire business of L. Vogelstein and Co.

ASSOCIATED LEAD & ZINC CO. OKLAHOMA

In receivership. B. F. Bryant, Miami, Okla. Company had a lease on a tract in the town of Quapaw, on which a mill was erected in 1918.

ATHLETIC MINING & SMELTING CO. MISSOURI

Address: Webb City, Jasper county, Mo. Charles T. Orr, pres. and gen. mgr.; R. O. Sturlock, v. p.; A. G. Young, sec.; James B. Millar, treas.;

C. A. Rice, supt.; R. E. Baird, chief engr. Formerly operated under name of Gopher M. & M. Co.

The mines covering about 100 acres, in the sheet ground district of Webb City, and Duenweg, Jasper county, have been closed down since March, 1919. Described in Volume XIV. The zinc smelter at Fort Smith, Arkansas., is in operation, treating about 2,000 tons of zinc ore per month in 1921. Product is Prime Western and Brass Special.

Company is active in the smelting and gas producing field, but not in mining. Is under same management as the Bertha A Mining Co. and the Wingfield Mng. Co.

ATOKA-MIAMI L. & Z. CO. — **OKLAHOMA**

Address: E. M. Applegate, supt., Miami, Okla. Mine is near Cardin.

Property: a lease on 40 acres west of Picher, on which 12 drill-holes exposed good ore at 240'. A 300-ton mill was to be built and hand jigs erected to treat a tailing dump.

A. T. S. MINING CO. — **MISSOURI**

Out of existence. See Vol. XIII.

AUBURN MINING CO. — **OKLAHOMA**

Address: Perry Webster, Miami, Okla. **Mine address:** Commerce, Okla.

AURORA MINING CO. — **OKLAHOMA**

Address: J. E. Turner, mgr., Box 214 Miami, Okla.

Officers: T. S. Adams, pres.; J. E. Turner, v. p. and mgr.; and C. A. Moore, sec.-treas. J. W. Hale, supt.

Property: near Sunnyside, in the Leadville district, E. of Quapaw.

Development: shaft sunk to open ore shown by drill at depth of 65 to 95'. Assays averaged 19.7% blende and 1.9% lead.

Equipment: 150-ton mill driven by 100-h. p. gas engine, and compressor. Operated part time, during 1920.

A. W. C. MINING CO., INC. — **MISSOURI**

Address: Amos Gipson, sec.-treas., W. 7th St., Joplin, Mo. Amos Gipson and I. T. M. Johnston, principal owners.

Inc. 1916, in Missouri. **Cap.** $500,000.

Property: 160 acres at W. 7th St., Joplin, in center of sheet ground district. Ore carries 2½% zinc and lead. The deposit is 12' thick. Six shafts are down 200'

Equipment: includes three mills of 500 tons capacity; two on A. W. C. land and one at the south end of the Expansion Co.'s land.

Production: in 1916, company is reported to have sold 2,435 tons of zinc concentrates, assaying 62% zinc, for $245,520 and 477 tons of lead ore for $40,914. Lead concentrate assays 75% metal. No recent production.

AZTEC MINING CORPORATION — **OKLAHOMA**

Address: H. G. Larsh, Miners Bank Bldg., Joplin, Mo.

Officers: H. G. Larsh, pres.-gen. mgr.; D. L. Larsh, v. p.; T. W. Clelland, sec.

Inc. July, 1919, in Okla.

Property: 20-acres lease, ½ mile S. of Zincville, formerly held by the Lucky Strike Lead & Zinc Co. Mill employs a crusher, rolls and 10 hand-jigs. Rich ore is mined. Weekly production is about 75 tons of blende.

BADGER MINING & DEVELOPMENT CO. — **KANSAS**

Address: J. M. Bloyd, 323 Miners Bank Bldg., Joplin ,Mo. T. E. Forster, pres.

Inc. 1917, in Missouri. **Cap.** $250,000; $1 par.

Property: a lease on 210 acres at Badger, developed by 4 shafts from 95 to 185' deep. Ore is high in lead. A 250-ton mill was built in 1918.

BAKER LEAD CO. — **MISSOURI**

Out of business. Property sold for $357,000 in 1920 to the **St. Joseph Lead Co.**, which see.

BAKER MILLING, SMELTING & REFINING CO. **OKLAHOMA**

John Baker, pres., writes that he holds the charter, keeping it in force for the present with no stock for sale. See Vol. XI, Copper Handbook.

BANKERS MINING CO. **MISSOURI**

Address: J. M. Boyd, mgr., 323 Miners Bank, Joplin, Mo.

Cap. $250,000.

Property: had a lease on St. Regis tract, near Chitwood, Mo. and at Picher, Okla.

BANTY HEN MINING CO. **MISSOURI**

Address: C. W. Moore, Pittsburg, Kansas. **Mine address:** Joplin, Mo.

BARNETT MINING CO. **MISSOURI**

Judgment of $174,000 rendered against this and other defendants in favor of R. R. Conklin of New York, on ground of misrepresentation as to value of Porto Rico No. 1 mine, near Duenweg. Property said to have been an active producer in 1918, from the Porto Rico No. 1 mine in sheet ground, between Duenweg and Carterville, Mo.

BARNSDALL ZINC CORPORATION **MISSOURI**

Company is a subsidiary of the Barnsdall Corp'n.

Address: P. O. Box 235, Joplin, Mo. and 41 East 42nd St., New York City.

Officers: F. H. Minard, pres.; P. B. Butler, v. p.-mgr.; E. O. Bartlett, v. p.; J. A. Dunn, sec.-treas.; with Robt. Law Jr., E. B. Reeser and A. W. Thurman, directors. R. S. Butler, asst. mgr.; Archie Butler, gen. supt.; Chas. Smith, mine foreman; Jas. Henson, mill foreman at No. 2 plant; Clarence Mosebaugh foreman; Claude Russell, mill supt. at No. 3 plant.

Inc. 1917, in Missouri. **Cap.** $500,000; $1 par; all issued and owned by the Barnsdall Corp'n. Company has large interests in the **Independent Zinc Lands** and **Waco Mng Companies,** which see.

Property: 3 tracts, No. 1, No. 2 and No. 3, 186 acres in the Waco district, 15 miles N. W. of Joplin. Ore carries blende and galena averaging 6 to 7% recovered. Deposit is 2,200′ by 200′, shafts are 110′ to 190′ deep.

Equipment: 3 mills employing jaw-crushers, Cornish rolls, Cooley jigs and Wilfley tables. The respective capacities are 300, 600, and 1,000 tons per day. Zinc concentrates carries 62% zinc; that of lead, 78%.

Production: averages 1,800 tons of zinc concentrate per month from No. 2 and No. 3; none from No. 1. At end of 1921 was about 1,500,000 lb. zinc concentrate weekly.

BARR H LEAD ZINC CO. **OKLAHOMA**

Address: O. E. Houston, Oklahoma City, Okla. **Mine address:** Sunnyside, Okla.

BARTLESVILLE ZINC CO. **OKLAHOMA**

Subsidiary of American Metal Co., Ltd., 61 Broadway, New York, which owns 100% of the $500,000 capital.

Officers and directors: C. M. Loeb, pres.; Wm. Simon and Otto Sussman, v. p's.; Julian B. Beaty, sec.-treas.; Hy. V. Putzel, asst.-sec. Wm. H. Bradv, asst.-treas.

Works: 2 zinc smelters at Bartlesville and one at Blackwell, Okla., on which $2,500,000 has been spent. One of the smelters was formerly owned by the Lanyon Starr Smelting Co., which was merged into the Bartlesville Zinc Co. The plants include the following:

	Bartlesville No. 1	Bartlesville No. 2	Blackwell
Furnaces	6	9	12
Retorts in each	576	576	800
Total retorts	3,456	5,184	9,600
Monthly ore capacity, total tons	.....	14,000	.....
Monthly spelter output, tons	.....	5,000 to 6,000	.....

At Bartlesville, one plant produces 350 tons of zinc oxide monthly, the other plant yielding 100 to 150 tons of zinc dust. At each smelter a clinkering plant treats the residue from the retorts, making it available for blast-furnaces. The clinker carries precious metals, mainly silver. A smelter at Collinsville, Okla., was dismantled in 1918.

BEAVER MINING CO. **OKLAHOMA**

Address: Miami, Okla.

Officers: J. F. Robinson, pres.; G. L. Coleman, v. p.; Geo. Bayless, supt.; R. J. Tuthill, purch. agent.

Inc. in Okla.

Property: at Cardin. **Production:** at end of 1921 was 1,522,870 zinc concentrate for week ending Dec. 10, compared with 4,666,860 lb. for succeeding week.

BECK MINING CO. **OKLAHOMA**

Address: G. W. Beck, gen. mgr., Frisco Bldg., Joplin, Mo. Ed. Ziler, supt.

Company is a partnership, not a corporation.

Property: a mine, ½ mile N. E. of Picher, was operated continuously in 1921, a 240′ shaft yielding lead ore. The mill operated 2 shifts daily, producing both lead and zinc concentrate.

BEN B. MINING CO. **MISSOURI**

Address: Miners Bank Bldg., Joplin, Mo.

Officers: O. Longacre, Jr., pres. mgr.; B. W. Brice, v. p. and supt.; G. J. Hiatt, sec.-treas.

Inc. Oct. 25, 1917, in Missouri. **Cap.** $30,000; increased June 21, 1918, to $50,000.

Property: 80 acres, 2½ miles W. of Joplin, on 7th Street. Ore deposit is 20′ thick, opened to 145′ depth and carries 8% zinc.

Equipment: 150-ton mill with crusher, rolls, 2 jigs, tables and gas engines.

BENDENE MINING CO. **OKLAHOMA**

Address: J. R. Green, supt., Baxter Springs, Kansas.

Officers: W. B. Conrad, pres.; G. T. Bacastow, v. p.; W. T. Baird, sec.-treas.-pur. agt.

Inc. Jan., 1918, in Oklahoma. **Cap.** $200,000.

Property: 20 acres south of Baxter Springs, Kansas, near State line. Zinc occurs in the usual sheet formation, and is 25′ to 35′ thick. Developed by shaft 96′ deep.

Equipment: 400-ton mill (10 hours), closed since late in 1918, but to be reopened by 1920.

BENNY MINING CO. **OKLAHOMA**

Address: Miami, Okla. A co-partnership.

Officers: J. F. Robinson, pres.; G. L. Coleman, sec.-treas.; A. Purcell, supt.; R. J. Tuthill, pur. agt.

Property: ½ mile S. of Cardin.

BERTHA A MINING CO. **MISSOURI**

Address: Chas. T. Orr, pres.-gen. mgr., Webb City, Mo.; Jas. B. Millar, treas.

Company was one of the largest producers of zinc and lead concentrates in the Webb City district, in 1918.

Closed down since March, 1919 and partly dismantled. Fully described in Vol. XIV.

BEST MINING CO **OKLAHOMA**

Inc. in March, 1918 **Cap.** $200,000. S. H. Lester, M. J. McLaughlin, and H. B. Callahan, of Shawnee, Okla., incorporators.

BETHEL L. & Z. CO. **OKLAHOMA**

Address: W. E. Broach, sec.-treas., Box 555, Tulsa, Okla. W. H. Aul, mgr.-purch. agt.

Property: the Bethel, Domado, and Croesus leases near Cardin. 3 mills and a tailing plant.

Production: weekly production normally is 140 tons of blende (60% metal); but was 334 tons in third week of February, 1920.

BETHLEHEM ZINC CO. **KANSAS**

Office: 229 Liberty Bank Bldg., Oklahoma City, Okla. Herman Jones, mgr., Joplin, Mo.

Officers: T. L. Wade, pres.; D. E. Rodgers, v. p. with J. F. Kroutil, Dr. R. L. Montgomery, P. A. Howle and J. A. McArthur, directors. J. D. Wade, sec.

Inc. Aug., 1917, in Oklahoma. **Cap.** $300,000.

Property: a 55-acre lease on the Wright land near Treece, Kansas, next south of the Silver Fox mine. A 225′ shaft was sunk, opening lead and zinc-bearing ore in a deposit 25-40′ thick. The 300-ton mill at Quapaw has been moved from mine at Quapaw to the new mine.

BETTY H MINING CO. **KANSAS**

Address: H. N. Miller, Scammon, Kansas. **Mine address:** Bellville, Kansas.

BEULAH B MINING CO. **OKLAHOMA**

Address: W. E. Broach, sec., Box 96, Cardin, Okla. J. R. Cole, mgr.; C. W. Ritter, supt.-pur. agt.

Property: a lease in the Tar River district, E. of Picher.

BEULAH MINING CO. **MISSOURI**

Address: Ed. James, Webb City, Mo.

Property: the Beulah mine at Kelcey, Franklin county, is a producer of marcasite ore, running 40 to 44% sulphur. This is shipped to Chicago and used for acid burning.

B-G-M. MINING CO. **MISSOURI**

Idle. **Address:** Webb City, Mo.

Officers: Z. A. Metzler, pres.; J. B. Gibson, v. p.; S. C. Boggess, sec.-treas.

Inc. in Missouri. **Cap.** $100,000.

Property: 60 acres N. of Webb City, Mo. Ore carries 2% zinc and lead and is opened to depth of 180′.

Equipment: 800-ton mill (24 hours), containing crusher, rolls, jigs and sludge tables. Concentrate assays 59 to 61% zinc. Cost of mining and milling is $1.25 per ton.

No recent returns.

BIG BEN MINING CO. **MISSOURI**

Address: A. Baker, v. p., Springfield, Mo.

Inc. in Missouri. **Cap.** $5,000.

Property: about 160 acres, 6 miles S. E. of Springfield, developed by 190′ shaft. **Equipment:** includes 100-ton concentrator, compressor, drills, steam power.

In 1919, mine was reported producing 6 tons of zinc and 2 tons of lead concentrates daily. Twenty men employed.

BIG CHIEF MINING CO. **OKLAHOMA**

Described in Vol. XIV. Property now operated by **Kentucky Chief M. Co.**, which see.

BIG EIGHT MINING CO. **OKLAHOMA**

Dead. Formerly operated at Miami.

BIG ELK MINING CO. **KANSAS**

Address: J. T. Whaley, pres., Miami, Okla. C. L. Kelly, gen. mgr.

Property: 20-acre lease N. W. of Treece. Ore was found by drills at 194′. Developed by two 259′ shafts. Ore is remarkably rich.

Equipment: 250-ton (per 10 hours) mill moved from Dorris mine at Quapaw, Okla. A dump on the ground assaying 30.6% zinc and 17.18%

lead has been treated. Is a regular producer; output for week ending Dec. 17, 1921, was 149,970 lb. lead concentrate and in previous week, 1,083,080 lb. zinc concentrate.

BIG FOUR MINING CO. — **MISSOURI**

Operated at Potosi, Washington county, in 1919.

BIG HAWK MINING CO. — **MISSOURI**

Address: Carterville, Mo.

Property: 40 acres, developed by 2 shafts to depth of 122' and equipped with steam power. Three men employed in 1920.

BIG JIM MINING CO. — **OKLAHOMA**

Address: Box 128, Miami, Okla.

Property: 40 acres at Douthat, Okla., where one hole has been drilled in each acre, showing good ore.

BIG L. & Z. CO. — **OKLAHOMA**

Address: Dr. J. A. Settle, Boyington, Okla. Mine located N. W. of Picher, Okla.

BIG LEAD MINING CO. — **KANSAS**

Idle since 1918. See Vol. XIV.

BIG MUDDY COAL & IRON CO. — **MISSOURI**

Property: Pilot Knob iron mine in Iron county.

BIG SEVEN MINING CO. — **OKLAHOMA**

Address: W. W. Oder, sec., Oklahoma City, Okla. Company has a surface tram to connect its mines with the mill and mines of its Queen City property, S. of Commerce.

BIG SHOT LEAD & ZINC CO. — **KANSAS**

Address: J. A. Frates, pres., Miami, Okla.

Inc. 1918, in Kansas. **Cap.** $200,000.

Property: a lease S. W. of Baxter Springs. Drilling exposed ore at two points in tract.

BIG THREE MINING CO. — **OKLAHOMA**

Officers: Seth V. Conrad, pres., Marshfield, Mo.; V. Jenson, v. p.; Ira Edwards, sec.; C. C. Atterbery, supt.

Property: 160 acres N. W. of Quapaw. On 80 acres 26 holes exposed ore carrying from 5 to 20% blende. Another 40 acre tract was sold to Howard Paschal, of New York, for $75,000, plus 2½% royalty.

BIG V MINING CO. — **OKLAHOMA**

Address: J. C. Voorhees, c/o Vinita Bank, Vinita, Okla.

Property: S. E. of Quapaw. A 250-ton mill was erected early in 1919.

BIG VEIN LEAD & ZINC CO. — **OKLAHOMA**

Incorporated with capital of $250,000 in March, 1918, by W. A. Dotty, of Miami, G. B. Crumbine and J. A. Utterback, of Oklahoma City.

BILHARZ MINING CO., O. M. — **OKLAHOMA**

Address F. H. Gartung, Commerce, Okla.; and O. M. Bilharz, Baxter Springs, Kan.

Company has 3 mines, the Shorthorn, Chapman and Bluebird, and 3 mills, shut down at mid-1919 on account of the market. The weekly output was 370 tons of blende and 33 tons of lead early in 1920. A year later it was 510 tons of blende worth $27 per ton. In December, 1921, production was 1,513,250 lb. zinc concentrate for week ending Dec. 10, and 610,450 lb. lead concentrate for week ending Dec. 17, 1921.

BILL BOY MINING CO. — **OKLAHOMA**

Address: Clyde Poole, Miami, Okla. **Mine address:** Tar River, Okla.

BILLIKEN MINING CO. — **OKLAHOMA**

Address: J. B. Ellis, pres., Oklahoma City, Okla.

Property: a lease on ground adjoining that of the St. Louis M. & S. Co.

BLACKBERRY MINING CO. — **MISSOURI**

Address: Granby, Newton Co., Mo.

Property: in Section 12, T. 25, R. 31., is developed by 100′ shaft. Operated with a small force in 1921.

BLACK EAGLE MINING CO. **OKLAHOMA**

Address: Box 265, Miami, Okla.

Officers: J. B. Milan, pres.; P. R. Mattocks, v. p.; W. G. Phelps, sec.-treas.; M. F. Owens, supt.

Inc. in Okla. **Cap.** $200,000.

Property: 40-acre lease, 1 mile E. of Picher, contains only high-grade zinc ore, no lead.

Equipment: includes a 300-ton mill.

BLACK HAWK LEAD & ZINC MINING CO. **OKLAHOMA**

Address: Box 143, Picher, Okla., and 708 Boatman's Bank Bldg., St Louis, Mo.

Officers: J. H. Yount, pres.; G. K. Williams, v. p.; R. H. Cornell, sec.-treas.; G. N. Williams, mgr.; J. A. Cohenour, supt.-pur. agt.

Inc. 1917 in Okla. **Cap.** $250,000.

Property: 20-acre lease on Walker land, S. of Picher. Drilling revealed ore from 218 to 248′ depth. Developed by two 250′ shafts.

Equipment: includes a 400-ton mill.

Production: at end of 1921, 766,030 lb. for week ending Dec. 17.

BLUE BIRD MINING CO. **OKLAHOMA**

Address: O. M. Bilharz, Baxter Springs, Kansas. **Mine address:** Commerce, Okla.

BLUE BONNET MINING CO. **OKLAHOMA**

Described in Volume XIV. See **Victory Metal Co.**

BLUE DIAMOND MINING CO. **KANSAS**

Address c/o Nial Wagner, Box 743, Baxter Springs, Kans. **Mine address:** John Hoffman, Treece Kansas.

A producer of lead and zinc, adjoining the Blue Mound and controlled by same interests.

BLUE GOOSE MINING CO. **OKLAHOMA**

See **Commerce M. & Royalty Co.**

BLUE JAY MINING CO. **OKLAHOMA**

Address: Grant Maus, gen. mgr., Miami, Okla. Mine located W. of Cardin, Okla.

BLUE MOUND MINING CO. **KANSAS**

Office: 618 Bryant Bldg., Kansas City, Mo.; or Baxter Springs, Kansas.

Officers: Wm. Kenefick, pres.-treas.; J. W. Hoffman, v. p.-mgr.; A. E. Rucker, sec.; N. Wagner, supt.

Inc. 1917, in Kansas. **Cap.** $20,000; $100 par. Gross returns from ore sales were $933,765 in 1920.

Property: three 20 acre leases, 7 miles S. W. of Baxter Springs, Kansas, just N. of Picher, Okla. Ore carries zinc and lead, totaling 9.11%. Some promising lead ore was discovered in 1920.

Development: with the Blue Diamond, 9 shafts, 210′ deep. Mules are used underground for haulage.

Equipment: modern mining and milling plants on both properties. The concentrators treat 600 tons in 24 hours, and produce from 1,000 to 1,500 tons of concentrate monthly, that averages 61.5 to 62.5% metallic zinc. The Blue Mound was a large producer in 1919 and 1920.

BLUE RIBBON MINING CO. **OKLAHOMA**

Was a producer of zinc concentrate in December, 1921, output being 84,880 lb. for week ending Dec. 17th.

BLUE ROCK MINING CO. **MISSOURI**

Control acquired 1917 by the **Crescent Lead & Zinc Corporation**, which see.

Address: Glen Smith, Carl Junction, Mo.

BLUE STAR MINING CO. **MISSOURI**

Address: C. V. Jones, Joplin, Mo. Mine between Lincolnville & Peoria, Missouri.

BON AMI MINING CO. **OKLAHOMA**

Address: Miami, Okla. In Nov., 1918, a 150-ton mill was to be built.

BONANZA MINING CO. **MISSOURI**

Address: Aurora, Mo.

Production: 60 tons of blende weekly.

BOOR MINING CO. **KANSAS**

Dead. Formerly operated near Galena, Kan.

BOSKA MINING CO. **KANSAS**

Address: Coe Rhea, 402 Commerce Bldg., Miami, Okla. John T. Ready, trustee c/o Miami Trust & Savings Bank, Miami.

Inc. in Oklahoma.

Property: 40-acre lease on the Wright land, just W. of Treece, formerly held by **Redskin Mining Co.**

Equipment: includes a 250-ton mill driven by gas engines.

Production: about 125 tons of zinc concentrates and 4 tons of lead concentrates a week.

A suit is pending (Nov., 1921) involving foreclosure of the mortgage and appointment of a receiver.

BOSTON DUENWEG MINING CO. **MISSOURI**

Presumably out of business. See Vol. XIV.

BOSTON-ELVINS LEAD CO. **MISSOURI**

Address: Elvins, St. Francois county, Mo.

Property: 40 acres at Elvins, on Flat river. Main shaft was completed in 1916, but mining has only been carried on for two short periods up to early 1919 on account of water. In 1917, about 10,000 tons of ore was shipped to the St. Louis Sm. & Ref. Co.'s plant at St. Francois.

Idle.

BOSTON-MIAMI ROYALTY CO. **OKLAHOMA**

Office: Denman Blanchard, pres., 19 Congress St., Boston, Mass. R. M. Sturdevant, mgr., Miami, Okla.

Property: 400 acres in the Picher-Tar River district.

BOSTON MINING CO. **KANSAS**

Out of business. Formerly operated near Treece, Kan.

BRADLEY LEAD & ZINC CO. **MISSOURI**

Address: 1705 Bird Ave., Joplin, Mo.

Property: a lease on the St. Louis-Joplin Lead & Zinc Co.'s land, comprising part of the A. B. C. Mining Co.'s ground, and the Martha Ball mine, in the Chitwood district, near Joplin, Jasper county, Mo.

Ore: lead-zinc occurs in disseminated deposits in the A. B. C. and as sheet-ore, 20' thick at depth of 200' in the Martha Ball.

Development: by shafts. **Equipment:** 250-ton mill on Martha Ball ground and a second 250-ton mill in the West Joplin district.

BRENZ MINING CO. **KANSAS**

Said to have operated in 1919 near Galena, Kan., but no record of company obtainable, 1921.

BREWINGTON MINING CO. **MISSOURI**

Address: Carterville, Mo., or C. L. Turner, Carthage, Mo.

Property: 20-acre lease at Carterville, developed by 2 shafts to depth of 90'. Four men employed.

BREWSTER MINE **OKLAHOMA**

Owned by Federal M. & S. Co. of Idaho.

Address: 120 Broadway, New York; and Box 133, Baxter Springs, Kan. P. W. George, supt.

Property: 220 acres at Zincville, Okla., bought for $125,000. Drilling since March, 1919, revealed 147,000 tons of ore, containing 13,600 tons of

zinc and 830 tons of lead concentrates. A 300-ton mill, employing flotation process was erected.

Production: in 1920 was 90,394 tons of ore; operations suspended late in that year.

BRINSTON-KIRTLEY MINING CO. **OKLAHOMA**

Address: Box 49, Quapaw, Okla.

Officers: M. E. Brinston, pres. T. P. Kirtley, sec.-treas., Miami, Okla.; A. G. Kelly, mgr.-pur. agt.

Inc. in Okla. **Cap.** $125,000.

Property: 20- acre lease just N. W. of Quapaw. A heavy flow of water has hindered shaft sinking.

Equipment: 200-ton mill driven by gas engine.

BROWN & HEAD ZINC CO. **KANSAS**

See **Brown Bros. Mining Co.** Listed in Vol. XIV.

BROWN BROS. MINING CO. **KANSAS**

Former address: J. Wise Brown, Box 421, Baxter Springs, Kansas.

Property: 20-acre lease on the Cooper estate, S. of the Southern mine, N. W. of Treece.

Development: by shaft to depth of 256'.

Equipment: includes a modern mill of 400 tons capacity per 10-hour shift.

Produced regularly during 1919, but reported out of business, 1922.

BUCKSHOT MINING CO. **KANSAS**

Address: Box 205, Miami, Okla.

Officers: J. A. Frates, Sr., pres.; J. A. Frates, Jr., v. p., with W. Matthews and R. E. Brooke (gen. mgr.), directors. J. H. Grant, sec.; G. E. Matt, treas.

Inc. in Oklahoma. **Cap.** $300,000; $10 par; 8,000 issued.

Property: lease on three 40-acre tracts N. of Picher, Okla., just over the line in Kansas, under development. Royalty payable is 10%.

Development: 12 test holes showed ore from depth of 315 to 340', some samples assaying up to 16% zinc. The ore is a dissemination in flint. Development done is considered to justify an expenditure of $200,000. A 200-ton mill was moved from Joplin to the mine.

BULL FROG MINING CO. **MISSOURI**

Address: W. E. Skelley, Joplin, Mo. **Mine address:** Smelter Hill, Mo.

BUMBLE BEE MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: 140 tons of blende per week during part of 1918. No later figures.

BUNDY ZINC CO. **MISSOURI**

Address: Dr. J. W. Boyd, Sarcoxie, Mo. **Mine address:** Sarcoxie, Mo

BUNKER HILL MINING CO. **KANSAS**

Dead. Last operations, 1918, near Baxter, Kan.

BUNKER HILL MINING CO. **OKLAHOMA**

Address: care Hayward & Frey, 344 Robertson Bldg., Tulsa, Okla. **Mine address:** Hockerville, Okla.

BURNHAM LEASE MINING CO. **OKLAHOMA**

Address: Chas. Von Weise, mgr., Ardmore, Okla.

Inc. in Oklahoma.

Property: 1½ miles N. W. of Picher.

BURTON MINING CO. **MISSOURI**

Dead. Described in Vol. XIV.

BUTLER BROS. MINING CO. **MISSOURI**

Dead. Formerly operated near Waco, Mo.

BUTTE-KANSAS MINES CO. **KANSAS**

Address: Box 433, Joplin, Mo. L. P. Buchanan, mgr.; E. Y. Ellis, supt.

Officers: C. J. Stralem, pres.; John MacGinnis, v. p. Hallgarten & Co., 5 Nassau St., New York, fiscal agents.

Inc. 1917.

Property: a lease on the Butte mine, 120 acres, in Cherokee county, Kansas, and the Acme mine, 130 acres, in the Waco field, Joplin district, Missouri. Ore carries 8% blende. Reserves placed at 750,000 tons. Orebodies are long but narrow with 50′ face.

Development: by six 200′ and one 120′ shafts in Kansas.

Equipment: steam power plant, air-compressors, oil engines, and two mills (in Kansas) of 500 tons capacity in 10 hours. The 400-ton mill at Waco, Mo., was burned in Dec., 1918; the second mill was destroyed in May, 1920, by a cave-in. A new mill was completed by August.

Production: 800 tons of concentrate monthly, assaying 62.5% zinc and 0.05% lead. Costs are $1.70 per ton for mining and 40c. for milling, a total of $2.10.

CACTUS HILLS MINING CO. **MISSOURI**

Out of business. See Vol. XIV.

CACTUS MINING CO. **OKLAHOMA**

Address: Miami, Okla.

Officers: J. F. Robinson, pres.; G. L. Coleman, sec.-treas.; R. J. Tuthill, pur. agt.

Inc. in Oklahoma.

Property: at Commerce.

CANTON MINING CO. **OKLAHOMA**

Address: Box 511, or Room 317 Hancock Bldg., Miami, Okla.

Officers: J. L. Eggert, pres.; J. C. Abbott, v. p.; Geo. Wilson, sec.-treas.; Otis white, mgr.; J. L. Eggert, supt.

Inc. April, 1917, in Oklahoma. **Cap.** $75,000.

Property: 40 acres at Lincolnville, Okla.

Development: the deposit is 35 by 1,320 by 1,320′, and is worked by 4 shafts, 75′ deep.

Equipment: gas engines, compressor, drills, and 500-ton (24 hours) mill. Developing.

C. & O. MINING CO. **OKLAHOMA**

Address: W. T. Landrum, mgr., Picher, Okla.

Property: 2 miles W. of Treece, developed by shaft.

CARLAT MINING CO. **MISSOURI**

Address: Curley Cornett, Webb City, Mo. **Mine address:** Webb City, Mo.

CARL JUNCTION COMMUNITY DEVELOPMENT CO **MISSOURI**

Address: Carl Junction, Mo.

Officers: D. G. Evans, pres.; C. M. Dawns, v. p.; C. W. Roney, sec.; C. W. Hilliker, treas., with J. A. Magoon, C. E. Hawk and J. B. Coons, directors.

Is a partnership of local business men, who each pay $10 monthly drilling ground a mile west of Carl Junction. When ore is found, the lease will be turned over to responsible operators for development. This is a worthy effort to develop a mine in the Carl Junction field, 10 miles from Joplin.

CARMEAN & SQUIRES MINING CO. **MISSOURI**

Office: Room 14-16 Wagner Bldg., Webb City, Mo.

Inc. in Missouri. **Cap.** $2,000.

Property: mines in S. W. Missouri, including Gwinn land, 2 tracts, one 20, the other 40 acres of Kelly land, all located in Jasper county, the old John L. mine 20 acres, in the north Webb City sheet ground district, purchased for $30,000, in November, 1915, and the Old Virginia mine, near Carterville.

Development: the Gwinn tract has 2 shafts, depth 186′, and a 250-ton concentrator. The 20-acre Kelly tract is opened by 200′ shaft, and has a

150-ton concentrator; the 40-acre tract is opened by 180' shaft and has a 200-ton concentrator.

Production: lead-zinc concentrates, not reported.

CARNEGIE MINING AND MILLING CO. OKLAHOMA

Address: P. L. Bucy, Bartlesville, Okla.

Property: a lease near Douthat, on which the 300-ton mill bought from the National Zinc & Lead Co., of Webb City, Mo., was re-erected.

CAROLYN METAL CO. MISSOURI

Idle. **Address:** Nels Darling, Oklahoma City, Okla.

Property: that of **Neosho Granby Metal Co.,** at Granby, bought in July, 1918. The 150-ton mill was remodeled to 250 tons capacity.

No recent returns secured.

CARTHAGE MINING CO. OKLAHOMA

Address: Emma R. Knell, Carthage, Mo.

Cap. $32,000; shares $100 par; $16,000 paid in.

Property: 20-acre lease in the N. E. Oklahoma zinc field.

C. & S. MINING CO. MISSOURI

Address: Campbell Dawson, 417 Frisco Bldg., Joplin, Mo. **Mine address:** Commerce, Okla.

CATHOLIC MINING CO. KANSAS

Dead. Formerly operated the Alabama Coon mine S. E. of Lincolnville.

CAVE SPRINGS LEAD & ZINC CO. MISSOURI

Last address: M. Grundler, supt., Cave Springs, Mo. Mail unclaimed in 1920. Described in Vol. XIV.

C. C. & B. MINING CO. MISSOURI

Address: J. D. Morgan, Duenweg, Mo.

CENTER CREEK MINING CO. MISSOURI

Office: O'Neill Bldg., E. Daugherty St., Webb City, Mo.

Officers: I. D. Snedeker, pres.; M. L. Sears, v. p.; with Mrs. A. V. Stewart, Thos. McCroskey and J. H. Capelli, directors. R. F. Stewart, sec.-treas. and gen. mgr.

Inc. 1889, in Missouri. **Cap.** $200,000, reduced in July, 1919, from $1,500,000; shares $10 par. **Dividends:** paid from 1900-1917, aggregate 60%.

Company does not carry on active mining operations, but leases its land to other companies.

Property: 200 acres and mill-site between Webb City and Carterville, Jasper county, Mo., developed by 13 shafts from 110' to 165' deep, producing both lead and zinc ore. In 1920, reported to have started operations at the Jewel mine in the N. W. part of Carterville, Mo.

Total output is valued at nearly $14,000,000.

CENTRAL LEAD CO. MISSOURI

Entire capital stock owned by American Smelters Securities Co.

Property operated by the **Federal Lead Co.,** which see.

CENTRAL LEAD & ZINC CO. OKLAHOMA

Address: W. A. Geissing, mgr.-sec.-treas., Tar River, Okla.

Described in Vol. XIV.

CENTRAL ZINC MINING CO. MISSOURI

Address: Frank Danglade, supt., Waco, Mo.

A new mill was erected late in 1918.

CENTURY MINING CO. OKLAHOMA

Address: Gillespie Bldg., Miami, Okla.

Officers: J. E. Trogden, pres.; H. B. Webster, sec.-treas.-mgr.

Property: 40-acre lease S. E. of Douthat and E. of Century. A large deposit of ore was first entered at depth of 55'. A 150-ton mill is operated.

CENTURY ZINC CO. KANSAS

Address: Sid Davis, Baxter Springs, Kansas.

CHANUTE SPELTER CO. KANSAS

Subsidiary of American Metal Co., Ltd.

Offices: 61 Broadway, New York; 1625 Boatman's Bldg., St. Louis, Mo.; 315 Frisco Bldg., Joplin, Mo. and Baxter Springs, Kan.

Officers: Otto Sussman, pres.; D. F. Haley, v. p.-mgr.; Heath M. Steele, v. p.; Wm. Simon, sec.-treas., with E. R. Rombauer, directors. G. B. Corless, asst. mgr.; T. J. Rightly, supt. of operations; Arthur Warden, purch. agt.

Inc. May 26, 1915, in Missouri.

Property: owns 628 acres and leases 17,000 acres in Cherokee county, Kan., selected after careful study of the geologic conditions governing ore occurrences in the district. About $1,000,000 has been spent in development and lease fees. Over 30 drills used to block out ore. Royalties vary from 5 to 12½% on sales-value of the ore produced. Water was troublesome during shaft sinking, and at one time 7,000 gal. per minute were pumped. One of the principal mines is the Hartley, 320 acres, 1 mile W. of Baxter Springs; one mile N. of the Hartley is the Brewster mine. **Development:** by 10 shafts.

Equipment: includes 400-ton (10 hours) Hartley mill. Another mill reported to be under erection at the Brewster in 1921. The company's smelter at Chanute, Kan., was dismantled in 1917.

Production: from the Hartley for its first year of operation, ending about May, 1921, is a record for the Tri-State district. Average output about 1,800 tons of zinc concentrate per month.

CHARLOTTE LEAD & ZINC CO. — **OKLAHOMA**

Address: Baxter, route 2, Baxter, Kansas.

Officers: I. M. Holcomb, pres.; Lee Lumsberry, sec.; I. M. Holcomb, treas.; John W. Hale, mgr.

Inc. in Oklahoma.

Property: 3 miles from Quapaw.

CHECOTAH ZINC SMELTER — **OKLAHOMA**

Address: D. R. Muir, mgr., Baxter Springs, Kans. A custom smelter at Checotah, Okla., owned by **U. S. Smelting, Refining & Mining Co.**, which see for further details.

CHEROKEE ZINC CO. — **OKLAHOMA**

Address: Treece, Kansas.

Officers: J. B. Milam, pres.; F. J. Childers, v. p.-mgr.; A. Phillips, sec.-treas.

Inc. in Oklahoma.

Property: 1½ miles N. W. of Treece.

CHICAGO-MIAMI LEAD & ZINC CO. — **OKLAHOMA**

Office: 171 W. Randolph St., Chicago, Ill.

Officers: J. E. Cairns, pres.; Emil Eitel, v. p.; W. E. Shirra, sec., all of Chicago; Max Eitel, treas.; R. J. Eitel, mgr., Picher, Okla.

Inc. 1907 in Ill. **Cap.** $450,000.

Property: 40-acre lease, 1¼ miles N. W. of Picher.

Equipment: includes 300-ton mill, erected in 1918, producing 2 cars of zinc and 1 car of lead concentrates per week.

CHICAGO MINES CO. — **MISSOURI**

Idle. **Address:** 301 Miners Bank Bldg., Joplin, Mo.

Property: 10 acres owned by the Conner Investment Co., near Webb City, Jasper county. Opened by two 200' shafts, and equipped with a 200-ton mill. No recent returns.

CHICKASHA MINING CO. — **KANSAS**

Address: Geo. Dashner, Baxter Springs, Kansas.

CHOCTAW CHIEF LEAD & ZINC CO. — **OKLAHOMA**

Address: Geo. Sullivan, Miami, Okla.

Property: the Sullivan and Williams lease at Hockerville. Ore, 15' thick, assaying 8 to 17% blende and lead, was opened, a 250-ton mill erected and shipments made in 1918. No recent returns.

CLEAR-PEACHER MINING CO. MISSOURI

Address: Fletcher Clear, supt., Cunningham Bldg., Joplin, Mo.

Property: 3 miles E. of Joplin, is a zinc silicate (calamine) mine. An average of 28′ of ore was reported mined at depth of 107′. Has a 150-ton mill.

CLEVELAND & AURORA MINERAL LAND CO. MISSOURI

Address Aurora, Mo.

Officers: John T. Gill, pres.; H. J. Baldwin, sec.; J. J. Sullivan, treas.; C. C. Plank, supt.

Inc. in Illinois.

Property: company owns zinc and lead lands, which it leases to others.

CLIMAX MINING CO. OKLAHOMA

Address: Grant Mans, supt., Cardin or Miami, Okla.

Property: 40-acre lease N. W. of Cardin and 3 miles W. of Picher. Shaft cut ore at 230′ in October, 1918, and a 150-ton mill was planned.

C. M. & H. MINING CO. MISSOURI

Address: George Meece, mgr., W. 7th St., Joplin, Mo.

Inc. in Missouri. **Cap.** $80,000.

Property: 20-acre lease on the Malloy tract just south of Duenweg. Drilling showed good disseminated ore at 86 to 165′ depth. **Equipment.** includes 200-ton mill, compressor, steam power.

Ten men employed. Produced high grade sphalerite ore for several months in 1920.

COAHUILA LEAD & ZINC CO. MISSOURI

Mill office: Carthage, Mo.

Officers: C. F. Jennings, pres.; C. D. Smith, v. p.-mgr.; W. E. Parker, sec.-treas.

Inc. in Missouri. **Cap.** $300,000. 250 shares sold for $35 the lot in New York on Dec. 8, 1920.

Property: operated a lease on 120 acres, owned by Amsden & Amsden, in the Carthage district, Jasper county, Mo. Ore occurs in sheet-ground and soft ground. Also owns land in Barry county, Mo., where several shafts have been sunk and ore discovered, but not worked at present. Also reported to own mining and rubber lands in Mexico.

Development: by 5 shafts, 160 and 180′ deep. **Equipment:** includes a 400-ton mill, compressor, Wilfley tables. About 40 men employed.

Production: in 1918 was about 270 tons of blende concentrate weekly.

COALGATE LEAD & ZINC CO. OKLAHOMA

Address: H. F. Scruby, treas.-mgr., Miami, Okla.

Inc. in Oklahoma.

Property: 1½ miles W. of Cardin, now being operated by Stephen & Crissman.

COLUMBUS M. & D. CO. KANSAS

Property sold 1917 to American Metal Co. for $3,000, and a royalty of 2½% on future output.

COMMERCE MINING & ROYALTY CO. OKLAHOMA

Address: J. F. Robinson, Miami, Okla.

A partnership consisting of J. F. Robinson and G. L. Coleman of Miami, Okla.; C. M. Harvey, of El Paso, Texas; and Al Coleman, of Rocky Ford, Colo.

Property: 2,000 acres, including the Cactus mine at Commerce, the Beaver and Webber at Treece, Kansas the Pelican mine and mill at Picher, and the Bennie, Jay Bird, Grace Walker, Lost Trail, Woodchuck, and Wilbur at Tar River. These mines are equipped with mills.

A new concentrator was erected late in 1921, on a lease N. E. of the Barr mine, N. of Picher, at foot of the Blue Mound, or Hill. Two drill rigs were operated by the company in West Cardin, November, 1921.

COMMONWEALTH LEAD & ZINC CO. OKLAHOMA

Address: I. Shelton, mgr., Box 14 A, Picher, Okla., or 401 McClelland Bldg., Kansas City, Mo.

Inc. in Oklahoma.

Property: a lease ½ mile N. E. of Picher. Drilling revealed 12% ore at depth of 235' and two shafts were sunk.

Production: at end of 1921 was 305,510 lb. zinc concentrate for 2 weeks ending Dec. 17th.

CONCORD MINING CO. MISSOURI

Address: Carterville, Mo. Phil Gray, Webb City, chief owner.

Inc. in Missouri. **Cap.** $100,000. Company controlled by same people and management as Unity Co.

Property: the Concord mine, 50 acres, at Carterville, developed by 2 shafts to depth of 165'.

Equipment: includes 300-ton concentrator, compressor, tables, crusher, drills, steam power. Thirty five men employed when active.

CONNECTICUT ZINC CORPORATION MISSOURI

Office: 500 Fifth Ave., New York. A. J. Burnham, gen. mgr., Independent Bldg., Joplin, Mo. **Mine address:** Oronogo, Mo.

Officers: Ross M. Turner, pres.; A. J. Burnham, v. p.; Geo. P. Smith, treas., with J. H. Ballantine, W. M. Crombie, R. M. Turner, A. R. Turner, W. S. Hallowell and W. H. Lyon, directors. M. A. Pappert, sec.

Inc. June, 1914, in New York, as holding company for Oronogo Circle Mining Co. In July, 1917, company took over leases and cancelled stock and charter of the Oronogo Circle Co., and now owns and operates this property. **Cap.** authorized and outstanding, $2,000,000; increased in 1921 from $1,000,000; $25 par. Fidelity Title & Trust Co., transfer agent, Stamford, Conn. **Bonds:** authorized, $1,250,000 first mortgage 7% 10-year dated Nov. 15, 1920; $1,000,000 outstanding. Sinking fund 80% of net earnings. Annual meeting second Monday in July.

Property: a 40-year lease, from Nov. 15, 1919, on 280 acres, including the Oronogo Circle mine at Oronogo, Mo., that has been a producer for 60 years. Developed by 2 shafts to depth of 240'.

Equipment: includes locomotives, 2½-ton dipper-shovel, power drags, 5-ton side-dump ore-cars, No. 8 McCully crusher on 240' level (all underground); 2 compressors, 5-ton skips, 2,500-ton storage-bin at surface, belt-conveyors.

Mill of 3,000-ton capacity with two 24-in. Webb City Carterville crushers, two sets of 60-in. rolls, four sets of 40-in. high-speed rolls, 8 Akins classifiers, various jigs, 27 sludge-tables, 5 Dorr thickeners, and complete oil flotation plant. The power plant consists of 3,050 h. p. connected load of electrical power.

Production: 35,000 tons of blende (60%) per annum. Twenty men employed.

CONQUEROR ZINC CO. MISSOURI

F. H. Houk, sec., Joplin, Mo.

In liquidation at last reports.

CONSOLIDATED LEAD & ZINC CO. OKLAHOMA

Address: Picher, Okla.

Property: S. E. of Picher. The mill includes sludge-tables, Dorr thickeners, and flotation plant.

CONSOLIDATED ZINC & SMT. CO OF OKLAHOMA OKLAHOMA

Dissolved 1919. See **Emma Gordon Mng. Co.**

CONSTITUTIONAL LEAD & ZINC CO. OKLAHOMA

Address: L. Viers, receiver, Miami, Okla. **Mine address:** Century, Okla.

CONSUMERS MINING CO. MISSOURI

Idle. Former address: W. 7th St., Joplin, Mo.

Cap. $10 000.

Property: lease on 15 acres of mineral-bearing land near Joplin formerly worked by Otis Mining Co.

Development: by 2 shafts to 185′ level.

Equipment: includes 300-ton concentrating mill, crusher, 8 tables, 11 air drills, 2 hoists and pump. Employs 80 men.

CONTINENTAL ZINC CO. MISSOURI

Company liquidated in Nov., 1920, stockholders receiving $1.90 per share. Fully described in Vol. XIV.

COOK & McCULLOUGH MINING CO. KANSAS

Probably dead. **Former address:** W. McCullough, Baxter Springs, Kan.

CORTEZ MINING CO. OKLAHOMA

Address: Jefferson City, Mo., or Box 1568, Picher, Okla.

Officers: Houck McHenry, pres.; Charles Tweedy, v. p.; H. B. Church, Jr., sec.-treas., with Cortez F. Enloe, A. W. Happy, G. E. Haigh, D. M. Oberman, C. C. Carson, W. T. Paylor, H. L. Grigsby, and W. T. Landrum (supt.) directors.

Inc. 1918, in Oklahoma. **Cap.** $105,000; $10 par.

Property: 40 acres, 1 mile N. E. of Picher. The deposit is a dissemination of galena and blende in flint and limestone.

Development: by two 260′ shafts.

Equipment: hoist, compressor, pump, gas power, and 200-ton mill, started in February, 1919.

Production: 4,500 tons of 8% ore treated during 1919; 105 tons of blende per week in February, 1920. Operations resumed late in 1921 and output was 267,000 zinc concentrate for 2 weeks ending Dec. 17, which was below average.

COSMOS MINING CO. OKLAHOMA

Subsidiary of **Lucky Tiger Combination M. Co.**, operating in Mexico.

Address: Frank Childress, Cunningham Bldg., Joplin, Mo.

Property: 40 acres, known as the Lucky Tiger, E. of Picher. A 300-ton mill, employing flotation, was started in October, 1918. The first year's run averaged 12% zinc and lead.

COW CREEK MINING CO. MISSOURI

No news since 1918. Probably dead. Formerly at Carl Junction, Mo.

CRESCENT LEAD & ZINC CORPORATION MISSOURI

(Succeeds Blue Rock Mining Co., by purchase of assets in 1917.)

Office: 804 Grand Ave., Kansas City, Mo. Glen Smith, mgr. at Waco, Mo., W. A. Doty, mgr. at Miami, Okla.

Officers: Lawrence E. Smith, pres.; Lewis H. Falley, v. p.-mgr.; W. R. Rowe, sec.; W. T. Grant, treas.

Inc. March 21, 1917, in Missouri. **Cap.** $500,000; 411,000 shares issued. To September, 1919, a total of $165,000 had been expended on the mine and machinery.

Property: the Blue Rock mine, 40 acres in the new field at Waco, Mo. Also 480 acres of land at Sunnyside, Ottawa county, Oklahoma, 5 miles S. of Baxter Springs, Kansas. This property is sub-leased, and in May, 1919, there were 5 mills in operation.

The Blue Rock mine has 2 shafts opening up ore 10 to 30′ thick, that is of very high quality assaying as high as 63% metallic zinc and averaging 7 to 10% actually recovered. Though the output is mainly blende, occasional pockets of lead ore are mined. The ore comes from depth of 165 to 240′.

Equipment: at Field shaft, 50 h. p. boiler, geared steam hoist, one 3″ and one 4″ double-action pump; at Mill shaft first-motion hoist and 300-ton hopper. Power plant consists of 150 h. p. and 40 h. p. high-pressure boilers and steam-driven air-compressor.

The 250-ton mill at Waco, uses an 18" crusher, 2 sets, each of 30 and 36" rolls, 2 jigs, 2 separators and classifiers, three trommel screens and 5 tables. The power unit has 3 distillate engines, two of 80 and one of 50 h. p., and one 600 cu. ft. 2-stage compressor.

Not operating .

CROESUS MINING CO. **OKLAHOMA**

Address: W. E. Broach, sec.-treas., Box 555, Tulsa, Okla.

Officers: Lee Clinton, pres.; W. H. Aul, mgr.-pur. agt.

Inc. in Oklahoma.

Property: 1½ miles S. of Cardin, developed by 208' shaft, with two levels. Operations resumed August, 1921, and on 145' level of mine a run of lead ore was found. Forty men employed. Output 65,000 to 86,000 lb. zinc concentrate weekly at end of 1921.

CRYSTAL MINING CO. **OKLAHOMA**

Address: B. B. Dancey, pres., Picher, Okla.

A 250-ton mill was planned in 1918.

CULBERT LEAD & ZINC CO. **MISSOURI**

Address: W. S. Pate, Bartlett Bldg., Joplin, Mo.

Property: a lease and mill at Four Corners, N. W. of Joplin. Plant was sub-leased late in 1919.

CYGNI MINING CO. **MISSOURI**

Address: A. J. Burnham, mgr., Joplin, Mo.

Property: a lead-zinc mine near Prosperity; a veteran sheet-ground producer, yielding 1,000 tons per day of 2% ore in 1917. Mine has 3 shafts. No recent returns.

DALLAS MINING CO. **MISSOURI**

Address: Granby, Mo.

Property: Little Bess mine, on the Knight land at Carl Junction Jasper county, Mo.; also 20 acres of the Nilson land and a lease near Granby.

Development: on the Knight land, 2 shafts, deepest 170'. The Nilson land has a 195' shaft.

Equipment: 300-ton concentrating mill and sludge mill for treatment of sand and slime from large mill at Carl Junction and a mill erected in 1920 at the Granby mine.

DALLAS-PICHER LEAD & ZINC CO. **OKLAHOMA**

Address: A. J. Harrington, Carterville, Mo.

Company had a lease on the Southland mine at North Century.

DANIEL BOONE MINING CO. **OKLAHOMA**

Incorporated in March, 1918, with capital of $150,000, by J. E. Jenkins, of Springfield Mo., and A. Avery, of Oronogo, Mo., to operate at Quapaw.

D. C. & E. MINING CO. **MISSOURI**

Address: Box 224, Webb City, Mo.

Officers: E. M. Drummond, pres.; M. O. Curd, v. p.; R. C. English, treas.

Inc. in Kentucky. **Cap.** $300,000; $1 par.

Property: 200 acres, 1 mile N. of Webb City. Shafts are 150' deep.

Equipment: 500-ton mill treats 3% zinc-lead ore.

DE ARMOND MINING CO. **KANSAS**

Probably dead. Mail returned from former address: Treece, Kan. See Vol. XIV of this Handbook.

DEFENDER MINING CO. **OKLAHOMA**

Described in Vol. XIV. Property now owned by **S. S. & G. Mng. Co.**

DELAWARE ZINC CORPORATION **KANSAS**

Address: Hayward Scott, pres., Joplin, Mo.

Property: well-developed leases W. of Baxter Springs.

DELTA LEAD & ZINC CO. **MISSOURI**

Dead. See Vol. XIV.

DESLOGE CONS. LEAD CO. **MISSOURI**

Office: St. Louis, Mo. **Mine address:** Desloge, St. Francois Co., Mo.

Inc. in Missouri. **Cap.** $1,000,000, with $1,500,000 invested in land and plant.

Property: 4,704 acres, developed by shafts to depth of 366'.

Mill: a 1,500-ton concentrator, equipped with Wilfley vanners, rolls, Chilean mills, a 780-k. w. steam turbine, and Mineral Separation machines; also smelter equipped with reverberatory furnaces. Flotation is employed in the mill, and a Lowden drier used for dewatering flotation concentrate. Employed about 167 men in 1920.

DESPERATION MINING CO. OKLAHOMA

Formerly the Tiger L. & Z. Co.

Address: Box 104, Cardin, Okla. Charles Von Weise, pres.; E. Van Drevelt, mgr.

Property: near the Harrisburg mine, west of Cardin. Drilling revealed three orebodies at depths of 150, 250, and 320'. The 350-ton mill was treating 8% ore in 1919.

Production: 42 tons of blende and 42 of lead per week early in 1920.

DEW DROP MINING CO. OKLAHOMA

Out of business. See **Howe Mining Co.**

Formerly at Picher, Okla. See Vol. XIV.

DIAMOND JOE MINE OKLAHOMA

Address: G. W. Dixon, owner, F. Street, 33 N. W., Miami, Okla.

Property: 80 acres, 1¼ miles E. of Hockerville, Okla. The 250-ton mill was idle most of 1919. Mine reported taken over by **Niangua M. & R. Co.**

DIPLOMAT MINING CO. KANSAS

Out of business. Formerly operated near Galena, Kansas.

DOE RUN LEAD CO. MISSOURI

A subsidiary of **St. Joseph Lead Co.**, and described thereunder.

DOMADO LEAD & ZINC CO. OKLAHOMA

Address: W. E. Broach, sec.-treas., Box 555, Tulsa, Okla.

Officers: J. H. McBurney, pres.; W. H. Aul, mgr.-pur. agt.

Inc. in Oklahoma.

Property: ½ mile S. of Cardin, with main workings on 220' level. Operations resumed June, 1921, employing 50 men.

Production: about 250 tons of zinc concentrate weekly.

DOROTHY BILL MINING CO. OKLAHOMA

Office: Box 1605, Picher, Okla.

Officers: J. R. Cole, Jr., pres.-mgr.; C. C. Cole, v. p.; W. A. Easley, sec.-treas.; C. W. Ritter, supt.

Inc. Jan., 1918 in Okla. **Cap.** $500,000.

Property: a 40-acre lease W. of Picher. Rich lead-zinc ore was opened at depth of 184'.

Equipment: complete with 1,000-ton (10 hours) mill, yielding an average of 25 tons of blende concentrate daily.

DOROTHY G CO. OKLAHOMA

Address: Box 513, Commerce, Okla. or Miami, Okla.

Officers: W. S. Godfrey, pres.; F. H. Gartung, sec.-treas.; Joe Ramsey, mgr.-pur. agt.

Inc. in Oklahoma.

Property: a 10-acre lease at Commerce.

DOUTHAT MINING CO. OKLAHOMA

Address: A. P. Standefer, receiver and manager, Miami, Okla. Harry Wright, supt.

Property: between Cardin and Commerce. Some rich ore was opened in 1918, and hand-jigs were used to dress it, but a 200-ton mill was to be built at last report. Litigation has hindered operations.

DROM IRON CO. MISSOURI

Property: Judith Spring iron mine in Franklin county.

DUDLEY MILLING CO. **OKLAHOMA**

Address: Douthat, Okla.

Is the owner of three tailings mills near Douthat, which remill chat piles. Operated in 1921. Produced 60 tons blende concentrate weekly, December, 1921.

DULUTH-MIAMI MINING CO. **OKLAHOMA**

Address: H. L. Kyllo, mgr., Quapaw, Okla.

Fully described in Vol. XIV of this Handbook.

DUNCAN LEAD & ZINC CO. **OKLAHOMA**

Incorporated 1918 with capital of $200,000 by W. E. Williams, J. H. Goodnight, and W. M. Lockett, of Duncan, Okla.

DUQUESNE MINING CO. **MISSOURI**

Lease given up, 1916, and company out of business.

DUTCH GIRL MINING CO. **MISSOURI**

Address: Granby, Mo.

Property: in Sec. 6, T. 25, R. 30, Newton county, developed by 100′ shaft. Four men employed.

EAGLE-PICHER LEAD CO., THE **OKLAHOMA-MISSOURI**

Office: Continental & Commercial National Bank Bldg., 208 S. La Salle St., Chicago, Ill.

Officers: John B. Swift, pres.; Frederick Hertenstein, v. p.; S. M. Evans, v. p.; Thos. S. Brown, Jr., v. p.-treas.; A. E. Bendelari, v. p.; J. A. Schaffer, v. p.; Jos Hummel, Jr., sec., with F. L. Perin and J. Edward Webb, gen. mgr., directors.

Inc. June, 1916, in Ohio. **Cap.** $9,000,000 com., and $1,000,000 6% non-cumulative preferred; $100 par; $8,000,000 common., and $1,000,000 preferred outstanding. Preferred dividends payable quarterly; initial dividend of 1½% paid July 12, 1905. Office of the company, transfer agent. Annual meeting in February.

Company is a consolidation of the Eagle White Lead Co., of Cincinnati, Ohio, and the Picher Lead Co.

The Eagle Picher Lead Co. is the third oldest corroder of white lead by the Dutch process in the United States, having been established in 1843 as the Eagle White Lead Co., and in continuous operation ever since. Company is a manufacturer of carbonate of lead, sublimed (sulphate of) lead; oxides of lead, sulphuric acid, lithopone, oxide of zinc and plumbers lead goods; and also mines and smelts zinc and lead ores.

Plants are situated at Joplin and Webb City, Mo.; Galena, Kan.; Picher, and Henryetta, Okla., Newark, N. J.; also at East St. Louis, Hillsboro, and Argo, Ill.

Production: normally 1,300 tons of blende (60% metal) per week.

The output of both galena and sphalerite by the Eagle Picher Lead Co. is much larger than that of any other operator in the Miami district. Flotation units have been installed at nearly all the plants and the concentrate recovered by that process has materially added to the production.

The estimated capacity of the concentrating plants is 6,400 tons in 24 hours. The ore is mainly derived from levels between 250 and 270′. There is also a large production from ground leased to other companies.

Operations resumed and 450 men at work in May, 1921. Shipped 1,080 tons blende concentrate in week ending Dec. 17, 1921.

EAGLEWOOD MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: averaged about 27 tons of blende per week, at last report.

EARLY BIRD MINING CO. **KANSAS**

Address: Chas. Neal, supt., Baxter (route 5), Kansas, or Miami, Okla.

Officers: W. Atwood, pres.; C. Y. Semple, v. p.; F. E. Ireton, sec.-treas.

Property: 20-acre lease and mill, 1½ miles N. W. of Treece. Rich ore was opened at depth of 185'. A producer since 1919.

EASTERN LEAD & ZINC CO. **KANSAS**

Address: Walter Ragland, mgr., Webb City, Mo. J. B. Jameson, principal owner, Concord, N. H.

Property: owns 160 acres and leases 80 acres of land near Lawton. Equipped with a mill, and has been good producer since 1915, but operated for a few days only early in 1920.

EDGAR ZINC CO. **KANSAS**

Works address: Cherryvale, Kansas. Is part of American Steel & Wire Co., a subsidiary of the United States Steel Corp.

Office: Boatman's Bank Bldg., St. Louis, Mo.

Officers: A. S. McMillan, pres.; J. S. Keefe, v. p.; John Davis, sec.-treas.; L. B. Schneider, auditor. O. F. Garrison, mgr.

Cap. $1,000,000.

Company operates a zinc smelter with 4,984 retorts.

The Glendale smelter in the Carondelet section of St. Louis, was closed in April, 1918. This was one of the oldest zinc works in America, being in operation for 49 years.

EDWARDSVILLE MINING CO. **MISSOURI**

Address: Herbert Wheeler, W. 4th St., Joplin, Mo.

Property: at Joplin, developed by several shafts, to depth of 100' and equipped with 150-ton concentrator, compressor and drills. Thirty men employed.

EIGHT FRIENDS MINING CO. **OKLAHOMA**

Probably dead. Reported to have taken over the Denver-Miami mine, near Miami, in 1917.

ELCOSA MINING CO. **OKLAHOMA**

Address: Tar River, Okla.

Officers: M. Dawedoff, pres.; R. S. Sampson, Oklahoma City, v. p.; W. C. Greening, Oklahoma City, sec., with Messrs. Tolliver and Martin, directors.

Cap. $200,000.

Property: a 40-acre lease W. of Tar River.

Development: drilling exposed zinc-lead ore at depth of 180 to 215'. Shafts were to be sunk and a mill erected at last report.

ELEVEN O'CLOCK MINING CO. **OKLAHOMA**

Reported out of business, 1921. Described Vol. XIV. Formerly at Quapaw, Okla.

ELIZABETH MINING CO. **MISSOURI**

Address: 625 Frisco Bldg., W. 20th St., Joplin, Mo.

ELLIS MINING CO. **KANSAS**

Address: Kanok Metals Co., Box 1576, Picher, Okla.

Property: 80-acre lease near Crestline, Kansas. A mine and mill are operated.

ELLSWORTH MINING CO. **OKLAHOMA**

Incorporated in January, 1918, by Lloyd Weber, J. W. Brown, of Tulsa, Okla.; and A. B. Ellsworth, of Joplin, Mo., with capital of $150,000.

No record of operations.

EMMA GORDON MINING CO. **OKLAHOMA**

Address: G. W. Bigham, pres., Miami, Okla.

Inc: 1908. **Cap.** $250,000; reduced from $1,000,000.

Property: 320 acres near Quapaw, Okla., which have produced zinc and lead worth $4,500,000 up to 1920.

Equipment: includes 4 mills of 450 tons capacity.

EMPIRE DEVELOPMENT CO. **KANSAS**

Address: A. S. Molacsay, mgr., 402 James Bldg., Miami, Okla.

Officers: B. E. Mance, pres.; J. H. West, v. p.; M. G. West, sec.-treas.

Inc. in Kansas.

Property: a zinc mine N. of Hockerville, 2 miles S. W. of Baxter. A 200-ton concentrator was erected in 1920 and regular shipments made, 1921, employing 30 men.

Production: about 130 tons weekly of zinc concentrate.

E. & N. MINING CO. **MISSOURI**

Address: Walter Eberlin, Joplin Mo. **Mine address:** Duenweg, Mo.

Property: 40-acre lease, developed by 4 shafts to depth of 110'.

Equipment: includes 75-ton mill, compressor, drills, steam power. Six men employed.

ESSENTIAL PRODUCING CO. **OKLAHOMA**

Company was organized in January, 1918, to drill leases, operate mills, and a smelter, etc. A 150-ton mill was secured in the Lawton-Waco district, Mo. Rich ore was reported cut by drilling between Hockerville and St. Louis, Okla. Company also said to own 600 acres of oil leases in the Chelsea-Nowata field. No record of operations securable.

EUTERPE MINING CO. **OKLAHOMA**

Address: D. M. Collins, mgr., Hockerville, Okla.

Property: a 250-ton mill and the Euterpe mine, a half mile north of Hockerville. Operated 2 shafts with 35 men for 2 shifts in 1921, opening a large cave with zinc blende ore.

Company uses oil engines.

Production: resumed October, 1921, was about 115 tons zinc concentrate weekly in December.

EVANS-HALL-SOY MINING CO. **MISSOURI**

Address: J. M. Evans, pres., Joplin Mo.

Property: a lease and mill at Duenweg, Mo. Operations were suspended in latter part of 1919.

F. AND F. MINING CO. **OKLAHOMA**

Address: F. E. Finerty, sec.-treas., Oklahoma City, Okla. C. E. Holliday, supt.

Inc. 1918, in Oklahoma. **Cap.** $100,000; $100 par; all issued.

Property: 100 acres, W. of Quapaw. A new mill was completed in May, 1919.

FAIR HOPE MINING CO. **MISSOURI**

Address: M. L. Kline or E. D. James, Porto Rico, via Joplin, Mo.

Officers: Albert Boiling pres; D. M. Murphy, Greensburgh, Ind., v. p., and W. E. Brown, Connersville, Ind., directors.

Property: 23 acres purchased in 1918 from Playter Bros., of Joplin, operated for a while by company, then leased, May, 1919, to E. D. James. A 200-ton mill in operation.

FARMERS LEAD & ZINC CO. **OKLAHOMA**

Dead. Formerly operated the Katy mine in the Quapaw district, and small shipments made in 1918.

FARMINGTON MINING CO. **OKLAHOMA**

Out of business. Mine sold 1920 to the Lucky O. K. M. Co., a subsidiary of **Federal M. & S. Co.**, which see.

FEDERAL LEAD CO. **MISSOURI**

Subsidiary of American Smelters Securities Co., 120 Broadway, New York City.

Address: Flat River, Mo. H. A. Guess, pres.; H. G. Washburn, mgr.; Parkhurst Sleeth, bus. mgr.

Inc. in Delaware. **Cap.** $2,000,000; shares $10 par. The lead-smelting and refining plant, at Federal, Ill., near Alton, comprises 302.5 acres. The plant is a custom smelter, and has a daily capacity of 540 tons of ore.

Property: 14,000 acres including the Central Lead Co.'s property, in the Flat River district, southeastern Missouri, containing lead ore in limestone.

Development: mine has 12 shafts, and prospecting is done by diamond drills, as no outcrop of disseminated ore occurs. In Dec., 1919, No. 12 shaft was producing 3,000 tons of ore daily.

Equipment two mills are in operation. No. 3, of 5,000 tons daily capacity, is equipped with 12 Hancock jigs, 72 tables, 18 vanners arranged in 6 sections; also regrind rolls, elevators, Esperanza-Federal drag classifiers and a flotation unit. Mill No. 4 of 3,000 daily capacity was put into operation during January, 1917. It is equipped with 6 Hancock jigs, 40 tables arranged in 2 sections, regrind rolls, elevators, mills for regrinding and drag classifiers and a flotation plant for slime treatment. The ratio of concentration is approximately 20:1. Mineral Separation flotation units are used.

Most of the power is generated at a central plant. This plant consists of a battery of 12 boilers, equipped with chain-grate stokers. Three 750-k. w. vertical turbines, two 2,000-k. w. and one 800-k. w. Allis-Chalmers turbines, four compressors, together with necessary condensing equipment, etc. About 550 men employed.

Production: 1,163,000 tons of ore in 1913; 1,212,000 tons in 1914; 1,355,000 in 1915; 1,328,474 tons in 1916; 1,870,000 tons in 1917; 1,905,000 tons in 1918; 1,241,651 tons in 1919; 1,506,080 tons in 1920. Tons milled was somewhat less, in 1921.

FEDERAL LEAD & ZINC CO. **OKLAHOMA**

Address: H. Martin, Miami, Okla.

Officers: H. L. Holen, pres.; J. P. Whatley, v. p.; R. W. Yakish, sec.-treas.

Inc. in Okla. **Cap.** $40,000.

Property: 20 acres at Tar River and 40 acres at Quapaw, thoroughly developed in 1917-18. A 300-ton mill was erected and regular shipments made.

FERCH MINING CO. **MISSOURI**

Idle, 1921.

Property: company early in 1918 was operating on West Seventh street, Joplin, under a lease from the Continental Zinc Co. Good ore was opened at depth of 224'. No returns.

FIELDS MINING CO. **MISSOURI**

Producing zinc concentrate, Dec., 1921, at rate of 40-50 tons weekly.

FIFTEENTH STREET MINING CO. **MISSOURI**

Address: C. L. Windbigler, Box 41, Joplin, Mo.

Property: on east 15th St., Joplin, Mo., was sold by O. W. Sparks, of Galena, Kansas, and associates, to H. C. Clinton of Clinton, Oklahoma, and others, for $100,000. Two shafts were sunk, opening rich ore and a mill built.

Idle.

FINK MINING CO. **MISSOURI**

Idle. No news since 1918. **Property:** near Ozark, Mo.

Development: by 210' shaft and level at 90, 135 and 175', all in pay-ore. The face is 20' thick. A 400-ton mill was in operation, at last accounts.

FIRST NATIONAL MINING CO. **OKLAHOMA**

Address: Quapaw, Okla.

Property: N. W. of Quapaw, Okla. Two shafts are down to ore at 145'. Rich ore was treated in the Red Rose mill in 1919.

FLANNERY ZINC CO. **MISSOURI**

Idle. **Address:** W. F. Friday, Sarcoxie, Mo.

Property: the Boyd zinc mines at Sarcoxie, acquired in 1915, and $40,000 spent in rehabilitating mine and mill.

Equipment: includes a 1,000-ton concentrator and a Diesel engine. The ore is blende, but some calamine is also mined.

FOCH MINING CO. **OKLAHOMA**

Address: A. E. Bendelari, mgr., and A. J. Beasley, supt., Picher, Okla.

Inc. in 1919. Owned by employees of the Eagle-Picher company.

Property: the Sheridan-Adams mine, a 40-acre lease, one mile W. of Picher, developed by 240' shaft, and equipped with 250-ton mill. Idle in 1919-20.

FORT WORTH LEAD & ZINC CO. OKLAHOMA
J. C. Squires & Co., lessees, Picher, Okla.
The mine, located south of Picher, is developed by 2 shafts, opening an orebody 35' thick. **Equipment:** includes 200-ton mill.

FOUR MILE MINING CO. OKLAHOMA
Dead. See description in Vol. XIV.

FRANKLIN MINING CO. MISSOURI
Probably dead. See Volume XIV.

FREEHOLD OIL & GAS MINING CO. MISSOURI
Address: W. S. Marquis, Webb City, Mo.
Inc. in W. Va. **Cap.** $200,000.
Property: several leases covering 60 acres, in the Waco field. Three mills are at work, producing 64% zinc concentrate. **Equipment:** includes compressor, steam power and drills. All mines are regular producers.

FRISCO L. & Z. CO. MISSOURI
Address: E. S. Warnet, Buffalo, Mo. **Mine:** S. E. of St. Louis, Mo.

FRISCO MINE OKLAHOMA
Address: G. W. Dixon, Miami, Okla., or W. W. Imms, mgr., Picher, Okla. Presumably owned by C. L. & D. Mng. Co.
Property: a 40-acre lease S. W. of Hockerville, equipped with a mill.

GAGER MINING & MILLING CO. MISSOURI
Address: F. D. Gager, Joplin, Mo.

GALENA LEAD & ZINC CO. KANSAS
Dead. Once operated near Galena, Kan.

GALENA MINING & DEVELOPMENT CO. OKLAHOMA
Property: is at Century, Okla.

GASCHO ZINC CO. MISSOURI
Address: Frank Dangiad, supt., Cunningham Bldg., Joplin, Mo.
Inc. 1919, in Missouri. **Cap.** $100,000.
Property: a 40-acre lease near Waco, Mo. Drilling revealed ore at 300 to 340' depth.
Development: by two 200' shafts. Ore is mined below 150'.
Equipment: includes 300-ton mill, drills, crusher, compressor and tables. Thirty five men employed.

GEORGE BALL MINING CO. MISSOURI
Probably dead. No information since 1918. **Address:** George Ball, supt., Webb City, Mo.

GEORGETTE MINING CO. MISSOURI
Dead. See Vol. XIV. Formerly operated in Newton county, Mo.

GIBSON MINING CO. MISSOURI
Dead. Operated, 1918, near Joplin, Mo.

GILMAN MINING CO. MISSOURI
Address: C. L. Windbigler, Box 41, Joplin, Mo.
Property: a 40-acre lease and mill in the Waco field, developed by 2 shafts to depth of 175'. **Equipment:** includes 200-ton concentrator, compressor, crusher, drills and tables. Twelve men employed at last account.

GILT EDGE MINING CO. MISSOURI
Dead. Lease transferred, June, 1916, to **Wade Mining & Milling Co.**, which see.

GOLCONDA MINING CO. OKLAHOMA
Organized in March, 1918, with capital of $50,000, by J. M. Imrie, E. E. Chivers and O. C. Lasbier, of Ardmore, Okla. No record of operations.

GOLDEN EAGLE MINING CO. OKLAHOMA
Address: M. A. Young, R. F. D. 2, Baxter, Okla. **Mine address:** Miami, Okla.

GOLDEN ROD MNG. & SMELTING CORP'N OKLAHOMA
Address: Box 106, Cardin, Okla., and Keystone Bldg., Joplin, Mo.
Officers: E. Z. Wallower, pres.; F. C. Wallower, v. p., with W. R.

Ramsey, P. E. Tabor, H. T. Parker, Paul Johnston, and H. A. Riddle, directors. H. C. Mills, sec.-treas., Joplin, Mo. A. N. Gaines, mgr.

Inc. Aug., 1917, in Oklahoma. **Cap.** $1,100,000 com. or dfd. dividend shares and $1,000,000 pfd. shares; $5 par; all of com. and $755,607 pfd. issued. Preferred shares receive all earnings until 100% has been paid, after which the deferred shares participate.

Bonds: $1,000,000 first sinking fund 5-year, 6s, dated April 1, 1919; $916,500 issued. A sinking fund of 50% of net operating earnings, with a minimum of $10,000 monthly started July 1, 1919.

Financial statement for year ended Jan. 1, 1921, showed net income, $762,548, of which $761,100 was net from ore sales after deducting $155,506 for royalty; expenditures were $703,554; surplus, $58,994.

Property: 320 acres, including the Dallas-Picher mine, near Tar River, Okla.; also 4 mills, (3,000 tons daily capacity), No. 4 being of 1,500 tons in 20 hours. In No. 5 tract, drilling is said to have blocked out 1,500,000 tons of zinc-lead ore, assaying from 30 to 40% blende and galena. The latest mill employs the best practice, including flotation. Purchase price of property was $1,350,000.

Production: weekly output in 1921 averaged about 300 tons of zinc concentrate from ore of 220 and 230′ levels of No. 1 and No. 4 mines. Company kept two rigs busy in 1921 doing prospecting work. Employs 60 men at No. 1 mine and mill.

This is one of the big producers of the Tri-State region.

GOLDEN SPIKE MINING CO. **OKLAHOMA**

Organized in February, 1918, with capital of $125,000, by R. H. Drenna, F. E. Herrin, and O. D. Halsell, of Oklahoma City. No record of operations.

GOLDEN STATE MINING CO. **OKLAHOMA**

Formerly operated near Picher. See Volume XIV.

GOOD CHANCE MINING CO. **OKLAHOMA**

Organized January, 1918, with capital of $30,000, by George Ostrander, of Miami; R. W. Eastman, and H. H. Sherman, of Alva, Okla. Had no mines at last report.

GOODEAGLE MINING CO. **MISSOURI**

Mine sold in 1920 to the **Hartford Mining Co.**, which see.

GRACE MINING CO. **MISSOURI**

Out of business. Formerly operated at Joplin, Mo.

GRACE WALKER MINING CO. **KANSAS**

Controlled by Commerce M. & R. Co., Okla. The 250-ton mill at Baxter Springs was destroyed by fire, in 1918.

GRANBY CONSOLIDATED MINES CO. **OKLAHOMA**

Dead. Former address, care W. G. Wilkerson, supt., Granby, Mo. Mine presumably near Miami, Okla.

GRANBY MINING & SMELTING CO. OF MISSOURI **MISSOURI**

Subsidiary of the **American Z., L. and S. Co.**, which see.

Address: Granby, Mo.

GREAT SCOTT MINING CO. **MISSOURI**

Dead . See Vol. XIV.

GREAT WESTERN LEAD & ZINC CO. **OKLAHOMA**

Organized April, 1918, with capital of $100,000, by M. B. Rook, of Miami; Edward Kesler, of Carter, and J. G. Wherry, of Commerce, Okla., No further information obtainable.

GREENBACK MINING CO. **OKLAHOMA**

Probably dead. Operated in 1918 at Quapaw. See Volume XIV.

GREENFIELD LEAD & ZINC CO. **OKLAHOMA**

Organized in March, 1918, by J. E. Ross, J. C. Collier, and J. W. Baker, of Greenfield, Okla. No record of operations obtained.

GREENING MINING & SMELTING CO. OKLAHOMA
Subsidiary of the Hare M. & M. Co.

GREEN ZINC CO. OKLAHOMA
Dead. Formerly operated near Miami, Okla.

GRIFFITH LEAD & ZINC CO. MISSOURI
Dead. See Vol. XIV. Formerly held lease on land near Saginaw, Newton Co., Mo.

GUENING MINING CO. OKLAHOMA
Dead or dormant. No news since 1918. See Volume XIV.

HANOVER LEAD & ZINC CO. OKLAHOMA
Organized December, 1917, with capital of $160,000, by J. J. Strong, C. W. Rice, and Rudolph Johnson, of Cushing, and J. T. Dickinson, of Edmond, Okla.
No record of operations obtained.

HARDING MINING CO. MISSOURI
Succeeds Log Cabin Mining Co., which see.

HARD ROCK MINING CO. KANSAS
Address: Ben Malang, Joplin, Mo.
Property: a new producer at Peacock, Kansas, S. W. of Waco, Mo

HARE MINING & MILLING CO. OKLAHOMA
Office: Hobart, Okla. **Works:** Picher, Okla.
Officers: Alfred Hare, pres. and gen. mgr.; J. D. Carruthers, v. p.; W. F. Hearne, sec.; A. E. Fritsche, treas.
Property: one mile W. of Picher. Also owns control of the **Greening M. & S. Co.**, and bought the Jack Rabbit mine for $35,000. Good ore was opened in all mines, and a 200-ton mill erected. Is one of the large producers in the southwestern part of the Picher camp. Mill contains Mineral Separation flotation equipment.

HARRISBURG MINING & MILLING CO. OKLAHOMA
Address: F. C. Wallower, mgr., Box 102 Cardin, Okla.
Officers: F. S. Wallower, pres., E. Z. Wallower, sec.-treas., with Geo. J. Smoyer and H. C. Mills, directors.
Cap. $400,000.
Property: 40 acres W. of Cardin, Okla., equipped with 2 mills.

HARTFORD MINING CO. MISSOURI-OKLAHOMA
Address: 305 Miners Bank Bldg., Joplin, Mo.
Officers: L. A. Barbour, pres., Hartford, Conn.; Harlan H. White, sec.-treas.-gen. mgr., Joplin; with S. B. Griswold, Carthage, Mo., and C. C. Spencer, Joplin, directors. Geo. Elliott, supt., Galena, Kansas.
Inc. 1906, in Missouri. **Cap.** $100,000; $100 par; all outstanding.
Property: a 120-acre lease, 1 mile N. of Duenweg, including the No. 1 mine; a 10-acre lease at Carthage, including the No. 3; and a 70-acre lease near Galena, Kansas, but in Missouri, including No. 2. The Goodeagle mine in Oklahoma was purchased in 1920 for $250,000.
Development: by 5 shafts in sheet-ground at No. 1; one shaft in sheet-ground at No. 3, and 3 shafts with 40' ore face in No. 2.
Equipment: includes 600, 150, and 350-ton mills, gas and steam power.
Production: about 200 tons of zinc concentrate weekly during 1921.

HAWKINS LEAD & ZINC CO. OKLAHOMA
Address: Baxter (route 2), Okla.
Officers: Lee Hawkins, pres., J. A. Henry, v. p.; H. H. Hawkins, sec.-treas.-mgr.
Property: operating in the Sunnyside district, E. of Quapaw, on land of the **Crescent L. & Z. Co.** A modern mill was erected, part of it to treat an old dump of zinc-lead tailing, and small shipments made.

HAWK MINING CO. OKLAHOMA
Dead. Formerly operated near Miami, Okla.

HAYNES MINING CO. OKLAHOMA
Address: J. Hawthorne, Commerce, Okla.

No record of operations obtained.

HEALDTON MINING CO. **OKLAHOMA**

Address: Cardin, Okla.

Cap. $100,000. Incorporated by W. A. Rodgers, John Mulkey and H. S. Cox, of Ardmore, Okla. A mill was to be built, at last report. No news since 1919.

HEATON & HODGES MINE **MISSOURI**

Idle or dead. **Address:** W. Heaton, supt., Granby, Mo.

Property: a tract in the Sheet-ground area of Joplin district, in which the ore lies at depth of 210'. Reported that shafts were sunk and a mill erected in 1919.

HENRYETTA ZINC SMELTER **OKLAHOMA**

Owned by the United States Zinc Co. (q. v.), a subsidiary of the Am. Sm. & Rfg. Co.

Office: 120 Broadway, New York. **Works address:** C. E. Gregg, supt., Henryetta, Okla.

Smelter has 3,200 retorts and complete accompanying equipment.

HERCULES DEVELOPMENT CO. **KANSAS**

Dead. Formerly did exploratory work near Louisville, Kan.

HIDDEN TREASURE MINING CO. **OKLAHOMA**

Probably dead. **Former address:** Baxter Springs, Kan. See Vol. XIV.

HIGH FIVE MINING CO. **MISSOURI**

Office: Temple Chapman, 627 Frisco Bldg., Joplin, Mo., or Waco, Mo.; Geo. E. Starr of Philadelphia is also an interested party.

Inc. in Missouri. **Cap.** $500,000.

Property: 80 acres in the Waco district, Mo., held under lease on a 10% royalty basis. Also 80 acres in Kansas.

Development: 17 drill-holes cut good ore at depths of 135 to 150' Three shafts were sunk to 196'.

Equipment: includes compressor crusher and drills; a motor-driven mill, finished in July, 1919, has a daily capacity of 600 tons. Operated during 1919-20. Reported September, 1921, that a long-term option on the Waco holdings has been taken by the Am. Z. L. & Sm. Co. Forty men employed normally.

HIGH GRADE LEAD & ZINC CO. **OKLAHOMA**

Address: Picher, Okla.

Officers: P. W. Payton, pres.; Earl Edgerly, treas.; Clyde Walker, sec.; Fred Star, mgr.

Property: 1 mile W. of Quapaw.

HIGH GRADE ZINC CO. **MISSOURI**

Address: care J. W. Baker, Duenweg, Mo.

Inc. in Missouri. **Cap.** $50,000.

Property: 80 acres, developed by 3 shafts to depth of 105'.

Equipment: includes 150-ton concentrator, steam power, drills and crusher. Seven men employed.

HILDA MINING CO. **MISSOURI**

Address: Amos Freeman, Joplin, Mo.

Property: N. E. of Baxter, Mo.

HILL LEAD & ZINC CO. **MISSOURI**

Dead. Last address. care H. B. Wolcott, Joplin, Mo.

HOME RUN MINING CO. **MISSOURI**

Address: Granby, Mo.

Property: developed by 2 shafts, to depth of 70'. Three men only were employed in 1919.

HOMESTAKE MINING CO. **KANSAS**

Operating in the Hockerville district and shipments made regularly since 1918. Production for week ending Dec. 17, 1921, was 297.750 lb. lead concentrate.

HOPE LEAD & ZINC CO. **OKLAHOMA**

Address: J. F. Ladd, mgr., Fayetteville, Ark.

Property: 1½ miles N. of Quapaw, Okla.

HOPKINS MINE **OKLAHOMA**

Owned by the **Producer L. & Z. Co.**, which see.

HOWE MINING CO. **OKLAHOMA**

Address: F. S. Seagrave, mgr., Box 234, Picher, Okla. A merger of the Dew Drop and Howe companies.

Property: the Dew Drop mine, ½ mile W. of Picher.

Production: normally 43 tons of blende (60% metal) per week.

HUNT MINING CO. **OKLAHOMA**

Address: 2200 Ins. Exchange Bldg., Chicago, Ill., and Box 67, Picher, Oklahoma.

Officers: Robt. W. Hunt, pres.; J. C. Halstead, v. p.; C. B. Nolte, sec.-treas.; C. C. Whittier, mgr.; H. L. Jones, supt.

Inc. 1919 in Oklahoma. **Cap.** $250,000.

Property: 50-acre lease on the Pittsburg-Miami mine, about 1 mile N. E. of Picher. Developed by two shafts to depth of 280'.

Equipment: includes 400-ton concentrator. Mine started producing in 1919

HURRY-UP MINING CO. **MISSOURI**

Address: Webb City, Jasper Co., Mo.

Property: in the North Webb City sheet-ground district, said to show lead-zinc ore occurring at depth of 200'. A 300-ton mill on the property, operating almost continuously for 10 years was to be dismantled and replaced by one of 400 tons capacity per 10 hours. Company hoists ore from the Florence shaft, 1,000' N. E. of the mill.

HUTTIG LEAD & ZINC CO. **OKLAHOMA**

Address: R. F. D. No. 5, Baxter Springs, Kansas.

Officers: F. Huttig, pres.; F. J. Huttig, sec.-treas.; H. E. Huttig, v. p.; all of Kansas City, Mo. B. E. Brown, supt.

Property: a 120-acre lease on the Brewster land N. E. of St. Louis, Okla. Company was the second largest producer in the district in 1918, ore coming from the 225 to 265' levels. The 200-ton mill was burned in August, 1918, but was replaced by the Inspiration company's old mill in November 1919, so there are two 300-ton plants at work. No. 2 mine was operated continuously throughout 1921 employing 100 miners in 3 shafts. This mine is between Hockerville and Zincville.

Production: weekly output in 1920, was 40 to 50 tons of blende. In Jan., 1921, it was 300 tons, worth $27 per ton. Shipments in December, 1921, varied from 125 to 225 tons of zinc concentrate weekly.

ICE PLANT MINING CO. **MISSOURI**

Out of business and corporation dissolved. See Vol. XIII.

IMPERIAL DEVELOPMENT CO. **OKLAHOMA**

Address: Quapaw, Okla.

Officers: C. H. Cleveland, pres.; R. E. Gilbert, sec.; F. T. Cochran, treas. G. O. Spafford, mgr.

Inc. in Delaware. Property is in the Osage tract just S. W. of Quapaw, where water caused much trouble and necessitated an expenditure of $200,000 before mine was adequately drained and ore production was begun.

IMPERIAL MINING & DEVELOPMENT CO. **OKLAHOMA**

Address: care T. L. Robinson, Miami, Okla.

IMPERIAL ZINC CO. **MISSOURI**

Address: Bud M. Robinson, Frisco Bldg., Joplin, Mo.

INCLINE MINING CO. **MISSOURI**

Property: a lease on part of the lands belonging to the **Center Creek Mining Co.**, between Webb City and Carterville. Developed by 5 shafts to depth of 150', showing lead and zinc ore.

Equipment: included 2 concentrators of 500 tons capacity, pump, boiler and steam power.

INDEPENDENT ZINC LANDS CO. MISSOURI

Subsidiary of the **Barnsdall Corporation,** which see.

Office: P. B. Butler, mgr., Frisco Bldg., Joplin, Mo.

Property: a lease on 2,600 acres of land, S. W. of Joplin.

INDIANA MINING CO. MISSOURI

Address: care of F. H. Kissling, Joplin, Mo.

Inc. 1921, in Mo. **Cap.** $150,000; $80,000 subscribed (Nov., 1921).

Property: an 80 acre lease, north of Carl Junction.

INDIAN CHIEF MINING CO. OKLAHOMA

Dead. Formerly at Miami, Okla.

INDIAN QUEEN MINING CO. OKLAHOMA

Address: H. H. Hawkins, Hockerville, Okla.

Officers: W. W. Hanlan, pres.; E. A. Gualtney, v. p.; T. L. Ripley, sec.; W. W. Champion, treas.; J. E. Ernhart, gen. mgr.

Property: a lease S. W. of Hockerville, adjoining the Lucky O. K. and Blue Bonnet mines. A mill was erected and shipments begun in 1918.

INSPIRATION MINING CO. KANSAS

Dead. Described in Vol. XIV.

INSPIRATION MINING CO. OKLAHOMA

Out of business. See Vol. XIV.

INTERSTATE LEAD & ZINC MINING CO. OKLAHOMA

Organized January, 1918, with capital of $40,000, by L. G. Sims and L. M. Linebaugh, of Vinita, Okla., and S. P. Strong, of Dallas, Texas.

Property is a tract four miles W. of Picher, on which a 200-ton mill was to be built. Idle since 1918.

IOWA MINING CO. OKLAHOMA

Address: A. F. Place, pres., Leon, Iowa; or E. P. Rhodes, Box 224, Joplin, Mo.

Cap. $100,000.

Property: a lease on 40 acres of the Fred Gillmore tract, just across the State line from Baxter Springs. Ore occurs at depth of 138'. Seventeen drill-holes show good ore, suitable for hand-jigging. A 150-ton concentrator was erected, September, 1920.

IRISH GIRL MINING CO. MISSOURI

Address: Granby, Mo. Has a 6-acre lease, developed by 75' shaft.

IRON MOUNTAIN M. & SM. CO. MISSOURI

Property: the Iron Mountain mine in St. Francois county.

JASPER COUNTY LAND & MINING CO. MISSOURI

Dead. Formerly operated near Carterville, Jasper county, Mo. See Vol. XIV.

JAYBIRD MINING CO. OKLAHOMA

Address: c/o Commerce M. & R. Co., Miami, Okla.

Officers: J. F. Robinson, pres.; Geo. L. Coleman, sec.-treas.; J. E. Pearson, supt.

Inc. in Oklahoma.

Property: about ½ mile S. of Cardin.

JEFF CITY MINING CO. OKLAHOMA

Address: Box 1571, Picher, Okla.

Officers: Geo. Potter, pres.; H. B. Church, sec.-treas.; A. E. Bendelari, mgr.; O. E. Lichliter, supt.

Inc. in Oklahoma.

Property: S. E. of Picher.

JEFFERSON MINING CO. OKLAHOMA

Address: Box 666, Picher, Okla.

Officers: A. B. Clark, pres.; T. J. Landers, v. p.; F. W. Hackman, sec.-treas.; G. M. London, mgr.

Inc. in Oklahoma. **Cap.** $400,000.

Property: 40 acres, S. E. of Picher, which contains the ore horizon at 230' in depth, with a face of 12' of stoping ore.

The 300-ton mill employing flotation, erected February, 1919, yields 160 tons concentrate per week.

JOHNSON MINING & DEVELOPMENT CO. — **KANSAS**

Dead. Formerly operated near Baxter Springs, Kans.

JOPLIN BOY MINING CO. — **KANSAS**

Address: T. R. Lynas, 11 S. La Salle St., Chicago, Ill. **Mine address:** R. F. D. 2, Galena, Kan.

JOPLIN-KENTUCKY LEAD & ZINC CO. — **MISSOURI**

Dead. Formerly operated near Joplin. See Vol. XIV.

JOPLIN ORE AND SPELTER CORPORATION — **KANSAS**

Mail returned from last address: 40 Exchange Place, New York. E. Allendorf, Joplin, Mo., treas.

A George Graham Rice promotion.

Inc. April, 1916, in West Virginia, to take over the property of the Joplin Ore & Spelter Co., of Missouri. **Cap.** $2,000,000; shares $1 par; changed from $5 July, 1916; all issued and fully paid. Empire Trust Co., New York, registrar. Stock transferred at company's office.

Dividends: initial one of 5.5% paid May 25, 1916, followed by others in June and July.

Property: a zinc smelter at Pittsburg, Kan., about 37 miles from Joplin, Mo.

Company was exploited by Ridgely & Co. (Geo. Graham Rice), of which the late William Barrett Ridgely, former Treasurer of the United States, was the nominal head. On the New York Curb shares skyrocketed to $5, only to fall back to 5c. Appears to be a good property that was used for speculative purposes rather than mine profits. Presumably out of business. Described in Vol. XIV.

JOPLIN ZINC METALS CORPORATION — **MISSOURI**

Company dissolved. Described in Vol. XIII of this book.

JUANITA W. MINING CO. — **MISSOURI**

Formerly Tampa Mining Co., Treece, Kansas.

Address: Bob Wilkerson, Carterville, Mo.

JULIAN MINING CO. — **MISSOURI**

Dead. Formerly at Joplin, Mo.

KANOK METALS CO. — **OKLAHOMA**

Offices: 417 Boston Bldg., Denver, Colo., and A. M. Gaines, gen. mgr., Box 1576, Picher, Okla.

Officers: F. M. Woods, pres.; J. M. Kuykendall, v. p.; R. P. Jones, sec.; and C. H. Shilling, treas.

Inc. in Colorado.

Company controls the **Ellis and McBee** companies in Kansas, the **Plumb** company in Oklahoma, and 50% of the **Premier** in Oklahoma, which see under respective titles.

KANOMA ZINC CO. — **KANSAS**

Address: C. Playter, Treece, Kan.

KANSAS CITY-JOPLIN MINING CO. — **MISSOURI**

Company dead. See Vol. XIV.

KANSAS LINE MINING CO. — **OKLAHOMA**

Address: G. Meese, pres., Joplin, Mo.

Property: near the Kansas State line, just N. of Zincville.

KANSOURI MINING CO. — **KANSAS**

Address: C. B. Boylan, pres., Miami, Okla.

Property: a lease northwest of Treece, in Blue Mound territory. Thirty drill-holes cut ore to depth of 270'. Two shafts were sunk and 400-ton mill erected. Shut down in 1919 on account of metal market.

KATY MINING & MILLING CO. **MISSOURI**

Address: J. R. Underwood, Granby, Mo.

Property: a lease on 50 acres at Granby, Newton County, developed by 4 shafts to depth of 90'. Equipped with 300-ton concentrator, drills and crusher. Fifteen men employed.

KEENO MINING CO. **OKLAHOMA**

Dead, or dormant. Formerly held a lease near Miami, in which 21 holes showed rich lead-zinc ore. A 220' shaft was reported in ore in 1918.

KENEFICK ZINC CORPORATION **MISSOURI**

A subsidiary of **United Zinc**, which see. Organization, record, etc., fully described in Vol. XIV.

KELTNER MINING CO. **OKLAHOMA**

Address: F. W. Evans, mgr., Box 1526, Picher Okla.

Officers: F. W. Evans, pres.; J. M. Keltner, v. p.; E. C. Nott, sec.-treas.

Inc. Nov., 1917, in Oklahoma **Cap.** $200,000.

Property: a 40-acre lease E. of Picher, on Eagle Picher Lead Co. ground. Drills passed through 21' of ore, assaying up to 25% blende and galena. Two shafts were sunk in 1918 and a third shaft, N. E. of the mill, was down 125' in May, 1919. The 500-ton mill has been in operation since mid-1918, and early in 1920 the weekly output was 44 tons of blende. In Jan., 1921, it was 87 tons, worth $27 per ton.

Equipment: includes 150 h. p. gas engine and 880 ft. compressor.

Reported November, 1921, to have bought the mining property of the **Southern Lead & Zinc Co.**, a mile west and north of Blue Mound, near Treece, Kansas.

KENTEX MINING CO. **OKLAHOMA**

Address: E. C. Mabon, Miami, Okla.

A mill costing $100,000 was erected and shipments made in 1918.

KENTUCKY CHIEF MNG. CO. **OKLAHOMA**

Address: Box 1586, Picher, Oklahoma.

Officers: John A. Skinner, pres. Webb City, sole owner. R. C. English, sec.-treas.; Fred Sallee, mine mgr.

Inc. in Oklahoma.

Property: Big Chief mine and mill, ½ mile N. of Picher. Closed down in summer of 1921.

KEYSTONE TAILING CO. **MISSOURI**

Address: P. B. Butler, Frisco Bldg., Joplin, Mo. **Mine address:** Cardin, Mo.

KING BEE MINING CO. **OKLAHOMA**

Dead. No record of operations since 1918. See Vol. XIV.

KING-BRAND MINING CO. **KANSAS**

Address: W. T. Landrum, Box 1538, Picher, Okla.

Officers: A. W. Happy, pres.; D. W. Oberman, v. p.; F. J. Kersting, sec.-treas. Directors: Joseph Pope, Felix Senevey, Dr. C. F. Enloe, Lee Jordan, Horick McHenry.

Inc. August 10, 1918, in Missouri. **Cap.** $170,000. Issued and sold, 100,000 shares.

Property: 55 acres near Treece, in Cherokee county. Ore contains galena and zinc blende limestone and is mined by 280' shaft. Ore reserves are stated as equivalent to 26,000 tons of concentrates, with 5,000 tons on dumps.

In 1921, acquired the O. Longacre lease of 22 acres adioining company's own tract at Treece. Land is proven by 30 drill holes and has a 130' shaft.

Development: by two 225' shafts.

Equipment: steam hoist, 650 cu. ft. compressor, 250-ton mill and gas power. Half of mill product is galena, the other half blende. Operating Dec., 1921, producing 35 tons concentrate in week ending Dec. 10th.

KINGSBURY MINING CO. MISSOURI
Property: the Carson iron mine in Howell county, Mo.

KIRKWOOD MINING CO. MISSOURI
Out of business since 1918. Formerly at Webb City, Mo.

KITTY MINING & MILLING CO. OKLAHOMA
Address: J. H. Minnrick, mgr., Box 175, Cardin, Okla.
Officers: S. B. Waters, pres.; J. B. Waters, sec.-treas.
Property: 40-acre lease W. of Cardin, equipped with a mill.
Production: about 170 tons of blende per week, 1920-21.

KROPP MINE OKLAHOMA
Address: Chas. E. Schwarz, Picher, Okla. Mine located 2 miles E of Picher, Okla., owned by the **St. Louis S. & R. Co.**, Miami, Okla.

KUSA SPELTER CO. OKLAHOMA
Office: 120 Broadway, New York. Works address: C. W. Morrison, supt., Kusa, Okla.
Owns a zinc smelter with a 5,360 retort capacity, under lease to the U. S. Zinc Co., subsidiary of A. S. & R. Co.

LACLEDE LEAD & ZINC CO. OKLAHOMA
Address: Cardin, Okla.
Officers: W. E. McComb, pres.; R. O. Mayfield, sec.; O. L. Weissgerber, treas.-mgr.; C. A. Rice, supt.
Inc in Oklahoma.
Property: a 40-acre lease in the Tar River-Douthat area, with a weekly output of over 80 tons of blende. A steady producer. Mine has been noted for its lead caves.

LADD MINING CO. KANSAS
See Vol. XIV.

LADISON MINING CO. KANSAS
Address: Geo. West, Coffeyville, Kansas. Mine address: Galena, Kans.

LA NORA MINING CO. MISSOURI
An inactive company. Organized February, 1918, with capital of $48,000, by G. G. Bayless of Carterville and Phil Gray of Webb City.

LANYON STARR SMELTING CO. OKLAHOMA
Dissolved. Fully described Vol. XII.

LARSH LEAD & ZINC CO. OKLAHOMA
Address: H. G. Larsh, Miners Bank Bldg., Joplin, Mo.
Property: N. E. of Commerce. Ore occurs from a depth of 215 to 265', and is high-grade. The mill was reported making 22 tons of blende concentrate and 3 or 4 tons of galena concentrate daily, at last account.

LA SALLE MINING CO. OKLAHOMA
Address: A. E. Bendelari, mgr. Picher, Okla.
Company composed of employees of the Eagle-Picher company.
Property: N. W. of Picher. Hand-jigs were used prior to the erection of a 500-ton mill in December, 1918. The jig product paid for the mill.

LAWYERS MINING CO. KANSAS
Address: E. G. McAdams, Terminal Bldg., Oklahoma City, Okla., pres.; Harry Rodgers, v. p.; J. B. Dudley, sec.-treas.; George Pearson, mgr.
Property: 40 acres, west of Treece, just across the State line. Rich ore being mined, and a 400-ton mill erected early in 1919. Recovery is 10% lead and zinc. A regular producer.

L. C. H. CORPORATION OKLAHOMA
Probably defunct. No record of operations since July, 1918, when a 200-ton mill was erected.

LEAD & ZINC DEVELOPMENT CO. OKLAHOMA
Address: Box 352, Miami, Okla. Mine located N. E. of Quapaw, Oklahoma.

LEAD BOY MINING CO. OKLAHOMA
Address: Baxter (route 2), Okla.

Officers: Robt. M. Scott, pres.; Geo. S. Alcorn, sec.-treas.; R. H. Elkins, mgr.

Inc. in Oklahoma.

Property: Lead Boy mine on Crescent L. & Z. Co. land, in the Sunnyside field. The 150-ton mill was remodeled and enlarged in 1918 and shipments made. Operated by lessees at last account.

LEAD-KING MINING & CONCENTRATING CO. MISSOURI

Address: E. A. Grady, 123 Moffett, Bldg., Joplin, Mo. **Mine address:** Duenweg, Mo.

LEADLAND MINING CO. MISSOURI

Address: R. H. Barratt, Joplin, Mo. **Mine address:** Chitwood, Mo.

LENABEE MINING CO. KANSAS

Dead; mill planned to be erected in 1919, did not materialize so far as known.

LENNAN ZINC & LEAD CO. OKLAHOMA

Address: Box 635, Miami, Okla.

Had a lease on the Commerce Mng. & Royalty Co.'s land at the N. E. end of the town of Commerce.

LEONORA MINING CO. OKLAHOMA

Address: H. Chamberlain, 6th & Moffett Sts., Joplin, Mo.

Inc. in 1917. **Cap.** $200,000.

Property: formerly the Lucky Five mine, 1 mile S. of Picher, Okla., thoroughly drilled, a shaft sunk, and mill under construction in March, 1919. Water hindered development for some time.

LIBERTY MINING CO. KANSAS

Address: care Jno. Wingfield, Baxter Springs, Kansas.

LIGHTFOOT O. & M. CO. OKLAHOMA

Dead. Was to erect a mill in 1918.

LINCOLNVILLE LEAD & ZINC CO. OKLAHOMA

Address: T. H. Nerbern, pres., Miami, Okla.

Property: a lease between Lincolnville and Sunnyside, on which considerable drilling has been done, shaft sunk, and mill erected.

LION MINING CO. OKLAHOMA

See **Velie Mines Corporation.**

LITTLE BILL MINING CO. MISSOURI

Address: George Moore, Joplin, Mo.

Property: a lease west of Chitwood, adjoining on the south the property of the St. Regis M. & S. Co.

Development: drill-holes yielded up to 18% zinc and lead, and shafts were sunk to 180' level. Equipped with 200-ton mill. No record of operations since 1919.

LITTLE JEWEL MINING CO. OKLAHOMA

Address: J. W. Chaffner, Quapaw, Okla.

Property: the Miami Sunrise mine, S. E. of Quapaw. Ore is mined at a depth of 85'. The mill contains crusher, rolls, and 6 hand-jigs, and the concentrate shows the ore to carry 15% mineral in equal portions of zinc and lead. Developing. See **Miami Sunrise Mining Co.**

LITTLE MARTHA CORPORATION MISSOURI

Address: H. B. Wolcott, Joplin, Mo.

Property: N. of Chitwood, said to produce 75 tons of blende weekly. In July, 1919, entire holdings valued at $10,000, assigned for the benefit of creditors to H. W. Blair, of Carthage, Mo.

LITTLE MARY MINING CO. MISSOURI

Address: Webb City, Jasper county, Mo.

Cap. $100,000.

Property: a lease on 40 acres of mineral land, owned by D. S. Weaver. Developed by 3 shafts to depth of 175'.

Equipment: includes 500-ton concentrating mill, pumps, 3 drills, 2

hoists, steam power, and compressor. No record of production available since 1919.

LOGAN & CO., W. & H. — **OKLAHOMA**

Address: F. Sleck, mgr., Picher, Okla.

In August, 1919, the old Coronet mill north of Blue Mound in Kansas was to be moved to the mine at Picher.

LOG CABIN MINING CO. — **MISSOURI**

Address: W. W. Wakeman, Baxter Springs, Kansas.

Property: the old Log Cabin mine N. E. of Duenweg, said to have yielded lead ore worth $1,000,000 from depth of 40', all concentrated by hand-jigs, and whose tailings were to be re-treated. At depth of 175 to 200' more ore has been found and a mill wes erected in 1919. Name reported changed to **Harding Mining Co.**

LONE ELM DEVELOPMENT & MINING CO. — **MISSOURI**

Address: W. F. Shaner, sec.-gen. mgr., Webb City, Mo.

Inc. 1913. **Cap.** $10,000.

Property: a lease on 240 acres of Granby land and 80 acres of Picher land, N. W. of Joplin. Company unwatered the ground, sublet its holdings in small tracts, and operates a 150-ton custom mill. Deposits are shallow, and many lessees are at work.

LONE STAR MINING CO. — **OKLAHOMA**

Address: W. A. Claunch, sec.-treas., Waxahachie, Tex.

Organized in March, 1919, with capital of $40,000, by Ray Thompson, Clark, Oklahoma City, and R. I. Tibbs, Maypearl, Texas.

Property: 20-acre lease, 2 miles E. of Picher. Sinking a shaft and equipment installed at last account.

LONGACRE-CHAPMAN MINING CO. — **MISSOURI**

Dissolved in June, 1918, and all profits distributed. Described Vol. XIII.

LONG-HUNT MINING CO. — **OKLAHOMA**

Address: 404 Commerce Bldg., Miami, Okla. **Mine address:** Hockerville, Okla.

LORANE MINING & ROYALTY CO. — **OKLAHOMA**

Organized in March, 1919, with capital of $40,000, by Ray Thompson, C. C. Moses, J. T. Dewberry, and J. T. Gephart, of Miami, Okla. No other information obtainable.

LOST TRAIL MINE — **OKLAHOMA**

See **Miami Mining Co.** Mine on land of the Commerce M. & Royalty Co., at Commerce, is one of the oldest producers in the field.

LOWER LEVEL MINING CO. — **MISSOURI**

Address: Sarcoxie Mo. Is a reorganization of the Bearcat Mining Co.

Directors: J. W. Boyd, J. J. Stephenson, Geo. Spiva, and Sam Tamblyn.

Property: the Cameron zinc mine on J. W. Boyd land, at Sarcoxie, 20 miles E. of Joplin, Jasper county, Mo. Developed by 278' and 200' shafts.

Equipment: includes 400-ton mill, compressor, and boilers.

LUCKY BELL MINING CO. — **MISSOURI**

Dead. Operated near Webb City, Mo., in 1918.

LUCKY BILL MINING CO. — **OKLAHOMA**

Address: G. L. Childres, Cardin, Okla.

LUCKY BOB MINING CO. — **OKLAHOMA**

Address: William Pascal, pres., Miami, Okla. Mine lies one mile W. of Quapaw, Okla.

LUCKY DOZEN LEAD & ZINC CO. — **OKLAHOMA**

Probably dead. Formerly operated N. W. of St. Louis, Okla. Ore was opened at 195' in October, 1918, and hand-jigs installed to treat the ore.

LUCKY ELEVEN MINING CO. — **MISSOURI**

Address: W. F. Cooper, Keystone Hotel, Joplin, Mo. Mine located S. E. of Carthage, Mo.

LUCKY JACK MINE **OKLAHOMA**

Address: F. W. George, supt., Box 160, Baxter Springs, Kansas.

Property: at Hockerville, owned by Federal M. & S. Co. of Idaho. No production figures available.

LUCKY JEM LEAD & ZINC CO., THE **KANSAS**

Dead, or dormant. Planned to operate a mine and mill near Miami, in 1919.

LUCKY JENNY MINING CO. **KANSAS**

Property: 160-acre lease in Miami field, 7 miles W. of Baxter Springs, drill holes showed 3.6 to 19.9% blende, with some lead in places, and the dump contained 25,000 tons of rich ore. A 300-ton mill was erected late in 1918. Under option to the Lucky O. K. Mining Co., which see, under **Federal Mng. & Sm. Co.** of Idaho.

LUCKY JEW LEAD & ZINC CO., THE **KANSAS**

Address: 1313 R. A. Long Bldg., Kansas City, Mo., or M. G. West, mgr., Baxter (route 5), Kansas.

Officers: W. C. Bowman, pres.; E. J. Bushaw, v. p.; M. G. West, sec.; Robt. H. Bowman, treas.; H. Stout, supt.

Inc. in Oklahoma. **Cap.** $200,000.

Property: 160-acre lease, in Miami field, 7 miles W. of Baxter Springs, Cherokee Co., Kansas, near the U. S. Smelting property. Ninety holes drilled showed ore to depth of 350′, carrying 11% zinc and lead.

Development: by 4 shafts, 328′, 330′, 326′ and 325′.

Equipment: a 300-ton mill was erected in 1919. Shipments made in 1921.

LUCKY JIM MINING CO. **KANSAS**

Address: O. C. Hamilton, supt., Galena, Kan.

A 200-ton mill and mining plant was erected late in 1918. In 1920 a new shaft was sunk to 110′ depth. Producing.

LUCKY KID MINING CO. **OKLAHOMA**

Address: Frank Childress, Cunningham Bldg., Joplin, Mo.

Property: at Zincville. Has two mills whose normal weekly production is 40 tons of blende (60% metal) and 40 tons of galena (80% metal).

LUCKY MINING CO. **MISSOURI**

Dead. Formerly operated 8 active mines in the Joplin district.

LUCKY O. K. MINING CO. **KANSAS**

Address: Federal M. & S. Co., 120 Broadway, New York; or Fredk. Burbidge, gen. mgr., 725 Old Natl Bank Bldg., Spokane Wash.; or P. W. George, mgr., Baxter Springs, Kans.

Subsidiary of Federal Mng. & Sm. Co., Idaho, which invested $171,283 in purchase of 55% interest. First earnings are to be devoted to repayment of this sum at 6% interest, after which profits will be divided between company and former owners on basis of 55 and 45% respectively.

Property: the Lucky O. K. mine in Kansas, just north of Hockerville. Orebodies are horizontal, in chert, at depth of 180 to 230′, carrying 1 to 5% lead and 3 to 15% of zinc. Reserves at the end of 1919 were 80,000 tons, estimated to contain 5,330 tons of zinc and 1,600 tons of lead concentrates. Mining is by room and pillar system.

The Farmington mine was purchased in 1920; and an option is held on the Lucky Jenny and Choctaw Chief mines.

Equipment: includes steam hoist, compressor, pumps, electric motors and oil engines for general power, and 300-ton mill employing the flotation process.

Concentrates carry 61% zinc and 82% lead. One month recently yielded 300 tons of lead and 280 tons of zinc concentrates.

A large producer during 1919, its output in 1920 was 74,488 tons of ore up to suspension of operations in December.

LUCKY PAT MINING CO. **KANSAS**

Address: W. L. Turner, Galena, Kansas.

Cap. $125,000.

Property: E. of Lincolnville. A 200-ton mill was completed in 1919.

LUCKY STRIKE LEAD & ZINC CO. **OKLAHOMA**

Described in Volume XIV. See **Aztec Mining Corporation.**

LUCKY SYNDICATE CO. **OKLAHOMA**

Address: J. G. Marcum, mgr., Joplin, Mo.

Mill, ½ mile N. W. of Picher, was burned in June, 1918, but was rebuilt later in year. In Jan., 1921, weekly output was 175 tons of blende, worth $27 per ton.

LUCKY THREE MINING CO. **OKLAHOMA**

Address: Quapaw, Okla.

Mine located 1 mile S. W. of Quapaw.

LUCKY TIGER MINING CO. **MISSOURI**

Property transferred, 1916, to **Utah-Missouri Mines Co.,** which see.

MAGIC MINING CO. **KANSAS**

Address: Jess Graham, Coffeyville, Kansas. Mine lies N. W. of Picher, Okla.

MAHATMAH MINING CO. **MISSOURI**

Address: E. D. Hornbrook, 1116 Oak St., Kansas City, Mo.

Property: 120 acres S. of Webb City, developed by two 200′ shafts in sheet-ground formation. **Equipment:** includes a 200-ton motor-driven mill.

Production: about 83 tons of blende weekly during 1918. Idle since 1919.

MAHUTSKA MINING CO. **OKLAHOMA**

Office: A. H. Ramage, mgr., 608 Frisco Bld., Joplin, Mo. J. H. Capelli, mgr.; W. L. Kepner, supt. Controlled by S. Y. Ramage interests.

Inc. May 9, 1917, in Oklahoma. **Cap.** $150,000.

Property: 40 acres at Picher, Okla. **Development:** by 3 shafts, 250′ deep. Ore carries 7% zinc and 3% lead. A feature of the deposit is the occurrence of rich ore in the caves opened in mining.

Equipment: 500-ton mill, in 70 hours' test run in April, 1919, dressed 1,300 tons of "dirt", yielding 185 tons of lead and 99 tons of zinc-concentrates. The company is a large producer of both galena and sphalerite concentrate, operating one of the largest lead mines in the district. Output to 1920 was valued at over $1,000,000. Producing throughout 1920-21, at rate 45 to 85 tons zinc concentrate weekly.

MALCONA MINING CO. **MISSOURI**

Dead. Formerly operated near Joplin, Mo. Produced 32 tons of blende weekly.

MANHATTAN MINING CO. **OKLAHOMA**

See **United Zinc Smelting Corporation.** Mine at Picher Okla.

MANHATTAN MINING CO. **OKLAHOMA**

Address: Miami, Okla.

Operates a mine with workings at 230′ depth, near Victory Co's property. Employed 40 men at mine and mill in 1921.

MANSFIELD MINING & DEVELOPMENT CO. **OKLAHOMA**

Idle. **Address:** J. R. Sardage, supt., Mansfield, Mo.

Property: 1,712 acres in Wright county. The ground was drilled, and a 250-ton mill was erected at last accounts.

MARGARET D. MINING CO. **MISSOURI**

Address: Granby, Mo.

Inc. in Mo. **Cap.** $25,000.

Property: in Sec. 12, T. 25, R. 31, developed by 4 shafts to depth of 120′, and equipped with 150-ton concentrator, tables, compressor, crusher, steam power, 4 drills. About 20 men employed.

MARJORY STEWART MINING CO. **KANSAS**

See Vol. XIV. Company dead.

M. & R. MINING CO. **MISSOURI**

Address: W. R. Rice, Wentworth, Mo.

MARY ANN MINING CO. **OKLAHOMA**

Address: F. H. Kissling, sec.-gen. mgr., Baxter Springs, Kansas, or Box 624, Joplin, Mo.

Officers: A. J. Roth, pres.; R. V. Newton, v. p.; Carl C. Smith, treas., with W. H. Johnson, John M. Hedges, G. Edwin Johnston, G. O. Foster, and George Darsee, directors.

Inc. in Oklahoma. **Cap.** $350,000; $1 par.

Property: 40 acres near St. Louis, just S. of the Kansas line, on which zinc-lead ore occurs in limestone and flint.

Development: by several shafts to depth of 235'. Extensive drilling is carried on to keep development ahead of ore extraction and keep the 300-ton mill fully supplied. A rich strike was made in November, 1921.

Production: for 1920 was 6,500 tons of lead and zinc concentrate.

M. AND T. MINING CO. **MISSOURI**

Dead. Described in Vol. XIV.

MAURINE LEAD & ZINC CO. **OKLAHOMA**

Address: J. R. Cole, C. C. Cole Bldg., Tulsa, Okla. Company has a lease and mill S. E. of Douthat, Okla.

MAXINE MINING O. **OKLAHOMA**

Address: Nat McCutchin, Douthat, Okla.

Property: a tract S. of Picher on which 26 drill-holes showed good ore at depth of 205', the ore being 35' thick. A 400-ton gas-driven mill was erected 1920.

McBEE MINING CO. **KANSAS**

Address: Kanok Metals Co., Box 1576, Picher, Okla.

Property: 40-acre lease near Crestline, Kan. Ground has been drilled and a 400-ton mill erected during 1920.

McBRIDE MINING CO. **MISSOURI**

Dead. See Vol. XIV. for description.

McCLELLAN & MUNSON MINE **OKLAHOMA**

Address: J. J. McLellan & Ray Munson, Webb City Mo. **Mine address:** Douthat, Okla.

McCURDY BROS. MINING CO. **OKLAHOMA**

Inactive. Formerly operated a 250-ton mill built in 1918-19, between Picher and Quapaw.

MEDIA MINING CO. **MISSOURI**

Probably dead. See Vol. XIV for description.

MEDICAL MINING CO. **OKLAHOMA**

Out of business. Described in Vol. XIV.

MELROSE MINING CO. **OKLAHOMA**

No record of operations since 1918-19. See Vol. XIV.

MERRILL MINING CO. **KANSAS**

Defunct. In 1918, operated near Baxter Springs, Kans.

METALS EXTRACTION CORPORATION **MISSOURI**

Office: 212 McKinley St., or Bldg., Joplin, Mo. Alfred Schwartz, metallurgist. D. M. Liddell, New York, cons. engr.

Company buys concentrates containing 60% zinc, with no iron, and reduces it direct into lead-free zinc oxide by the Schwarz process. Two furnaces were operated in 1920, capable of producing 10,000 lb. of oxide per day of 24 hours. Attached to the furnaces are fans, flues, and a bag house. The ultimate capacity is to be 80,000 lb. daily.

METALS MILLING CO. **OKLAHOMA**

Operated 1918, near Tar River, Okla. Probably dead.

METROPOLITAN MINING CO. **MISSOURI**

Mine address: c/o Dr. C. W. Boyd, Wentworth, Mo.

MIAMI-ADA MINING CO. **OKLAHOMA**

Owned a lease near Quapaw; also the Phillips zinc mine near Yellville, Ark. Drills at the former passed through 42' of ore, beginning at 190' depth; while drifts in the Phillips were in ore.

MIAMI METALS CO. OKLAHOMA

Address: Otis W. White, lessee, Commerce, Okla. L. E. Cartwright, supt.

Property: the Southeast Missouri lease at North Picher, reported reopened and under development since September, 1920.

MIAMI MINING CO OKLAHOMA

Address: R. J. Tuthill, agt., Miami, Okla.

Property: a lease on the Lost Trail mine of the Commerce M. & R. Co., ½ mile S. W. of Commerce.

A 400-ton mill was built in July, 1918.

MIAMI NATIONAL LEAD & ZINC CO. OKLAHOMA

Dead. No record of operations since 1919. See Vol. XIV.

MIAMI SUNRISE MINING CO. OKLAHOMA

Address: J. W. Chaffner, Quapaw, Okla.

Property: S. E. of Quapaw, was operated by Little Jewel Mng. Co., which see.

MIAMI-TEXAS MINING CO. KANSAS

Dead. In 1918, operated near Treece, Kans.

MIAMI VOLUNTEER MINING CO. OKLAHOMA

Dead. Was active in 1918. See Vol. XIV.

MIAMI-WACO LEAD & ZINC CO. KANSAS

Dead. See Vol. XIV for description.

MIAMI WONDER MINING CO. OKLAHOMA

Address: Miami, Okla.

Officers: Fred D. Whiting, pres.; A. V. Ellis, v. p.-mgr.; O. R. Hisel, sec.; S. P. Carey, treas.

Property: S. E. of Picher. Rich ore was opened at depth of 208′ and a mill erected.

MIAMI ZINC & LEAD CO. KANSAS

Address: T. F. Lennan, sec.-mgr., Joplin, Mo.

Inc. in 1918. Cap. $250,000.

Property: a 40-acre lease on the Chubb land, W. of Treece.

Development: by two 265′ shafts. A mill was to be erected.

MIAMI ZINC MINES CO. OKLAHOMA

Address: Denman Blanchard, 19 Congress St., Boston, Mass. R. M. Sturdevant, mgr., Miami, Okla.

Property: 200 acres at Picher, Okla.

MID CONTINENT IRON CO. MISSOURI

Operates a furnace and by-product charcoal plant at Midco, near Fremont, Carter county. Also operated mines 15 and 32 in Shannon county.

MID-NATION IRON PRODUCTS CO. MISSOURI

Probably dead. No record of operations since 1918. See Vol. XIV.

MILLER WORLEY MILL OKLAHOMA

Address: W. C. Miller, Box 83, Miami. Tailing mills located S. W. of Picher, Okla., destroyed by fire in March, 1921.

MINE LA MOTTE CO. MISSOURI

Name changed Nov. 1, 1916, to **Missouri Metals Corp.**, which see.

MINT MINING CO. OKLAHOMA

Dead. Formerly operated near Miami, Okla. See Vol. XIV.

MIO OIL & MINING CO. OKLAHOMA

Address: W. J. Briggle, 535 Frisco Bld., Joplin, Mo.

Property: the W. F. White mine and flotation mill N. W. of Picher, taken over in July, 1919. Operating profitably at last accounts.

MISSISSIPPI QUEEN MINING CO. KANSAS

See Vol. XIV. Probably dead since 1919. Formerly at Baxter Springs, Kan.

MISSISSIPPI VALLEY IRON CO. MISSOURI

Owns the Puxico iron mine, at Puxico, Hoddard county. Ore is a secondary limonite.

MISSOURI COBALT CO. MISSOURI

Address: S. F. Kirkpatrick, mng. director, Fredericktown, Mo.

Inc. in Missouri. **Cap.** $1,000,000.

Property: that of old North American Lead Co., about 911 acres, at Fredericktown, Madison county. Ore is a comlex mixture of the sulphides of copper, iron, cobalt, nickel and lead. Developed by 2 shafts to depth of 250'.

Equipment: includes a 100-ton smelter and 300-ton mill completed in August, 1917, employing flotation process.

The mill produces lead concentrates and a copper-cobalt-nickel product. The metals recovered are sold as electrolytic copper ingots, nickel either as shot metal or nickel oxide; cobalt as metal or cobalt oxide.

In 1920 the managing director states that this was the only producer of cobalt in the United States. It is also one of the principal copper producers in that State. Employs about 65 men.

Closed down since Oct., 1920.

MISSOURI COPPER MOUNTAIN MINING CO. MISSOURI

Office: Room 4, Pehl Bldg., Sedalia, Mo. **Works office:** Sullivan, Franklin county, Mo.

Officers: S. Urban, pres.; F. Maerschel, v. p.; Peter Pehl, treas.; J. W. Graham, sec., with H. H. Graham, C. C. Kelly, and F. T. Mulcahy, directors.

Inc. Jan., 1903, in Arizona. **Cap.** $1,500,000; shares $1 par.

Property: about 5,134 acres in Crawford and Washington counties, Missouri, including some farm lands. The Copper Hill mine, 32 acres, worked in a small way before 1850, shows an orebody with a good gossan in manganese limestone.

Development: by a 50' shaft and about 200' of tunnels. Idle several years.

MISSOURI LEAD & ZINC CO. MISSOURI

Office: Mercantile Trust Co., trustee, 805 Frisco Bldg., Joplin, Mo.

Officers: S. A. Mitchell, pres.; W. L. Chambers, v. p.-gen. mgr.; J. P. Newell, sec.-treas.; J. G. Farrell, asst. sec.

Inc. Feb. 19, 1898, in Missouri. **Cap.** $300,000.

Property: 1,100 acres of land within the city limits of Joplin, on which there are a number of developed mines. Ore carries blende, calamine and galena, found at depths of 110' to 200'. Company does no work itself, only deriving income from royalties. Ground has been a big producer for years.

MISSOURI METALS CORPORATION MISSOURI

Offices: 1945 Railway Exchange Bldg., St. Louis, Mo.; 52 Vanderbilt Ave., New York. **Mine office:** Wm. G. Dooley, asst. treas., Mine La Motte, Missouri.

Officers: A. J. Meier, pres.; F. E. Butcher, v. p.-sec.; with W. S. McCall, G. G. Moore, A. J. Drexel, Jr., Hamilton Fish, H. E. Taylor, and J. E. Liggett, directors; R. Morrison, Jr., treas.

Inc. in Maine, as the Mine La Motte Co., 1914; name changed, 1916.

Inc. Nov. 1, 1916, in Missouri. **Cap.** $5,000,000; shares $100 par: all issued. Security Transfer & Registrar Co., New York, transfer agent. Equitable Trust Co., New York registrar.

Bonds: $1,000,000 1st refunding gold 6s, due Nov. 1, 1926. Coupon, $1,000. Empire Trust Co., New York and S. H. West, St. Louis, Mo., trustees. Is first lien, subject to $330,000 prior lien, retired by this issue. Offered Feb., 1917, at 96½. On Dec. 31, 1920, $80,000 in bonds sold for $1,000 the lot at public auction in New York.

Net earnings (applicable to interest) $169,432 for year ended June 30, 1916: quarter ended Sept. 30, 1916, $53,438.

Property: Mine La Motte with 37,614 acres of mineral and farm lands in Madison and St. Francois counties, Mo. Lands have produced since

1723, over $20,000,000, mostly lead. For geology, see Kemp's "Ore Deposits," p. 228, also Mo. Geol. Survey, Vol. IX, Report 4, p. 48.

Development: by a number of shafts, average depth 125'. The shallow surface diggings, which were first worked, were followed down 100-125' and from this level the ore has been coming that for 50 years has supplied the mill and smelter. In recent years the copper and nickel cobalt sulphide ores, which occur in bunches and masses in the lead ore, have not been mined, owing to the difficulty of smelting them. In 1915 four shafts were operated, and much of the ground was re-worked with steam-shovels, the only mine in S. E. Missouri to be so worked. Much carbonate of lead is recovered.

Reserves are reported to be equal to 3,000,000 tons yearly for 60 years, half of which can be mined by open-cut methods.

Equipment: 19 miles of railway, 1,000-ton ore concentrator with 350-ton flotation unit, 1,000-ton tailing plant, Diesel engine power-plant, etc.

Mine was closed in 1919, due to a receivership and foreclosure proceedings started, 1920.

MISSOURI MULE MINING CO. — **OKLAHOMA**

Address: Ed. Standefer, Miami, Okla.

Officers: Chas. Fribley, pres.; Dr. W. A. Powers, sec.-treas.; E. L. Standefer, mgr.

Inc. in Oklahoma.

Property: a lease and mill S. of Picher. Work retarded by water.

MISSOURI ZINC MINES CO. — **MISSOURI**

Dead. Described in Vol. XIV.

MIZPAH MINING CO. — **OKLAHOMA**

Address: Miami, Okla.

Officers: G. L. Coleman, pres.; R. J. Tuthill, sec.-pur. agt.; T. J. Dooley, supt.

Inc. in Oklahoma.

Property: the Blue Goose mine, 2 miles N. E. of Commerce and the Grace Walker mine, 1 mile S. E. of Picher.

M. K. & T. MINING CO. — **MISSOURI**

Address: S. J. Williams, pres., or C. A. Davis, mgr., Granby, Mo.

Property: at Granby. Ore is mined at depth of 240' and treated in a 500-ton mill.

MOGUL MINING CO. — **OKLAHOMA**

Address: A. E. Dunlap, sec.-treas.-mgr., Miami, Okla.; J. B. Stringer, supt.

Officers: E. E. Wilson, pres.; W. M. Rothrock, v. p.

Inc. in Oklahoma. **Cap.** $250,000.

Property: a 20-acre lease, 1½ miles E. of Picher; also operates west of the town. Drilling exposed from 4 to 51% ore, at 180' and 212' depth, and a shaft was sunk late in 1918. Hand-jigs were formerly used to dress the ore, but a new mill was started in November, 1919. In 1920 the output exceeded 30 tons of blende per week. Operations resumed Oct., 1921.

Production: about 80,000 lbs. of blende concentrate weekly.

MONARCH MINING CO. — **OKLAHOMA**

Address: A. O. Nichols, Gentry Apts., Joplin, Mo. **Mine address:** Picher, Okla.

MONLUX & CO. — **KANSAS**

Mine address: care Geo. C. Monlux, Galena, Kan.

MONTREAL MINING CO. — **OKLAHOMA**

Address: C. F. Dike, mgr., Joplin, Mo.

A partnership, consisting of the manager, J. P. Heffernan, and Mr. Henault of Montreal, Canada.

Property: 40 acres at Century said to be one of the richest mines in the region since 1916. The weekly output in 1918 was 330 tons of blende, 60%

metal, and the same early in 1920. This mine was the largest shipper of sphalerite in the district.

MORGAN & SIMPSON MINE MISSOURI

Mine address: care J. D. Morgan, Duenweg, Mo.

MOSELEY MINING CO. MISSOURI

Address: Granby, Mo.

Property: in Sec. 12, T. 25, R. 31, Newton county, developed by 110′ shaft. About six men employed during 1919.

MOUNT NEBO LEAD & ZINC CO. OKLAHOMA

Address: J. E. Turner, mgr., Peoria, Okla.

Development: 3 shafts open ore at a depth of 130′ to 176′. A 200-ton mill erected in 1918, includes 100 h. p. steam engine for mill, 80 h. p. engine for compressor, crusher, 4 sets of rolls, 3 jigs, and 5 tables.

MUNCIE MINING CO. KANSAS

Controlled by Clover Bros., Tulsa, Okla.

Address: R. C. Kelly, mgr., Baxter Springs (route 5), Kansas.

Officers: S. C. Clover, pres.-mgr.; D. Vensel, v. p.

Inc. in Oklahoma.

Property: 40 acres on the Cooper land, W. of Baxter Springs and N. W. of Treece. Drilling was done in 1917. Ore is chatty, needing fine grinding.

Development: by two 240′ shafts, with high ore faces.

Equipment: includes 3 oil engines and 1 gas engine, air hoists, compressor, and large mill. A regular producer.

MUSKOGEE LEAD & ZINC CO. OKLAHOMA

Address: Box 191, Quapaw, Okla.

Officers: Phil Brown, pres.; W. M. Eicholtz, v. p.; L. W. Thompson, mgr.

Inc. in Oklahoma.

Property: 60 acres, just W. of Quapaw. Ore was encountered at 165′ and 180′, but water was so troublesome that company joined with the Imperial Development, St. Louis, and Big Three companies to drain the ground. The Muskogee shaft was cemented and a depth of 200′ attained.

MUTT & JEFF MINE MISSOURI

Address: L. Fannan, or F. M. Kelley, Joplin, Mo.

Property: on A. C. Maherland, worked from 45-60′ levels. Drilling to 130′ reported to have cut rich lead ore in December, 1921.

NAPOLEON MINING CO. MISSOURI

Dead. Described in Vol. XIV.

NATIONAL LEAD CO. MISSOURI

For description, see under United States section.

NATIONAL LEAD & ZINC CO. OKLAHOMA

Address: E. C. Ruff, pres., Oklahoma City, Okla. Mine lies south of Quapaw, Okla.

NATIONAL ZINC & LEAD CO. MISSOURI

Property sold. Company dead. See Vol. XIV.

NATIONAL ZINC CO., THE KANSAS-OKLAHOMA

Subsidiary of **International Minerals & Metals Corporation,** which see, in United States section.

NEARBY MINING CO. MISSOURI

Probably dead. Was operating in 1918 at Webb City, Mo.

NECK CITY MINING CO. MISSOURI

A company incorporated 1919, that never functioned so far as known.

NEIL MINING CO. KANSAS

Dead. Was to build mill in 1918 at the Old Abe mine, Lincolnville, Kan.

NEMO MINING CO. KANSAS

Probably dead. Last operations, 1918.

NEVER SWEAT MINING CO. **OKLAHOMA**

Dead. Formerly operated near Miami, Okla.

NEW CHICAGO MINING CO. **OKLAHOMA**

Address: A. M. Gaines, mgr., Box 1576, Picher, Okla. Controlled by the Joplin Royalty M. Co. and Utopia M. Co.

Property: 40-acre lease at Picher, fully equipped and producing. The new Chicago mine east of Douthat, is 140' deep. Employs 80 miners since July, 1921 when mining was resumed. Shipping 70 to 100 tons zinc concentrate weekly at end of 1921.

NEW ENGLAND ZINC CORPORATION **MISSOURI**

Dead. Described in Vol. XIV.

NEW GERONIMO MINING CO. **MISSOURI**

Probably dead. Formerly at Joplin, No record of operations since 1918.

NEWKIRK SMELTING CO. **MISSOURI**

Address: care R. S. Chappel, Forney Hotel, Joplin, Mo. Mine lies west of Joplin.

NEW STATE MINING CO. **OKLAHOMA**

Address: Homer Seals & Co., Box 24, Commerce, Okla., or Joplin, Mo.

Property: operates the New State mine on McBee land at Commerce. Galena and sphlarerite ores are reported mined at the 110' level and treated in the 75-ton mill.

NEW YORK MINING CO. **OKLAHOMA**

Address: W. T. Landrum, mgr., Box 1538, Picher, Okla.

Property: 1 mile S. of Picher, developed by shaft.

NIANGUA MINING & ROYALTY CO. **OKLAHOMA**

Address: W. S. O'Bannon, receiver, Box 588, Picher, Okla. Frank Childress, supt.

Officers: E. S. Warner, pres.; R. W. Smith, v. p.; W. S. O'Bannon, sec.-treas.

Inc. in 1917, in Okla. Cap. $125,000. Company went into bankruptcy in 1920 and is being operated by a receiver for the creditors.

Property: lease of 40acres on Tar River, midway between Picher and Cardin. The royalty is 17½%. In August, 1919, the M. & M. mine was acquired at a cost of $150,000.

Geology: orebodies lie on three levels—145', 179', and 200'. At 149' level ore is all lead; at 170' horizon, ore is mixed lead and zinc, the latter predominating, and on the 200' level ore is 75% lead. About 30% of the ore is of disseminated type in flint and lime-breccia; remainder is lump ore in broken flint. Ore now being milled assayed 6.5% lead and 4% zinc.

Development: 2 shafts to 200' level, and 600' drift connecting mine and mill.

Equipment: mill treats 500 tons, in 10 hours. It includes a 500-ton ore bin, 18-in. crusher, 42-in. rolls, with 36 in. return rolls, 2 rougher Colley type jigs, one cleaner and one sand jig, same type, one 36 in. high-speed rolls for recrushing, and 10 tables. The recovery is 82%, or 6½% blende and lead.

Power furnished by 150-h. p. gas engine; hoist and drills are operated by air furnished by 3 400 cu. ft. gas-driven compressors.

Production: 110 tons of blende per week in 1919; in 1921, 80 tons, worth $27 per ton.

NORTH AMERICAN LEAD CO. **MISSOURI**

Property: sold at forced sale in 1910 to the Missouri Cobalt Co., which see.

NORTH AMERICAN ZINC CO. **MISSOURI**

Property sold and company out of business, March, 1919. See Vol. XIII of this book.

NUEVA DINERO MINING CO. **KANSAS**

No record of operations since 1918. Former address, Baxter Springs, Kan.

NYMO ZINC & LEAD CO., INC. MISSOURI

Company dissolved. Fully described in Volume XIV.

O. F. & L. MINING CO. MISSOURI

Idle and probably dead. **Former address:** Duenweg, Jasper County, Mo. See Vol. XIV.

OHIMO MINING CO. OKLAHOMA

Address: Box 687, Miami, Okla.

Officers: O. M. Bilharz, pres. F. H. Gartung, sec.-treas.-mgr.

Property: 20 acres, N. of Picher, developed by 2 shafts. Crude ore is mined at level between 220' and 265', the ore is concentrated in a 250-ton mill built in 1918, with a recovery of 10% as concentrates. The weekly output given as 100 tons of blende. A regular producer during 1919.

OKA MINING CO. OKLAHOMA

Address: Box 695, Picher, Oklahoma.

Officers: W. H. Tyles, pres.; T. F. Lennan, mgr., Box 295, Joplin, Mo.; J. E. Reno, supt.

Inc. in Oklahoma. **Cap.** $200,000.

Property: 40-acre lease, 1 mile S. of Picher, developed by 3 shafts.

Equipment: includes 300-ton concentrator, producing in 1920-21.

OKLAHOMA MINING CO. MISSOURI

Dead, or dormant since 1918.

OKLAHOMA WOODCHUCK ZINC LEAD CO. OKLAHOMA

Office: 25 Broad St., New York, N. Y.

Officers: C. C. Burger, pres.; R. M. Atwater, Jr., v. p.; L. E. Whicher, treas., with W. T. Rosen and Herman Aaron, directors S. L. Sherman, sec.; C. F. Dike, mgr. at Joplin, Mo.

Inc. May 5, 1915, in Delaware. **Cap.** $1,000,000; $10 par; all outstanding. Authorized and outstanding, $250,000, 8% 5 year gold notes.

For year ended April 30, 1920, company received from ore sales, $270,258; operating expenses totaled $225,753; net income, $21,939, which was charged against depreciation and depletion.

Property: leases located at Cardin, Ottawa county. Mine contains a chamber deposit of zinc and lead sulphides, assaying 10 to 30% zinc and 3 to 10% lead.

Production: 1917, 7,258,300 lb. zinc and 6,080,200 lb. lead; 1918, 15,405,200 lb. zinc and 1,065,500 lb. lead; 1919, 12,094,100 lb. zinc and 775,690 lb. lead; 1920, 11,864,600 lb. zinc and 4,732,800 lb. lead.

OKLA LEAD & ZINC CO. OKLAHOMA

Dead. See Vol. XIV.

OKO ZINC & LEAD CO. OKLAHOMA

Address: Box 226, Commerce, Okla.

Officers: A. W. Pope, pres.; Malcolm Green, v. p.; A. Mayfield, mgr.; Tom Kitto, supt.

Inc. in Massachusetts.

Property: the Southland mine at North Century, lease formerly held by the Dallas Picher Lead & Zinc Co., but forfeited for non-working. The Lennan mill at Commerce was moved to the mine, and was yielding over 40 tons of blende weekly.

Operated during 1921, producing between 500,000 and 900,000 lbs. of zinc concentrate weekly.

OLD GLORY MINING CO. MISSOURI

Address: M. M. Kline, Frisco Bldg., Joplin, Mo. **Mine address:** Waco, Mo.

OLD RELIABLE MINING CO. OKLAHOMA

Property about 2 miles S. E. of Quapaw.

Developed and small shipments made in 1918.

OMAHA LEAD & ZINC CO. OKLAHOMA

M. R. Moore, mgr.

Property: 40 acres in Oklahoma, S. of Baxter, Kan. The mill was destroyed by fire, May, 1920.

ONAMENA MINING CO. MISSOURI

Plant sold in 1918, and company out of business. See Vol. XIII of this book.

ONCE MORE MINING CO. MISSOURI

Out of business. See Vol. XIII of this work.

ONTARIO SMELTING CO. OKLAHOMA

Address: J. G. Starr, pres. and mgr., Independent Bldg., Joplin, Mo. F. M. Sparks, supt.; Harry G. Stephens, ore buyer.

A lead smelter at Hockerville, in the Oklahoma section of the Tri-State region. Plant has been working since March 15, 1918. It consists of bag-house, motor-room, and furnace-room, all of brick, concrete, and steel; also a refinery of frame construction. Five Newman furnaces have a capacity of 1,600 tons of "Ontario" lead per month.

ORANGE MINING & MILLING CO. MISSOURI

Address: Joplin, Mo.

Works at Carterville, Jasper county, include a mill with Mineral Separation flotation machines and complete equipment.

ORONOGO CIRCLE MINING CO. MISSOURI

Stock and charter cancelled, July, 1917. Property now owned by **Connecticut Zinc Corp'n.**, which see.

ORONOGO MUTUAL MINING CO. MISSOURI

Property sold September, 1918, to the **Athletic Mining & Smelting Co.**, which see.

OSAGE MINING CO. MISSOURI

Dead or dormant. Mail returned from former address, 306 Commerce Bldg., Kansas City, Mo. Fully described in Vol. XIV.

OTIS MINING CO. MISSOURI

Property operated by the **Consumers Mining Co.**, which see.

OTTAWA METAL CO. OKLAHOMA

Dead. No record of operations since 1918.

OWOSSO MINING CO. MISSOURI

Address: J. L. Harris, Hancock, Mich. The mine is owned by J. L. Harris, Daniel Fisher, Jas. Fisher, Jr., T. G. Shubert, all of Hancock, Mich., and H. H. Culver.

Property: a 10-year lease on 1 claim, 40 acres, on Baker land, Jasper county, Mo., carrying lead and zinc ore in sheet-ground formation. This is a virgin mine in the sheet-ground field in Duenweg, between the Lincoln and Coahuila mines.

Development: by 2 shafts, deepest 242' in sheet-ground, with 20' ore face.

Equipment: includes compressor, 8"x8" steam hoist, 3 pumps and 200-ton concentrating mill with jigs, crusher, rolls and tables. Plan reconstructing 200-ton mill at Duenweg, which will double capacity.

Production: begun in Sept., 1915, amounted to 4,240 tons of ore, or $9,872. Concentrates averaged 58% zinc and 78% lead. Not operating in 1921.

OZARK LEAD & ZINC CO. OKLAHOMA

Dead. Former address: St. Louis, Okla.

Reported that a mill was put up a year before any development was done and the little exploration done up to July, 1919, failed to find ore.

Dead. Planned operations in 1918. See Vol. XIV.

PARAGON MINING CO. MISSOURI

Address: Joplin, Mo.

Production: 31 tons of blende per week.

PEARL CITY-JOPLIN MINING CO. MISSOURI

Address: Jess Hibbs, pres., Joplin, Mo.

Property: the Bankers mine, just N. W. of Joplin, reported sold for $30,000, early in 1919.

PELICAN MINING CO. **OKLAHOMA**

Address: Picher, Okla.

Officers: J. F. Robinson, pres.; G. L. Coleman, sec.-treas.; Guy Blackmer, supt.; R. J. Tuthill, pur. agt.

Property: W. of Treece, reported under development.

PERRY ZINC LEASE **MISSOURI**

Property: a 12 acre lease at Joplin, Jasper county, equipped with hoist and drill. Six men employed.

PERUVIAN MINING & DEV. SYNDICATE, LTD. **MISSOURI**

Dead or dormant. No record of operations since 1918.

PFAEFFLE-KELLY MINE **MISSOURI**

Dead or dormant. Last address, care F. Pfaeffle, Joplin, Mo.

A small mill was erected and started in May, 1919.

PHOENIX MINING CO. **MISSOURI**

Address: E. N. Cunningham, mgr., Joplin, Mo. Not incorporated.

Property: 40 acres in Jasper county, Mo., carries lead-zinc ore in a soft limestone formation.

Development: by 176′ vertical shaft and total workings of 600′.

Equipment: includes steam power, hoist, pump and 150-ton concentrating mill.

Production: in 1913, was 3,222,450 lb. zinc and 1,003,450 lb. lead; in 1914, 5,524,310 lb. zinc and 428,080 lb. lead.

Mine has been idle since October, 1914, save for some diamond-drilling done in 1916.

PICHER BIG CHIEF MINING CO. **OKLAHOMA**

Address: O. D. Halsell, Picher, Okla. Property last operated by Kentucky Chief Mng. Co.

PICHER LEAD CO. **MISSOURI**

Merged, June, 1916, with the Eagle White Lead Co., of Cincinnati, and a new company organized called the **Eagle Picher Lead Co.** (Okla.), which see.

PICHER-OKLAHOMA MINING CO. **OKLAHOMA**

Dead. Operations planned for 1918 failed to materialize. See Vol. XIV.

PIOKEE MINING CO. **OKLAHOMA**

Address: H. W. Harrison, sec.-treas., Box 717, Picher, Okla.

Officers: H. O. Abbott, pres.; A. G. Happock, v. p.; J. W. Wright, mgr.; A. N. Gaines, supt.

Inc. in Oklahoma. **Cap.** $67,000.

Operates a lease on Eagle Picher Lead Co. land, just W. of Picher. The normal production is 40 tons of blende (60% metal) per week, from a 350-ton mill.

PIONEER LEAD & ZINC CO. **OKLAHOMA**

Address: Box 553, Joplin, Mo.

Officers: Harry Larsh, pres. and mgr.; J. L. Wilken, treas.; D. L. Larsh, sec.; C. M. Britt, supt.

Inc. in 1917 in Oklahoma.

Property: a 40-acre lease near the Bluebird mine of the Bilharz company, in Tar River area. Drilling opened 15 to 42% ore.

Equipment: a 600-ton mill was erected in 1918, and has been a steady producer. In February, 1920, the weekly output was over 40 tons. To Jan., 1920, the output was 5,000 tons of zinc and 2,000 tons of lead concentrates.

PITTSBURG-MIAMI LEAD & ZINC CO. **OKLAHOMA**

Idle. Property operated by **Hunt Mining Co.**, which see.

PLAYTER BROS. PARTNERSHIP **MISSOURI**

Office: 201 Pearl Ave., Joplin, Mo. A partnership consisting of C. C. Playter and Geo. H. Playter.

Engages in prospecting and development and when ore is opened and mining started, operations are then controlled by separate organizations.

In 1920, leases W. of Baxter Springs, Kan., and E. of Picher, Okla., were being explored. Firm specializes in looking after interest of non-resident owners of mining properties.

PLEASANT VALLEY MINING CO. — **MISSOURI**

Address: J. M. Millard, pres. Carthage, Mo.

Inc. in Missouri.

Property: 100-acre leases, 3 miles S. W. of Carthage, developed by 138′ shaft. Further drilling in 1920 revealed a 20′ face of 15-25% blende ore at 128′ depth and 7.6% ore at 175′.

Equipment: hoist, 400 cu. ft. compressor, 1,200-gal. pump, 3 engines, drills, and 100-ton mill, employing 90 h. p. gas engine, 30-in. rolls, 14-in. crusher, rougher and cleaner jigs. Concentrate assays 62% zinc, no lead, and under 1% iron. Eight men employed in 1919, and mine produced high-grade ore.

PLUMB MINE — **OKLAHOMA**

Controlled by the **Kanok Metals Co.**, Box 1576, Picher, Okla. A. N. Gaines, mgr.

Property: 40-acre lease S. E. of Douthat, on which a mill was erected during 1920.

PORTLAND LEAD & ZINC CO. — **OKLAHOMA**

Dead. See Vol. XIV.

PORTO RICO MINING CO. — **MISSOURI**

See **Barnett Mining Co.**

POTOSI MINING CO. — **OKLAHOMA**

Address: T. F. Blount, pres., Potosi, Mo.

Property: 1 mile N. of Douthat.

POWER MINING CO. — **OKLAHOMA**

Address: C. W. Power, 1304 Kentucky Ave., Joplin, Mo.

Property: 48 acres, 1½ miles S. of Baxter, Kansas, in Oklahoma. Rich zinc-lead ore was revealed by drilling. Development underway in 1920.

PRAIRIE LEAD & ZINC CO. — **OKLAHOMA**

Address: Commerce, Okla.

Officers: C. O. Bedwell, pres.; Lester Eads, sec.-treas.; C. G. Giles, supt.

Property: a tract E. of Quapaw, on which at depth of 81′, a drift shows ore to be 18′ thick for a distance of 300′ and drill holes show the ore horizon to vary between 62′ and 112′ below the surface. The 150-ton mill on the Crescent lease, E. of Quapaw, had a 3,000-ton dump to treat while mine development was underway.

PREMIER ZINC CO. — **OKLAHOMA**

Address: A. M. Gaines, mgr. Box 1576, Picher, Okla.

Owned by **Kanok Metals Co.** and **Tri-State Mining Co.**

Property: a lease on Tri-State company ground on South Main street, Picher; said to be one of the richest tracts in the district.

Development: ore occurs at 193′ to 230′ depth, with main level at 242′. Caves of rich ore are found frequently. Two shafts were sunk.

Equipment: includes a 500-ton mill.

Production: in 1919, 199,019 tons of ore hoisted, yielded 7,493 tons blende and 1,929 tons galena; in 1920, 105,537 tons hoisted yielded 5,176 tons blende and 1,974 tons galena. During Sept., 1921, company's mine yielded 22,320 tons of "dirt," producing 1,584 tons of zinc concentrate and 795 tons of lead concentrate. Employs 250 miners.

PRODUCERS CO. — **OKLAHOMA**

Address: E. C. Wirtz, receiver, Miami.

Operating the Hopkins lease, at Picher, Okla., at last accounts.

PRODUCERS LEAD & ZINC CO. — **OKLAHOMA**

Address: I. G. Conkling, mgr., Enid, Okla.

Officers: F. W. Hemme, pres.; A. C. Black, v. p.; I. G. Conkling, sec.-treas.

Inc. Oct., 1917. **Cap.** $350,000.

Dividends: amount to $35,000.

Property: leases in the Picher district. Shafts were sunk to open 6 to 30% ore found by drills, and a 250-ton mill erected. A recovery of 7% lead and zinc is made.

PROSPECTORS' DEVELOPMENT CO. **OKLAHOMA**

Address: Geo. Sullivan, mgr., Miami, Okla.

Officers: J. D. Simpson, Clinton, Okla., pres.; Ellis Lamb, treas.

Property: 40-acre lease on the Weiss land, S. of Hockerville. **Equipment:** includes a 150-ton mill.

PROSPERITY MILLING CO. **MISSOURI**

Dead. Operated near Joplin, in 1918. See Vol. XIV.

PRUDENTIAL MINING CO. **OKLAHOMA**

Dead. Formerly at St. Louis, Okla.

QUAKER VALLEY MINING CO. **KANSAS**

Dead. Last reports, 1918. Former address, Baxter Springs, Kan.

QUAPAW JACK LEAD & ZINC CO. **OKLAHOMA**

Address: 233 Terminal Arcade, Oklahoma City, Okla.

Officers: L. E. Knight, pres.; Geo. Bass, v. p.; A. M. Coats, sec.-treas.

Inc. in Oklahoma.

Property: 1 mile N. of Quapaw. In July, 1918, company built a 200-ton mill and small shipments were made, but the slump in prices closed this and many other small plants at the time the armistice was signed.

QUAPAW MINING CO. **OKLAHOMA**

Dead. Formerly at Quapaw, Okla.

QUEBEC MINING CO. **OKLAHOMA**

Address: Tom Shelton, mgr., Drawer A, Douthat, Okla.

Mining and milling with production of lead and zinc concentrates began in September, 1918. In 1920, the weekly output was over 40 tons.

The company is involved in litigation with W. P. McCullough over rightful ownership of lease on Fish estate.

QUEEN ESTHER MINING CO. **KANSAS**

Office: 805 Cosden Bldg., Tulsa, Okla.

Officers: F. M. Aiken, pres.; Allen Mason, v. p.; E. R. Perry, sec.; J. S. Cosden, sec.-treas., also directors. W. B. Shackelford, mgr., Cunningham Bldg., Joplin, Mo.

Inc. Aug. 18, 1915, in Oklahoma. **Cap.** $50,000; $100 par; all issued.

Property: a lease of 20 acres, 3 miles S. W. of Baxter Springs, Kansas, and one at Hockerville, Okla. Deposit is a dissemination of galena and sphalerite in limestone, at depths of 30′ to 80′ and 120′ to 240′. Ore assays 0.672% lead and 4.704% zinc.

Development: by 180′ shaft. **Equipment:** steam and electric power, hoist, compressor, pump, and 350-ton mill with 3 jigs and 14 tables. Was in operation Dec., 1921, shipping 80 tons of zinc ore in week ending Dec. 17th.

QUICK SEVEN MINING CO. **MISSOURI**

Dead since 1918. See Vol. XIV.

QUINTON SPELTER CO. **OKLAHOMA**

Works address: Quinton, Okla. **Office:** Joplin, Mo.

Officers: J. G. Starr, pres.-treas.; G. F. Streich, v. p.-gen. mgr.; L. P. Coblentz, sec.-asst. treas.

Cap. $1,000,000.

Operates a zinc smelter with a 2,016 retort capacity and a production of 700 tons of slab zinc per month.

RAINBOW LEAD & ZINC CO. **OKLAHOMA**

Address: Ed. Dunkin, Quapaw, Okla.

Officers: F. E. Herring, pres.; O. D. Halsell, v. p.; R. H. Drennan, sec.-treas.

Inc. in Oklahoma. **Cap.** $100,000.

Property: E. of Picher and N. W. of Quapaw. Ore is found at 165' depth, and is from 20' to 35' thick. A 300-ton mill was built.

RAMAGE MINING CO. — **OKLAHOMA**

Address: 608 Frisco Bldg., Joplin, Mo.

Officers: S. Y. Ramage, pres.; A. Green, sec.; Alfred Ramage, treas.; H. H. Hartsell, mgr.

Inc. May 9, 1917, in Okla. **Cap.** $240,000.

Property: a lease at Century, equipped with a 500-ton mill. Weekly production averages 90 tons of blende, 60% metal when operating normally. Mill idle since Sept., 1918.

R. & N. KANSAS LINE MINING CO. — **KANSAS**

See Vol. XIV. Probably dead.

RASHGO MINING CO. — **MISSOURI**

Dead. No record of operations since 1918. Formerly at Joplin, Mo.

REBECCA MINING CO. — **KANSAS**

Dead. Mail returned from former address, Treece, Kan.

RED EAGLE MINING CO. — **OKLAHOMA**

Out of business. See Vol. XIV.

RED GRANITE COPPER & WATER POWER CO. — **OKLAHOMA**

Dead. See Vol. XIV.

RED ROSE LEAD & ZINC CO. — **OKLAHOMA**

Address: Hockerville, Okla.

Erected a 200-ton mill, 1918.

REDSKIN MINING CO. — **KANSAS**

Office: 404 Commerce Bldg., Miami, Okla., or Baxter (route 5), Kansas.

Officers: D. H. Wilson, pres.; E. B. Frayser, v. p.; F. R. Bouldin, sec.-treas.-mgr.

Inc. in Oklahoma.

Holdings acquired by **Boska Mining Co.**, which see.

RED WASP MINING CO. — **MISSOURI**

Out of business since 1919. Mill sold, 1920, to Larry Brunk. Formerly operated 2 miles N. of Aurora, Mo.

REINDEER LEAD & ZINC CO. — **MISSOURI**

Dead. No record of operations since 1918.

REPUBLIC MINING CO. — **OKLAHOMA**

Dead. See Vol. XIV.

REX MINING & SMELTING CO. — **MISSOURI**

Address: Box 553, or 1805 Frisco Bldg., Joplin, Mo.

Officers: W. L. Chambers, pres.-mgr.; W. H. Picher, v. p.; Herbert Schnurr, sec.; E. A. Lucia, treas.

Inc. 1891, in Missouri. **Cap.** $250,000.

Property: 1,000 acres of land adjoining the city of Joplin, to the S. W. Ore is mined at from 60 to 150' depth, and carries blende, calamine and galena. Production is said to total about $3,000,000. Company does no mining, but leases ground on a royalty basis.

RIALTO MINING CO. — **OKLAHOMA**

Is a large and steady producer of zinc concentrate, at the rate of 60 tons weekly.

RICHARD MINING CO. — **MISSOURI**

Address: L. M. Richard, trustee, 1401 Rialto Blvd., Venice, Calif. J. R. Marquette, mgr., Belle, Mo. J. Barbarick, supt.

Property: a diaspore mine at Belle, Mo., opened by shaft and opencuts and equipped for a production of 100 tons daily. The product is a highly aluminious material used in place of bauxite for the manufacture of abrasives.

RICHARDSON MINING CO. — **OKLAHOMA**

Address: W. J. Mendenhall, sec., Claremore, Okla. **Mine address:** Quapaw, Okla.

RICH STRIKE MINE — **OKLAHOMA**

Reported drilling, shaft sinking, and a mill erected in 1918, near Quapaw.

RIGHT GOOD MINING CO. **OKLAHOMA**

Address: W. T. Dunlap, mgr.-supt., Box 327, Quapaw, Okla.

Officers: Walter Glidden, pres.; E. D. Reed, v. p.; Arthur Gollaber, sec.

Property: a 40-acre lease on the Kropp land, ½ mile S. of Hockerville, developed by 154′ shaft. Erected a 250-ton mill early in 1921.

ROYAL MINE **OKLAHOMA**

Address: F. J. Childress, supt., Picher, Okla. Controlled by **United Zinc Sm. Corp.**, Missouri.

Operated intermittently. Normal production 60 tons weekly.

ROYAL SHELL MINING CO. **KANSAS**

Dead. No record of operations near Baxter Springs, Kans.

SAFEGUARD MINING CO. **OKLAHOMA**

Probably dead. Planned mill near Commerce, Okla., in 1918.

SAINT FRANCOIS LEAD CO. **MISSOURI**

Property acquired by the Baker Lead Co., and sold in 1920 to the St. Joseph Lead Co.

ST. GEORGE MINING CO. **MISSOURI**

Address: W. E. Lloyd, mgr., or Warren Heaton, Neosho, Mo.

Cap. $400,000.

Property: 40 acres in Aroma, Newton county, 2 miles S. of Granby, Mo. Ore occurs in a sheet formation carrying blende and lead under 200′ of limestone. Drill-cores assayed 9.65%.

Development: by a 274′ shaft, sunk in 1919, and another sunk in 1920.

Equipment: includes a 500-ton mill, erected in 1920.

ST. JOE MINING CO. **OKLAHOMA**

Address: J. W. Grounds, Jr., pres.-mgr., Box 564, Picher, Okla.

Inc. in 1916. **Cap.** $70,000.

Property: a 40-acre lease on Eagle-Picher Lead Co.'s land in the town of Picher. Equipped with a 300-ton mill, working steadily since 1919, producing about 125 tons of zinc concentrate weekly.

ST. LOUIS LEAD & ZINC CO. **OKLAHOMA**

Address: George Lumick, supt., Quapaw, Okla.

Property: S. W. of Quapaw. Drilling has proved ore and shafts have been sunk. The mill near Quapaw was moved to the Jefferson mine south of St. Louis, Okla., late in 1918. Gas-driven compressors are at work.

ST. LOUIS SMELTING & REFINING CO. **OKLAHOMA**

Subsidiary of National Lead Co.

Address: J. A. Caselton, 2nd v. p. 722 Chestnut St., So. Louis, Mo.; C. E. Schwarz, supt., Miami, Okla.

Cap. $500,000, all owned by National Lead, reduced from $2,000,000 in 1917, when St. Louis holdings, except smeltery, basic lead sulphate plant and some minor properties, were taken over by National Lead, and became nucleus of its branch, St. Louis Smelting & Refining Wks.

Property: 160 acres of leased property at St. Louis, Okla., on which three 400-ton modern mills are erected. Also 1,240 acres of partly developed ground about 3 miles E. of St. Louis. More than half of all the crude ore mined in the territory E. of Picher was treated in the mills of this company, which are regarded as the best in the district. Ore was hoisted from 4 shafts from levels between 232 and 245′.

Production: over 600 tons of blende weekly early in 1920.

Company operates also a lead smelter and refinery at Collinsville, Ill.; capacity is 72,000 tons of pig lead and 120,000 tons of concentrate.

ST. LOUIS SMELTING & REFINING WORKS **MISSOURI**

Formerly owned by the St. Louis Sm. & Ref. Co. (q. v.), now a branch of the National Lead Co.

Address: J. A. Caselton, asst. mgr., 722 Chestnut St., St. Louis, Mo.

Property: 1,895 acres at St. Francois, southeastern Missouri. **Ore:** carries lead sulphide in dolomite. Six shafts are in operation, deepest 565′.

Equipment: complete with a 3,000-ton concentrating plant. Flotation is employed with gravity concentration. Besides treating its own ore, company

treats that from the Baker Lead Co., at Leadwood, and the Boston-Elvins Lead Co. at Elvins.

A system of conveyors takes ore to the crushers, after which it passes rolls, screens, jigs, tables, and finally to the flotation department.

Company has its own power-plant, consisting of 32,000 h. p. in steam boilers, supplying 5 engines and generators of 2,161 k. w. capacity, two large air-compressors, 5 motor-generator sets for the underground haulage system, electric light, pumps and fans in the mines, hoists, mill, and other works. One of the hoists is of double-drum type, driven by a 225-h. p. motor provided with control in the hoist-house or at 365' down in the mine. Five ton skips are hoisted 425' in 55 seconds. Employs about 380 men.

ST. REGIS MINING AND SMELTING CO. MISSOURI

Address: McClelland Bldg., Kansas City, Mo. E. R. McClelland, pres.-treas.

Inc. in September, 1915. **Cap.** $100,000.

Property: 40-acre lease, including the old American Beauty mine, N. W. of Duenweg, developed by two 208' shafts in sheet-ground formation; said to have a 20'-25' ore face.

Equipment: includes 350-ton concentrator, 4 gas engines, 2 compressors, two 100 h. p. boilers and a change-house.

Production: 103 tons of blende per week.

SAND SPRINGS ZINC SMELTER OKLAHOMA

Owned by the **United States Zinc Co.** (q. v.), a subsidiary of the Am. Sm. & Rfg. Co.

Office: 120 Broadway, New York. **Works address:** F. P. Lannon, Jr., gen. supt., Sand Springs, Okla.

Has a 5,936 retort capacity.

SANTA FE MINING CO. OKLAHOMA

Address: A. J. Davidson, mgr., Box 451, Baxter Springs, Kansas.

Officers: W. G. Skelly, pres.; J. H. E. Nilsson, sec.-treas.

Property: 40 acres, 1 mile S. W. of Hockerville.

Operates a 300-ton mill, driven by 15, 37½, 50 ,and 100 h .p. oil engines; operations show a recovery of 10% zinc and lead. Weekly output is about 50 tons of concentrate.

SCHOOL HOUSE MINING CO. MISSOURI

Idle. **Address:** Joplin, Jasper county, Mo.

Inc. in Missouri. **Cap.** $100,000.

Property: 40 acres of lead-zinc land near Carterville.

Development: by 3 shafts, average depth 167'. Equipped with 800-ton concentrator. Does not reply to requests for information.

SCOTT EAGLE MINING CO. OKLAHOMA

Dead. Formerly at Commerce, Okla.

SCOTT MINING CO. MISSOURI

Address: D. L. Argyle, supt., Duenweg, Mo. Haywood Scott, pres.

Property: in Duenweg district. The 500-ton mill was destroyed by fire in 1917. No recent returns.

SEA BEE MINING CO. MISSOURI

Idle. **Address:** Sam Smith, Carterville, Mo.

SEMINOLE MINING CO. MISSOURI

Address: J. W. Mabry, supt., Purcell, Mo. Mine at Neck City, Mo.

SHAWGO MINING CO. MISSOURI

Dead. Formerly operated near Webb City, Mo. (1918).

SHORT CREEK ZINC & LEAD CO. MISSOURI

Out of business. Described Vol. XIII.

SILVER CROWN MINING CO. OKLAHOMA

Dead. Formerly at Peoria, Okla.

SILVER FOX LEAD & ZINC CO. KANSAS

Address: Treece, Kans., or Box 1596, Picher, Okla.

Officers: B. J. Conley, pres., F. J. Childress, mgr.

Inc. in Oklahoma.

Property: 40-acre lease, 1½ miles N. W. of Treece, an extension of the Picher, Oklahoma, field. The 300-ton mill, erected in 1918, was burned in July, 1919, but was rebuilt. Mine is a steady producer.

SILVER PLUME MINING CO. OKLAHOMA

Address: W. H. Logan, Baxter Springs, Kan. Mine located N. of Picher, Okla.

SINDEN ZINC CO. OKLAHOMA

Address: W. B. Shackelford, mgr., Douthat, Okla.

Officers: F. M. Aiken, pres.; J. S. Cosden, v. p.; E. R. Kemp, sec.-treas.; M. B. Lawrence, mine supt.

Inc. 1917, in Oklahoma. **Cap.** $200,000.

Property: 20-acre lease just N. of Douthat. Equipped with a 300-ton mill. Producing, December, 1921.

SKELTON LEAD & ZINC CO. OKLAHOMA

Address: Frank Childress, mgr., Douthat, Okla.

Property: a 10-year lease on 240 acres, including 9 producing mines and 9 mills, at Douthat and Tar River.

Production: the mills dress about 1,000 tons of 6% ore per shift. Company is second largest producer in Oklahoma.

The weekly output averages 500 tons of zinc concentrate. All operations were stopped December, 1920, but resumed 1921 at four of company's mines, viz. 1, 4, 5, and 7. The No. 2 mill was burned in 1921.

SLEDGE HAMMER MINING CO. MISSOURI

Address: Granby, Newton county, Mo. Operates a one-acre lease. Three men employed.

SLIGO FURNACE CO. MISSOURI

Operates the Walker mine at Sligo, Dent county. Ore is red and specular hematite. Also operates the Winkler mine in Phelps county.

SOUTHEAST MISSOURI MINING CORP. OKLAHOMA

Probably dead. Former address: Picher, Okla.

In 1918, two shafts were sunk, to open a 35′ face of ore exposed by drills at depth of 185′, and a 300-ton mill erected.

SOUTHERN ACID & SULPHUR CO. MISSOURI

Inc. in Illinois. **Cap.** $50,000.

Property: 160 acres, includes Rueppele iron mine at Stanton, Franklin county, developed by 2 shafts to depth of 175′. About 18 men employed.

SOUTHERN LEAD & ZINC CO. KANSAS

Address: H. S. Clarke, sec.-treas., Box 676, Miami, Okla. C. A. Neal, mgr.

Inc. 1907, in Okla. **Cap.** $300,000.

Property: 100-acre lease on tract of Cooper land, near the State line, 1 mile N. W. of Treece, and 7 miles W. of Baxter Springs. Two shafts have been sunk. Water was reported to be troublesome.

Equipment: includes an electrically-driven 500-ton (10 hours) mill.

Operated one shift during 1919. Reported, Nov., 1921, that company's property had been sold for $150,000 to F. W. Evans for the **Keltner** Mining Co.

SOUTH SIDE MINING CO. KANSAS

Idle. Last operations in 1918, near Galena, Kan.

SPELTER MINING CO. OKLAHOMA

Address: J. J. Gurlach, Woodward, Okla.

Cap. $150,000.

Property: a lease on Abrams' land E. of Quapaw. Eight drill-holes found ore, one lot assaying 38%.

SPIRAL LEAD & ZINC CO. MISSOURI

Address: J. S. Mullen, pres., Ardmore, Okla.

Property: the Martha Ball mine, a sheet-ground mine W. of Chitwood, and E. of La Nora B. mine, developed to depth of 195′.

SQUARE DEAL MINING & ROYALTY CO. MISSOURI

Dead. Formerly operated near Ozark. See Vol. XIV.

SQUIRES MINING CO., C. W. **KANSAS**

Idle, if not dead. Last operations reported were in 1918, near Galena, Kan.

S. S. & G. MINING CO. **OKLAHOMA**

Address: A. M. Gaines, Box 1576, Picher, Okla.

Property: a tri-partnership operating a 50-acre lease and 450-ton mill, 2 miles N. of Cardin, formerly owned by the Defender Mining Co. A regular producer since 1919, output in 1921 being between 300,000 and 400,000 lb. of zinc concentrate weekly.

STANDARD ZINC LEAD MINING CO. **OKLAHOMA**

Office: 314 Frisco Bldg., Joplin, Mo. J. F. Haley, gen mgr.

Property: at Cardin, Okla.

Development: two 220′ shafts were sunk during 1918-19, opening a thickness of 30′ of unusually rich ore of indefinite length. High-grade lead ore has also been developed from which a concentrate is made that assays up to 85% Pb.

Equipment: a 300-ton mill, completed in Feb., 1919, and operating regularly since.

SUCCESS ZINC CORPORATION **MISSOURI**

Address: J. F. Adair, Ruby Hotel, Joplin, Mo.

Inc. in Missouri. **Cap.** $100,000.

Property: 40-acre lease on the Rensenhausen land, S. W. of Joplin, developed by 155′ shaft.

Equipment: includes 150-ton mill, compressor, Wilfley tables, steam power, drill.

SULLIVAN ZINC MINING CO. **MISSOURI**

Dead. See Vol. XIII of this work for data.

SWARTZ MINING CO. **MISSOURI**

Probably dead. Formerly at Joplin, Mo.

TAR CREEK MINING CO. **OKLAHOMA**

Address: O. Longacre, Jr., 207 Miners Bank Bldg., Joplin, Mo. **Property:** 310 acres at Alba.

TAR RIVER MINING CO. **OKLAHOMA**

Dead. Formerly at Douthat, Okla.

TATUM MINING CO. **MISSOURI**

Controlled by F. U. Tatum and W. M. Youtsler, of Joplin, Mo.

Property: Dime Mine, said to contain high-grade ore.

TENNESSEE ZINC & LEAD CO. **MISSOURI**

Mail returned from former address, 220 Miners Bank Bldg., Joplin, Mo. P. H. Corbett, pres.

Inc. 1916, in Missouri. **Cap.** $100,000.

Property: 62 acres, 8 miles N. W. of Joplin, Mo. Ore carries zinc blende from 3 to 20%, the average being 7.15%. The deposit is 12′ thick, 600′ long and is opened by 92 and 123′ shafts.

Equipment: includes 100-ton mill, using rolls, crusher, jigs, screens and tables.

Production: (1917) 70 to 335 tons of 63% zinc concentrate, with up to 0.16% lead per month. Costs were $1.90 for mining, 32.9c for milling, a total of $2.23 per ton. Good profits were made in 1917 and 1918.

Probably closed down.

TEN O'CLOCK MINING CO. **MISSOURI**

Address: Carterville, Mo.

Property: 10 acres in Carterville district, Jasper county, developed by 5 shafts to depth of 180′.

Equipment: includes 150-ton concentrator, compressor, drills, crusher, steam power. About five men employed.

TEXAS MINING CO. **OKLAHOMA**

Address: 1802 Bird St., Joplin, Mo. H. H. Holeman, sec.-treas.; W. L. Owen, mgr.

Property: 2 miles E. of Picher. Rich ore—20 to 30% blende—was

opened at 176' depth, and a mill erected in 1918. Water has hampered development. Weekly output is over 40 tons of blende.

TIGER MINING CO. OKLAHOMA

Address: Theo. Hudson, mgr., Miami, Okla.

Property: N. of Cardin.

TOLTEC MINING CO. MISSOURI

Address: H. G. Larsh, Miners Bank Bldg., Joplin, Mo.

Property: S. of Hockerville, was operated in 1921, shipping 67,400 lb. zinc concentrate in week ended Dec. 10, 1921.

TRIANGLE MINES CO. OKLAHOMA

Dead. Formerly at Commerce, Okla. See Vol. XIV.

TRI-STATE COMPANY OKLAHOMA

Address: L. C. Church, Frisco Bldg., Joplin, Mo.

Company has over 1,000 acres under lease in Oklahoma and two mills the Premier and Blue Bonnet.

TROUP MINE MISSOURI

Address: Geo. J. Kusterer, owner, Webb City, Mo. Operated by Caylor, Davis and Burk.

Property: at Prosperity, said to contain high grade lead ore. Developing and shipping in 1921.

TULSA FUEL & MANUFACTURING CO. OKLAHOMA

Subsidiary of **New Jersey Zinc Co.**

Works: at Collinsville, Okla. Company operates a zinc smelter.

TULSA-PITTSBURG MINING CO. MISSOURI

Address: Margaret O'Connor, 435 West 6th Street, Pittsburg, Kansas.

Property: a lease on the Missouri side of the Waco district, tract carrying 17 to 30% ore at depth of 160 to 175'. Three shafts have been sunk, machinery installed, and a 250-ton mill erected. Operating part time. Shipped 424,800 lb. blende in December, 1921.

TULSA-SAPULPA-MIAMI ASS'D MINES CO. OKLAHOMA

Address: R. C. Howard, mgr. Tulsa, Okla.

Property: leases around Wyandotte, S. W. of Miami, Okla. Drilling was completed and shaft sinking started in June, 1918.

TWIN CITIES MINING CO. MISSOURI

Address: Geo. Moore, mgr., Webb City, Mo.

Inc. in Missouri. **Cap.** $50,000. Is a merger of the Laura Alice and Ben Franklin mining companies.

Property: lands leased from Daugherty & Davey, in Jasper county, on Center creek, between Webb City and Carterville, using the 175-ton Davey No. 1 mill. Developed by two shafts steam power being used.

TYLEE & LENNAN OKLAHOMA

Address: P. O. Box 635, Miami, Okla. Mine located at Commerce, Okla.

UNDERWRITERS LAND CO. OKLAHOMA

Address: Box A-32, Picher, Okla.

Officers: Geo. H. Worthington, pres.; Andrew Squire, v. p.; Alvin Good, sec.-treas., with Warren S. Hayden, F. N. Bendelari, A. E. Bendelari, Harry W. Davis, directors. F. N. Bendelari, mgr.

Inc. 1901, in Delaware. **Cap.** $1,000,000; $1 par; all outstanding. Annual meeting in February. No bond isssues. Transfer office, 1015 Hippodrome Bldg., Cleveland, Ohio; registrar, the Union Trust Co., Cleveland, Ohio.

Dividends: 6%, 1917; 14%, 1918; 14%, 1919 10%, 1920.

Property: 162 acres owned in fee in Jasper county, Missouri, 200 acres under lease in Ottawa county, Oklahoma, and 160 acres under lease in Cherokee county, Kansas.

Development: four mines in operation-No. 1 Mine at Douthat, Okla., with workings at 160'; No. 2 mine at St. Louis, Okla., with workings at 235'; No. 3 mine at St. Louis, Okla., with workings at 245'; No. 4 mine at Douthat, Okla., with workings at 165'. No. 1 mine is in mineralized brecciated rock

largely "water-course" ground. No. 2 and No. 3 mines are in mineralized brecciated rock "tight ground". No. 4 boulders with interstices mineralized.

Equipment: at No. 1 mine, 250 ton mill and flotation unit; No. 2 mine, 300 ton mill and flotation unit; No. 3 mine, 300 ton mill and flotation unit, No. 4 mine, 300 ton mill.

Normal production 500 tons concentrates weekly of which about 8% is galena, 82% pb., 92% sphalerite and 62% zinc. Producing Nov. and Dec., 1921, at rate of 200 to 250 tons weekly.

UNION METAL MINES CO. **MISSOURI**

Address: P. B. Butler, mgr., Frisco Bldg., Joplin, Mo.

Described in Volume XIV. Property now owned by **Barnsdall Zinc Corporation.**

U. S. LEAD & ZINC CO. **MISSOURI**

Promoted by C. L. Glass & Co., Vandergrift Bldg., Fourth Ave., Pittsburgh, Pa.

Directors: P. S. Chambers, D. A. Rees, and W. S. Maxey.

Inc. in Delaware. **Cap.** $600,000; $1 par.

Property: one 20-acre lease in Joplin district, opened by 190′ shaft and several drifts, and one 24-acre lease opened by two 120′ shafts, two 50′ shafts, and drifts, all in high-grade ore.

Equipment: each mine has a 150-ton mill for concentrating the zinc-lead ore. Presumably idle several years.

UNITED ZINC SMELTING CORP. **MISSOURI**

Controlled by Charles M. Schwab of the Bethlehem Steel Corporation since Dec., 1919.

Office: 233 Broadway, New York. D. G. Harrison, mgr., Frisco Bldg., Joplin, Mo.

Officers: B. Lissberger, pres.; Otto Proeless, v. p.; W. A. Mitchell, sec.; and H. W. Lohman, treas.; with C. M. Schwab, Max Lissberger, J. H. Ward, Albert Bridgens, A. F. Cassidy, and B. D. Foster, directors.

Inc. May 1, 1916, in New York. **Cap.** 600,000 shares common without par value, offered at $12.50 per share in April, 1916; 565,684 outstanding. Also $1,000,000 pfd, par $5, created April 1921. **Bonded debt:** $307,000 of 8% serial notes. Bankers Trust Co., New York, transfer agent; Equitable Trust Co., New York, registrar. Listed on New York Curb.

Financial Statement: gross earnings for the year ended April 30, 1917, were $807,026, and profit, $638,957. The year ended Dec. 31, 1919, yielded a revenue of $1,431,032, of which $94,941 was profit, plus $13,028 other income. Deducting depreciation, amortization of Manhattan mine, interest, taxes, etc., of $201,754, net loss for year was $93,785.

Company produces about 16,000,000 lb. of spelter annually.

Property: owns 98.5% of the common stock of the Kenefick Zinc Corp'n; also the entire stock of the Pearlman Co. Inc., which in turn owns the entire capital stock of the Clarksburg Zinc Co. Also owns the Manhattan mine at Tar River, Okla., which yields zinc concentrate, and the Royal mine acquired Oct., 1920.

Smelter: at Moundsville, W. Va. has two 50-ton Hegeler roasters, 2,304 retorts, pottery plant making 500 retorts daily and storing capacity for 12,000 gas producers, etc. Plant makes 100 tons daily of 60% sulphuric acid.

Zinc Leasing and Dev. Corp.

Inc. 1920 to take up various leases of the United Zinc and operate them on a royalty. **Cap.** $300,000; par $5. Issued 287,855. Stockholders of United Zinc of record Nov. 30, 1920, were given right to subscribe to one share of Dev. Corp'n for every 10 shares United Zinc owned.

UNITY MINING CO. **MISSOURI**

Address: E. Carey, sec., Webb City, Mo.

Property: the Unity, a sheet-ground mine N. of Webb City, yielding about 5,500 tons of high grade concentrate annually

UTAH-MISSOURI MINES CO. MISSOURI

Probably dead. Former address, Neck City, Mo. See Volume XIV.

VACATION MINING CO. MISSOURI

Dead. Described in Vol. XIV.

VANTAGE MINING CO. OKLAHOMA

Address: O. A. Sneed, mgr., Picher, Okla.

Property: operates on land of Eagle Picher Lead Co., in Picher district. At company s No. 1 mine at Picher, 79,476 tons of "dirt" yielded 7,293 tons of zinc ore and 3,808 tons of lead ore in 1921. The "recovery" was 9.17% zinc and 4.79% lead in local parlance. Produces between 300,000 and 600,000 lb. of zinc concentrate weekly.

In December, 1921, company took an option on the Boston mine, 1½ miles south of Baxter Springs, Kansas, a 40-acre tract with one shaft opening ore at 145′ and a 150-ton mill.

VELIE MINES CORPORATION OKLAHOMA

Address: 420 Frisco Bldg., Joplin, Mo., or Box 181, Cardin, Okla.

Officers: S .H. Velie, pres.; F. E. Weeks, sec.-treas.-mgr.; C. O. Plunkett, supt.

Inc. in 1917. **Cap.** $96,000.

Property: 200 acres, ½ mile N. W. of Cardin, including the Lion and Panther mines.

Equipment: includes two 300-ton steam and electric-driven mills.

VESUVIUS MINING CO. MISSOURI

Operations stopped and charter surrendered, 1918. Described, Vol. XIII.

VICTOR MINING CO. OKLAHOMA

Dead.

Operated a lease near Picher, on Eagle Picher Lead Co. ground in 1918.

VICTORY METALS CO. OKLAHOMA

Address: Geo. Moore, Joplin, Mo. **Mine address:** Miami, Okla.

Officers: Sam Davis, pres.; Arthur Wolf, v. p.; J. A. Harrison, sec.; W. H. Logan, treas.-mgr.; John Cox, supt.

Inc. in Arizona.

Property: the Blue Bonnet mine in the Miami field, and the Beck zinc smelter at Henryetta, Okla. The west Cardin mine had 60 men working double shift on 235′ level during last half of 1921.

Equipment: a 250-ton mill driven by gas engines. Producing regularly at rate of 500,000 to 800,000 lb. zinc concentrate weekly with 57,000 to 92,590 lb. lead concentrate bi-monthly in 1921.

VICTORY MINING CO. OKLAHOMA

Address: John Wingfield, Baxter Springs, Kansas.

Officers: J. Wingfield, pres.; W. H. Langford, sec.; L. F. McDonald, treas.-mgr.

Inc. in 1919.

Property: the Republic mine, between Picher and Cardin, equipped with a mill. A steady producer.

VINEGAR HILL ZINC CO. KANSAS

Address: J. G. Trewartha, gen. supt., Baxter Springs, Kan. See same title in **Wisconsin.**

WACHUSETTS LEAD & ZINC CO. OKLAHOMA

Address: Box 226, Commerce, Okla.

Officers: Arthur Pope, pres.; Malcolm Green, sec.-treas. Is a Massachusetts corporation. Aug. Mayorhoff trustee, Miami, Okla.

Property: owns a mine located North of Tar River, Okla. Also a mine and mill at Treece, Kan., J. H. Klinefelder, mgr., to which the Lennan mill, formerly at Commerce, was moved in 1921.

WACO MINING CO. MISSOURI

Address: P. S. Butler, Joplin, Mo.

Fully described in Volume XIV. Holdings transferred to Barnsdall Corporation, which see.

WADE MINING & MILLING CO. **MISSOURI**

Dead or dormant. **Address:** 620 Joplin St., Joplin, Mo.

Officers: C. E. Brenton, pres.; Frank Boehm, v. p., St. Louis; and E. W. Buskell, treas., Joplin.

Property: a lease formerly held by Gilt Edge Mng. Co., on the Wade farm, 120 acres, 3 miles W. of Diamond and 3 miles E .of Tipton Ford, Mo. The proportion of metal in the ore is 33% lead and 66% zinc. Two shafts, drifts and drill-holes have been opened. Ore treated in a 150-ton mill.

WALKER MINING CO. **OKLAHOMA**

Dead. Last address: Miami, Okla.

WAR BABY LEAD & ZINC CO. **OKLAHOMA**

Dead. Formerly operated in Peoria district. Fully described in Volume XIV.

WARD MINING & MILLING CO. **OKLAHOMA**

Dead. Former address: Lincolnville, Okla.

WARNER MINING CO. **OKLAHOMA**

Address: J. H. Medlin, Tar River, Okla. Mine located E. of Tar River, Okla.

WARREN-BREWER MINING CO. **MISSOURI**

Address: Joplin, Mo.

Inc. in Mo. **Cap.** $9,000.

Property: in Sec. 18, T. 27, R. 32, developed by 3 shafts to depth of 125'.

Equipment: includes 100-ton concentrator and Wilfley tables. Employed 18 men during part of 1919.

WASHINGTON LAND & MINING CO. **MISSOURI**

Idle.

Address: W. Maclay, mgr., Bliss, Mo.

Officers: A. L. Shapleigh, pres.; J. D. Filley, v. p.; R. W. Shapleigh, sec.; the foregoing are directors.

Inc. about 1880, in Missouri. **Cap.** $50.000; $100 par; all issued.

Owns 6,250 acres lead and baritic lands in Washington county, operated on royalty basis.

WAUGH & JONES MINE **KANSAS**

Address: W. B. Waugh, Baxter Springs, Kansas. **Mine address:** Treece, Kansas.

WAXAHACHIE MINING CO. **OKLAHOMA**

Address: Gateway Hotel, Quapaw, Okla.

Officers: L. D. Laswell, pres.; J. A. Simmons, v. p.; Alfred Hare, sec.-treas.-mgr.

Inc. in Oklahoma.

Property: Waxahachie No. 1 mine, about 3 miles E. and Waxahachie No. 2 mine, 1 mile W. of Quapaw. Produced over 30 tons weekly in 1920. A new 200-ton mill was erected in 1920.

WAYLAND MINING CO. **KANSAS**

Out of business. See Vol. XIV.

WEAVER MINING CO. **OKLAHOMA**

Dead. Formerly at Commerce, Okla.

WEBB CITY-CARTERVILLE DEVELOPMENT CO. **MISSOURI**

Address: G. J. Kusteret, chairman, Webb City, Mo.

Organized March, 1919, by local business and mining men to raise $100,000 and drill for new ore deposits in this district. The developed tracts are sub-leased to other operators.

WEBBER MINING CO. **OKLAHOMA**

Address: R. J. Tuthill, agt., Miami, Okla.

Property: 1½ miles N. of Picher.

WELCH MINING CO. **OKLAHOMA**

Company held leases on 360 acres of mining land near Douthat owned by Indians. These leases were declared void by the Secretary of the Interior in 1920 and the land has been leased to various other companies, including the Skelton L. & Z. Co. on a 10% royalty basis.

WENTWORTH MINING CO. **MISSOURI**

Owns 40 acres lead-zinc land at Wentworth, equipped with 250-ton mill. Shipped 51,200 lb. blende, in October, 1921.

WESTERN SPELTER CO. **OKLAHOMA**

Presumably dead. Its 3,200 retort zinc smelter was acquired by U. S. Zinc Co., subsidiary of the A. S. & R. Co.

WEST VIRGINIA LEAD & ZINC CO. **OKLAHOMA**

Address: E. B. Hatton, Savoy Hotel, Miami, Okla., or Baxter (route 2), Kansas.

Officers: Chas. Heinselman, pres.-mgr.; A. D. Sees, v. p.; A. A. Haught, treas.; and H. B. Reid, sec.

Inc. in 1918 in W. Va.

Property: at Sunnyside, adjoining the Lead Boy, in the Quapaw district. Drill holes said to show good ore. A mill was erected late in 1919 and company was producing and shipping about 50 tons of zinc concentrate weekly at end of 1921.

WEST VIRGINIA MINING CO. **KANSAS**

Dead. Last address: care W. W. Mucklow, Galena, Kan.

WHAT CHEER MINING CO. **MISSOURI**

Dead. Operated, 1918, at Duenweg, producing 32 tons of blende per week.

WHITE BIRD MINING CO. **OKLAHOMA**

Address: T. F. Steers, Joplin, Mo.

Property: 40-acre lease E. of Picher. Has a mill, and is a steady producer. Shipments for week ending Dec. 17th, 1921. were 216,980 lb .of zinc concentrate.

WHITE EAGLE MINING CO **MISSOURI**

Address: Chas Theurer, Joplin, Mo. Mine located S. of Baxter.

WHITE MINING CO., WM. FOSTER **OKLAHOMA**

Address: Otis White, mgr., Picher, Okla.

Operating the old Buffalo mine in N. W. Picher, late in 1921, and shipping 40-50 tons of concentrate weekly. Employs about 70 men.

WINGFIELD MINING CO. **MISSOURI**

Dead. Sold mill and surrendered lease, 1920. See Vol. XIV, for account of Oklahoma mine and mill.

WINNIE-LAWSON ZINC CO. **MISSOURI**

Probably dead. Highly advertised in the Joplin papers, January, 1916, as an "investment offering of great significance and importance." The company claimed to have under lease, 270 acres of land in the "most promising portions of the southwest lead and zinc district," and that it had let a contract for a 400-ton mill. Edward Lawson was the promoter.

WOLFTON MINING CO. **OKLAHOMA**

Dead. Formerly at Picher, Okla. See Vol. XIV.

WOLVERINE MINING CO. **OKLAHOMA**

Address: Verne E. Thompson, pres., Miami, Okla. Mine located S. W. of Quapaw.

Officers: above with V. Taylor, sec.-treas.; C. R. Garrett, supt. and purch. agt. Is an Oklahoma corporation.

YALE MINING CO. **MISSOURI**

Address: Hornbrook & Federmann, owners. 1116 Oak Street, Kansas City, Mo.

Property: 35-acre lease on Missouri Zinc Fields land, S. of Webb City, developed by two 200′ shafts in sheet-ground.

Equipment: includes a 350-ton electrically-driven mill. Idle since 1919.

YELLOWSTONE MINING CO. **MISSOURI**

Address: T. P. Jones, 323 Miners Bank Bldg., Joplin, Mo.

Property: a lease on East 15th Street, Joplin. Equipped with 150-ton mill. Idle during 1919, but operated part of 1920.

ZINC CORPORATION OF MISSOURI **MISSOURI**

Address: Tom Franks, Cunningham Bldg., Joplin, Mo.

ZINC LEAD CORPORATION **OKLAHOMA**

Address: C. C. Whittier, Box 67, Picher, Okla.

Officers: J. J. Cole, pres.; C. C. Whittier, mgr.; O. N. Maness, supt.; Robert W. Hunt & Co., 2200 Insurance Exchange, Chicago, Ill., engineers.

Inc. in 1917 in Delaware. **Cap.** $350,000.

Property: 40 acres, about 1 mile N. W. of Picher, on Tar Creek. Two shafts supply a 400-ton mill.

MONTANA

Montana is essentially a copper and silver State, the 1918 output of these metals being 323,174,850 lb. copper, and 16,797,489 oz. silver, both an increase over that of the previous year. Gold declined to 150,193 oz., a decrease of 20,000 oz.; lead increased to 37,135,875 lb. or 65%, while the zinc output of 209,258,148 lb. was also an increase. Dividends totaled over $20,000,000. In 1919 there was a decrease in production of all metals, partly due to labor strikes, partly to fuel shortage. Production in 1919 was 180,246,000 lb. copper; $2,272,000 gold; 42,163,000 lb. lead; 13,281,000 oz. silver, and 176,432,000 lb. zinc. Dividends were over $10,000,000.

Metal production in 1920 was $1,851,165 gold, 12,579,178 oz. silver, 177,743,747 lb. copper, 31,253,916 lb. lead, and 184,337,786 lb. zinc, valued at $65,573,047. Dividends totaled $9,515,000.

In 1921, the value of gold, silver, copper, lead and zinc mined was about $16,212,000, a decrease from the 1920 value, owing to the unusually low prices for copper, lead and zinc which resulted in the closing down of the large copper and zinc mines at Butte, in April, 1921.

Metal production for 1921 was $1,360,000 gold; 6,233,000 oz. silver; 51,595,000 lb. copper; 21,674,000 lbs. lead and 23,000,000 lb zinc, valued at $16,212,000. No dividends were paid during the first eleven months of 1921.

AINTRAM MINING CO. **MONTANA**

Address: D. Buchanan, supt., Martina, Missoula county, Mont.

Property: a small gold mine sufficient to keep 5 light stamps and a Forrester rod mill employed, the latter machine being added in May, 1919.

ALICE GOLD & SILVER MINING CO. **MONTANA**

Office: John Gillie, gen. mgr., Hennessy Block, Butte, Mont.; C. L. Berrien, gen. supt., Butte, Mont. Is a subsidiary of the Anaconda Copper Co. Output, 1918, 132,600 tons. Is a zinc silver mine. Closed down 1919-20.

Mine is operated as one of the Anaconda units. A steel head-frame and large hoist were erected during 1918. For recent litigation, see Vol. XIII.

In December, 1919, minority shareholders were allowed a re-argument of the proceedings covering sale of the mine to the Anaconda company. The dispute was over the price paid, and upon jurisdiction of the court, the Alice Company having been incorporated in Utah. In Jan., 1921, the U. S. Supreme Court set aside the decision in favor of the Anaconda and ruled that the price paid was not enough.

ALLIANCE COPPER CO. **MONTANA**

Address: Donald Campbell, pres. or J. D. Simons v. p.-treas., Butte, Mont. A. T. Morgan, sec.

Inc. May 19, 1906, in Montana. **Cap.** $400,000, fully issued, shares $2 par. Stock listed on Butte Exchange.

Property: is very small acreage in the S. E. portion of the Butte district with surface rights to sundry town lots.

Development: by shaft, sunk jointly by the Alliance and Farrell companies. Mine was worked by lessees in 1919.

ALPENA COPPER MINING CO. **MONTANA**

Office: Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: C. W. Beale, pres.; A. H. Featherstone, sec.-treas.; preceding officers, Alex. Muir and A. P. Cochrane, directors.

Mine: in the St. Joe district, near the Monitor, and 2 miles from Adair on the C. M. & St. P. railroad.

Development: by 2 long tunnels and shaft, showing a 2' vein of quartz with chalcopyrite. At last account face was 400' from projection of ore-shoot exposed on surface.

Equipment: includes several buildings. No recent data available.

ALTA CONSOLIDATED MINING CO. **MONTANA**

Address: Curlew, Montana.

Frank V. Whiting, pres., c/o N. Y. Central R. R. Co., New York City. S. L. Bright, mgr.-dir.

Inc. Oct. 5th, 1920. **Cap.** $1,500,000; par $1.

Company had an option on and reopened the old Alta mine, did new work on the botton level finding the vein, and spent over $10,000 on test work on ore and old tailings, finally closing down at the end of 1920 and transferring the company's activities to the Curlew mine, near Victor, Missoula county, Mont., which is being actively developed. The Alta is regarded as a "likely prospect" as the zinc and pyrite found in the bottom levels, which discouraged the former owners, can now be handled by flotation. See **Alta Montana M. Co.**

ALTA MONTANA MINING CO. **MONTANA**

Address: L. S. Ropes, mgr., Helena, Mont. See Boston & Alta Copper Co. and Alta Consol.

Inc. 1917. **Cap.** $3,000,000; $5 par.

Property: an old silver-lead mine with large production (reported variously up to $4,000,000) in the Corbin district of Jefferson county. Mine closed for 23 years, but workings reported open.

Development: by 8 tunnels, from the lowest of which a vertical shaft is down 682'. The lowest point of development is 1,300' below apex of the veins.

New York interests spent over $110,000 up to 1919 sinking 300' shaft and endeavoring to find a body of commercial ore in the undeveloped part of the ground. Early in 1920, L. S. Ropes, backed by Duluth people, secured a lease on the property, and has been working on No. 12 and 13 levels. A mill being erected in 1921, will treat old dumps.

AMALGAMATED SILVER MINES CO. **MONTANA**

Address: 42 W. 6th Ave., Helena, Mont. **Mine address:** Clancy, Mont. H. B. Emigh, mgr.

Officers: R. A. McCray, pres.; J. S. Scott, v. p.; R. A. Weisner, sec.-treas. with M. E. Weston, J. W. Stolzenback, J. G. Shaffer, R. L. Varney, R. E. Smith, and Jas. G. Bain, directors.

Inc. 1917, in Montana. **Cap.** $1,500,000; increased March 29, 1921 from $1,000,000; $1 par; 912,666 issued to pay for property and development. The Banking Corp'n of Montana, registrar and transfer agent, Helena, Mont.

Property: 33 claims, including the Free Coinage and Silver King mines, at Lump Gulch, in Jefferson county, 2 miles from rail at Clancy. Previous production is given as several million dollars.

Development: by 350' shaft on the Free Coinage to be sunk another 300'. There are other shafts, including the 300' Little Alma and 125' Silver King; with over a mile of workings. Dumps are estimated to contain 10,000 tons of ore.

Equipment: hoist and compressor; electric power and equipment to be installed.

Production: during part of 1919, shipments were as much as 30 tons of 115 oz. silver ore per week. In 1920, some small, though rich shipments were made. Operations suspended, March, 1921,

A New York Stock brokerage firm had an option on 200,000 shares, and offered them at 60c. in Dec., 1919, and at 70c in 1920. Extravagant statements were published, such as, "Will it develop into a $30,000,000 silver producer?" "Net profits of $1,000 a day or over $300,000 a year." ".....will be in a position to distribute dividends to its stockholders by August (1920)".

AMAZON-BUTTE COPPER CO. **MONTANA**

Office: Butte, Mont.

Officers: James H. Lynch, pres.; John A. Poore, v. p.; with F. Love, M. J. Cavanaugh, and Thomas T. Poore, directors.

Inc. Sept. 29, 1906, in Montana. **Cap.** $2,500,000; $5 par; 198,000 issued.

Property: the following lode mining claims: Amazon, Altoona, Annie, Antoinette, Bertha, Henrietta, Jessie, Josephine, and Gaynor. Approximately 128 acres, situated in the east side district of Butte, Silver Bow county.

Property has been inactive for a number of years.

AMAZON DIXIE MINING CO. **MONTANA**

Property: at Sildix. Mineral county Mont, on the Idaho-Montana boundary is really a Coeur d'Alene corporation, and is described under Idaho.

AMERICAN COPPER MINING CO. **MONTANA**

Office: St. Regis, Mont. William Lintner, mgr.

Cap. $10,000; 10c par.

Property: 120 acres between St. Regis and De Borgia, in Mineral county, Mont. Ore occurs in a limestone and quartzite formation and averages 4% copper, and 4 oz. silver. Development is by tunnels.

AMERICAN ZINC, LEAD & SM. CO. **MONTANA**

See in U. S. section of this volume.

Address: Silver Dike mine, Neihart, Mont.

Bought the Silver Dike mine, for $145,000 in March, 1922. Had 30 men employed for a year, in development work, and will build 350-ton concentrator to handle the low grade lead-silver-zinc ore, said to average $10 to $13 per ton.

ANACONDA COPPER MINING CO. **MONTANA**

See under United States section.

ANGELICA MINING & DEVELOPMENT CO. **MONTANA**

Address: Wickes, Mont.

Officers: C. d'Autremont, Jr., Duluth, pres.; Chas. D. Morton, v. p.; C. K. Tibbetts, sec.-treas., with T. T. Hudson and C. M. d'Autremont (mgr.), directors. Chas. D. Horton, supt.

Inc. Jan., 1915, in Montana. **Cap.** $500,000; $10 par; increased July 27, 1920 from $200,000; $10 par; 14,320 issued. Annual meeting, last Monday in June.

Earnings: gross income from ore sales, $164,652 in 1918, with $88,956 expenses, not allowing for depletion of ore, compared with 1916 ore sales of $49,556, and operating expenses, $64,714.

Property: the Mt. Washington mine, 6 claims, 110 acres, in Colorado mining district, 2 miles west of Wickes, Jefferson county.

Geology: ore occurs on both sides of a rhyolo-dacite dike cutting through andesite. The Bluebird is probably the western extension of this vein, but displaced by 5 cross faults. Development shows vein 60' wide with 20' of ore, mostly on the Handy Andy and Homestake claims. A weighted composite sample from cuts throughout entire mine, 15 tons in all, assayed $5 gold, and 24.3 oz. silver per ton, with 1.12% copper, 13% lead, lead 10.3% copper and 76.88% zinc.

Development: 4,000' tunnel and 100' levels down to 900'; total workings, 10,500'. Mining is by square-set system. Reserves were 13,915 tons. 8.58% zinc. The mill product runs 13.42% gold, 68.86% silver, 86.17%

Equipment: electric power, air-compressor and 100-ton concentrator completed in 1921. This mill produces tails that carry 72% of the gold but makes a good recovery otherwise.

Production: ore is sent to smelter at East Helena.

Year	Tons	Gold, oz.	Silver, oz.	Lead, lb.	Average value per ton
1919 (July).....	60 daily	....	.....	.....	$33.50
1918.....	12,583	1,694	171,400	1,659,223	27.90
1917.....	6,711	933	65,526	1,012,176	....

ANSELMO MINING CORPORATION **MONTANA**

Subsidiary of the **International Minerals & Metals Corp'n** (which see).

Mine address: Jos. C. Pyle, mgr., Miner Block, Butte, Mont. E. L. Ralston, supt., 1030 West Platinum St., Butte, Mont. General office: 61 Broadway, New York City.

Property: the old Anselmo mine in Butte, Silver Bow county, showing 2 veins, 3 to 6′ wide, carrying zinc-lead ore with gold and silver values. Is developed by the 1,600′ Trifle shaft with numerous levels; also by crosscuts and workings from the Gagnon mine of the Anaconda Copper Mng. Co.

ARGENTA-DILLON MINING CO. **MONTANA**

Idle. Property taken over by **Montana Mines Co.**, which see.

ARGYLE SILVER MINING CO. **MONTANA**

Address: J. B. Leggatt, Salt Lake City, Utah.

Inc. October, 1919, in Montana. **Cap.** $100,000. Financial arrangements were completed by Aug., 1920.

Property: that of the Benton M. & M. Co., in the Vipond district of Beaverhead county, last operated in 1908. Nearest rail is 6 miles to Dewey on the Montana Southern R. R., or 12 miles to Divide on the Oregon Short Line.

Development: by 150′ shaft and drifts. At the bottom is 12 to 18″ of 75 to 200 oz. silver ore, while a W. drift is in 54″ of good ore.

Equipment: hoist, compressor, etc.

Some ore shipped during 1920.

ARKANSAS COPPER CO. **MONTANA**

Property: on Ten Mile creek, near Helena, Mont., and about 2 miles W. of the summit of Mt. Helena, shows a 30′ vein in diorite, traceable 800′, carrying some copper ore with small gold and silver value.

Development: by 200′ shaft. Was in hands of lessees early in 1915, but inactive at last advice.

ARLINGTON MINING CO. **MONTANA**

Idle. **Office:** Wallace, Idaho. Mine near Thompson, Sanders county, Chas. T. Fisher, pres.; M. J. Mahoney, sec.

Cap. $1,500,000; shares $1 par.

Property: 20 claims, well timbered in the Mountain House (unorganized) mining district, near the Idaho-Montana divide.

A vein is said to be traced 6,000′ by surface cuts, 30 to 100′ in width, carrying, at shallow depth, galena of concentrating grade, with some ore assaying up to 78% lead. The 175′ upper tunnel shows 3′ of concentrating ore, and the 900′ lower crosscut tunnel shows a 10″ stringer assaying 8% copper, 15% lead and 15 oz. silver per ton. No recent returns secured.

ATLANTIC MINES CO. **MONTANA**

Company dissolved May, 1916, and properies sold to Anaconda Copper Mining Co., Nov. 1, 1916. Fully described in Mines Handbook, Vol. XII.

ATLAS MINE **MONTANA**

Address: Wickes, Mont.

Property: the old Atlas mine at Wickes, Jefferson county, reopened in 1920 by Great Falls people. Ore carries copper, silver, and gold. The mine produced a good deal of ore years ago, and apparently operated a smelter, which made 10,000 tons of slag, some of which was sent to the smelter at East Helena.

Development: by 300′ shaft, with 3 levels and a total of 800′ of drifts. Reserves are given as 40,000 tons, assaying 3.2% copper, 12 oz. silver, and 80 cents gold.

Equipment: includes a small mill, hoist, etc.

AUGUST GOLD MINING CO. — **MONTANA**

Address: Landusky, Phillips county, Mont.

cyanidation.

AUTOMOBILE GROUP — **MONTANA**

Property: a well-known producing gold mine. Ore is a porphyry dike, containing low value in gold. Ore is mined by glory-holing and treated by

Address: W. M. Cady, Libby, Mont.

Property: claims near Libby, Lincoln county. Ore carries gold. Work was started early in 1920.

B. & H. MINES & MILLING CO. — **MONTANA**

Owners: N. J. Bielenberg and W. I. Higgins, Deer Lodge, Mont.

Property: known as the Bielenberg-Higgins, consists of 30 claims, 10 patented, 360 acres, 3 patented millsites and 1 unpatented tunnel site, in Bear Gulch, 14 miles from Twin Bridges, Madison county, Mont., on a branch line of the N. P. R. R.

Geology: ore is a complex sulphide, occurring in porphyry and altered granite. There are 9 known veins, said to be traceable for 4,000′ and to contain gold, silver, lead, iron and copper. Veins strike E.-W. with dip of 38°, becoming flatter as work progresses; 4 veins have been extensively developed and proven to be from 7′ to 105′ wide, and continuous at depth, containing ore of commercial value, said to average $4 per ton. Ores are treated by wet concentration, making a recovery of 90%. Concentrates run $54 to $80 gold, 11 oz. silver, 25% lead, 2% zinc and 0.5% copper. Ore reserves are estimated at 200,000 tons of $4 to $10 ore.

Development: a 7′x7′ crosscut tunnel, 900′ long, drifts, raises and winzes, underground workings totaling 2,000′.

Equipment: 100-ton mill, 2 air hoists, pumps, wet-concentration plant, and compressor of 640 cu. ft. capacity.

In 1917, management planned adding electric power, driving the tunnel to 3,000′, and increasing daily capacity of mill to 300 tons. In 1918, mill was closed, pending construction of a transmission line from Twin Bridges to the mine, 14 miles; completed, 1919.

BALKAN BUTTE COPPER MINING CO. — **MONTANA**

Office: Chas. Steele, mgr., 13 N. Wyoming St., Butte, Mont.

Officers: Chas. Steele, pres.; Thos. Tomich, sec.-treas.

Inc. Jan. 26, 1907, in Montana. **Cap.** $450,000; shares $1 par.

Property: operating throughout 1921, 4 patented claims, 80 acres, in Elk Park, Jefferson county, Mont., shows gold, silver, copper, lead ore.

BALTIMORE COPPER MINING CO. — **MONTANA**

Office: 49 W. Park St., Butte, Mont.

Officers: R. L. Clinton, pres.; J. Maher, v. p.; T. J. Fenlon, sec.-treas., with B. E. Calkins, D. J. Charles, and E. H. Renisch, directors.

Inc. in Montana. **Cap.** $2,500,000; shares $5 par; assessable; 197,520 shares outstanding. No bonds.

Property: five patented claims in Boomerang Gulch, near Boulder, Mont., showing on ore zone 40′ wide, with silver-lead ore in lenticular shoots Ore said to contain about 3% copper, 20 oz. silver, 12% lead, and $2 gold.

Development: by 5 tunnels, 100′ vertically apart, longest 700′. Property was under lease to the estate of M. W. Atwater, former manager of the Davis-Daly at Butte, who began operations late in 1918.

Production: 7 to 8 cars of ore monthly in early part of 1919.

BAMAR COPPER CO. — **MONTANA**

Address: Dr. M. J. Scott, Butte, Mont.

Officers: Dr. M. J. Scott, pres.; F. H. Butler, v. p.; J. B. Frisbee, sec.; M. A. R. Scott, treas

Inc. Sept. 24, 1910, in Montana. **Cap.** $1,500,000; $1 par. Annual meeting, first Tuesday in June.

Lands: 12 claims, 230 acres, in the Summit Mountain district, near Buxton Switch, in the foothills of Fleecer mountain, 13 miles S. W. of Butte. Claims were bought of Butte & Buxton Copper Mining Co. for 150,000 shares of Bamar stock. Country rock is granite, with a mineralized zone one-half mile wide, carrying 4 veins, with a diorite dike to the northward. Shallow pits and trenches show continuity of the veins, which are leached at surface, carrying a little lead and copper carbonate ore.

Development: by 180′ two-compartment Linda shaft, connecting with the 700′ tunnel, on a ledge, carrying a 10′ streak, mainly pyrite, with some argentiferous chalcopyrite. Property has yielded ore carrying 1 to 36% copper and 43 oz. silver per ton, with up to $2.50 gold, also galena assaying 11% lead, 24 oz. silver and $1 gold per ton.

Equipment: includes a 40-h. p. boiler, 20-h. p. hoist good for 500′, 2-drill air compressor and several mine buildings. Idle, but company plans deepening shaft, drifting, and crosscutting.

BANNACK GOLD MINING CO. **MONTANA**

Reorganized, 1918, as the **New York-Montana Mines Co.**, which see. Details of old company are in Vol. XIII of this work.

BANNER & BANGLE MINING CO. **MONTANA**

Address: W. J. C. Wakefield, pres., Spokane, Wash. Leo Greenough, mgr., Spokane.

Cap. $600,000; par $1.

Property worked for many years by T. L. Greenough, is now under lease and bond to **Snowstorm Mines Consolidated,** which see.

BARNES-KING DEVELOPMENT CO. **MONTANA**

Address: Hennessy Bldg., Butte, Mont. **Mine office:** Kendall, Fergus county, and Marysville, Lewis & Clark county, Mont.

Officers: C. W. Goodale, pres.; A. J. Davis, v. p.; J. E. Corette, sec.; C. C. Swinborne, treas., with C. R. Leonard, F. L. Melcher, I. A. Heilbronner, T. A. Marlow, directors. W. B. Roll, asst. sec.

Operating officials: G. T. McGee, gen. mgr., At the North Moccasin; T. W. Heatherley, in the mine; A. E. Worsdell, in the mill; C. A. Morgan, in the office; E. G. R. Manwaring, mining engineer, and W. A. Young, assaying. At the Piegan-Gloster: J. H. McCormick, in the mill; J. W. Johns, in the mine: William McClean, mechanical engineer; F. E. Eccles, in the office, and Ward Cole, assaying. At the Shannon; J. W. Johns, in the mine, and J. E. Goyer, in the office. At the Kendall: A. B. Fox, in the power-plant.

Inc. 1907, in Montana. **Cap.** $2,000,000; $5 par; all issued. W. B. Roll, Box 1375, Butte, Mont., transfer agent. Annual meeting, first Wednesday in March. Stock listed on Butte Exchange.

Financial Statement—Years ending December 31:

Assets.

Year	Property and Equipment	Deferred	Current (Cash, Bullion, Liberty Bonds, Investments)	Total
1921	$1,831,426	$41,831	220,150	$2,093,409
1920	$1,859,008	$42,332	$160,093	$2,061,435
1919	1,980,516	68,196	193,351	2,242,064
1918	2,103,463	90,024	198,246	2,391,733
1917	2,433,433	68,462	265,669	2,767,564
1916	2,299,707	54,802	109,783	2,464,292

Liabilities.

	Capital Stock	Current (Accounts and Wages, etc.)	Surplus	Total
1921.....	$2,000,000	$22,738	$70,669	$2,093,408
1920.....	$2,000,000	$20,117	$41,317	$2,061,434
1919.....	2,000,000	47,816	194,247	2,242,064
1918.....	2,000,000	42,228	349,503	2,391,732
1917.....	2,000,000	35,747	731,818	2,767,564
1916.....	2,000,000	139,467	324,825	2,464,292

Income Account

	Operating Profit	Taxes, Exploration, Losses, etc.	Net Profit
1921.....	$67,844	$32,080	$35,764
1920.....	$18,501	$15,762	$ 2,739
1919.....	87,170	19,258	67,912
1918.....	189,313	49,980	139,333
1917.....	454,551	10,296	444,254
1916.....	139,671	43,332	96,338

Dividends: initial on March 1, 1916, total of 15c per share in 1916; 10c in 1917; 40c. in 1918; 30c. in 1919; 15c. in 1920. The total is $440,000.

Funds (cash and Liberty bonds) on Sept. 30, 1920, were reduced to $110,000.

Loss.

For first half of 1921 earnings were $30,529; expenses, $21,625; net profit, $8,903. Receipts from Shannon mine bullion were $156,435 and royalties from the North Mocassin properties, $3,628, with $1,586 interest; expenses of Shannon were $120,916; at Piegan Gloster, $3,279; North Mocassin $3,699; Kendall mines, $355; Black Hawk option, $5,435 and Betsy Baker option, $4,342 and miscellaneous expenses, $3,469. Cash on hand and bullion in transit $95,066, less wages and accounts payable, $21,535, leaving cash and Liberty bonds, $123,531, on July 1, 1921.

Property: three mines known as the (1) **North Mocassin** property, (2) **Piegan-Gloster** property (3) **Shannon** property. The company originally held only the Barnes-King mine.

In 1912, after spending considerable money in an unsuccessful search for new orebodies, the Barnes-King mine was closed down. In 1912, the North Mocassin property, covering about 2,000′ in length along the ore-bearing formation adjoining the Barnes-King on the north and the Kendall on the south, was purchased for $150,000; $5,000 cash, and the remainder to be paid from net working profits as made. The **Piegan-Gloster** property, near Marysville, Lewis & Clark county, Mont, was obtained in 1913 for $100,000, with an additional cost of $8,200 for 5 adjoining claims. The **Gloster** mine had been worked from 1880 to 1888 and is credited with a production of several million dollars.

In 1915, the company paid $100,000 for all the property of the **Kendall Gold Mng. Co.** The Shannon mine, 2½ miles southwest of Marysville, was purchased in 1915 for $228,223, payable from mine profits. Final payment was made during third quarter of 1917.

Company has made an energetic search for new properties, and in addition to those mentioned, has had under option 3 claims, 1½ miles N. of the Gloster, at $50,000; surface indications were good, but at 50′ depth results were disappointing. In May, 1918, the Mount Pleasant group of 2 claims, 3,000′ E. of the Shannon, was taken under option at $30,000, but after doing 1,000′ of work, no further exploration was deemed justified. In February,

1919, a $70,000 option was acquired on the Silver Bullion group in the Judith mountains, 10 miles from Kendall. By July, a shaft was down 200′, but 50′ of work had revealed no ore. In Sept. 1920, the Black Hawk mine near the Shannon was acquired, and by Feb., 1921, had cut the Penobscot vein.

In March, 1920, Barnes-King bought 17,500 shares, at $1 each, of the Kansas-Montana Oil & Gas Co., operating 3 miles from Winifred, and 63 miles N. of Lewiston, Fergus county, Mont. It has about 13,500 acres under lease with one well down 2,400′.

The Strawn property, under option, 1921, was being explored in December.

Barnes-King mine: The orebodies at Kendall are irregular replacement deposits in limestone, dipping 25°. The ores are mostly soft and well oxidized.

Development totaled 4,008 in 1916; 10,013 in 1917; 10,633 in 1918, and 10,864′ during 1919. These figures are exclusive of work in properties under option.

The **North Mocassin group** was first worked through the Barnes-King shaft; later the Santiago shaft was completed to the 500′ level and it is now the main working shaft. Orebodies have been opened up on different levels to a depth of nearly 800′. Exploration in 1919 on the 600′ level has disclosed a new orebody said to average $11 a ton. The Kendall mine has been under lease for over 2 years, giving the B. K. Co. a royalty of up to $3,700 per year for ore mined and power used. Development kept up with ore extraction, but during 1920, the reserves were almost depleted, and the mine was leased in September. No production by leasers, Dec., 1921.

The old **Piegan-Gloster mine** had been opened by a vertical shaft to a depth of 500′, and a winze sunk 300′ below the 500′ level. The Piegan claim had been developed by tunnels. The B.-K. Co. unwatered the Gloster mine to the 800′ level and opened the Piegan orebody above water-level. The Norman tunnel, connects the No. 4 Piegan tunnel and Gloster workings with the tram to the mill. In 1918, the advance on the 500′ level, 937′ west, cut four ore-shoots with a combined length of 350′. They do not appear to extend far above the level. Reserves were 2,835 tons of $7.30 ore. Mine closed down since May, 1920.

The **Shannon mine**, previous to the time of its being taken over by the B.-K. Co., was opened by a tunnel with 2,000′ of workings, chiefly on the vein which, in the tunnel, was 300′ long, from 4 to 10′ wide, worth $15 gold per ton. The B.-K. Co. has sunk a shaft 450′ below the tunnel on the vein, dip 70°. The vein is in slate, and where crosscut on the 100′ level is said to have a width of 15′. In 1918, a new ore-shoot, 400′ long, was opened on the 500′ level, but on the 650′ level, the shoot was only 100′ long. The Shannon is 13,400′ from the Gloster mill, with which it is connected by aerial tram. This mine is now the mainstay of operations. Production, Dec., 1921, 3,294 tons of $11.72 ore (recoverable value).

Equipment: at the **North Mocassin** there is a double-drum electric hoist, compressor, and a 1,400′ electric tramway from mine to mill, which is on the original B.-K. group, and has a nominal daily capacity of 200 tons, allowing 10 days leaching period. There is also a small oil-fired roaster for treating the black unoxidized ore found in the eastern ore-shoot. There is a 500-ton cyanide plant on the Kendall.

The **Piegan-Gloster** equipment includes a double-drum electric hoist, 100-h. p. motor and compressor at the Gloster shaft. The old Gloster 60-stamp mill was remodeled with a No. 5 Symons disc-crusher, three 10′ Chilean mills, 2 Wilfley tables, and a cyanide plant. The Shannon mine has a 75 h. p. electric-driven compressor.

Operations and costs at the Piegan-Gloster mill are described by J. H. McCormick in the September, 1918, Bulletin of the A. I. M. E.

Power: purchase of the Kendall property included a 400-h. p. hydro-

electric plant on Warm Springs creek, 6 miles from the mine. This plant furnishes power for the Kendall properties, and also supplies the towns of Hilger and Kendall with lighting facilities. The Piegan-Gloster and Shannon properties obtain power from the Montana Power Co.

Production:

	North Mocassin			Piegan-Gloster			Shannon		
	Tons	Value	Bullion Sales	Tons	Value	Bullion Sales	Tons	Value	Bullion Sales
1919..	25,843	6.56	178,191	11,917	6.27	78,426	36,740	10.75	424,710
1918..	21,378	8.19	178,230	15,338	9.21	141,327	26,048	13.02	349,138
1917..	26,790	8.53	227,925	20,525	10.43	210,311	32 359	15.17	492,684
1916..	33,715	8.65	253,788	22,144	6.15	133,588	13,392	13.94	180,486
1915..	47,038	9.80	418,569	14,956	7.22	85,533	.....	.....	.....
1914..	51,471	8.44	424,411	.....	....	.....	.....	.....	.....
1913..	49,726	8.89	400,854	.....	....	.....	.....	.....	.....

Costs per ton:

Year	North Mocassin	Piegan-Gloster	Shannon
1920	$12.088	$11.990	$7.497
1919	8.194	14.066	6.212
1918	7.558	10.197	6.885
1917	6.006	7.991	5.265
1916	6.307	6.998	6.494
1915	4.653	6.940	....

The Barnes-King Development Co. is a well-managed corporation, which issues a complete report. Development work generally has not been very encouraging, though enough ore was opened for the mills. Details of properties taken on option show that company is endeavoring to prolong its life, and it shows conclusively that most of these outside claims in the district are worthless.

BARTON GULCH MINING CO. **MONTANA**

Address: A. H. Jones, mgr., Virginia City, Mont.

Property: in Hungry Hollow, at Summit, near Virginia City, Madison county. Mine is opened by tunnels, and is said to show $16 gold ore in a 7′ vein. Living quarters and shops have been erected, and a mill was to be installed in 1919.

BASIN-MONTANA MINES CO. **MONTANA**

Office: Room 1012 Little Bldg., 80 Boylston St., Boston, Mass.

Officers: Melvin A. Houser, pres.-gen. mgr.; Francis A. Cave, v. p.; Wm. A. Fotch, treas.; K. F. Baker, sec., pro tem.; E. J. Strasburger, cons. eng.; R. W. Clinton, counsel

Inc. May 22, 1919, in Montana. **Cap.** $500,000; $5 par; non-assessable; $350,000 issued. Annual meeting in July.

Property: 22 claims, 400 acres, at Basin, Jefferson county, 29 miles by rail N. E. of Butte. The claims were formerly held by the Ruby and Columbia Mines Co., but forfeited. Sixteen claims, acquired for $350,000 in cash and stock, are said to contain ore to value of $300,000. Six other claims are held under bond and lease. The Great Northern Railroad runs within 500 feet of the property. Examined by E. J. Strasburger and geology described in Bull. 527 of U. S. Geological Survey. Country rock is granite (monzonite) cut by porphyry dikes and traversed by two veins containing shoots of complex gold-silver-lead-copper-zinc ore, difficult of treatment. The group covers 6,000′ along the outcrop of the Custer vein.

Development: on six claims, 2,250′ tunnel on Custer vein and 8 tunnels, viz.: Wilson, 750′; Custer No. 2, 500′; Powder House, 100′; Confidence, 100′; Old Custer tunnel No. 1, 100′; Old Custer No. 2, 200′, and Bergman, 500′.

It was proposed to drive a new crosscut tunnel over 2,000′ to the veins at a depth of 800′.

Equipment: electric power, air-compressor, drills, etc.

Production: shipments made some years ago carried 40 oz. silver and $18 gold per ton. Management expects to resume shipments at an early date.

An official report states "The future of this enterprise can hardly be estimated when you take into consideration the orebodies in sight and with proper equipment. . . The company can pay a dividend or disbursement of more than $2 per share, or 40 per cent . . . Take into consideration that the mine has only been developed to the 100 foot level and already produced $100,000 and there is still left $1,700,000 in sight in the mine." We hope so, but, in our opinion, the facts stated do not warrant the conclusions given, and such statements are reprehensible.

Property was operated by lessees during 1920-21, who were extracting rich silver-gold ore.

BEAR CREEK PLACER CO. **MONTANA**

Probably dead, as letters sent to last address, E. G. Mellander, agent, Libby, Lincoln county, Mont., were returned unclaimed.

Property: company paid $150,000 for Libby Placer Mining Co. and $40,000 for Comet Placer Co.'s properties covering 10 miles of gravel flats along Libby creek, beginning 18 miles above the town.

A dredge was being erected in 1917 and ground was to be prospected thoroughly before beginning operations.

BEAR GULCH MINING CO. **MONTANA**

Office: care of Alex. Johnston, Clark Brothers' Bank, Butte, Mont. **Mine:** at Twin Bridges, Madison county, Mont.

Property: the Montana View group, carrying auriferous and argentiferous copper ores, opened by tunnel about 3,000′ long. Has steam power and air-compressor. Property has little ore and is not on the contact zone; its chief value is for a tunnel-site for the Moffat claims, which adjoin it, and were being worked, 1917, by Charles J. Stone, former manager of the Alex Scott mine at Butte. The Moffat mine has developed a granite lime contact with basic ore carrying magnetite, that varies from 5′ wide for 1.000′ along the tunnel, to 100′ wide near the face. This ore, averaging 2.1% copper, was shipped, in 1916, to the East Butte smelter. Tramming to rail cost $2; freight, $1.75, and smelting, $3.75 per ton.

BEAVER CREEK MINING CO. **MONTANA**

Address: Whitcomb, Phillips county, Mont.

Property: in the Little Rocky Mountains Carries low-grade gold ore in a porphyry dike, mined by glory-holing and treated by cyanidation.

BEAVER CREEK MINING CO. **MONTANA**

Address: Philipsburg, Granite Co., Mont.

Property: the Sharktown manganese mine, operated in 1916-17 by the **Montana Manganese Co.**

Development: by main adit exposing a vein of manganese oxide, 20-30′ wide and 100′ in length, averaging 40% manganese and 14% silica. A concentrating plant was erected in 1918.

Production: totals 16,000 tons of ore.

BEAVERHEAD MONTANA COPPER MNG. CO. **MONTANA**

Argenta, Beaverhead county, Mont. Property taken over by the **Montana Mines Co.**, which see.

BEAVER MINING CO. **MONTANA**

Probably dead, as letters were returned unclaimed, 1919, from Duluth, Minn., and from Butte.

Officers: M. H. Gannon, pres.; W. L. Harnan, Butte, Mont., v. p.; Morgan M. Pattison, Duluth, v. p.; Dr. J. B. Sullivan, Butte, Mont., treas.; J. W. Neukom, Duluth, sec.

Inc. 1917. **Cap.** $950,000. Treasury stock being offered, 1917, at 40c a share.

Property: 320 acres, 7 miles from Brown, on Oregon Short Line, in

Beaverhead county, about 50 miles from Butte, said to show several copper-bearing veins. A shipment of about 1,200 tons is reported to have averaged 4% copper and over 3 oz. in silver.

Development: work has only been done on 2 veins, and management in 1917, planned to drive 650′ tunnel with raises, winzes, etc., to open up the orebody at a depth of 400′ from surface.

BELL BOY MINE — **MONTANA**

Address: L. S. Ropes, Helena, Mont.

Property: in Towsley gulch, near Marysville, operated by lessees. Rich ore was opened early in 1919, by the Intermountain Eng. & Dev. Co., and gold bullion and concentrates shipped.

BELL MINING CO. — **MONTANA**

Address: A. C. Badger, Livingston, Mont.

Property: the Bell lead-silver mine near Livingston, on the E. side of Park county, in the Crazy mountains. A 7′ vein of $150 ore is said to have been opened early in 1921.

BENBOW MINE — **MONTANA**

Address: T. C. Benhow, Columbus, Mont.

Property: in Sweet Grass county, 7 miles S. of Nye shows chromite deposits in a pyroxenite dike in a schist-gneiss contact; the ore is soft and when massive carries about 38% chromic acid. Was producing in 1920.

BEN HUR MINING CO., LTD. — **MONTANA**

Address: Saltese Supply Co., Saltese, Mineral county, Mont.

Officers: D. S. Dickson, pres.; Frank H. Bell, v. p. and purch. agt.; Chas. J. Luedke, sec.; C. A. Keating, treas., with Peter Peterson and A. J. Matthiessen, directors.

Cap. $1,500,000; shares $1 par. Annual meeting, last Saturday in April.

Property: 9 claims, adjoining the Last Chance mine, 3 miles from Saltese, showing a fissure vein in quartzite, of 10′ to 60′ width at surface.

Development: by 3 crosscut tunnels, the lower, of 1,100′ cutting a vein carrying silver lead and gray copper ores. Property considered a promising prospect. No recent returns secured.

BEN THOMAS MINING CO. — **MONTANA**

Address: B. M. Thomas, Libby, Mont.

Property: 10 claims in Rainy Creek district of Lincoln county, was under bond to F. J. Doland, of New York.

Development: by 9 short tunnels, ore carrying gold, silver and copper, with molybdenite and vanadium.

BERNICE RED ROCK MINING CO. — **MONTANA**

Address: Bernice, via Basin, Mont.

Officers: H. D. Fagon, v. p.; N. B. Lewis, sec.-treas.; J. B. Anderson, agent, 1924 Thirteenth St., Washington, D. C.

Property: 4 claims located 3 miles from Bernice station on Gr. Northern Ry., 26 miles from Butte.

A large vein shows scattered mineralization of lead carbonate and sulphide ore, but of low average value containing gold, $0.40 to $1.60, silver 2 to 7 oz., 0.5% copper, lead 2%, and zinc 5%. Course of vein is N. 70° W. with dip 70° S., and where exposed has a width of 8′ in the upper tunnel, and 23′ in lower tunnel.

Development: 2 tunnels, upper one 150′ long, the other 100′ vertically below the upper, cut the vein at a distance of 200′ from the portal. A 20′ winze was sunk on the vein from the lower level. The ore can be cheaply mined and is capable of flotation, but value is low. Company officers and stockholders are all colored men. No recent data available.

BETTY ALDEN MINING CO. — **MONTANA**

Closed down and company probably dissolved. Fully described, Vols. XI-XII.

BIG EIGHT MINE MONTANA

Address: H. L. Day, Wallace, Idaho; or J. D. Finley, Exchange National Bank, Spokane, Wash.

Property: 3 claims and 1 millsite on Callahan creek, in the Troy district, Lincoln county, adjoining the Snowstorm Mines Consolidated. Ore carries zinc and lead.

Considerable litigation has hampered operations. In 1910, the Big Eight M. Co. leased the mine to R. C. McCaffrey, with an option to purchase for $50,000. A good deal of work has been done, and ore shipped.

BIG EIGHT MINING CO. MONTANA

Property owned by H. L. Day of Wallace, Idaho, and others. See under Big Eight Mine.

BIG ELK MINING CO. MONTANA

Office: Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: Peter Peterson, pres. and gen. mgr.; Carlton Fox, v. p.; A. H. Featherstone, sec.-treas., with Geo. K. Garrett and W. S. Brown, directors. C. F. O. Merriam, mg. eng.

Inc. April, 1909, in Idaho. **Cap.** $2,000,000; shares $1 par; assessable; fully issued. Last assessment, 1 mill per share, July 22, 1914.

Property: 15 claims, 300 acres, unpatented, on Bald mountain, in the St. Joe district, near Adair, showing 3 fissure veins in St. Regis quartzite, Various trenches exposing veins with 4′ thickness carrying streaks of chalcopyrite and spathic iron, in spar and quartzite. A carload shipment to Helena from an 18′ prospect shaft, returned 28.7% copper, 28.9% iron, 15% sulphur, and 2 oz. silver per ton. A 125′ upper tunnel and a 200′ lower diagonal crosscut tunnel show chalcopyrite and bornite, carrying small values in gold. The C. M. & St. P. R. R. crosses property.

In May, 1918, control passed to S. B. Holbert, of Pittsburgh, Pa., who agreed to spend $25,000 in development and plant in consideration for an option on 1,000,000 treasury shares at 2½ cents, and 500,000 issued shares at 5 cents.

Property considered promising.

BIG FOOT MINING CO. MONTANA

Address: Boulder, Mont.

Inc. Sept., 1917, in Montana. **Cap.** $3,000,000; shares $5 par.

Property: a group of 7 claims in the Big Foot district, Jefferson county, about 12 miles from Boulder. Claims said to show ore carrying silver, lead, and zinc.

Development: by several shafts from 50′ to 200′ deep, all under water.

Mine had been closed down for many years, and was unwatered and reopened in 1917.

BIG SEVEN MINING CO. MONTANA

Address: Neihart, Mont.

Officers: D. L. S. Neihart, pres., treas., mgr.; Violet Barker, v. p.; L. S. Barker, sec., with John Clover, directors.

Inc. 1893. **Cap.** $3,000; shares $2 par; assessable; all outstanding. Annual meeting, March 10th. Gross earnings for 1916 amounted to $12,497, and operating expenses, $19,259.

Property: the Big Seven mine, an old-time producer, near Neihart, Cascade county, Mont., which shows a fissure vein 2″ to 2′ wide, in granite-porphyry, said to carry high value in gold and silver.

Development: 3,600′ tunnel.

Equipment: includes compressor and steam power. Total production to date $1,500,000. Management planned advancing tunnel and further development at last accounts.

BLACK FRIDAY GOLD MINING CO. MONTANA

Office: Helena, Mont.

Officers: Willard Bennett, pres.-treas.-mgr.; A. J. Galen, v. p.; R. M. O'Hearn, sec., with J. L. Templeman, directors.

Inc. 1910, in Montana. **Cap.** $2,000,000; par $5; issued; 356,000. Bonds authorized and issued, $75,000.

Property: 10 patented claims, 128 acres in the Radersburg mining district, carrying a vein in andesite, that runs N.-S. and dips 45°. Ore contains iron pyrite, with gold and silver values.

Development: by 700′ inclined shaft and 3,500′ of workings. **Equipment:** includes 150 h. p. electric hoist, compressor, 15-ton concentrator.

Production: reported as $261,000 to date. Concentrates average $32 per ton.

Latest reports are that E. N. Breitung & Co. relinquished their option and that foreclosure proceedings were to be started by J. L. Templeman for the bondholders.

BLACK TRAVELER COPPER MINING CO. **MONTANA**

Address: J. R. Bean, sec., Mullan, Idaho.

Officers: O. S. Roof, pres., Mullan, with R. E. Sisler, Wallace, Idaho., and F. Lendtke, Saltese, Mont., directors.

Cap. $1,500,000; par $1; assessable. Annual meeting, 2nd Tuesday in November.

Property: 6 unpatented claims in St. Regis district, under bond and lease to **Saltese Consolidated Mining Co.**, which see.

BLISS MINING CO. **MONTANA**

Address: c/o C. W. Johnson, or Mrs. Josie Rose, Lewistown, Mont. Gustave Johnson, pres.

Property: a gold mine near Cone Butte.

BLUEBIRD COMPANY (THE) **MONTANA**

Office: 706 Sears Bldg., Boston, Mass.

Officers: W. B. Dickerman, v. p.; Clarence W. McGuire, sec.-treas. 89 State St., Boston, with F. M. Stone and H. K. McHarg, directors.

Inc. 1893, in New York. **Cap.** $500,000; shares $5 par; 66,667 shares issued.

Property: 237 acres, in Butte, Mont., shows silver, copper and zinc ores. Company has never operated its property. See U. S. G. S. Prof. Paper 74, by W. H. Weed, for geology, etc.

In 1917 the mine was taken over under bond and reopened. Shipments made in 1918. Idle, 1919-20.

BLUEBIRD-CORBIN GOLD, SILVER & COP'R M. CO **MONTANA**

Address: Wickes, Jefferson county, Mont.

Officers: Wm. Q. Ranft, owner and mgr.; John W. Johns, supt.

Property: 4 miles west of Wickes. One of the old mines of the district, taken over in 1911 together with the Penn Yan claim. Claims show 2 veins of 4′ to 14′ in width, carrying ore-shoots averaging 5% copper, 5% lead, 25 oz. silver, and $1.50 gold per ton. Ore occurs in a tourmalinized vein in andesite tuffs and diorite along a contact with a 50′ wide dacite dike that forms the foot-wall.

Development: by 2,248′ tunnel and 225′ shaft, with levels at 100′ and 200′. Equipped with electric power. Mine was worked in 1919.

BLUEBIRD LODE **MONTANA**

Address: C. T. Young, Getaway, Mont.; Gus. Peterson and Philip Fortin, owners.

Property: 6 claims, 1 patented, 14 miles from Getaway, Mont. Gold-silver-copper ore occurs in quartz vein, course N.-S. Tunnel 120′ long.

An undeveloped prospect.

BLUE-EYED NELLIE MINE, INC. **MONTANA**

Address: A. W. Paterson, pres., and E. C. Paterson, sec.-treas., Spokane, Wash.; or C. H. Brown, Anaconda, Mont.

Cap. $100,000; 10c par.

Property: 7 claims, 6 miles W. of Anaconda. Mine was a silver-lead

producer, reopened, 1918, after an idleness of 25 years. Yield from 1885 to 1891 reported to have been over $1,000,000.

Development: by 325′ shaft; an 1,800′ tunnel (800′ by May, 1918,) will open ore at depth of 700′. **Equipment:** compressor, drills, etc.

BLUE VEIN COPPER MINING CO. **MONTANA**

Office: 17 Owsley Blk., Butte, Silver Bow county, Mont.

Officers: F. L. Melcher, pres.; Lewis A. Smith, sec.; W. F. Noyes, treas., all of Butte.

Inc. June 21, 1906, in Montana. **Cap.** $1,000,000; shares $1 par.

Property: 9 claims, patented, being the Little Boulder, Valentine, Bunker Hill, Blue Vein, Blue Vein No. 1, Myrahl, North Star No. 1, the Ozone and Columbia lode claims in the southern part of the Butte district. Idle since November, 1909.

BONANZA-BUTTE MINING CO. **MONTANA**

Care: John Kenoffel, 111 S. Main St., Butte, Mont.

Officers: Chas. H. Lane, Wm. Youlden, J. J. McCarthy, H. H. Walrath, Wm. Meyer, John and Geo. E. Johnson, directors.

Inc. June, 1915, in Montana. **Cap.** $500,000; shares $1 par.

Property: the Bonanza, Bonanza Extension, and Ruth claims, 4 miles north of Butte. Mine under lease and bond to a syndicate of Butte people, who have made one substantial payment on the property.

Development: the Bonanza vein is opened by a 55′ shaft and 300′ crosscut tunnel. A new tunnel, 166′ lower than old tunnel, was over 1,000′ long in 1917, exposing 5 different but parallel E.-W. tourmaline veins, showing stringers and spots of galena. This tunnel cut the downward extension of the oreshoot exposed in the winze sunk below the upper tunnel. The shoot shows bunches of high-grade, fine grained and dense galena, with no copper. Selected samples are high in silver, but average samples are too low-grade for milling. The vein is in a granite area surrounded by rhyolitic rocks, near the B. & M. reservoir, on the road to Lowland creek. Ore carries a little gray copper, but the bulk of the black material seen in it is a tourmaline and not copper glance.

BOSTON & ALTA COPPER CO. **MONTANA**

Address: care Geo. S. Graham, 165 Broadway, New York City.

Company formerly owned the Alta mine near Corbin, Mont., but sold it to the **Alta-Montana Mng. Co.** for 100,000 shares of A. M. Mng. Co. stock, which now constitutes its sole asset. See Vol. XIV.

BOSTON-BUTTE COPPER & ZINC CO. **MONTANA**

Office: 46 East Broadway, Butte, Mont.

Officers: W. W. McDowell, pres.; F. J. Dorhofer, v. p.; W. E. Reynolds, sec.-treas., with W. S. Carns and Charles Schmidt, directors.

Inc. Dec. 12, 1912, in Arizona. **Cap.** $1,000,000; $1 par; 871,775 issued. Annual meeting, January 11, each year.

Property: 13 claims, all patented, on W. side of Butte district, undeveloped and not operated, but lying west of the Hibernia mine.

BOSTON-COLBY COPPER MINING CO. **MONTANA**

Address: N. Knudson, pres., Saltese, Mineral county, Mont.

Inc. September 16, 1903, in Montana. **Cap,** $1,500,000; $1 par; $1,300,000 issued, of which 1,075,000 is held by Andrew Flaig, of 208 E. Lake St., Minneapolis, Minn.

Property: 9 claims, unpatented, 180 acres, and a 5-acre millsite, lying next east of the Butte-Coeur d'Alene Copper Mining Co., immediately west of Saltese, in the East Coeur d'Alene, formerly known as St. Regis district. Lands have 2 copper-bearing veins, No. 1 of about 40′ width, showing a great iron capping, and No. 2, to the south, of about 3′ width, carrying mainly chalcopyrite, with some bornite, of good average grade. Company is also interested in the Hemlock lead-silver mine, 1¼ miles from Saltese.

Developed: by 2 crosscut tunnels, upper of 400′, lower of 900′ length with about 500′ of drifting in both tunnels, said to show chalcopyrite streaks

in blue hematite ore. Property crossed by C., M. & St. Paul railroad. Wood and water are abundant. Assessment work only has been done for several years owing to lack of funds, but owners wish to raise money and sink the shaft 500' deeper. At the end of 1920 some 12% copper ore was opened, and a raise was being driven from the lower tunnel.

BOSTON & CORBIN MINING CO. **MONTANA**

Office: C. R. Jeffers, treas., 67 Milk St., Boston, Mass.

Company is in process of liquidation. Development work at the mine was unsuccessful and the plant burned down. A distribution representing receipts from insurance and sale of remaining equipment was made in August, 1918, equal to 35 cents a share. This is probably the final distribution, unless property is sold. For description, see Vol. XIII.

BOSTON & MONTANA DEVELOPMENT CO. **MONTANA**

Succeeded by the **Boston Montana Corporation,** but shares of company are still traded in on the New York and Boston curbs. Shares exchangeable for Boston Montana Corp. stock, ten for one.

BOSTON MONTANA CORPORATION **MONTANA**

Succeeds Boston-Montana Dev. Co.

General office: 408 Daly Bank Bldg., Butte, Mont. Boston office: 63 Devonshire St.

Officers: W. R. Allen, pres.; J. D. Pope, v. p.-gen. mgr.; W. O. Siderfin, v. p.; George Gallup, sec.; Perry B. Goddwin, asst. sec.-treas.; J. A. Brown, gen. counsel. Foregoing with O. S. Heater, E. E. Esselstyn and T. J. Bennetts, directors.

Inc. April 29, 1920, in Mont. **Cap.** $25,000,000; issued $12,500,000; par $25.

An issue of $5,000,000, 6%, 10 year bonds, was made early 1922 to refund existing obligations of $1,821,413, owed largely by subsidiary corporations. The bonds were offered stockholders of B. & M. Corporation (not Development Co.) for shares, accepted at $10 per share, i. e. $100 in bonds can be obtained for ten shares B. & M. Corpn. stock. The bonds at maturity are reconvertible into stock at $25 per share.

Transfer agent, U. S. Corporation Co., New York City and New England Trust Co. Boston. **Registrars:** Equitable Trust Co., New York and Boston Safe Deposit and Trust Co., Boston.

Company acquired all assets and asumed all liabilities of the Boston & Montana Dev. Co., giving one share new stock for ten of the Development Co. stock.

General balance sheet, Dec. 31, 1920:—

Assets		Liabilities	
Mine properties, real estate	$23,483,856	Capital stock	$25,000,000
Treasury stock	5,278,575	Notes & acct. pay	238,202
Securities owned	5,988,775	Accrued liabilities. (pay roll)	8 280
Development	1,073,567	Surplus donated	12,500,000
Due from subsidiaries	1,405,403		
Cash	127,283		$37,746,482
Notes and acct's rec	386,472		
Miscellaneous	3,539		
	$37,746,482		

Company reports that up to March 13, 1922, expenditures total $5,300,000, the railway costing $2,100,000, the mill and power line $1,200,000 and mine development $1,500,000. According to reports made to the Montana state authorities the company and its subsidiaries owe $1,821,413, most of it due in 1922.

Disbursements for the year 1920 amounted to $943,138, including $205,615 for mill construction; $206,246, for completion of railway construction

contracts; $163,285 for Mont. Southern Ry. Co., $11,000 for salaries of genera officers, etc.; $144,363 for Elkhorn mines; $40,509 for power line; $27,224 for investments, besides numerous lesser items listed in annual report

Subsidiary Companies: The Boston-Montana Corporation owns the entire common stock of the Boston-Montana Milling & Power Co., and of the Montana Southern Ry. The latter owns a narrow gauge railroad 38.33 miles in length running from Divide, Mont. a station 28 miles south of Butte, on the Oregon Short Line R. R. to the Elkhorn properties; this line will it is said be extended into the Big Hole Valley and a branch line built to the French Gulch mines.

Property: two tracts about 20 miles apart, known as the Elkhorn and French Gulch properties.

The **Elkhorn group,** 65 claims, about 1,100 acres, owned or controlled, covers practically the whole of the Elkhorn mining district, together with 6 placer claims covering the townsite of Brundy, the company's millsite, railyards, etc., the whole making a tract about 2 miles long by a mile wide.

Geology: the entire Elkhorn tract is covered by granite (quartz monzonite) cut by a number of quartz veins, 17 of which outcrop on the surface. Five veins run N. E.-S. W., 14 others run E.-W. being either faults or cross veins that link together the other fractures. The vein filling is quartz of replacement type, containing pyrite and scanty amounts of other sulphides, with local lenses of ore. Faulting is common; a great displacement dipping westerly delimits the veins to the east, and no payable ore has so far been found beneath this master fault. Westward this block above the fault shows promising surface exposures and the underground work has disclosed ore. The mining operations of many years ago were stopped by flat faults whose nature was not then understood. These and other steeper faults are common but well understood, features of the mine workings.

Development: of about 41,000 feet, comprises two tunnels, the lower, or 1,000′ level, enters the mountainside near the railroad terminus and mill level; the upper, or 300 mill level, is some 700 feet higher and is at present the working level.

These two tunnels open the Idanha vein for a distance of nearly a thousand feet on the upper level, and over 400′ on the 1,000′ level; two raises above the 1,000 level, one connecting with the 300′ level with drifts on the 450′ and 800 levels, prove the continuity of the vein and disclose ore. The underground work shows the Idanha vein to vary from 8′ to 30′ in thickness, with streaks or bands of pyritic ore 4′ to 5′ wide and small lenses of high grade ore.

On the 300 level, ore is practically continuous for 700′. The Idanha workings are said to indicate about 300,000 tons of ore above the 1,000 level which will average about $12.05 gross, figuring lead at 5c. and copper at 15c. a pound and silver at $1.00 an ounce.

On May 15, 1922, the 300′ level cut the Mono-Idaho lode beneath the Mono shaft, the 8′ exposed showing a 12″ hanging wall streak assaying 25 oz. silver per ton and 6% copper, the next two feet assaying 10 oz. silver, with ore carrying 5 oz. silver and 3% copper for 4′ on hanging wall.

Work on the Central, Park and Elkhorn veins though extensive has not yet opened up any appreciable tonnage of commercial ore, though the Elkhorn contained small shoots or bunches of excellent ore. Work in 1922 on the Park vein is said to have disclosed a width of 10 ft. of ore carrying from 6 to 100 ounces of silver per ton.

The Mill: comprises a complete concentration plant with flotation equipment. The plant can handle 250 tons of ore in one eight hour shift or 750 tons in 24 hours. The first unit was started Nov. 11, 1921, but lack of miners restricted production to 200 or 225 tons per day.

On Feb. 29, 1922, the general manager stated mill was treating 225 tons of $11 ore daily with a 90% recovery producing 40 tons of $40 concentrate

with total mine and mill costs of $5 to $6 per ton. In April the mill feed was reported to be much higher.

Shipments up to April 15, 1922, of 57 car loads of concentrate from the mill aggregating 2,158 tons dry concentrate, yielded smelter returns of $34.82, or $22.49 per ton after deducting freight and treatment charges of $4.50 to $7.50 per ton.

These figures suggest that considerable waste or low grade material has gotten into the orebins. If they represent a true average it is apparent that selective mining will have to be done to raise the value of the mill heads.

The relatively small daily tonnage milled, is said to be due to scarcity of labor, owing to the reopening of the Butte mines, and not to scarcity of ore. As new ground is prepared for stoping, the Idanha vein should furnish an adequate supply for the mill from the ground already partly developed, and new work on the southwest drift on the 300' is expected to add materially to the existing tonnage.

Ore Reserves: according to three engineers who have examined and sampled the mine, viz Wm. F. Word, Geo. A. Packard and W. H. Weed, in 1920 the workings showed between 200,000 and 325,000 tons of developed and partly developed ore of an average value of $10.16 per ton in lead, copper and silver, or of about $2 net realizable return per ton of crude ore. If concentration is 4 to 1 and recovery 90%, $40.00 concentrate is equivalent to $11 ore as claimed.

The French Gulch group of claims includes 1,100 acres, patented, water rights to 5 streams and 15 miles of ditches and flumes. About $750,000 is said to have been spent in development. Claims have been opened up by shafts and tunnels principally upon the Spain, Lucky Strike, Golden Crown and Leo. The work on the Spain consists of a 900' tunnel and 200' shaft, with 800' of drifting on the 200' level. The drift tunnel is about 350' below the apex, and shows the vein to carry from a few inches to 4' of sulphide ore, averaging $17 a ton, according to estimates made by James E. Beveridge. Ore is said to be blocked out to the value of $500,000.

The Lucky Strike has an 800' tunnel following a contact vein reported to be 20' to 40' wide and 100' shaft with 300' of drifting on the vein whose thickness is reported to be 35' with a paystreak of ore running from $41.50 to $80 gold, 5 to 7 oz. silver and 2½% copper.

The vein has been opened to the west by another 100' shaft, with 600' of drifting, showing an orebody 12' wide averaging $18 a ton, according to the management. Eight hundred feet of tunneling on the Golden Crown claims shows a 1' to 3' vein said to carry $8 to $20 ore.

Besides these there are smaller shafts and tunnels on the various claims in the French Gulch group.

Conclusions:

Montana Southern Railway.

Company controls the Southern Montana Railway, a 38.33 mile narrow gauge line from Divide a station 28 miles south of Butte, on the Oregon Short Line (Union Pacific system), completed to the Elkhorn mine and mill in October, 1919. Three locomotives are employed and the line can handle 2,000 tons of ore daily. This road will handle all freight for the settlements of the Big Hole valley, and should derive a considerable revenue from the transportation of lumber milled along the road on Forest reserve ground and shipped to Butte and nearby Utah and Wyoming points

In view of a recent report by a broker-mining engineer as to possible earnings, a careful review of the entire evidence is necessary before a conclusive opinion can be given. It is current belief however that the property can be made to pay and that the derogatory reports made against it were based on a very superficial examination. The next six months mill operations will tell who is right.

The property was developed and equipped during the war period and

costs have been undeniably high, but the financing of the project was successfully carried out against great odds, by the company's president and his friends.

BOULDER MINING CO. MONTANA

Address: E. M. Cooper, Box 1136, Helena, Mont.

Property: the Evening Star silver-lead claims of 20 acres bonded to Andrew Lavich, at last accounts.

BROADWATER COUNTY MINING CO. MONTANA

Officers: J. J. Fisher, pres., Harlowton, Mont.; Len Jobb, sec.; John A. Matthews, treas.

Inc. 1910. **Cap.** $225,000; $1 par.

Property: 7 claims, includes the Evening Star, Copper Glance and Lombard, about 5 miles west of Townsend, on the Radersburg road. Claims show promising outcrops and development is said to disclose veins 4' to 12' wide, with chalcocite ore assaying up to 60% copper, 6 oz. silver, with gold and lead. In 1918, management planned having property prospected and reported on with a view to resumption of operations in near future, but nothing recent available.

BUENA VISTA MINES CO. MONTANA

Officers: G. F. Russell, bus. mgr., 1303 Dean St., Spokane, Wash.; J. L. Magney, opr. mgr. Identified with the organization are W. P. Russell, J. D. Chickering, F. Leslie, J. Millspaugh, G. P. Larson, J. P. Boyd, G. F. Russell, D. K. McDonald, V. Rapp, Wm. Coleman.

Property: 3 patented claims, known as Buena Vista mine, Maxville, Granite county. Idle for 20 years until present company secured bond and lease. Principal values in silver.

BULLWHACKER COPPER CO. MONTANA

Reorganized as **Butte Bullwhacker Mining Co.**, which see.

BUTTE-ALEX SCOTT COPPER CO. MONTANA

Dissolved. **Property:** 4½ acres at Butte, Mont., sold to Anaconda Copper Mining Co., for $750,000 cash, on Feb. 10, 1916. Stockholders received dividends of $10 a share. There were 79,311 shares outstanding and $80,000 in the treasury. See Copper Handbook, Vol. XI.

BUTTE & ANACONDA CONSOLIDATED M. & M. CO. MONTANA

Office: Box 138, Anaconda, Mont.

Officers: J. C. Keppler, pres.; J. Winterhalter, v. p.; Andrew Flieger, sec., Box 359 Portland, Oregon; John J. Wegener, treas., with W. R. Allen, directors.

Inc. 1908, in Montana. **Cap.** $1,500,000; shares $1 par; assessable; 900,015 shares outstanding. Company is a consolidation of the Flint Creek Mining Co., and the Golden Eagle M. & M. Co.

Property: 9 patented quartz claims, 3 unpatented placer claims and 2 millsites, about 240 acres, in Flint Creek Gulch, Granite Co., Mont., 3 miles from a railroad. Claims show quartz veins carrying tellurides. Average assays said to run $25 per ton in gold and silver. Developed to depth of 450' by 2 shafts and 2 tunnels, 900' long. No work was done in 1918, but in 1919 property was leased for 18 months.

Also owns 23 patented claims, a mile north of the Butte Superior shaft, purchased at sheriff's sale on Dec. 22, 1920 for $75,315. The Great Butte Copper Co. formerly owned this group.

Development: exploration at the Calumet shaft, is 2,000' deep with crosscuts and drifts at that level.

BUTTE & BACORN MINING CO. MONTANA

Owned by Great Butte Copper Co., which see.

Office: 53 Silver Bow Block, Butte, Mont. **Pittsburgh office:** 331 Fourth Ave. Chas. Hyde, treas.

In June, 1916, company was reorganized and sold its property to the Great Butte C. Co., which company paid indebtedness and exchanged 400,000 shares of its stock in ratio of 4 to 1. See Vol. XII.

BUTTE & BOULDER MINE **MONTANA**

See **Shields & Ironsides Mining Co.**

BUTTE & CORBIN CONS. COPPER MINING CO. **MONTANA**

Officers: J. L. Templeman, pres.; Lewisohn Block, Butte, Mont.; Lee Williams, v. p.; J. B. Fitzpatrick, sec.-treas.; at last accounts.

Inc. May 1, 1907, in Montana. **Cap.** $700,000; $1 par; issued 469,000. Annual meeting, February 4.

Property: 5 claims, 82 acres; also 10 acres timber lands in the Corbin, or Colorado district, on the eastern side of Valparaiso mountain. The ore is a complex mixture of lead, copper, and zinc, occurring as short shoots in fissure veins in granite. Vein reported by company to average 8′ 4″ in width, and to carry 4% copper, 6% lead, 2% zinc, 8 oz. silver, and $1 gold per ton.

Development: by shaft and the 500′ Rarus tunnel, which cut a 10′ vein at 165′ from the portal, assaying 2.5% copper, with paystreak carrying covellite, averaging 6% copper, 8 oz. silver, and $6 gold per ton. Amount of ore on dump, 7,000 tons of $10 value, according to Ropes & McIntyre.

Idle at last accounts.

BUTTE & ELK RANGE CO. **MONTANA**

Address: Grant St., Pittsburgh, Pa.

BUTTE & ELLISTON GOLD & COPPER MINING CO. **MONTANA**

Merged into Evening Star Developing Co., which see.

Described, Vol. XIII.

BUTTE & GEORGETOWN MINING & MILLING CO. **MONTANA**

Office: The Napton, Butte, Mont.

Officers: Constant Rembaud, pres.; J. A. Nadean, v. p.; Orila Nadean, sec.-treas., with F. L. St. Jean (mgr.), and Franck Boucher, directors.

Inc. 1910, in Montana. **Cap.** $1,000,000; par $1; assessable; 530,000 outstanding.

Property: 13 claims, 12 patented, total 881 acres of placer ground, to be worked for gold platinum and sapphires. Inactive.

BUTTE & GREAT FALLS MINING CO. **MONTANA**

Inactive. **Address:** Box 1393 Butte, Mont.

Officers: E. Bryant Crump, Bloomington, Ill., pres.; R. M. Green, Butte, v. p. and gen. mgr.; Allen Pierse, sec.-treas.; with Ira N. Honnold, L. G. Diehl, J. Cohan, Wm. Richardson, J. W. Beckwith, Louis Lauritson, R. M. Sutherland, J. P. Mondloch, Walter A. Kenney and C. F. Murphy, directors.

Inc. Nov. 28, 1911, in Montana. **Cap.** $500,000; shares $1 par; assessable; 400,000 outstanding; $32,000 was expended on development work during 1914-15. In December, 1916, an assessment of 5c per share was levied.

Property: the Genevieve group of 8 claims, 134 acres, in the Lost Child mining district, 3½ miles N. E. of the Butte & Superior property.

Claims show Butte monzonite cut by aplite and traversed by wide, rusty veins carrying tourmaline and occasional specks of chalcopyrite. The Genevieve vein runs S. W.-N. E., with dip of 35° and reported width of 30′. It is mainly decomposed granite with clay and quartz streaks and one 3′ band of quartz and tourmaline carrying occasional sulphides. Has a 1½ compartment shaft, 500′ deep. The Genevieve is said to have a good showing in a 2′ vein on 200′ level, but average of assays is small. The Silver King claim has a 200′ tunnel. Property reported on by Paul Billingsley, Jesse Cohan & Peterson.

Equipment: included electric hoist, good for 1,500′, pump, 10-drill compressor, mine building and dwellings. Mine closed down and hoist sold, September, 1917.

Property regarded as a prospect of doubtful merit.

BUTTE & LONDON COPPER DEVELOPMENT CO. **MONTANA**

Office: 46 East Broadway, Butte, Mont.

Officers: W. W. McDowell, pres.; John D. Haines, v. p.; W. E. Reynolds, sec.; E. S. Passmore, treas.; with Fred. Whiteside, Guy W. Stapleton, W. S. Carns, J. A. Sheldon and Maurice Eisenberg, directors.

Inc. Jan., 1906, in Arizona, as Butte & London Copper Co. **Cap.** $5,000,000; $5 par; 907,700 outstanding. Annual meeting, third Tuesday in January. Listed on Boston Curb.

Property: 115 acres, known as the Greendale placer claims, lying immediately north of the Pittsburgh & Montana in the valley of Silver Bow Creek, east of Butte. Property claimed by the management to carry the possible extension of the Rainbow lode. Forty acres of the property is said to be valuable for townsite purposes.

Development: 1,350′ three-compartment shaft with 2 crosscuts on the 1,100′ level cutting 9 veins, none carrying ore of commercial value, except a streak that gave assays of 2% copper, 50 oz. silver, and $2 gold, per ton.

The company agreed December 24, 1912, to accept a contract with Thos. F. Cole, for the transfer of all its property to a new company, the Greendale Exploration Co., with a capitalization of $200,000, to be organized by him. The terms of the contract provided that in consideration of sinking the shaft to 1,600′ level, running crosscuts north and south 2,500′ the entire width of the property, and doing other stipulated development work, Mr. Cole was to receive 51% of the stock of the new company, one-half to be paid as the work progressed, the balance remaining in escrow until the work is finished. Mr. Cole spent $300,000 on this development, and contract was completed. Failing to find shipping ore in commercial quantities the property was closed down.

BUTTE & PLUTUS MINING CO. **MONTANA**

Address: Shelby Cohen, sec., 401 Phoenix Bldg., Butte, Mont.

Officers: J. R. Moyle, pres.; T. Tomich, v. p., with John Harrington, Sam Barker, Clement Stonemetz, and W. H. Badhman, directors. M. S. Cohen, attorney.

Inc. in Montana. **Cap.** $1,000,000; $1 par; increased to this amount in April, 1920.

Property: the Plutus, Mapleton, and other claims, N. of Anaconda's Nettie group at Butte, which contain veins of silver and manganese ore; also a half interest in the Jack Knife claims near Philipsburg, carrying manganese ore.

Development: by two 400′ shafts and fairly extensive workings. Water is troublesome. The shafts are connected. During 1920, good silver-manganese ore was cut on the 100 and 250′ levels. Drifting is progressing on the bottom level, and prospects appear to be good for a real mine.

Equipment: includes electric power, hoist, compressor, pump at 300′, etc.

BUTTE & RED EAGLE COPPER CO. **MONTANA**

Officers: Fayette Harrington, pres., Missoula, Mont.; Jas. A. Canty, sec.-treas., Butte, Mont.

Inc. May, 1907, in Montana. **Cap.** $5,000,000; shares $5 par.

Property: 7 claims, patented, S. E. of the Butte & Bacorn and N. E. of the Butte & Superior, the Red Eagle claim having a 400′ tunnel, showing a little ore. Mine shut down since 1907, but company still alive.

BUTTE AND SUPERIOR MINING CO. **MONTANA**

Office: 25 Broad St., New York. **Mine office:** Butte, Mont.

Officers: and directors: D. C. Jackling, pres.; Charles Hayden, v. p.; C. W. Peters, v. p.; A. J. Ronaghan, sec.; J. R. Dillon, treas.; and Charles Bocking.

Operating officials: Charles Bocking, mgr.; E. V. Daveler, gen. supt.; Angus McLeod, mine supt; J. L. Bruce, cons, engr.

Inc. Oct., 1906, in Arizona. Cap. originally $6,000,000; $5 par; reduced December 3, 1910, to $2,500,000; $10 par; increased September, 1912, to $3,500,000. Outstanding December 31, 1920, $2,901,977. No bonds. Equitable Trust Co., New York, and Old Colony Trust Co., Boston **transfer agents;** Guaranty Trust Co., New York, and National Shawmut Bank, Boston, registrars. Annual meeting 3rd Friday in April, at Phoenix, Ariz. Stock listed on Boston, New York and Butte exchanges and on the Paris

Bourse. Name changed from Butte & Superior Copper Co., May, 1916, and new stock issued.

Controls the **North Butte Extension Development Co.**, through ownership of 64% of the stock; also controls the **Butte-New York Copper Co.**, through ownership of more than 55%. Company holds 35,000 shares ($25 par) of **Am. Zinc, Lead & Smelting Co.**, for which it issued in 1916, 17,500 shares ($10 par) of its own stock. In 1920, acquired 36,000 shares of **Shasta Zinc and Copper Co.** for $360,000.

In 1912 the control of the company passed into the hands of Hayden, Stone & Co. interests, who have been closely identified with Utah Copper, Chino, and other great and sucessful mining companies, thus ensuring ample finances and competent direction.

Comparative General Balance Sheet—years ending December 31:

Assets.

Year	Prop. Equip & Devel	Investments	Current	Deferred Charges	Total
1920....	$5,568,502	$1,601,772	$3,165,808	$94,099	$10,410,181
1919....	5,580,362	1,152,836	3,317,815	3,753	10,054,766
1918....	5,576,284	1,666,818	4,326,711	6,669	11,576,482
1917....	5,799,475	749,325	3,384,002	543,256	10,476,058
1916....	5,245,260	692,063	4,393,668	542,163	10,882,153
1915....	4,458,133	574,295	5,267,080	486,129	10,785,638
1914....	4,190,872	338,567	1,269,633	274,330	6,073,402

Liabilities

Year	Cap. Stock	Current	Prem. on Sales Cap. Stock	Reserves	Undiv. Profits	Total
1920....	$2,901,977	$35,017	$2,176,868	$1,657,688	$3,250,051	$10,410,181
1919....	2,901,977	120,267	2,176,868	1,494,951	3,062,121	10,054,766
1918....	2,901,977	451,320	2,176,868	1,129,407	4,916,910	11,576,482
1917....	2,901,845	482,331	1,214,106	807,469	5,070,306	10,476,058
1916....	2,901,872	1,155,337	1,214,222	.....	5,610,722	10,882,153
1915....	2,726,970	606,317	1,214,386	.....	6,237,965	10,785,638
1914....	2,726,089	111,985	1,213,985	.....	2,021,944	6,073,402

Share sales in New York for 1921 totaled 26,900, with a price range of 10¼ to 22⅛.

Working capital:

Year	Cash and Govt. Bonds	Ore and products	Supplies, etc.	Accounts receivable	Total current assets	Total current liab.	Excess of assets
1920..	$2,213,987	$1,026,981	$637,605	$161,392	$3,144,922	$423,597	$2,721,325
1919..	1,113,041	1,291,604	544,060	367,637	3,317,815	508,849	2,808,966
1918..	2,377,032	1,203,004	467,610	97,810	4,326,711	451,320	3,875,391
1917..	845,359	1,769,204	728,584	50,855	3,384,002	482,331	2,901,671
1916..	853,529	3,198,741	325,445	15,952	4,393,667	1,155,337	3,238,330
1915..	2,128,187	2,912,881	175,457	50,555	5,267,080	606,317	4,660,763

Operating accounts:	1920	1919	1918	1917
Sales of Metals, less freight..	$4,460,547	$5,912,640	$5,915,245	$6,716,437
Operating charges.....	1,363,290	4,996,368	5,263,320	4,595,501
Profit	$97,257	$916,272	$651,925	$2,120,936
Other income.....	.....	126,267	62,874	103,191
Total income.....	$195,691	$1,042,539	$714,799	$2,224,127

Reserve for taxes, etc.....	7,762	177,549	86,451	236,647
Balance to surplus account..	$187,929	$864,990	$628,348	$1,987,480
Surplus from previous year...	3,062,121	4,916,909*	*5,070,306	5,610,722
Total available.....	$3,250,040	$5,781,899	$5,698,654	$7,598,202
Dividends paid.....	.....	.....	.....	1,567,057
Net surplus.....	$3,250,040	$3,062,121†	$5,698,654	$6,031,145

* Adjusted. †After deducting $2,719,778 paid to Elm Orlu Co.

Dividends: initial in 1914, $611,908; in 1915, $4,908,115, in 4 quarterly payments of 75c each and extra payments of $15 per share; in 1916, $9,490,472 in quarterly payments, 2@75¢, 2@$1.25, ea. and extra of $30.00 per share; 1917, paid $1.25 quarterly, for first three quarters, $1.25 extra for first two, and Red Cross of 40c, a total of $6.65 for the year. None since.

Property: 27 claims, 165 acres, including the Black Rock mine, about 2 miles N. E. of the business section of Butte, with the exception of 4 claims, Peake, Parker, Prescott and Pardee, which lie about 3 miles N. W. of Butte. In addition, fractional interests equivalent to 8.88 acres are owned in 11 claims, 60.3 acres, and surface rights only for 34.15 acres. Also additional, North Butte Extension Development Co., a subsidiary, owns 29.48 acres. See below for holdings of another subsidiary, the Butte-New York Copper Co.

In November, 1917, a syndicate, known as J. L. Bruce Trustees, was formed to acquire for the Butte & Superior 200 acres of zinc-lead ground W. of the Emma mine of the Butte Copper & Zinc Co. In 1919, three claims just W. of Butte, carrying a vein of rich silver ore, were acquired.

The Germania-Tzarena claims, 1 mile S. W. of Butte, were worked under lease and option in 1918. Shaft was sunk to 1,000' and 500' driven on vein, but payments being due before ground was explored, the bond was dropped. In 1920, company undertook the development of property of Butte Metals Mng. Co., the latter to pay for work with stock; to date results have been unsatisfactory.

Litigation: Butte and Superior has had eight years of costly litigation; a suit with the Elm Orlu Mining Co. involving extralateral rights of certain orebodies, another with the Minerals Separation Co. concerning the patent rights of the flotation process. In this latter dispute, B. & S. has really done great service to the whole mining industry in forcing the patents to be clearly defined.

In 1916, Elm Orlu, through its controlling company, the Clark Montana Realty Co., started suit against the Butte and Superior Mining Co. over rights to certain orebodies in the Elm Orlu claim and in the Black Rock claim of Butte and Superior. The successive steps in this controversy are as follows:

In 1917, the U. S. District Court decided in favor of Elm Orlu, giving this company the westernmost 301' along the vein and B. & S. all rights to the Rainbow lode east of the point where it enters the Black Rock claim (**B. & S.**); subject, however, to the prior rights of the Pyle vein of the Elm Orlu, below its junction with the Rainbow.

The B. & S. appealed this to the U. S. Circuit Court of Appeals at San Francisco in November, 1917, which affirmed the decision of the lower Court, and found that ore taken by B. & S. from the disputed ground was worth, with interest, $177,707. Application to the U. S. Supreme Court for a review of this decision, was denied on May 10, 1918; but the Circuit Court of Appeals granted an appeal to the U. S. Supreme Court, who heard the appeal January, 1919, and sustained the decision of the Circuit Court of Appeals. The Geological features of this case were presented by R. M. Searles in 'M. & S. Press' of May 10, 1919.

Another collateral issue of the case not wholly determined by the U. S. District Court involved claims on the part of Elm Orlu to certain orebodies developed in the Black Rock claim 550 ft. eastward of the point above referred to by reason of the alleged apex in the Elm Orlu claim of a branch of the Rainbow lode extending into the earth beneath Black Rock claim. This issue was never tried as a settlement was arrived at in August, 1919, and confirmed by the Court. By this agreement, Elm Orlu got about ⅓ and B & S. ⅔ of the disputed area, while B & S paid Elm Orlu $2,719,778 cash for ore already extracted. Elm Orlu was awarded 186′ additional eastward on the Rainbow vein below 1,200′ and the B & S. that portion above 1,200′ The Jersey Blue vein west of the new plane below 1,300′ was awarded to Elm Orlu. Each side paid its own costs. The suit involved examining 12 levels in each mine, crosscuts, 6 miles of drifts, 10 raises, 500 to 1,200′ long, and a complexity of vein-intersections and fault-crossings.

Litigation with Minerals Separation over United States patents was first provoked by the installation made in 1911 by James M. Hyde, at the mill of the Butte & Superior Copper Co. (name since changed to B. & S. Mining Co.) In that suit (Minerals Separation v. Hyde) the District Court at Butte, Montana sustained U. S. patent No. 835,120 and found infringement as to 7 claims. In 1914, the Ninth Circuit Court of Appeals at San Francisco, reversed this decision; but on writ of certiorari the U. S. Supreme Court on December 11, 1916, unanimously adjudged this basic patent for air-froth flotation valid as to 10 of its 13 claims. The remaining 3 claims, which specified the use of "a small quantity of oil," and which the Court held to be invalid, have since by disclaimer, been brought within the scope of the Supreme Court's decision.

Following this decision of the Supreme Court in the Hyde case, the Butte and Superior Mining Co. began using oil in minimum quantities of ½ of 1 percent contending that this relieved it of liability for infringement. This issue was tried in the suit of Minerals Separation v. Butte & Superior, and on May 4, 1917, the United States District Court at Butte, Mont., again found validity and infringement as to the 10 claims (3 modified by disclaimer) previously litigated. On May 13, 1918, the Ninth Circuit Court of Appeals at San Francisco partly reversed this decision, holding the patent limited to ½ of 1% of oil on the ore. The U. S. Supreme Court reviewed this case on writ of certiorari, and on June 2, 1919, partly reversed the decision of the Circuit Court of Appeals, holding that the patent extended to and covered the use of oils in amounts equal to any and every fraction of 1% on the ore. Pursuant to this decision, the District Court of Montana entered its decree on July 19, 1919, issued a permanent injunction against the Butte and Superior, and held it to account for all profits made by reason of its infringement. This accounting was set for October 27, 1919, but extended to December 1. In its report filed with the U. S. District Court, B. & S. suggested to M. S. the sum of $451,097 for infringement, this not being an admission of the amount saved by flotation, but as an aid in the accounting. Objections however were filed by M. S. and a new accounting to show production figures, selling contracts, and smelter returns, was ordered for submission on May 18, 1920. At the end of 1921, this case had not reached a settlement.

On September 8, 1919, the U. S. Circuit Court of Appeals at San Francisco dismissed an appeal of the Butte and Superior Mining Co. v. Minerals Separation. The appeal was against certain provisions of the decision of Judge George N. Bourquin at Butte in September, 1917. In January, 1920, M. S. brought contempt proceedings against B & S., alleging disregard of injunction. On June 1, the U. S. District Court, Judge Bourquin, dismissed this action, holding that B. & S. was not using less than 1% of oil on the ore, as alleged by M. & S.

Geology: the claims cover several thousand feet along the course of the big Rainbow lode, which cuts through granite and forms the northern

boundary of the known, productive area of Butte. The ore consists of an intimate, fine grained mixture of zincblende, galena and small quantities of pyrite and chalcopyrite occurring with gangue material, mostly quartz, silicified granite, rhodochrosite and rhodonite as replacement of the granite. The ore forms parallel or branching ore shoots ranging in thickness from narrow stringers up to orebodies as much as 100′ wide within the limits of the broad general zone of mineralization forming the Rainbow Lode. Near the surface the commercial ore consisted principally of silver ore, which was mined in the early days of Butte mining. The commercial zinc ore shoots as developed during recent years occur downward from approximately the 500′ level, and increased in horizontal area and in importance as greater depth was gained. Ore blocked out ready for mining is normally maintained at about one million tons, greater development than this being inadvisable owing to the difficulty in maintaining developed drifts and crosscuts for any considerable period before actual mining operations are to be conducted.

The ore varies from 10% to 30% zinc, averaging about 18% zinc, 1.25% lead, 0.2% copper, 8 oz. silver and 30c. gold. The small amount of iron, lead and copper contents permits of the production of a good grade of zinc concentrates, but the very fine dissemination of the mineral requires fine grinding for efficient concentration, and most of the zinc mineral is afterwards recovered by oil flotation. The silver content decreases slowly with depth, but thus far the zinc ore continues clean and without appreciable pyrite.

Development:

Year	Total footage	Shafts feet	Total miles workings	Ore reserves tons	Zinc %	Silver o.z
1920.....	16,981*	858	36	422,100	15.5	5.50
1919.....	21,069	.....	33	263,300	16.7	5.70
1918.....	33,459	950	29	830,000	17.0	5.70
1917.....	17,730	724	23	1,059,200	17.6	5.90
1916.....	21,838	2,649	20	1,044,850	17.7	5.65

*Exclusive of 856′ of drilling.

Reserves at end of 1919 showed a decrease of 25% due to loss of ground by adverse decision in the Elm Orlu case and not to any diminution of orebodies. A further decrease in 1920 was due to restricted development.

There are three shafts—No. 1 is 2,030′ and No. 2 is 2,300; No. 3 which is 2,600′ deep, is the new main or working shaft. It has concrete skip-pockets on 1,200, 1,300, 1,400, 1,500, 1,600, 1,700, 1,800 and 1,900′ levels. Ore occurs in heavy ground with frequent fault seams and slips, and there is considerable movement as a result of ore extraction. These facts necessitated sinking a new shaft. All 3 shafts are well protected by concrete and cement coating. On the 1,200′ station of No. 2 shaft electrically-driven quintuplex pumps handle the mine water. The main ore-shoot has been opened continuously for 2,000′ E of the ground in dispute with the Elm Orlu. No. 3 shaft is to be sunk to 3,050′.

While the property was shut down a considerable amount of development work was completed on the zinc ore reserves. This development work has resulted in the uncovering of what promises to be one of the **most important copper mines discovered in the Butte camp for a series of years.** On the 2,000′ level B. & S. ran into copper ore while crosscutting north, of sufficient value to warrant further investigation. A vein of ore 8 to 10′ wide was opened up on the 2,200′ level for over 300′ and averaging in excess of 5% copper with approximately 7 oz. silver to the ton. The same vein has again been opened up on the 2,600′ level and at this point the ore is 18′ wide with an average of better than 5% copper and approximately 6 oz. of silver. If drifting on the 2,600′ level discloses a body of ore of the same size as on the 2,200′ level, Butte and Superior will be justified in concluding that it has in

sight the making of a very important copper producer. This would, of course, be in addition to its present zinc properties, the operation of which was resumed Jan. 1922, after shutdown of 13 months.

Equipment. at main shaft is a Nordberg hoist designed for an ultimate depth of 5,000', hauling at 3,000' per minute, driven by a 2,000 h. p. Westinghouse motor, employing the Ilgner and Ward-Leonard systems of balance and control; electric locomotives underground; movable Sirocco fan and motor for fire or gas purposes; compressors, complete machine-shops, coarse-crushing plant at No. 3 shaft, and 1,800 ton mill using gravity concentration and flotation. Normally, 430 men are employed in surface operations.

Part of the concentrates are sold under contract to the American Zinc, Lead & Smelting Co., and U. S. Smelting Co. under a toll basis, though small quantities have been disposed of by sale to various zinc retort smelters throughout the country or to the Anaconda Copper Mining Co. for treatment at its electrolytic plant at Anaconda.

Production: figures for the production of the property prior to 1913 are not available, but the results of operations since that time are as follows:

Year	Tons Milled	Oper. Cost	Tons Concts.	Assay Con.,%	lb. Zinc in Concts.	Zinc Rec.	Aver. % Pr. c.	Net Incl	Profit per share
1920.....	334,919	$9.80	81,836	53.18	87,037,776	94.98	7.91	$ 187,929	$0.65
1919.....	403,.436	9.03	104,198	54.36	113,287,464	95.53	7.14	864,990	2.98
1918.....	468,814	11.23	135,543	51.22	139,522,506	92.97	7.58	628,348	2.16
1917.....	461,953	9.95	138,661	47.36	132,036,735	91.13	8.73	2,347,496	8.08
1916.....	627,370	6.93	171,747	52.87	181,624,842	93.10	12.03	8,873,446	30.57
1915.....	522,300	5.76	158,171	53.61	165,382,921	93.00	12.34	9,125,947	33.47
1914.....	327,210	5.33	101,383	53.16	108,644,120	88.71	5.04	1,417,128	5.21
1913.....	296,940	5.70	106,443	49.00	102,997,916	88.43	5.52	942,988	3.47

This table does not give the lead, copper, and silver in concentrate, which in 1918 amounted to 11,956,951 lb., 1,293,313 lb., and 2,781,394 oz., respectively.

In 1919, these were 9,871,013 lb., 1,019,866 lb., and 2,254,485 oz.; also 3,634 oz. gold; and in 1920, 6,257,506 lb., 722,745 lb., 1,593,319 oz. plus 2,806 oz. gold. In the latter year, 1,150 tons of lead concentrate were produced yielding 22,558 oz. silver and 940,580 lb. lead and 221,695 lb. zinc.

All operations, save development, were suspended Nov. 10, 1920, and were not resumed until Jan. 16, 1922. Reported that 7,000,000 lb. of zinc will be purchased monthly by Anaconda C .M. Co.

Butte-New York Copper Co.

Controlled through stock ownership by Butte and Superior Mng. Co.

General office: 25 Broad St., New York.

Officers: M. M. Ferguson, pres.; R. J. Schaefer, v. p.; W. G. Sargant sec.-tres., with L. B. Hollaway, Philip Lawrence, G. M. Minton and A. J. Ronaghan directors. Annual meeting 2nd Monday in January.

Inc. Oct. 17, 1906, in South Dakota. Previously a holding company controlling over 95% of the capital stock of the Butte-Milwaukee Copper Co. In 1914 it purchased all the assets of that company. **Cap.** authorized $1,100,000; outstanding, $582,172; par $1; decreased, April 16, 1915, from $4,000,000, with shares at $5 par. The Butte and Superior Mining Co. owns $330,435 of the stock. Stock transferred at company's office. Registrar: Empire Trust Co., New York.

Bonded debt: $150,000 first mortgage convertible income gold 6s; dated June 1, 1916; due June 1, 1925; int. J. & D. (up to and including June 1, 1920, interest is payable only out of income at rate of 6%, but is cumulative for that period; thereafter interest will be paid unconditionally). Coupon, $100 $500, and $1,000. Authorized, $500,000. The unissued bonds are reserved for future requirements. Convertible at any time prior to maturity into stock of the company at par. Subject to call on and after June 1, 1918, at

105 and interest. First offered (150,000) to stockholders of record April 19, 1915, at par, on the basis of $100 bond for each 400 shares of stock held. Normal income tax deducted from interest.

Property: 4 claims, patented, known at the Pollock, Colonel Sellers, Florence, and Bird, in Summit Valley district, Silver Bow county, adjoining Butte and Superior, on the N., and 3 claims in the Argenta district, Beaverhead county, aggregating 53 acres.

The Colonel Sellers claim has a promising surface showing with strong persistent quartz veins in granite. The Butte and Superior completed the sinking of the 1,200′ Milwaukee shaft on Colonel Sellers claim and connected it by a crosscut with 1,200′ level of Black Rock mine. This work was continued beyond the Colonel Sellers shaft so as to open the Mastodon vein on the Florence claim. The Milwaukee shaft is well equipped with power plant and hoist. The Butte and Superior Co. spent $24,000 in development work on the Butte-New York property, for which it received 205,000 shares of the capital stock of that company.

Surface outcrop on Bird claim is 100′ wide and resembles outcrops of the typical fault veins of the district.

The Pollock mine has 4 veins, 2 more or less developed by a short tunnel and a 730′ three-compartment shaft. A silver vein was opened on the 300′ level and mine is said to have produced, years ago, about $400,000 worth of ore, with values mainly in silver and gold, from above the 200′ level. A little ore running 2% copper and 15 oz. silver per ton, with small gold values was produced, 1906 Drilling 698′ during 1919 did not reveal any payable ore.

North Butte Extension Development Co.

Controlled through stock ownership by Butte and Superior Mining Co. **Office:** 25 Broad St., New York. **Mine office:** O'Rourke Estate Bldg., Butte, Mont.

Officers: H. G. Bell, pres.; A. J. Ronaghan, sec.; with I. A. Heilbronner, Elbridge L. Adams, David Angus and C. W. Peters, directors.

Inc. Oct. 10, 1908, in Maine. **Cap.** $1,500,000; shares $1 par; issued, $1,349,036. Is a reconstruction of the North Butte Extension Mng. Co. A controlling stock interest of $870,040 was sold, March, 1910, to the Butte and Superior Mng. Co. Annual meeting in September.

2,000 shares (with a lot of other companies shares) sold for $210 the lot at public auction in New York on Dec. 16, 1920.

Suit was instituted by the Butte and Superior interests against the promoters of the North Butte Extension Development Co. to recover shares of stock claimed to have been illegally issued and a proposal to return 50,000 shares was made and accepted by the company.

Apparently, the company's only present property is the Overman claim, the Black Crow fractional claim of 2½ acres and the Clipper and Assay mill sites.

Development: by a 700′ shaft.

Most of the ground for which the various North Butte Extension companies were organized was held only under options which were forfeited. The Occidental claim was developed by a long crosscut from the Butte and Superior shaft, but nothing of importance was found and after payments of $90,000 the claim was abandoned. Much of the original ground held by the company is now owned by the Rainbow Development and Butte and Superior companies.

According to the contract with the Butte and Superior, the latter company drove a crosscut on the 1,200′ level through the Four Johns claim and through the entire length of the Overman claim belonging to the North Butte Extension Co. The total exploration E. of the 1,221′ crosscut of the Butte and Superior was 3,318′ after which work was abandoned at the property. No work was done in 1920.

BUTTE & ZENITH CITY MINING CO. **MONTANA**

Inactive. Wm. D. Gibson, mgr., Hirbour Block, Butte, Mont. Fully described in Vol. XIV, Mines Handbook, which see.

BUTTE-ARGENTA COPPER CO. **MONTANA**

Probably dead. See Vol. XII.

BUTTE-BALLAKLAVA COPPER CO. **MONTANA**

Address: Sherwood Bldg., Duluth, Minn. Carl Zachow, sec.-treas. The property of this company was sold at foreclosure sale Oct. 2, 1920 and bid in by bondholders, who transferred it to the **Silver Butte Mines Corp.** The bondholders waive interest, and are to get half of face of bonds in cash, payable in 18 months and balance in Silver Butte stock at par. Stockholders were permitted to exchange their stock, share for share by paying 50¢ a share for all stock held. The Ballaklava Co. is without any holdings or property and stock valueless. See Vol. XIV for description.

BUTTE BULLWHACKER MINING CO. **MONTANA**

Office: Hennessey Block, Butte, Mont.

Officers: A. Frank, pres. and gen. mgr.; H. I. Wilson, v. p.; H Frank, sec.; D. J. Fitzgerald, treas.

Inc. Oct. 24, 1914 in Washington. **Cap.** $1,000,000; $1 par; assessable; all issued. Annual meeting, second Monday in January, at Butte. Security Transfer & Register Co., New York, transfer agents and registrar. Listed on New York Curb. A dividend of 1c. per share was paid Oct. 25, 1917.

Property was leased for one year to East Side Mining Co., incorporated, by I. A Heilbronner and Patrick Wall, April, 1916. Lease called for royalty of 25% and shipments of not less than 1,000 tons a month. Controlling stockholders also gave an option on 51% of entire stock at 50¢ a share, payments in 30 and 90 days and at intervals for 18 months.

Company is a reorganization of the Bullwhacker Copper Co., whose stockholders received share for share in the new company on payment of 15c. a share in six months' installments. This wiped out a debt of $121,200 due the sons of Patrick Clark (Clark Bros. & Klein) and put $20,000 in the treasury. Mine was profitable when leased, but ran into debt for an experimental leaching plant. The **Mines Operating Co.** secured control by buying three-fifths of East Side stock at 75c. per share.

Property: one claim, 20 acres, on the east side of the Butte district, near the Pittsmont smelter. Easterly part of claim covers a zone of granite impregnated with oxidized copper ores, mined in an enormous open pit 275′ across and 75′ deep, from which 30,000 tons of 4.07% copper ore were extracted by lessees in 1912-13. It is a highly silicious ore.

Development: by an old 300′ shaft with crosscuts beneath the orebody at that level, also several new shafts, proving an extension of the orebody beyond the open pit. The ore body is extensive and, though probably not deep, has a large tonnage from which much money should be made. Deep development is expected to show veins carrying copper sulphides.

Equipment: includes hoist, compressor and a 75-ton leaching plant, which as yet has not been successfully operated (described by P. E. Peterson in "Min. & Eng. World," Oct. 4, 1913, p. 584).

Idle in 1921. See proposed consolidation with **Butte-Duluth Mining Co.**, under that title.

BUTTE-CABLE COPPER & GOLD MINING CO. **MONTANA**

Officers: Louis Feldman, pres.; Nicholas Bossnitz, v. p.; preceding officers, Wm. Henthorne, John Strasser, J. G. Kimball and Dan Kowsky, directors. G. W. Peterson, Anaconda, sec.

Inc: Nov. 21, 1906, in Montana. **Cap.** $1,000,000; shares $1 par.

Property: 6 claims, 4 patented, 15 miles west of Anaconda, near Cable Consolidated Mining Co., show a 3 to 4′ vein carrying about 2′ of commercial ore, giving assays of 11.9% copper, 156 oz. silver and 0.6 oz. gold per ton. Sullivan & Peterson, of Anaconda, offered stock at 15 cts. a share, Feb., 1913, to raise money for patenting claims. Idle at last accounts.

BUTTE CENTRAL COPPER CO. **MONTANA**

A frenzied finance corporation put out by Davison & Co., formerly of Boston, reported out of business, 1922.

BUTTE CENTRAL MNG. & MLG. CO. **MONTANA**

Offices: 27 State St., Boston, Mass.; and Butte, Mont.

Officers: Walter R. McDonald, pres.; William G. Burns, v. p.; Ralph A. Gallagher, treas., with S. S. Carpenter and Harry W. Davis, directors. W. G. Burns, sec.; Carl J. Trauerman, agent and mgr., Butte, Montana.

Inc. Aug. 11, 1914, in Delaware. **Cap.** $750,000; $5 par; all issued. Bonds: $300,000 1st mortgage 6% 30-year gold bonds, all issued. Fifty-one per cent. of the stock is owned by the Butte-Detroit Copper & Zinc Mng. Co., and 66⅔% of the bond issue by the U. S. Manganese Corp. Federal Trust Co., Boston, Mass., transfer agents. Was a promotion of Davison Co., of Boston, Mass. (reported out of business, 1922.)

Property: company formerly owned the Ophir claim, 20 acres, at Butte, once owned and developed by the Butte Central Copper Co.

The Ophir plant and mill were sold by the Sheriff of Silver Bow county, Mont., October 31, 1918, to satisfy an old judgment. It was bid in by the Butte Copper & Zinc Co., a subsidiary of the Anaconda Copper Mng. Co., and not redeemed within the legal period.

BUTTE-CONCORDIA MINING CO. **MONTANA**

Inc. Sept. 8, 1915, in Montana. **Cap.** $50,000; shares 25 cts. **Directors:** G. F. Pitman, G. W. Deniger, G. Widmer, S. V. Wilking, 615 Phoenix Blk., Butte, Mont. E. C. Schwardner, O. J. Olson, Geo. W. Wall, F. A. Kean and Alfred Pearson, all of Butte, Mont.

No further details obtainable.

BUTTE CONSOLIDATED COPPER MINING CO. **MONTANA**

Mine at Corbin, Mont. Idle and apparently waiting for developments in the Bertha mine of the Boston-Corbin Co. to prove this property. See Vol. XI, Copper Handbook.

BUTTE COPPER CO. **MONTANA**

Property operated by **Anselmo Mng. Corp'n.**, which see.

Address: James H. Rowe, pres., 120 West Granite St., Butte, Mont.

Officers: J. H. Rowe, pres.; E. T. Lawler, v. p., Brookline, Mass.; W. M. Hanson, sec., with R. L. Rhule and B. J. Keenan, directors.

Inc. March 29, 1906, in Montana. **Cap.** $1,500,000; $1.50 par. Shares traded on Butte Stock Exchange; 4c bid in 1920.

Property: company owns approximately one-half of the Anselmo, Anselmo No. 2 and Trifle claims, balance being owned by the Hauswirth family. Payments made under bond by Anselmo Mng. Corp'n will be distributed and company dissolved. Fully described in Volume XIV.

BUTTE COPPER CZAR MINING CO **MONTANA**

Address: R. M. Green, or L. P. Sanders, Butte, Mont.

Officers: C. F. Murphy, pres., Anaconda, Mont. John K. Claxton, treas.; E. C. Meiklejohn, gen. mgr., Butte.

Cap. $300,000; shares 25c par. 2c bid, June 21, 1920.

Property: Copper Czar, Sunflower, and Mayflower claims E. of Butte. Examined by A. V. Corry and Morton Webber. In March, 1918, New York people acquired an option on control of shares.

Development: None in 1920. During 1918, work was in charge of Mr. Webber. A station was cut on 300′ level, 510′ of crosscutting done, and 477′ of driving on the vein. In the surface workings the ore-shoot constituted an attractive mining speculation, and its downward prolongation was the crux on which the future possibilities depended. The work done indicated that the shoot did not persist at depth. Highest assays, in spots, were less than 2% copper and 2 to 3 oz. of silver. After this result the New York syndicate dropped its option. A circular issued by the Butte Copper Czar company in

1919, containing proposals for re-financing, is said to contain incorrect statements concerning the work done under Mr. Webber's direction.

BUTTE COPPER KING MINING CO. **MONTANA**

Address: care Beebe Grain Co., Butte, Mont. C. E. Beebe, pres.; A. P. Henningsen, sec. Portland, Oregon.

Inc. April 19, 1906, in Montana. **Cap.** $1,500,000; shares $1.50 par.

Property: 3 fractional claims, 28 acres, known as the Frenchman No. 2, Rare Steak, and Missouri Girl, west of the Jennie Dell mine and north of the Butte Water company's reservoir. Idle since organization.

BUTTE COPPER & ZINC CO. **MONTANA**

Office: 61 Broadway, New York. Mine at Butte, Mont.

Officers: A. J. Seligman, pres.; Albert Fries, v. p.; A. L. Bailey, sec.-treas., with B. B. Thayer, C. F. Kelley, A. H. Melin, M. Eisenberg, and C. A. Wimpfheimer, directors.

Inc. Nov. 22, 1904, in Maine. **Cap.** $2,500,000; $5 par; increased to $3,000,000 July 7, 1917; 600,000 shares issued. Bankers Trust Co., New York, transfer agent; Liberty National Bank, New York, registrar. Annual meeting, first Wednesday in April. Listed on N. Y. Stock Exchange. Shares $11½ high, $¼ low in 1920; compared with $17 and $5⅛ in 1919.

Financial statement for year ended Dec. 31, 1920 showed: income from sale of 126,359 tons of ore, $517,844; interest, $23,109; total receipts, $540,953; total expenditures were $81,835; surplus for year, $459,118. Assets include: investments, $443,750; cash, $377,742; acc'ts. receivable, $125,257; liabilities: acc'ts. payable, $8,669; reserved for depreciation, $40,000; surplus, $1,111,576.

An initial dividend of 50c., $300,000, paid July 30, 1918.

Property: the Emma mine, 13 acres, and other claims totaling 80 acres in the Butte district, 1½ miles from the main properties of the Anaconda company. Mine was originally developed to 800′ level, but due to low copper and relatively high zinc content of the ore, was idle for several years. Development resumed by Anaconda Mining Co. by virtue of a 12-year option and lease, dated July 6, 1917. The Anaconda Co. agreed to install equipment and to unwater mine to the 800′ level. For expenditures actually made by the A. C. M. Co. in developing the Emma mine, the Butte Copper & Zinc Co. agreed to make payment in its capital stock in lots of 10,000 shares or fractional parts thereof, but total payment to the A. C. M. Co. for work and equipment shall in no case exceed 50,000 shares of Butte C. & Z. Co. stock. The A. C. M. Co. has a right to abandon the leased premises if it finds working them impractical, or impossible, in which event all machinery or equipment installed and permanently attached to the Butte property shall belong to that company. Anaconda now owns 217,040 of the 600,000 shares issued.

Development: aggregates several thousand feet from a 1,000′ shaft with levels at 200′, 400′, 500′, 800′ and 1,000′. The 1,000′ level has opened over 300′ of ore.

The Emma mine is in the heart of the city of Butte, and as transportation facilities were poor, a crosscut was driven 2,500′ south from the 1,800′ level of the Gagnon mine of Anaconda to connect with and develop the Emma orebodies. During 1918, rich zinc ore was opened, also considerable rhodochrosite (pink manganese), which was much in demand, and enhanced the value of the mine. The manganese workings are kept open, as the ferro-manganese made at Great Falls may eventually be sold as far east as Chicago. Reserves in Dec., 1917, amounted to 383,300 tons of zinc ore and 930,000 tons of manganese ore. The depletion of reserves and their low grade was offset by the ore opened on the 1,000′ level which is reported to be one of the best silver-zinc-lead bodies opened by Anaconda on this property.

Production: in 1918 was 32,293 tons of zinc and 71,364 tons of manganese ore. In March, 1919, ore extraction was at rate of 2,000 tons of 15% zinc and 7 oz. silver ore per month. The mine was closed from August to December, 1919; the total output for the year was 35,369 tons of zinc ore.

containing 10,027,165 lb. zinc, 4,346,653 lb. lead, and 260,580 oz. silver. During 1920, the mine was worked at full capacity, until January, 1921, when the Anaconda's ferro-manganese plant was shut down.

Polaris mine.

Glen Anderson, mgr., 46 E. Broadway, Butte, Mont.

The company also owns this property, a well known mine, once a good producer, in Beaverhead county, near Polaris P. O. The ores carry silver and copper and the property has a 200-h. p. steam plant. Idle for many years.

BUTTE-CURTIS & MAJORS COPPER MINING CO. MONTANA

Address: Geo. D. Curtis, 35 W. Granite St., Butte, Mont.

Company organized upon a lease and bond to purchase the surface and mineral rights of the Curtis and Majors addition to the city of Butte, the bond price being $125,000. The company went bandrupt and in 1917 owed about $700 labor claims. There are no legal assets and having defaulted on bond payment past due, the company has no rights thereunder, save the sentimental courtesy extended by John Curtis and associates, who would like to see the company rehabilitated and refinanced. Idle at last accounts.

BUTTE-DEER LODGE MINING CO. MONTANA

Address: Phoenix Bldg., Butte, Mont.

Officers: W. L. Hugo, pres.; Simon Bank v. p.; J. R. Davenport, sec.-treas., with E. F. O'Flynn and Dr. S. Herman, directors.

Inc. May, 1916, in Montana. **Cap.** $300,000; $1 par; all issued. Annual meeting in June.

Property: 11 claims, 7 patented, 200 acres, 9 miles S. E. of Deer Lodge and 28 miles N. of Butte. Former owners are said to have received over $2,000,000 in dividends.

Development: a 1,400′ incline (35°) shaft follows the ore to the bottom, no crosscuts having been driven. Water, in May, 1919, stood at 600′. Sampling above this level shows 1,000 tons of over $10 silver-gold ore and dump is said to contain 100,000 tons, that average $4.10 per ton, with silver at 56 cents an ounce.

Equipment: steam hoist, 1,000 cu. ft. air-compressor, mine pump, and concentrator.

Property has not been operated since 1917, when tests were made to devise suitable treatment. A concentration of dump ore, 12 into 1, gave a product worth $40 per ton, with silver at 68 cents. A flotation plant and electric power are contemplated.

BUTTE-DETROIT COPPER & ZINC MINING CO. MONTANA

Letters returned in Dec., 1920 (unclaimed from the Dime Bank Bldg., Detroit, Mich.

Officers: J. F. Austin, pres.; Ellery C. Wright, v. p.; Josiah S. Pishon, treas.; W. G. Burns, sec., Boston, Mass. Directors: Walter Colson, Charles A. Wilcox, Ralph A. Gallagher, Brigadier-General Henry M. Pellatt, James E. Simpson, Willard N. Morrison, Joseph Reriham, mgr., and Montana agt.; Carl J. Trauerman, engr., Butte, Montana.

Inc. March 7, 1916, in Delaware. **Cap.** $2,500,000; $1 par. Transfer agent, Federal Trust Co., Boston, Mass., and United States Corporation Co., New York. Registrars, State Street Trust Co., Boston, Mass., and Equitable Trust Co., New York.

Company owns 51% of the Butte Central Mng. & Mlg. Co. The U. S. Manganese Corp. owns 51% of the shares of Butte-Detroit Copper & Zinc Mng. Co., and has an agreement with shareholders of the latter company to exchange their shares for common stock of the U. S. Manganese Corp. It is probable that U. S. Manganese will eventually own all stock of the Butte-Detroit company.

This is another Davison & Co. promotion, now probably defunct. The above agreement, if carried out, would make Butte Detroit a subsidiary without property or business.

BUTTE-DULUTH MINING CO. **MONTANA**

Office: Chas. M. Everett, receiver, Lewisohn Block, Butte, Mont.

Officers: A. B. Wolvin, pres.; C. M. Everett, sec.-treas., with Meyer Genzberger, Al Green, John W. Neukom, directors.

The property is under lease to Mines Operating Co., of Butte, controlled by Alfred Frank and associates, for 5 years, and was operated until May, 1921, producing about 250 tons of 1.7% ore daily.

Inc. in Minnesota. **Cap.** $2,500,000; shares $10 par; 200,000 issued, balance held for redemption of $500,000 bond issue, on which interest is overdue since Dec., 1914 and sinking fund provision not fulfilled. Company went into receiver s hands on friendly suit, March 16, 1915. Receiver's report shows $42,368 liens ahead of bonds and a floating debt of about $190,833 unsecured. The prior lien is mostly for labor certificates ($39,000) issued in half payment of wages in 1914. Bankruptcy proceedings instituted in March, 1915, were set aside by the Federal Court, Sept. 29, 1915.

Property: Brundy group, at the base of the mountains east of Butte, includes the Macarona, Montgomery, and portions of the Altona, Colleen Bawn, and Amazon claims. These claims aggregate 67 acres and are crossed by the Columbia Gardens street car line and adjoin the Pittsmont mine on the southeast.

The ore thus far mined has come from open-cut work on the hillside back of the mill. This ore is an altered granite stained green and impregnated with silicate of copper with carbonate and oxide of copper in nests and bunches. As mined in the cut it has carried a little over 1.5% copper and with a mechanical loader can, it is said, be put in the mill for 15c a ton.

Development: underground is mainly on the Montgomery claim on which there is a tunnel 1,200′ long and a 200′ shaft, the latter with extensive workings at 100′. The main ore body on Altona hill, to the east of the street car line, has several tunnels, proving the downward extension of the ore on the property.

Equipment: included a $725,000 mill, now largely dismantled, which treated the oxidized ore, but was not a commercial success.

The property has merit and aside from its leachable ores has a decided prospective value in the veins at depth of 1,000′ below the surface.

In bankruptcy proceedings the former superintendent, Mr. Sherwood, said the mill ran an ore averaging 1.52% copper for 4 months before it was shut down, and that drill cores to a depth of 202′ from the bottom of a 23′ pit ran 0.98% to 2.70% copper. With acid at $12.50 per ton, a saving of 38¢ per ton could be made in leaching costs.

Production in February, 1915, was 120,000 lb. electrolytic copper and 30,000 lb. of cement copper. In 1918, the daily output was 175 tons of ore containing 1.75% copper which was sent to the leaching plant of the Anaconda company. A year later the quantity was 250 tons averaging 2%.

The Royalties from a lease to the Mines Operating Co. were expected to pay off all indebtedness and put company on its feet again.

In January, 1921, a consolidation with the Bullwacker was proposed by a committee of Butte-Bullwhacker stockholders and Butte Duluth bondholders, who plan a new company, with capitalization of $2,500,000, par $10, to be exchanged at par for $500,000 Butte Duluth bonds, and one share new stock for each 20 shares of Butte Bullwhacker stock; 40,000 shares to be sold to net company $160,000, and 10,000 shares to pay off debts of the old companies.

BUTTE EAST SLOPE MINING CO. **MONTANA**

Office: mail returned in 1920 from 619 Daly Bank Bldg., Butte, Mont.

Officers: E. P. Lomas, pres. and mgr.; M. F. Lyth, v. p.; C. B. Lomas, sec.-treas.; also directors.

Inc Jan. 28, 1916, in Montana. **Cap.** $500,000; $1 par. Annual meeting last Tuesday in January.

Property: 5 claims, 3 patented, 100 acres in Jefferson county, on E. side of range next east of Butte.

Geology: the country rock is granite and the vein formation is of the quartz-pyrite type. Ore carries gold and silver, with copper showing at depth. At 90′ in depth vein is 23′ wide and assays $6.10 per ton.

Development: started in 1919, consists of a 185. vertical shaft, which was to be sunk to 500′, a crosscut driven at 250′, and hoist erected.

BUTTE EXEMPTION COPPER CO. **MONTANA**

Officers: James H. Lynch, pres.; John A. Poore, v. p., Butte Mont.; with W. F. Love, M. J. Cavanaugh, T. P. Poore, and J. D. Crossman directors.

Inc. in Maine. **Cap.** $2,500,000; $1 par; $2,010,000 issued.

Property: consists of undivided ¾ interest in the Canyon, Colleen Bawn, Exemption, and the entire interest in Mountain Spur lode claims, approximately 56 acres, situated in the Eastern part of the Butte district, Silver Bow county.

Company has been inactive for a number of years.

BUTTE HERCULES MINING CO. **MONTANA**

Address: Geo. de Snell, sec., No. 1 North Montana St., Butte, Mont. Stock listed and quoted at 1c a share on Butte Public Stock Exchange. Is a dormant corporation, fathered by Passmore & Co., of 25 W. Granite St., Butte.

Property: 4 patented claims in the zinc-silver area on the western edge of the Butte district, near Rocker.

BUTTE HILL COPPER MINING CO. **MONTANA**

Address: Harry A. Frank, sec., Daly Bank Bldg., Butte, Mont.

Officers: Maurice Eisenberg, pres., 61 Broadway, New York City; J. W. Murphy, v. p., with Duncan MacRae, W. P. Cary, W. H. Hall, Thos. Driscoll and John S. Davies, directors.

Inc. April 18, 1906, in Montana. **Cap.** $5,000,000; $5 par; $2,950,000 issued. Annual meeting, fourth Saturday in January.

Property: 11 patented claims, 173 acres, in an undeveloped district in granite area, north of Walkerville. Has a 200′ shaft, cutting a vein of 40′ estimated width, showing stringers and bunches of ore assaying up to 4% copper and 19 oz. silver per ton. Has not been worked for several years and power plant is dismantled. Property is well located, has strong veins, and is much nearer developed ground than it was when operating.

BUTTE-JARDINE METALS MINES CO. **MONTANA**

Offices: 50 Broad St., New York City, and 33 W. Granite St., Butte, Mont.

Officers: W. H. Nichols, pres.; M. W. Acklemire, v. p.; L. M. Harley, sec.; D. E. Nichols, treas., with H. W. Barry, directors.

Inc. Jan. 10, 1917, in Montana. **Cap.** $250,000; shares 25c par; 600,000 shares issued.

The company was promoted and stock sold by W. H. Nichols & Co., New York.

Property: 11 claims, at Jardine, Park county, said to have over 1,600′ of workings exposing gold-bearing veins that vary from 2′ to 36′ wide, and occur in pre-Cambrian schistose rocks. Property includes the Champion silver mine.

Development: by tunnels and several thousand feet of workings. Work is mainly at the Champion, where an ore shoot over 350′ long has been opened. It averages 5′ in width and carries 18 oz. silver, and $1.50 gold per ton. The 600′ level revealed a very rich shoot during 1920. Reserves to a depth of 600′ are said to equal 3 years supply for the mill.

Equipment: includes electric power, 6-mile transmission line, transformer, compressor, head-frame, hoist, 150-ton flotation mill (completed early in 1921), shops, 60-man bunkhouse, sawmill, and 40 men.

Production: shipments to Anaconda, from June to Sept., 1920, totaled $16,000. A sample lot yielded 72.6 oz. silver and $4 gold per ton.

BUTTE-KNICKERBOCKER CO. **MONTANA**

Address: G. B. Conway, Helena, Mont.

No business done sine 1907, as property reverted to original owners on account of failure to make deferred payments.

BUTTE LODE EXTENSION MINING CO. **MONTANA**

Address: care C. J. Kelly, treas., 805 W. Broadway, Butte, Mont.

Officers: Chas. S. Warren, v. p.; John M. Murphy, sec.

Inc. April 28, 1906, in Montana. **Cap.** $500,000; shares $1 par.

Property: 4 claims, known as the St. Angus group, 12 miles N. E. of Butte, has a 150′ shaft with a crosscut showing 2 veins. Idle at last accounts.

BUTTE MAIN RANGE COPPER MINING CO. **MONTANA**

See **Tuolumne Copper Co.**, which controls and operates the Butte Main Range property.

BUTTE METALS MINING CO. **MONTANA**

Address: Room 811,25 Broad St., New York City.

Inc. 1919, in Montana. Is controlled by Hayden, Stone & Co.

Property: claims in S. E. part of Butte, S. of the Davis-Daly mine. The 200 acres include the Otisco, Mary Louise, Syndicate, Railroad, Curtis & Major, and Alliance. In the Otisco workings 4′ of ore was found on one wall of the vein and 6′ on the other at 200′ depth.

During 1920, Butte and Superior Mng. Co. arranged to develop the Mary Louise and Otisco claims, receiving stock in payment; and a shaft was sunk on the former. Results were unfavorable, lease on the Otisco was abandoned, and all work was suspended in July, 1920. Idle in 1921.

BUTTE-MILWAUKEE COPPER CO. **MONTANA**

Assets sold 1914 to Butte-New York Mng. Co. a Butte and Superior subsidiary, for $500,000. Shareholders were obliged to exchange their stock at the rate 2½ old for 1 new share, or 30c cash per share. Company paid a liquidating dividend of $0.3278 per share in July, 1914, and is in course of dissolution. Fully described under Butte-New York Mining Co.

BUTTE MINE EXPLORATION CO. **MONTANA**

Officers: Clinton C. Clark, pres., 408 West Granite St., Butte, Mont.; C. P. Connolly, sec., at last accounts. **Inc.** 1901. **Cap.** $250,000; shares $1 par.

Is no relation to the company of same title formerly holding the Six O'Clock property, in Butte, or to the Butte Mines Exploration Co., formerly having property at Tecoma, Box Elder Co., Utah.

Property: the Pacific quartz lode claim, on which considerable work was done, 1901-02. Company practically defunct, but property was reported under option to the North Butte Mining Co.

BUTTE-MINNESOTA MINING CO. **MONTANA**

Officers: Peter E. Peterson, pres.; Angus McLeod, Butte, Mont.; William Vuoti, J. E. Portham, A. W. Havela, John Kukko, Emmanuel Autio, John Lampi, Ade Herranen, directors.

Inc. June, 1912. **Cap.** $750,000; shares $1 par.

Property: 6 claims, about 1 mile south of Rocker, at the western end of the Butte district. Ground shows well-defined veins, 1 of which is traceable for 3,000′ across the surface. Country rock is granite, and part of the same mass as that in which the Butte deposits occur.

Development: 400′ tunnel on the vein and an incline shaft 35′ deep sunk on the vein disclosing well-defined walls, 6′ apart, from which ore has been taken carrying 0.5% copper, 8% lead, 12 oz. silver, and $28 gold, per ton. The property is equipped with a gallows frame, boilers and hoist.

Late in June, 1913, the company bought a group of mining claims in the Wolf Creek district, 40 miles east of Helena, Mont. Reports stated that development on these claims shows more than 100,000 tons of ore assaying

4 to 25% copper blocked out. A mill was to be built, but company has not reported any recent work.

BUTTE MONITOR TUNNEL MINING CO. **MONTANA**

Address: care C. J. Kelly, Daly Bank & Trust Co., Butte, Mont. Described in Volume XIII.

Reported 1919 that mine was purchased by **North Butte Mining Co.**, which see.

BUTTE-NEW ENGLAND MINING CO. **MONTANA**

Property: a fractional claim in the Davis-Daly tract at Butte. In May, 1919, development was under way on the 150′ level, where good silver-copper ore was being opened, but work was suspended in August, possibly because the Davis-Daly might claim apex rights.

BUTTE-NEW YORK COPPER CO. **MONTANA**

Subsidiary of the **Butte and Superior Mng Co.**, which see.

BUTTE RAMSDELL COPPER MINING CO. **MONTANA**

Office: Room 22 Hirbour Bldg., Butte, Mont.

Officers: Henry Meloy, pres.; J. D. Pope, v. p.; J. A. Henshaw, sec.-treas.; Hugh Smith, supt.

Inc. Sept. 17, 1917, in Montana. **Cap.** $300,000; $5 par.

Property: 64 acres owned and 25 acres leased from Davis-Daly in southeastern part of Butte district. Ore carries gold, silver, copper, and zinc.

Development: by 300′ shaft. New work in 1919 amounted to 1,240′.

Production: in 1918, averaged over 30 tons of ore daily. This ore carried from 1½ to 7% copper and 5 to 8 oz. silver per ton. In September, 1919, the daily output was a car of 10% ore.

During 1920, the Davis-Daly company arranged to mine the 6′ of 20% ore revealed at a depth of 2,500′ in the Ramsdell claims, on a profit-sharing basis.

BUTTE STANDARD COPPER MINING CO. **MONTANA**

Address: care H. G. Klenze, Box 377, Butte, Mont.

Officers: H. G. Klenze, pres.; A. M. Stephens, v. p.; J. W. MacLane, sec., Butte, Mont., with J. L. Templeman and H. H. Griffith, directors.

Inc. in Montana. **Cap.** $1,000,000; shares $1 par; 350,000 shares in treasury. Stock being offered at 12½c, August, 1917.

Property: 2 claims in the northern outlying section of the Butte camp and 2 patented claims at Amazon, Jefferson county, Mont., both partly developed and said to carry commercial orebodies. Selling stock in 1917. No news since.

BUTTE-SUMMIT COPPER CO. **MONTANA**

Presumably idle, as mail was returned in 1920 from 818 Hornet St., and Excelsior Ave., Butte, Mont.

Officers: Ed. A. Blomgren, Geo. P. Arnold and Wm. H. Smith, all of Lewistown, Mont., directors, at last accounts.

Inc. April, 1916, in Montana. **Cap.** $3,000,000; shares $10 par.

Property: the Hornet claim on the Yellow Jacket vein and a second vein 180′ to the south.

Development: by 200′ shaft, with levels at 100′ and 200′. Oreshoot on 100′ level. Yellow Jacket 13½′ wide with 4′ of ore assaying high in lead and silver, with over 20% zinc. On the 200′ level 7′ of commercial ore was opened on the downward extension of shoot cut on 100′ level.

BUTTE VIPOND GOLD MINING & MILLING CO. **MONTANA**

Office: 91 Owsley Bldg., Butte, Mont.

Officers: Jas. M. Hinkle, pres.; Wm. Worth, v. p.; Wm. E. Carroll, sec.; T. P. Manley, treas.; also directors.

Inc. May 14, 1910, in Montana. **Cap.** $600,000; $1 par; all issued. Annual meeting, third Tuesday in May.

Property: 5 claims, unpatented, at Vipond Park, Beaverhead county, 16 miles N. E. of Melrose. Carries a fissure vein, 4 to 8′ wide in granite, ore

containing gold and copper of an average value of $18 per ton. Ore is oxidized to 200', changing to sulphide below that depth.

Development: 200' vertical shaft and 940' tunnel.

Equipment: includes boiler and pump. Little work has been done on mine for some time.

BUTTE & WESTERN MINING CO. **MONTANA**

Address: Jens, Powell Co., Mont.

Property: 13 claims, 8 miles S. of Jens, on the N. P. Ry. The Forest Rose claims show 12' of ore carrying silver, lead, and copper.

Development: by 180' shaft and 450' tunnel. Work was underway early in 1921.

CABINET RANGE MINING CORPORATION **MONTANA**

Address: S. A. Whiting, Libby, Mont. J. C. Langley, pres., Seattle, Wash.

Property: 9 claims, 40 miles S. of Libby, Lincoln county, between Bramble and West Fisher creeks. A stamp mill of 100-ton capacity to be erected.

CABLE CONSOLIDATED MINING CO. **MONTANA**

Office: 52 Silver Bow Blk., Butte. Mont. **Mine office:** Cable, Deer Lodge county, Mont.

Officers: I. M. Fickeisen, H. Terheyden and S. Robinson, directors, Pittsburgh, Pa.

Property: 700 acres, 15 miles west of Anaconda, includes the Cable gold mine, in vicinity of the Southern Cross mine. Worked with varying success since 1870. Mine has produced about $4,000,000 worth of ore, with value mainly as gold, but has auriferous copper ore on the tunnel level.

Equipment: includes steam power, air-compressor and a 30-stamp mill. A reorganization as Cable Mining Corp'n was planned, at last accounts.

CALAMONT COPPER CO. **MONTANA**

Mine office: Norris, Madison county, Mont.

Officers: Walter V. Harrington, pres.; Wm. F. Davis, v. p.; Mark E. Davis, managing director; Hugh J. Leonard, sec.; Thos. F. Hogan, treas.; preceeding officers, Jas. Keller and F. G. Crist, directors.

Inc. Nov. 1909, in Arizona. **Cap.** $5,000,000; shares $10 par; non-assessable. Apparently is connected in management with the Montana-Hecla Mining Co.

Property: 22 claims, 380 acres, include the Old Colony group, adjoining the Montana-Hecla, 5 miles southeast of Norris, carrying auriferous and argertiferous copper ore.

Development: includes several shallow shafts, with an old 100' 2-compartment shaft on the Big Jack claim, and a 160' tunnel, with about 900' of workings. Not regarded favorably by the late H. J. Stevens. A report on the property made by Reeves Davis, 1911, recommended development of 2 surface outcrops. Mark Davis, former manager, reported to be protecting the property with a view to re-financing the company, at last accounts.

CAPE NOME COPPER MINING CO. **MONTANA**

Office: 1 Dixon Bldg., Missoula, Mont. **Mine office:** Clinton, Mont.

Officers: Edw. Donlan, pres.; F. H. Woody, v. p.; H. T. Wilkinson, sec.-treas.-gen. mgr.; with A. L. Coffey, directors.

Inc. Nov., 1906, in Montana. **Cap.** $1,000,000; shares $1 par; issued, 924,000. Annual meeting, first Monday in June.

Property: 3 claims, patented, 40 acres, adjoining the Aladdin Mining Co., show 4 fissure veins in granite 1 of 8' average width, traceable 800', being opened by 500' double compartment, vertical shaft, and 4 crosscut and 5 drift tunnels, with 3,750' of workings.

Equipment: includes two 60-h. p. boilers, a 40-h. p. hoist and a 12-drill air-compressor. There are 6 buildings.

The mine considered promising though idle for several years. Efforts were being made in 1919 to resume operations, but evidently without success.

CARBON HILL MINING & MILLING CO. **MONTANA**

F. S. Earnest, Spokane, Wash., chief owner.

Property: 9 claims, in the Grass Valley section, 1 mile north and west of Fort Harrison, Helena, shows a vein for 2,300'.

Development: by 250' incline shaft, to be sunk to 400' at last accounts, showing 5½' of carbonate ore and galena, said to assay $48 per ton. Value is chiefly in the gold content. A 15' shaft with 20' drift, shows a 9' vein of carbonate ore said to assay from $23 to $111 per ton. Has a 60-h. p. gasoline hoist.

Two carload shipments yielded $23 and $11 per ton respectively.

CASCADE CONSOLIDATED SILVER MINES CO. **MONTANA**

Address: William Creden, 1st Natl. Bank Bldg., Butte, Mont.

Company has a lease until Oct., 1923, on the property of the **Cascade Silver M. & M. Co.**, which see for description.

CASCADE SILVER MINES & MILLS **MONTANA**

Address: H. G. Palsgrove, mgr., Neihart, Mont.

Officers: G. Hale Brabrook, pres.; Lowndes Maury, v. p.; W. R. McLure, sec.; W. P. Wren, treas., with J. C. Fairchild, W. L. Creden, and Paul A. Gow, directors.

Inc. Jan., 1918, in Montana. **Cap.** $1,000,000; $1 par; 800,000 issued. Annual meeting in January. Cash on hand, April 1, 1919, $53,318. A note issue of $100,000, bearing 8% was offered in Aug., 1920. Profits were about $40,000 monthly during the operating period of 1920.

Property: 10 patented claims, include the old Moulton mine, the Broadwater group, the Rochester mine, and the Empire claims, at Neihart, Mont. Examined by W. L. Creden and Paul A. Gow. Mining geology of district described by W. H. Weed, in U. S. Geological Survey report on Little Belt Mountains.

Geology: ores occur in fissure veins in gneiss; the veins are 3 to 8' wide, dipping 78° and run N. 18° E. Shoots are from 150 to 200' long. Ore is a complex sulphide, but easily milled, carrying 20 oz. silver, 5% lead, and 3% zinc.

Development: by 600' vertical shaft (to be sunk to 1,500'), and 3,000' tunnel, opening the Moulton to depth of 600 and Broadwater to 1,200. Underground workings total 15,000'. The Moulton was unwatered by April, 1919, and large bodies of milling ore and considerable smelting ore exposed, the latter returning from $1,500 to $2,500 per carload. Ore is mined by back filling system. Reserves comprise 100,000 tons blocked out and 300,000 tons probable ore. During 1920, the 300, 400, 500, and 600' levels revealed considerable ore. The Broadwater tunnel was cleaned out and exploration started in May, 1919. In 1920 the 700' level opened 10' of 150 oz. ore, and the 1,300' level, 10' of 60 oz. ore.

Equipment: 350-h. p. steam hoist, boilers, 1,000 cu. ft. compressor, 200-gal. electric pump, 2 aerial trams, and 200-ton mill with a 5-cell Minerals Separation flotation plant, started February, 1919.

Production: from May 1 to Dec. 31, 1918, 174 oz. gold, 108,629 oz. silver, and 470,000 lb. lead. Ore averaged 75 oz. silver per ton. According to W. L. Creden, there is a large tonnage of ore above the 500' level.

In June, 1919, a suit was started by Paul A. Gow against the other directors to compel them to return the 150,000 shares illegally voted themselves for alleged services.

In Sept., 1920, the State Attorney-General petitioned for an injunction, restraining company from dumping tailings in Belt creek; but this was denied, and the company was awarded costs.

In October the property was leased to the **Cascade Cons. Silver Mines Co.** for 3 years.

In 1920 the mill was operated to June 1, started again Oct. 1, but shut down by injunction proceedings for a month and finally shut down in December. An average monthly yield of $50,000 was maintained while operating.

On October 17th, 1921, a meeting of the stockholders was held for the purpose of increasing the capitalization from 1,000,000 shares to 3,000,000 shares and for the further purpose of issuing to the Cascade Consolidated Company 250,000 shares for the release of their lease on the property and for the further purpose of issuing 800,000 shares in payment for the right to use the Schwartz Zinc Oxide process in Cacade County, Montana. Following this meeting a suit was instituted to prevent the carrying out of this program and the hearing set for January 16, 1922.

CASTLETON COPPER CO. **MONTANA**

Company probably dissolved as property was sold in 1917 for $150,215 to Furnace Creek Oxide Copper Co. See Vol. XIII for description of Castleton Copper Co.

CAYUGA DEVELOPMENT CO. **MONTANA**

Office: 616 Lyceum Bldg., Duluth, Minn. **Mine office:** Divide, Silver Bow county, Mont.

Officers: C. T. Fitzsimmons, pres.; Nels Anderson, v. p.; E. J. O'Rourke, sec.; Max P. Shapiro, treas.; John Helehan, gen. mgr.; preceding officers, Jacob Stein and Jas. L. Norman, directors.

Inc. April 4, 1910, in Minnesota. **Cap.** $150,000; $1 par; issued, 65,000.

Property: 4 claims, 80 acres, in the Fleecer district, 15 miles southwest of Butte, near the Oregon Short Line railway.

Geology: property shows granite with dikes of porphyry, aplite and quartzite, carrying veins with a generally E. W. strike, main vein being estimated to range 50 to 125′ in width, traceable for 2,000′, carrying cuprite melaconite, malachite, azurite, chrysocolla, chalcopyrite, chalcocite and bornite.

Development: by 100′ tunnel, and shafts of 45′, 125′ and 150′, showing ore assaying up to 30% copper, and from a trace to 70 oz. silver per ton. The 125′ shaft has crosscuts of 150′ and 180′, cutting the vein for an apparent width of 30′. The vein at this depth is nearly vertical. Idle, and no work reported done for many years.

CHAMPION MINING CO. **MONTANA**

Office: 313 Missouri Ave., Deer Lodge, Mont.

Officers: Tom McTague, pres.; Dr. H. A. Maillet, v. p.; Miles Blunt, sec.-treas.

An assessment of 10c. a share was levied in July, 1920, and over 80,000 delinquent shares were sold at about 25c. each. Another assessment was levied in September.

There is evidently some connection between the Champion and Butte-Jardine company, as the latter is operating the Champion mine, and exchanged Butte-Jardine stock for the old Champion stock at the rate of seven shares of Champion for one of Butte-Jardine.

Property: the old Champion silver mine, idle for many years until 1920, 16 miles S. E. of Deer Lodge, Powell county, and 6 miles from rail at Race Track.

Development: by 700′ tunnel, with 1,600′ of workings, and 800′ shaft, which are to be connected. Some rich ore has been opened on the 600′ level, and shipments up to 130 tons weekly made late in 1920.

Equipment: includes water power, head-frame, hoist, compressor, and 150-ton stamp-mill.

CHICAGO & ALTA EXTENSION MINING CO. **MONTANA**

Office: H. P. Skiles, pres.; 22 N. State St., Chicago, Ill. F. I. Foote, mgr., Helena, Mont., and Corbin, Mont.

Officers: Dr. H. P. Skiles, pres.; H. H. Ebert, sec., Helena, Mont.; Sheldon Leavitt, treas.; with F. I. Foote, J. E. Smith, E. F. Rinear and Arthur Dole, directors.

Inc. Oct., 1907, in Montana. **Cap.** $600,000; $1 par; $10,000 in treasury.

Property: 2 claims, 36 acres, at Corbin, Jefferson county, adjoining the Boston & Corbin Mng. Co. property on the E., shows fissure veins in

granite. The veins are from 1′ to 10′ thick, averaging about 4′, and carry lenticular shoots of copper, silver and lead ore, reported to assay $48 per ton, as shipped.

Development: by 900′ shaft with crosscuts and drifts cutting 4 ledges on 900′ level. Also has a 1,200′ tunnel. Underground workings total 2,000′

Equipment: 50-h. p. electric hoist and compressor.

All work was done through the Boston & Corbin shaft, crosscutting the entire claim and reported to have cut 5 veins. Ore was milled in the B. & C. concentrator, until it was burned down.

CLARK MONTANA REALTY CO. MONTANA

Address: 20 Exchange Place, New York City.

Is a close corporation, controlled by Hon. W. A. Clark, as a holding company for the Ophir mine, Utah; ½ interest in the Elm Orlu mine, Butte; ½ interest in the Timber Butte Milling Co., Butte, Mont.; Sunset mine, Wallace, Idaho, and in general all the Clark properties in the northwestern States. For litigation with Butte and Superior, see description of that company and Elm Orlu.

COEUR D'ALENE PACIFIC MINES CO. MONTANA

Defunct several years. See Vol. XIII of this book.

COLUSA-LEONARD EXTENSION COPPER CO. MONTANA

Is a subsidiary of the Tuolomme Copper Mining Co.

Officers: W. W. McDowell, pres., 804 W. Park St., Butte, Mont.; Guy Stapleton, v. p.; Meyer Genzberger, treas.; W. E. Reynolds, sec.; with J. Kaufman, directors.

Inc. Oct. 1, 1906, in Arizona. **Cap.** $5,000,000; shares $5 par.

Property: 5 claims, patented, 42 acres, consisting of the Maggie placer, Golden Hematite, Little MacQueen, Undine and Snow Bird placer, about a mile east of the Colusa and Leonard mines, and near the Pittsmont shafts of the East Butte Copper Co.

Development: by 800 three-compartment shaft on the Little MacQueen claim lying about the center of the group, that has cut several small stringers of ore assaying up to 9% copper, but none of commercial size. There is also a 7′ vein of 2% ore carrying 14″ paystreak said to range 8 to 10% in copper tenor, with small values in gold and silver also some lead and zinc.

Property reopened August, 1916, by the Tuolumme C. M. Co. under an agreement whereby the T. C. M. Co. acquires a 51% interest in the C. L. property for sinking shaft from 800′ to 1,600′ and driving crosscuts on the latter level to the N. and S. boundaries of the group.

See **Tuolumne Copper Mining**, p. 1120.

COLUSA-PARROT MINING & SMELTING CO. MONTANA

Office: Box 1683, Butte, Mont.

Officers: Hon. Wm. A. Clark, pres.; Wm. C. Siderfin, v. p.; W. C. Messiass, sec.; Alex. J. Johnston, treas.

Inc. Nov. 26, 1897, in Washington. **Cap.** $500,000; shares $50 par.

Company is practically out of business, its only present property being lands, platted as an addition to the city of Butte. Has an asset of considerable value in a million-ton tailing dump at the Butte Reduction Works, which is being treated.

COMET MINING CO. MONTANA

Office: Coeur d'Alene, Idaho. **Mine:** near Whitefish, Flathead county, Mont.

Officers: Dr. Max. A. Dorland, pres.; Fred Eppinger, v. p.; J. H. Wiggert, sec.; at last accounts.

Inc. 1909. **Cap.** 1,000,000 shares.

Mine is developed by a short tunnel, but is presumably idle.

CONDA MINING CO. MONTANA

Company formerly operated the Jack Rabbit mine in the Argenta district of Beaverhead County.

CONREY-PLACER MINING CO. **MONTANA**

Address: G. H. Edmunds, business mgr., Ruby, Mont. O. O. Sweeney, Ruby, Mont., dredge superintendent.

Officers: C. F. Adams, 50 State St., Boston, Mass., pres.; F. F. Stanley, 79 Milk St., Boston, secretary-treasurer.

Inc. in 1898.

Property: extensive placer claims in the Alder Gulch district, Madison county, Mont.; about 80 miles by rail from Butte. Described in detail in Bull. 121 of U. S. Bureau of Mines, 1916.

Equipment: up to 1916 has cost $1,200,000, advanced largely by the late Gordon MacKay and a few shareholders. There are 4 electric dredges, though since 1918 only 2 have been in operation. A few details of the electric dredges are of interest.

	No. 1	No. 2	No. 3	No. 4
Year built	1908	1908	1906	1911
Monthly returns, cubic yards	96,270	62,709	82,415	300,000
Power consumed, h. p.	380	380	460	1,235
Depth of digging below water, feet	30	35	45	55
Capacity of buckets, cubic ft.	7½	7½	9½	16 to 17
Gold-saving area, square ft.	1,231	1,231	1,264	3,000
Cost of boat	$108,000	$128,000	$198,999	$296,000

No. 4 boat has dug as much as 411,000 yards in a month. It weighs 2,000 tons.

Power is supplied by the Madison River power plant, 26 miles away. Over $50,000 has been spent on a machine-shop, and over $60,000 of spares and supplies are kept on hand. On the dredges 36 men have been employed; and 49 in other departments.

Production: from 1899 to 1916 a total of 37,000,000 yards had been dug, yielding 16c per yard, or $5,920,000. From 1906 to July 31, 1915, the quantity moved was 31,379,890 yards, at a total cost of 6.96c. per yard. In 1918, 3,350,000 cu yds. were handled and in 1919, 4,282,349 cu. yds. of gravel.

This has been one of the most profitable dredging enterprises in America, but will soon be worked out. Many dredge improvements, now generally in use, have been devised by the Conrey Company. By the will of Gordon MacKay, Harvard University benefits largely from the profits made at Alder Gulch.

CONSOLIDATED CENTRAL BUTTE COPPER CO. **MONTANA**

Office: care R. M. Cobban, sec., Butte, Mont.

Officers: R. R. Jones, pres.; R. H. Wearing, v. p.; D. J. Charles, treas., and E. E. Hershey, directors

Inc. Oct. 29, 1906, in Montana. **Cap.** $1,200,000; shares $1 par; assessable; issued 446,000 shares. At last report had levied 3 assessments, aggregating 6¼ cts. per share, or about $28,000. Annual meeting, second Thursday in January.

Property: a third interest in the North Star, South Star and January claims, patented, and mineral and mining rights on 110 acres of patented placer claims. The claims are developed by a 225′ shaft, said to show an orebody 3 to 6′ wide. Idle several years for want of working capital.

CONSOLIDATED SILVER-LEAD MINING CO. **MONTANA**

Address: 310 Hyde Bldg., Spokane, Wash.

A consolidation of Troy Mining Co., J. P. Lead Co. and Silver Tip M. Co.

Property: 26 claims on Grouse mountain, Lincoln county, 14 miles S. of Troy on the G. N. R. R. Developed by 2,400′ of tunnelling, said to have opened up a 6′ vein of ore containing silver, lead and zinc.

COOKE MINING & REDUCTION CO. **MONTANA**

Defunct. See Volume. XIV.

COPPER AGE & EDISON MINING CO. **MONTANA**

Idle. **Officers:** Chas. J. Heidenreich, Spokane, Wash., pres.; Morton Webster, Wallace, Idaho, sec.-treas.; L. N. Hyde, supt.

Inc. 1906, in Washington. **Cap.** $250,000. Last assessment of 2½ mills per share, payable Feb. 1, 1921.

Property: 12 claims, 4 miles south of Saltese, is an eastern extension of the Richmond mines, carrying extension of copper-bearing outcrop of that mine, the vein paralleling the Monitor. The vein is exposed for 700′ in the tunnel just east of the divide; it averages 10′ thick, is nearly vertical and carries a very little chalcopyrite and chalcocite in a siderite gangue.

Development: includes a main 1,160′ crosscut tunnel with back of 600′ showing sulphide ore assaying up to 30% copper, and $14 gold per ton. No work has been done since 1916, but company contemplated resuming operations at last report.

COPPER EAGLE MINING & SMELTING CO. **MONTANA**

Dead. Formerly owned Eagle lode claim, sold to satisfy creditors. Directors resigned.

COPPER HILL MINING CO., LTD. **MONTANA**

Office: Wallace, Idaho.

Officers: Morton Webster, pres.; A. T. Ryan, v. p.; P. L. Eberhardt, sec.-treas.; preceding, with Howard K. Welch and Jas. Howarth, directors.

Inc. March, 1908, in Montana. **Cap.** $250,000; shares 25c par; non-assessable.

Property: 7 claims, 125 acres, in the Sunrise district near Quartz, Missoula county on the Montana side of the Montana-Idaho divide, showing an altered zone of highly siliceous rocks of 25′ to 50′ width, carrying fine disseminations of copper carbonates and sulphides. Mine has a 75′ tunnel, showing ore said to be somewhat similar to that of the Snowstorm, and assaying about 4% copper.

Idle at last accounts.

COPPER KING MINING CO. **MONTANA**

Address: Cooke City, Park county.

Property: the King and Queen group, developed by tunnels, showing an extensive orebody, with fair value in gold. No recent data available.

COPPER MOUNTAIN MINING & DEVELOPMENT CO. **MONTANA**

Office: Mullan, Idaho.

Officers: John Hendricksen, pres.; A. B. Willard, v. p.; D. Flynn and John Foss, directors.

Inc. 1906, in Idaho. **Cap.** $1,500,000; shares $1 par. Annual meeting, 2nd Tuesday in December.

Property: 5 claims, one fractional, 95 acres, with 3 adjoining claims, at the head of Copper creek, near Thompson, Sanders county, Mont. Mine has 2 tunnels, the upper a crosscut, deflected for 56′ along the vein, said to be 25′ wide, carrying pockets and seams of copper carbonates, with gold and silver. Idle at last account.

COPPERSMITH MINING & MILLING CO. **MONTANA**

Address: Lothrop, Mont.

Inc. Jan. 23, 1909, in Idaho. **Cap.** $3,000,000; $1 par; issued, 2,200,000.

Property: 8 claims unpatented, 160 acres, the Coppersmith group of 6 claims and the Inverness group of 2 claims, also a water right and millsite, about 6 miles up Petty Creek from Lothrop. Property carries some good timber. The Coppersmith claim shows limestone and quartzite for an estimated width of about 400′, and length of about ½ mile, with outcrops yielding 3 to 20% copper ore.

Development: by prospect shaft and crosscut tunnel, said by management to cut merely 300′ of silicified limestone averaging 1% copper. Property also has a number of open cuts and pits, and a 50′ shaft, bottomed in

ore estimated to average better than 6% copper, with small gold and silver values. The Coppersmith was formerly reported to show 3 main veins, one reported to be over 100′ wide at surface with ore assaying 2 to 3% copper. The Exty vein, parallel with and 500′ from the Coppersmith, is reported as 15′ wide.

The Inverness group, 3 miles from Lothrop, has a vein of 3′ to 4′ wide, in quartzite and slate, carrying malachite, chalcopyrite and chalcocite, giving assays of 15 to 17% copper, and $10 to $12 per ton in combined gold and silver values. Property has 4 buildings.

Idle except for annual assessment work.

CORBIN COPPER CO. **MONTANA**

Office: 60 Congress St., Boston, Mass. **Mine office:** Butte, Mont.

Officers: R. M. Edwards, pres. and gen. mgr.; Henry Tolman, treas., Newton, Mass.; with S. L. Powers, Jos. C. Walker and T. S. Woods, directors; A. L. Wyman, sec.

Inc. Dec. 24, 1908, in Michigan. **Cap.** $3,750,000; shares $25 par; assessable; amount issued, 130,000 shares; amount outstanding, 26,000 shares; amount in treasury, 124,000 shares; $8 per share paid in. Company sold 15,000 shares of treasury stock, early 1910, at $10. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agt. Stock is listed on the Boston Curb. Annual meeting third Tuesday in April.

Three assessments levied: $65,000 due February 11, $65,000 due April 22, $130,000 due November 14, 1913. Poor response was made to these and the company was forced to borrow $95,000 on its notes, giving, as guarantee, the unpaid assessments. Owing to lack of funds all work was stopped on Corbin property early in 1914.

Annual report for 1920 shows receipts of $848 and expenses of $909. Assets include cash and accounts receivable of $6,189. Plant and improvements, $88,517. Delinquent stock purchased, $107,271. Liabilities include $76,857 notes payable and $9,767 accounts payable. Total amount of money actually paid in is given as $486,010.

Statement filed in May, 1919, with County Clerk at Butte showed property and other assets of $672,665, and liabilities of $86,596, all unsecured.

Property: company owns 57 mining claims, 45 patented, near Corbin, in Jefferson county. The 3 claims at Bute were sold to the Anaconda company.

The Corbin group lies at the head of Clancy Creek, a few miles west of Corbin, on the Western side of an andesite hill across from the Boston & Corbin mine. This property carries several strong fissure veins in andesite on which considerable exploration work has been done with disappointing results. A vein opened for 800′ in the Rosalie tunnel carries up to 20 oz. silver and 7% copper, but is only 18″ wide.

The Montana tunnel sows a pyritized conglomerate with andesite, dacite and aplite cobbles, the matrix containing small silver values in the upper tunnel, while the winze in the lower tunnel shows considerable pyrite. The Bonanza tunnel is driven on a tourmalinized granite dike in andesite, and in places the tourmaline rock carries galena and chalcopyrite with small amounts of zinc-blende and pyrite.

CORBIN-COPPER KING MINING CO. **MONTANA**

See **Silver Butte Mines Corporation.** Fully described in Vol. XIV.

CORBIN METAL MINING CO. **MONTANA**

Office: Pittston, Pa. **Mine office:** Corbin, Jefferson county, Mont.

Officers: J. H. Foye, pres.; John Hoy, v. p.; Thos. McLaughlin, sec.; M. W. O'Boyle, treas.; at last accounts.

Inc. 1907, in Montana, as Corbin-Montana Copper Co., changing name, Jan., 1910, to present title. **Cap.** $1,000,000; $1 par; issued, 400,000. Company apparently is a twin of the Jefferson-Montana Copper Mines Co. Annual meeting, second Tuesday in April.

Property: 11 claims, 176 acres, known formerly as the Baldwin mine,

2 miles S. E. of Corbin, in the Colorado district, shows 5 fissure veins ranging from a few inches to about 8′ in width, cutting granite. Ores carry chalcopyrite, bornite and galena, estimated by company to average 4% copper, 8% lead, 5 oz. silver, and $2 gold per ton.

Development: by 500′ 2-compartment incline shaft with considerable drifting on 500′ level, cutting a small orebody carrying lead-zinc-copper sulphides, and by several short tunnels.

Equipment: includes electric hoist, good for 1,000′ depth, and a 10-drill air compressor. There are 6 buildings, including carpenter shop, smithy and change house.

Idle several years.

CORBIN-VALPARAISO COPPER MINING CO. **MONTANA**

Presumably defunct. See Vol. VI, Copper Handbook.

CRUSE CONSOLIDATED MINING CO. **MONTANA**

Property transferred to **Thomas Cruse M. & D. Co.**, which see.

COTTER GROUP, THE **MONTANA**

Property: 10 claims, 200 acres, 6 miles E. of Butte, in Jefferson county, and 4 miles from the G. N. and N. P. Rys. by good wagon-road, said to contain quartz veins in granite, from 3 to 50′ wide, and to show some gold and a little copper. The gold vein on the Banker claim is said to have been traced for 3,000′, carrying from $3 to $40 per ton. A number of shafts, 10 to 60′ deep, were sunk.

CRYSTAL COPPER CO. **MONTANA**

Office: 79 Milk St., Boston, Mass. **Goldsmith mine address:** P. O. Box 375, Butte, Mont. **Crystal mine address:** A. C. Ray, mgr., Basin, Mont.

Officers: Bowdoin S. Parker, pres.-treas.; George W. Clement, v. p.; Eugene H. Walker, sec., with Edward P. Barry, J. A. Frohock, James Holland, M. W. Alderson and Joseph Ellis, directors.

Inc. April 6, 1916, in Maine. **Cap.** $3,000,000; $5 par. Capital increased Feb., 1920, from $2,000,000; $5 par; it was originally $1,500,000 and $1,000,000; $1 par. Federal Trust Co., Boston, transfer agent; Hanover Trust Co., Boston, registrar. Listed on New York and Boston curbs. Annual meeting, April first.

Financial statement for 1919 showed total receipts of $119,146, of which $48,245 was from ore sales. Expenses were $117,614, leaving a balance of $1,762.

Total receipts from Goldsmith ore shipped Jan. 1, 1920 to Nov. 10, 1921, $269,815.15. Royalty, applying on purchase price for same period, $82,441.28. Development work in that period cost $45,000 and $4,500 on railroad spur and orebins. In addition to above receipts the Crystal mine returned $7,953 net to company besides a payment of $6,300 royalty, that applies on balance due on purchase price of the Crystal ($14,253).

Properties: the Crystal mine at Basin, the Goldsmith mine at Butte, and the Penobscot mine at Marysville, Mont.

The **Goldsmith** mine, 17½ acres, at Butte has been held under bond and lease since Nov., 1917. The rich silver bearing ores occur in fissure veins in granite, the main vein being the western split of the Rainbow lode. The main shaft, when only 367′ deep, developed 3 veins from which about $1,500,000 worth of silver ore was produced by former owners.

The Anaconda company owns ground adjoining the Goldsmith. Its Alice mine, the richest silver mine of that company, is only 1,500′ distant, while W. A. Clark's Moulton mine, reputed to have produced over $6,000,000, is but 400′ away.

On acquiring the Goldsmith mine, company opened and retimbered the old Tong shaft, sinking it to the 700′ level. Crosscuts on the 500′ level intersect both the northern and southern veins, from which the company has been mining and shipping silver ore since 1918. Crosscuts driven in 1919 on the 600′ level opened shipping ore, 2′ of it very high grade. Between the 600′ and 700′ levels there is said to be ore enough for over a year's operations.

Equipment: the mine has up-to-date machinery and appliances, including a 150 h. p. electric compressor, a 100 h. p. electric hoist, good for a shaft of 1,000′ depth.

Sixty men are employed. Over $400,000 has been spent on the property.

Production: of the Goldsmith mine from Jan. 1, 1920 to Oct. 31, 1921, was 12,797 tons. Gross value of ore shipped during this period and up to Nov. 1, 1921, was $269,815. Net smelter returns received for shipments from Oct. 29, 1921 to Jan. 5, 1922, of 13 cars, about 650 tons, yielded $33,250.

(2) The **Crystal mine** is about 8 miles N. of Basin, Jefferson county. The company owns an undivided half interest in the Commerce and Crystal; one-half and one-sixth of the St. Lawrence and Jack Fraction and all of the Mammoth claim, total of about 84.39 acres, in the Cataract district. The output is mostly copper ore, but a silver-lead ore has also been developed, and shipments made.

Up to 1920, the gross value of copper ore mined and sold since the Crystal company took over the mine is $70,000, and of the silver ore, $25,000, a total of $122,000.

Development: all work done so far has been devoted to mine development. The upper tunnel has been extended to 1,334.. carrying it within 50′ of the Jack claim. There is over 3,000′ of unexplored vein to be opened by extending the tunnel farther W., the known orebodies on the St. Lawrence claim being over 1,000′ further west. The Lower or Mammoth tunnel, 200′ below the first is 1,500′ long, driven through granite until it cuts the Crystal vein about 900′ from the portal, running on it for 300′ or more. The Mammoth claim dominates the other claims, as the only outlet of the lower tunnel is through the Mammoth.

The copper ore extracted thus far has been of fair average grade for shipping, but there is also in the mine a large tonnage of ore profitable for concentrating. The silver ore obtained from the Crystal mine in 1919 carried from 25 to 45 oz. per ton, indicating that the mine might be operated profitably for silver ore alone.

Production: of Crystal mine in 1919, was 607 tons, valued at $34,892 gross. In 1920, the ore shipments returned $7,953 net to the company, in addition to the $6,300 paid on property account, as royalty.

Penobscot Mine: This property, near Marysville, Mont., was acquired in 1921. Formerly yielded extraordinarily rich ore from the vein of this name, for a length of 1,000′, mainly from above the 200′ level.

The property has 2 other veins, also in hornstone. While the desultory work of the past 20 years has developed no new ore, the geological conditions warrant well planned exploration.

Company's mines are well managed. Company now controlled by new and reliable people and outlook good for dividends in 1922.

CUPRITE COPPER MINING CO. **MONTANA**

Office: Helena, Mont.

Officers: P. L. Reece, pres. and mgr., Helena, Mont.; J. B. Waltz, v. p.; F. J. Rixon, sec.-treas.; with P. B. Moss, Geo. M. Sipley, directors.

Cap. $300,000; $1 par.

Property: 10 patented claims, about midway between Helena and Marysville, Mont. Two well-defined veins on property; one, a gold-silver-lead vein, 4′ to 20′ wide, the other, a gold vein of promise.

Development: by 200′ shaft, 100′ of drifting on this level, and a winze 100′ deep, with 340′ of drifting on the 300′ level, which will cut the quartz vein at depth of 340′.

Equipment: includes a steam hoist and air compressor.

CURLEW MINE **MONTANA**

Address: care A. M. Holter, owner, Helena, Mont.

Property: at Victor, Ravalli county, Mont. Was formerly a silver producer, but contains zinc ore, and a vein claimed to be 12′ wide, is said to show ore carrying 10% copper, with some lead, silver and gold. A con-

centrating mill with flotation unit to treat 85,000 tons of tailings was worked successfully, 1917. Financed by Los Angeles capitalists.

In July, 1921, W. R. Price of Helena, took an option on the property for $125,000.

DAILEY COPPER MINING & SMELTING CO. MONTANA

Address: Wickes, Mont. Wm. W. Dailey, pres.; A. R. Robertson, v. p.; C. H. Dailey, sec.

Inc. Feb., 1907, in Montana. **Cap.** $1,500,000; $1 par; issued, 870,000, of which amount 800,000 shares paid for the property, is held intact.

Property: the Atlas group of 4 claims, patented, 25 acres in town of Wickes, Jefferson county, said to show well-defined fissure vein in andesite. Vein runs E.-W. and is of 12' estimated average width, carrying lenses of ore showing chalcopyrite, bornite and chalcocite, estimated by management to average 3% copper, 12 oz. silver, and $1 gold per ton, 20% iron, 18% sulphur and 50% silica, without lead or zinc.

Development: a 340' shaft, with 2,000' of workings on vein, said to show 70,000 tons of ore blocked out.

Former owners shipped about $30,000 worth of ore. An independent source estimates ore to average about 3% copper, 7 oz. silver, and 80 cts. gold per ton.

Reports made and property endorsed by F. L. Sizer, and Potter, Dickman & McKenzie.

Idle for several years, owing to inability to finance the erection of a concentrator.

DARBY MINING AND MILLING CO. MONTANA

Office: S. G. Bean, sec., Mullan, Idaho.

Officers: M. J. McHugh, pres.; C. D. Miller, v. p.; S. C. Bean, sec.-treas.; N. C. Sheridan, mgr., with I. A. Ghormley, directors.

Inc. March, 1907, in Idaho. **Cap.** $1,000,000; shares $1 par; 400,000 issued; assessable.

Property: 10 unpatented claims, 200 acres, near Keystone, Sanders county, Mont., 4½ miles from a railroad, said to show a fissure vein in quartzite carrying lead and silver.

Development: by 3 tunnels 175, 375 and 670' long, opening vein at depth of 55, 155 and 450', respectively. Mine is a prospect.

DAVIS-DALY COPPER CO. MONTANA

Office: 79 Milk St., Boston, Mass.; and Butte, Mont.

Officers: H. M. Burton, pres.; Wm. Bloom, v. p.; Charles G. Schirmer, sec.-treas.; with F. M. Kimbal, asst. treas.; and F. A. Schirmer, directors. J. L. Bruce, gen. mgr.; J. W. Dudgeon, chief mng. engr.

Inc. Sept. 14, 1908, in Maine, as successor of Davis-Daly Estates Copper Co. **Cap.** $6,700,000; $10 par; assessable; ($8.50 paid), issued, $6,000,000. Listed on Boston Stock Exchange. Annual meeting 4th Tuesday in September. Federal Trust Co., Boston, transfer agent; Equitable Trust Co., Boston, registrar.

For the earlier chapters in the history of the company, readers are referred to description of the Davis-Daly Estates Copper Co., in Vol. VIII and X of the Copper Handbook.

Financial statement: years ending June 30th:

Year	Ore Sales, Etc.	Expenses	Profit After Deprecn, etc.	Current Assets	Current Liabilities
1921	$1,333,193	$1,412,310	$411,230*	$275,019	$319,133
1920	1,953,420.51	1,544,834.01	292,178	.....	.....
1919	1,239,240.34	1,002,142.19	237,098.15	579,706.21	99,094.40
1918	1,400,219.00	942,729.34	457,489.66	496,077.03	69,927.94
1917	739,042.30	575,239.15	163,803.15	247,235.77	42,783.47
1916	234,236.18	284,326.00	.....	128,233.15	100,778.52
1915	20,641.01	.....	.....	104,196.79	20,475.98

*Loss.

Dividends: initial 50c. paid June 29, 1918, and total of 75c. for that year; 50c. December 20, 1919, and 25c. March 30, 1920.

Property: a small surface area and mineral rights of 320 acres, 280 acres of which lie adjacent to, but south and west of the older productive area, and 40 acres, 1½ miles to the west of Butte, in the Burlington mining district. The area within Butte is being developed through the Colorado shaft.

Geology: several main veins of the northwest vein series have been developed in the workings from the Colorado shaft. These veins belong to the Blue Vein system, of which the Jessie, Edith May, and other very productive fault veins are examples. There are several east-west veins exposed in the workings, but no great amount of development has been done on these.

Development: to a depth of 2,800′ by the Colorado shaft and workings, and to a depth of 600′ by the Hibernia shaft. The northwestern part of the main property is developed by the Silver King shaft, 600′ deep and the Mount Moriah shaft, also 600′ in depth, both incline shafts. Development is being done at the rate of 9,000′ yearly.

The principal veins in the Colorado mine have been opened down to the 2,100, 2,300, 2,400, 2,500 and 2,700′ levels, these levels producing ore running over 7% copper. Reserves are said to be equal to a normal output of about three years.

To improve the ventilation of the Colorado mine, the 2,500′ level was connected with the Anaconda Co.'s Belmont mine in May, 1919, and with the Stewart mine of the Anaconda Co., from the 2,300′ level, in August, 1920. In addition to this, a new air shaft has been raised from the 1,700′ level of the Colorado mine to the surface. A Jeffrey 6′x3′ fan installed at the collar of this shaft will insure a volume of 125,000 cu. ft. of air per minute, thus giving the Colorado mine a ventilation system equal to any in the district.

The Hibernia mine contains zinc-silver ores, a large additional tonnage having been recently developed in the workings on the 600′ level.

Normally, 400 men are employed, of whom 300 are underground.

Equipment: the hoisting equipment at the Colorado mine consists of a 22x22x48′ double-drum Nordberg-Corliss hoist. Steam is supplied by a 500 h. p. Erie City tubular boiler, stoked by American Underfed Stokers. A battery of boilers consisting of two 150-h. p. and one 100-h. p. Scotch Marine boilers are held in reserve.

Hoisting is done in balance, using 3½-ton skips. The ore is dumped from the skips over a shaking grizzly and passed through a sorting plant before going to the mine bins. The ore from the mine bins is transported several blocks, over a narrow-gauge surface tram, to the ore bins alongside the Northern Pacific railroad.

The entire surface plant has been improved and rearranged during the past year, a modern timber-framing plant, blacksmith shop, and machine shop replacing the old equipment.

A copper precipitation plant has been installed, both underground and on the surface, to recover copper from the mine water.

Production: (all properties) years ending June 30th:

Year	Ore Mined, tons	Copper, lb.	Silver, oz.
1921	128,960	8,456,062	1,463,182
1920	123,607	13,654,064	902,979
1919	74,551	7,903,961	517,162
1918	70,273	7,014,272	437,116
1917	45,955	4,557,789	242,938
1916	20,512	1,955,722	161,730
1915	2,551	201,186	17,522

Mine operations at the Colorado were suspended Nov. 20, 1921. The Hibernia mine continues to produce. Property is splendidly managed, and has a prosperous future assured. Existing contention with the Anaconda company over apex rights will probably be settled through an amicable determination of rights based on the facts secured through development work by both companies.

DENNEMORA GOLD & COPPER MINING CO., LTD. MONTANA

Address: P. G. Swanson, sec.-treas., Wallace, Idaho.

Property: 6 lead and copper claims, one-half mile from N. P. R. R., near Taft, Mineral county, Mont. Described Vol. X.

According to Oscar Nordquist, manager, operations were resumed in 1918 and the vein has been opened for 600', and a 200' shaft put down, at 450' from portal with a crosscut to the vein.

Compressor and other equipment dismantled July, 1921. Company idle and no work planned for near future.

DIVIDEND MINING CO. MONTANA

Corporate existence lapsed.

DULUTH-NEW YORK MINING CO. MONTANA

Idle. **Address:** John Zundel, Butte, Mont.

Property: the Excelsior claims in North Walkerville, Butte, and the Amy-silversmith group nearby. Eastern capital is said to have agreed to finance company to enable it to deepen the Excelsior shaft to 1,500'.

DURANT MINING & SMELTING CO. MONTANA

Address: Spring Gulch, via Martinsdale, Mont. C. M. Durant, supt.

Property: 14 miles from Martinsdale, Meagher county, shows fissure veins carrying copper sulphide ore with gold.

Development: by 200' 2-compartment shaft. No recent returns secured.

EAGLE MINING CO. MONTANA

Address: Arthur V. Corry, Lewisohn Block, Butte, Mont. Name changed to **Copper Eagle Mining & Smelting Co.**, which in turn lost property at Sheriff's sale, claims being bought by Butte and Superior Mng. Co See Volume XIV for description of Eagle Mng. Co. Both the Eagle and the Copper Eagle companies are defunct with no assets and officers resigned.

EAST BUTTE COPPER MINING CO. MONTANA

Office: 85 Devonshire St., Boston, Mass. **Mine and works office:** Butte, Mont.

Officers: Robt. H. Gross, pres.; Hon. Jas. H. Reed, v. p.; Wm. P. Everts, sec.; Frank P. Son, treas.; Oscar Rohn, gen. mgr., with F. Ward Paine and Wm. A. Paine, directors; L. A. Thulin, asst. treas.; Andrew J. Ray, mine supt.; John E. Rothwell, mill supt.; Julius H. Warner, engr.; G. E. Burton, geologist.

Inc. Oct. 14, 1905, in Arizona. **Cap.** $3,000,000; shares $10 par; increased, May 11, 1909, to $6,000,000, shares $10 par; 421,849 issued. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock is listed on the Boston Stock Exchange and N. Y. Curb. Annual meeting, first Monday in April.

The East Butte Copper Mng. Co. has no indebtedness. It owns all of the outstanding bonds and all preferred stock of the Pittsmont Copper Co., the latter amounting to $1,000,000 par value; also 91% of the common stock. East Butte Co. works the property of the Pittsmont Copper Co., paying the latter company as rental the net profit arising from such operation.

Financial Statement, years ending December 31:

Assets.

Year	Property and Equipment	Stock Unissued	Cash and Copper	Accounts Receivable	Total
1920....	$3,642,450	.....	$1,525,183	$305,977	$5,773,610
1919....	3,305,939	$1,781,510	1,953,441	433,252	7,774,042
1918....	3,401,491	1,781,510	1,637,442	197,936	7,018,379
1917....	3,298,820	1,792,690	1,947,589	183,837	7,222,936
1916....	3,480,514	1,890,000	2,214,568	11,928	7,597,009

Liabilities.

	Capital Stock	Accounts Payable	Contingent Funds	Total Surplus	Total
1920....	$4,242,820	$1,166,024	$136,904	$227,862	$5,773,610
1919....	6,000,000	1,343,143	131,201	299,698	7,774,042
1918....	6,000,000	283,695	126,456	608,227	7,018,379
1917....	6,000,000	941,187	75,152	206,597	7,222,930
1916....	6,000,000	1,219,600*	36,897	340,513	7,597,009

* $911,080 to Pittsmont Company.

Net quick assets at end of 1919 were about $2,000,000; and $2,500,000 in Aug., 1920, including copper on hand.

Income Account.

	1920	1919	1918	1917	1916	1915	1914
Gross income	$3,312,559	$4,342,390	$5,875,322	$5,397,868	$5,523,688	$2,753,588	$1,455,454
Mining charges, etc.	3,052,326	3,670,062	5,034,178	4,089,710	3,198,317	1,699,603	1,048,856
Development, etc.	276,799	138,775	53,739	116,640	294,191	214,692	136,101
Depreciation, etc.	51,597	9,365	22,936	169,557	465,411	56,296	48,244
Dividends	.....	210,924	632,774	831,731	.....	.....	.....
Surplus	*68,162	313,264	132,595	190,230	1,565,769	782,997	222,253

* Deficit.

Dividends: initial of $1 per share Jan. 29, 1917, and total of $2 for that year; $1.50 in 1918; 50 cents in 1919, a grand total of $1,687,396.

Net profits for 1920 were $260,033 not allowing for depreciation. Net deficit on all operations in 1920 was $68,162. County taxes paid were $31,888 in 1916; $34,322 in 1917; $8,802 in 1918; $6,750 in 1920.

Property: the Dutton group, 134 acres, held by placer patent, is in the S. E. part of Butte, near the Pennsylvania mine, and is idle at present.

Principal property is the **Pittsmont group** and smelter at Butte.

Miscellaneous holdings include the Swissmont group, of 6 claims near Elkhorn, Jefferson county, Mont., and the Chamounix group, near Austin, Lewis & Clark county, Mont., including the Christina group of 6 claims and the Fannie Parnell group of 33 claims. The Swissmont group has developed a considerable tonnage of low-grade oxidized gold ore carrying an excess of iron over insoluble material, and of value as a flux.

The Chamounix group has shipped some silver-copper ore in the past, but is now idle. Company also has timber operations at Feeley, Mont.

A mill was erected at the Elkhorn property in 1917, but owing to scarcity of labor and increased cost of cyanide, operations have been postponed until conditions become more favorable.

An interest is also held in claims on the west of the producing area of Tonopah, Nevada, and some good ore has been exposed. Company also owns a valuable lime quarry 40 miles from Butte.

East Butte also has a 49% interest in the Ohio Oil Co., a Standard Oil subsidiary, operating in Mule Creekfield Wyoming. Company's gas wells in Kansas are earning over $12,000 a month.

Colorado Holdings: E. D. Pratt, supt., Silver Plume, Colo.

In 1922, acquired Dives Pelican, Seven Thirty and Diamond Tunnel properties at Silver Plume, and installed machinery as preliminary to extensive development.

Geology: the Pittsmont claims cover 280 acres of flat valley bottom,

about 1½ miles east of Butte and extending outward from the footslopes of the continental divide mountain ridge. The ground is a filled-in valley, the sandy wash and debris being in places several hundred feet deep, so that no outcrops of any kind exist on the ground. The underlying rock is the normal Butte granite (quartz-monzonite) which is cut by 3 systems of veins; Northwest, corresponding to the Blue Vein series Ore-shoots occur in veins of each series. The zone of oxidization and leaching of copper extends from 500′ to 700′ below the surface. There are 12 principal veins that have been productive. While these are not wide, usually under 5′, the ore-shoots are long and persistent. At least 2 veins on the 800′ level have been stoped almost continuously for 1,500′ in length. Though the 800′ level has been the most productive level opened to date, due both to an increased primary mineralization and secondary enrichment which has affected the lower levels to a much lesser extent, the lower levels continue to yield strong ore shoots of commercial grade, though lower in value than ore from upper levels.

Development: 2 shafts, No. 2 and 3, 1,830′ and 1,240′ deep, respectively. No. 2 is the working shaft, and levels are opened from it at 800′, 1,000′, 1,200′ 1,500′ and 1,800′. A 3′ vein of 4½% copper ore was opened on the 1,800′ level during 1920.

Good ore has been opened on the two bottom levels, but as the 1,800′ level has bad ventilation, and it is difficult to get men to work there, a new shaft was raised from the 1,800′ level to surface. New work during 1918 amounted to 9,787′ and 6,303′ in 1919.

Ore production comes from the following levels: 800′, 39%; 1,000′, 18%; 1,200′, 15%; 1,500, 23%, and 1,800′, 5%. Sorting of ore underground is found to be an improvement.

Normally, 630 men are employed underground.

Equipment: consists of hoisting plant, flotation plant, and smelter. The above includes a 2,000-h. p. steam plant, 2,000-h. p. electric plant, 600-h. p. steam hoist good for 2,000′, and 50-h. p. steam hoist good for 1,500′; two 25-drill air compressors, and 50 machine drills. Electric power is used for practically everything except hoisting. There are about 20 buildings, which include the smelter, sintering plant, 2 engine rooms, change-house, boiler-room, concentrator, flotation plant, carpenter, machine and electric shops, sampling mill, laboratory and office building. The smelter building contains one 600-ton blast-furnace and one 300-ton furnace with 3 basic-lined converters. The sintering plant contains one 42″ Dwight-Lloyd machine. Concentrator is equipped with crushers, jigs, tables, etc., and flotation plant is equipped with tube mills and Janney machines. The capacity of concentrator is 600 tons and of flotation plant 800 tons, the additional capacity of flotation plant is to be used in reworking tailings, of which 123,520 tons were treated in 1918, carrying 0.7 lb. copper per ton, at cost of $1.29 per ton.

The Pittsmont reduction plant is the only operating smelter in Butte and does a considerable amount of custom business, treating ore from several independent mines, including Davis-Daly. The sampling mill for custom and second-class ores adjacent to the smelter was described by H. B. Pulsifer in Bull. 3. Nov., 1920, ofthe University of Montana. About 350 men employed on surface.

Production: normally, the daily output of ore is 900 tons.

	1920	1919	1918	1917	1916
East Butte ore tr., tons.	115,415	143,654	178,948	181,904	256,196
Average copper, per cent	.....	3.71	4.25	4.31	4.67
Custom ore treated, tons	87,545	79,818	83,038	30,851	79,861
Copper yield, lb.	18,543,270	19,987,733	24,599,890	20,013,900	18,340,713
Silver, ounces	690,488	698,146	776,818	581,190	556,542
Gold, ounces	867	1,013	1,419	1,825	3,844
Cost per lb. copper, cents	*7.15	*6.14	19.71	17.70	16.89

*Cost mining per ton.

Management gives out little information about its work, but developments seem to be favorable and revenue from custom smelting helps swell profits considerably.

The East Butte company maintained operations throughout most of 1921, producing 87,469 tons of 4.88% ore yielding 17,766,017 lb. copper, compared with 18,534,270 in 1920 and 19,987,733 in 1919. Costs were reduced to 11.284 cents per pound, compared with 15.854 cents in 1920, 16,582 cents in 1919, and 19.71 cents in 1918. Work on the 1,800′ level, the deepest in the mine, shows that the orebodies continue downward with substantially unchanged values and size, much of the ore averaging 7%. The No. 4 shaft is 2,000′ deep. The company earned a net profit of $150,772 in 1921, compared with a deficit of $68,162 in 1920, and spent $276,798 on outside properties.

EAST BUTTE EXTENSION COPPER MINING CO. MONTANA

Office: F. H. Cooney, mgr., 113 Hamilton St., Butte, Mont

Officers: Chas. J. Schatzlein, pres.; Philip A. Breen, v. p.; Frank H. Cooney, sec. and gen. mgr.; Dr. C. E. Blackburn, treas., with Chas. N. Joyce, directors; A. F. Munroe, engr

Inc. April 10, 1906, in Arizona . **Cap.** $1,000,000; shares $1 par; issued, $550,000. Paid, October 1, 1906, a 1% dividend, amounting to $2,486. Stock listed on Butte Exchange. Shares 4¢ bid, 1920.

Property: various fractional claims, 4 acres, lying between the Belmont, Pennsylvania and Ground Squirrel mines of the Anaconda developed by 6 shafts, deepest the 250′ two-compartment No. 6 shaft, begun 1909, with about 500′ of crosscuts. The Westlake and Wall mines are said to have produced, under former ownership, about $300,000 worth of ore. The two-compartment No. 1 shaft is 170′ deep, and the 200′ No. 2 shaft shows ore assaying up to 13% copper and 1 oz. silver per ton . No. 3, 1,040′, known as the Westlake, has a small precipitation plant.

Lessees shipments of 40 tons daily, with net smelter returns of $37,360, yielded the company a net royalty of $12,881.83 in 1917. Company also owns a divided one-half interest in the Centerville claim, and interests as follows; one-half in Malone; eleven-sixteenths in Little Evelyn; one-sixth in Valley Forge; one-half in Gregory; one-fourth in Simon; one-eighth in Eureka First; three-fortieths in Lost Fraction, and three-fortieths in Katy T.

Leasers operating in 1916 shipped several carloads of 8% copper ore from the 200′ level. East Butte Extension is reported to receive 15% royalty on all ore shipments. No recent returns available.

EAST COEUR D'ALENE MINING CO. MONTANA

Address: H. P. Hogan, Mullan, Idaho.

Officers: H. P. Hogan, pres.; W. J. Hughes, v. p.-mgr, Saltese, Mont. Mrs. L. M. Westervelt, sec.-treas.; with T. A. Westervelt, directors.

Cap. $150,000; 10c par; assessable.

Property: 14 claims, 3½ miles N. of Haugan, Mineral county. **Development:** tunnels totaling 1,324′ have opened some 8% copper, ½ oz. gold, and 3 oz. silver ore.

EASTERN BELLE MINING CO. MONTANA

Address: Helena, Mont.

Officers: George W. Huffaker, pres.; S. T H. Hill, v. p.; George H. Hill, sec.-treas.

Inc. Jan. 4, 1916. **Cap.** $100,000; shares $1 par. Bought the Eastern Belle mine from Helena Bureau of Mines.

Property: 2 claims, 40 acres, in the Scratch Gravel camp, near Helena. Claims show quartz, carrying free gold.

Management planned to sink incline shaft several hundred feet, at last accounts.

EAST HELENA LEAD SMELTER **MONTANA**

Owned by the Am. Sm. & Rfg. Co., which see.

Office: 120 Broadway, New York. Works address: C. W. Adams, mgr., East Helena, Mont.

Has an annual capacity of 330,000 tons.

EASTON MINES **MONTANA**

Address: Elling Estate, owners, Virginia City Mont.

Under option to W. H. Nichols, 50 Broad St., New York City.

Property: 5½ claims, patented, in Browns gulch, 4 miles west of Virginia City, covering the America and Eastern veins, lying in a very wide dike of andesite porphyry between granite and gneiss. Veins are 2½ to 6′ between walls. Pay ore occurs in 3 shoots, each 250′ long, and 16″ to 4½′ thick. Ore of Eastern vein averages $8 gold and 15 oz. silver, exclusive of high grade.

Development: by 300′ vertical shaft with 210′ winze on that level.

EAST PACIFIC MINING CO. **MONTANA**

Address: Box 122, Helena, Mont.

Officers: R. A. Bell, pres.; O. N. Kessler, v. p.; W. A. Dickinson, sec.; with N. Gage, directors.

Inc. in Arizona. **Cap.**, $1,000,000; $1 par; 556,118 shares issued. Annual meeting 1st Saturday in April.

Property: 8 patented claims, 139 acres, and a millsite, 5⅛ miles from Winston, Broadwater county, and 20 miles S. E. of Helena, reported to show a fissure vein in andesite, carrying gold, silver, lead values. Ore said to run $7-10 a ton.

Development: by 4 tunnels, longest 3,300′, and by a 134′ winze. Equipment includes 75-ton mill, pump and compressor.

Property idle for 3 years past, except for slight work by leasors.

EAST SPRING HILL MINING CO. **MONTANA**

Address: M. Kuphal, sec.-treas., 630 Monroe Ave., Helena, Mont.

Officers: A. H. Kleinschmidt, pres.-treas.; M. Kuphal, v. p.-sec., with F. H. Hillehecht, directors

Inc. Jan. 20, 1914, in Montana. **Cap.** $40,000; 10c par; 100,050 issued. Annual meeting first Monday after first Tuesday in January.

Property: 6 claims, 120 acres, surveyed for patent in 1920. Also the Moonlight claim, ½ of Gold Lode, the Standard, Standard Extension, S. E. millsite, ⅓ of Daylight, ¼ of Star, ⅛ of Big Mountain, and ⅔ of Convention Lode claims. All these claims acquired 1920, lie south of company's older holdings and join the Whitlach Union property. Company has kept up assessment work, in 1920-21, by continuing tunnel work on the older claims and starting a new tunnel on the on the Peretite claim.

The same owners controlled American Mining Co., Ltd., at Landore, Idaho.

ECLIPSE ARGO MINING CO. **MONTANA**

Defunct—property lost. **Address:** E. G. Hoffman, sec.-treas., New Britain, Conn., Eclipse, Argo Mine near Argo, Broadwater county, Mont. was lost by bondholders foreclosing and in April, 1913, deeds were given to trustee for entire property. In 1918 the **Furnace Creek Oxide Copper** Co., bought 51% interest in this mine, for $150,000.

ECONOMY GOLD MINES CO. **MONTANA**

Address: Rosenfield Bros., mgr's., Helena Mont.

Officers: J. L. Kessner, pres.; S. Rosenfield, v. p.; J. Rosenfield, sec.; S. L. Joseph, treas.; directors. C. E. Freyberger, supt.

Inc. in Montana. **Cap.**, $1,500,000; shares $1 par; 280,000 issued.

Property: 180 acres, patented, including the Economy Mine, 6 miles from East Helena, shows 15 fissure veins in diorite, andesite and granite. Chief vein has an E.-W. strike, with 75° dip. Ore, containing gold, silver and copper, occurs in shoots said to average 3′ in width and from 35′ to

150′ in length. The Chicago-Montana mine, in Mitchell gulch, is also worked by this company.

Development: by 2 shafts about 300′ deep. Ore developed on 300′ level is same shoot of high-grade ore stoped on the 100′, but wider and varying from $10 to $235 per ton. Tunnels were driven in 1920.

Equipment: 200-h. p. electric, includes boilers, 3 gasoline hoists, two 75-h. p. compressors, and a 100-ton concentrator built during 1920. Employs about 30 men, normally.

ELK GOLD MINING CO. **MONTANA**

Address: R. Lee Kelly, sec. and gen. mgr., Deer Lodge, Mont.

Officers: C. E. Aspling, Deer Lodge, pres. Trustees, I. S. Eldred, and J. E. Nevill, both of Deer Lodge.

Inc. March, 1913, in Montana. **Cap.** $800,000; $1 par; assessable; 400,000 shares issued.

Property: 2 claims, 1 patented, 20 acres, 10 miles S. E. of Deer Lodge, Powell county, and 17 miles N. of Butte, Mont. Claims show small stringers of oxidized ore on surface which at depth of 40′ are reported to assay from 4-7% copper, 1 oz. gold and 7-14 oz. silver per ton.

Development: by 100′ shaft. Shipped 15 tons of ore in 1915 netting $30 per ton. **Equipment:** 30-h. p. steam. No recent returns.

ELKHORN QUEEN MINING CO. **MONTANA**

Address: care R. C. Wallace, Helena, Mont.

Mine at Elkhorn, Jefferson county, Mont.

Lessees at last report were stoping ore, said to be 30′ wide, from the 300 level. Shipments made to East Helena smelter.

ELM ORLU MINING CO. **MONTANA**

Office: Miner Bldg., Butte, Mont.

Officers: W. A. Clark, Jr., pres. and gen. mgr.; W. A. Clark v. p., owners; W. D. Mangam, sec-treas.; J. C. Pyle, cons. engr.; W. N. Rossberg, mine mgr.

Inc. 1907. **Cap.** $100,000; shares $10 par. Statements filed with Assessor of Silver Bow county for years ending May 31:

	Ore	Value	Expenditure				Net
Year	Tons	per Ton	Mining	Const.	Trans.	Reduct.	Profit
1918.....	135,130	$18.20	$1,105,363		$351,338	$871,588	$43,790
1917.....	175,236	22.65	846,568	199,439	492,375	1,563,745	867,333
1916.....	200,752	18.52	1,011,537	18,029	408,823	1,783,352	495,751

County taxes paid were $14,332 in 1916; $23,678 in 1917; $1305 in 1918; $15,187 in 1920.

Property: company owns the Elm Orlu mine adjoining the Butte & Superior holdings, and the Badger State mine of the Anaconda Copper Co. in the N. E. section of the Butte district. The Poser claim is owned by a separate company.

Geology: the Elm Orlu covers part of the Rainbow lode and several other veins containing large bodies of copper and silver ore and immense bodies of zinc ore. Copper occurs as chalcocite both in secondary fault veins and in veins of the Rainbow lode, and also as chalcopyrite mixed with zinc ore.

Development: by 2,200′ shaft and several miles of workings, principally below the 900′ level.

An important development during 1919 was the opening of the Northwestern vein on 2,200′ level. It carries copper, and the apex is below depth of 2,000′.

Litigation with the Anaconda company concerning part of the Emily vein in the Pilot-Butte mine was settled in 1920 by the Anaconda conceding the claim.

Equipment: is exceptionally complete and recent additions include electrically-driven hoist with 2 drums 10′ diameter by 8′ face, designed to

wind 3,500′ of rope at a speed of 2,500′ per min. The motor is of 1,800-h. p., operating in conjunction with a motor-generator flywheel set.

The output of the mine is treated in the mill of the Timber Butte Milling Co. (which see), also owned by Senator and W. A. Clark, Jr.; zinc concentrates go to the National Zinc Co.'s plants at Bartlesville, Okla., and Springfield, Ill. Copper ore is shipped direct to the Anaconda smelter, the mine yielding from 50 to 100 tons a day when working full time.

Elm Orlu produces 100-200 tons per day of silver ore.

Normally, 380 men are employed underground and 73 on surface, producing 730 tons of ore daily.

Timber Butte Milling Co.

Is the corporation owning the mill in which the ores of the various Clark properties are concentrated.

Officers: W. A. Clark, Jr., pres., and gen., mgr.; W. A. Clark, v. p., W. D. Mangan, sec.; J. K. Heslet and A. J. Johnston, directors; W. N. Rossberg, mgr.

Cap. 1,000 shares; $100 par. A close corporation.

The mill was erected to concentrate zinc ores of the Elm Orlu mine. Capacity 2,000 tons daily. Process gravity separation and flotation. Crushing is by rolls and Hardinge mills; separation by tables and Minerals Separation flotation machines. Electric power is supplied by the Montana Power Co. Mill began operations about May 1, 1914. Recovery over 94% and concentrates average 52% zinc.

The copper section of 1,000 tons daily capacity, was added during the war. Zinc concentrates are shipped to the Great Falls zinc plant of the Anaconda Mining Co.

EMERY SILVER MINING CO. MONTANA

Address: Phoenix Block. Butte, Mont.

Officers: Clem Bartzen, pres.; W. L. Hugo, v. p.; J. R. Davenport, sec.-treas., with F. C. Gormerly and Oscar Nordquist, directors.

Inc. Aug., 1919, in Montana. **Cap.** $1,000,000; $1 par; $300,000 issued. Annual meeting in March.

The fiscal agents, C. W. Galvin & Co., 206 Broadway, New York City, arranged to sell 375,000 shares to finance development.

Property: 7 patented and 4 other claims, 10 miles E. of Deer Lodge, Powell county, including the Emery mine. A number of veins, carrying silver and gold, have been developed.

Development: by 450′ vertical shaft. Dumps contain 123,000 tons of second-class ore.

Equipment: electric power, and 50-ton flotation mill, costing $130,000; to be increased to 300 tons.

EVA MAY MINE MONTANA

Basin, Mont. Was owned by Betty Alden Mng. Co., now dead.

Mine idle 1920-21.

EVENING STAR DEVELOPING CO. MONTANA

Address: H. C. Cooney, Butte, Mont.

Officers: C. M. Joyce, pres.; R. E. Strasberger, v. p. and supt.; H. C. Cooney, sec-treas.; also directors.

Inc. Sept. 28, 1918, in Montana. **Cap.** $50,000; $1 par; none issued. During 1918, ore sold netted $924 and operating expenses were $6,200.

Property: the Big Dick and Black Jack mines, 5 claims, 1 patented, in Nigger Hill, Elliston district, Mont., formerly owned by the Butte & Elliston G. & C. M. Co. Examined by A. F. Monroe and E. J. Strasberger.

Geology: claims contain a fissure vein in diorite as well as a "blanket" deposit. Ore streak is 8″ wide, and consists of a complex sulphide assaying 20% lead, 7% zinc, 1 oz. gold, and 26 oz. silver per ton.

Development: by 300′ vertical shaft and 1,200′ tunnel. Greatest depth is 485′, and workings total over 2,000′. Ore is mined by underhand stoping.

On the 125′ level of the Black Jack mine, a vein of silver-gold-lead ore was opened for 80′ in length and work at 200′ is underway to open it further.

Equipment: steam hoist and compressor. A one-mile aerial tram is to be erected.

Company started work in June, 1918, and shipped 26 tons of $35 ore in that year. Shipments sent to East Helena in 1921, said to have run 100 oz. silver, 2 oz. gold and 35% lead.

FARRELL COPPER CO. **MONTANA**

Office: Butte, Mont.

Officers: Dr. Donald Campbell, pres.; I. A. Heilbronner, v. p.; J. D. Slemons, treas.; A. T. Morgan, sec.; with W. C. Lewis, W. H. Hall, and Daniel Tewey, directors.

Inc. July 24, 1906, in Montana. **Cap.** $1,000,000; shares $2.50 par.

Property: 17 acres, in the S. E. part of the Butte district, has a 200′ shaft, sunk jointly with the Alliance Copper Co. Crosscut on the 200′ level shows a little ore carrying copper, lead, zinc, and silver. Inactive.

FLATHEAD DEVELOPMENT CO. **MONTANA**

Probably dead. Former address: Gen. Chas. S. Warren ,73 Hirbour Blk., Butte, Mont. and Coram, Mont. See Vol. XIV.

FLOHART SILVER MINES CO. **MONTANA**

Address: W. H. Woodburn, v. p.-gen, mgr., Neihart, Mont. Robert Pierce, supt. Messrs. Liscomb & Parmeter, leasing a block of ground above No. 2 tunnel, were shipping in 1921. H. W. E. Carnahan, former manager, died in 1920.

Property: the old Florence mine and other claims at Neihart, Cascade county, with a past production of over 3,000,000 oz. of silver.

Development: by tunnels, and 500′ shaft sunk below No. 1 tunnel. Ore opened during 1920 consisted of a 26″ face of 300 oz. ore on No. 5 level and other promising shoots.

Equipment: includes electric power, pump, hoist, 750 cu. ft. Sullivan compressor, etc.

Production: several cars of ore assaying over $80 per ton.

FRANKLIN MINING CO. **MONTANA**

Described Volume XIII.

Mine transferred to Cruse Cons. Mng. Co., which see.

FURNACE CREEK OXIDE COPPER CO. **MONTANA**

Office: John E. Corrette, sec., Hennessy Blk., Butte, Mont.

Company lost all of its property and has no assests of any kind. Fully described in Volume XIII.

GIRARD COPPER CO. **MONTANA**

Officers: George J. Kirby, pres. Willimantic, Conn.; Geo. R. Grantham, sec., Kimball Bldg., Boston.; E. C. Denton, supt.; Warm Springs, Mont.

Inc. 1912. in South Dakota. **Cap.** $10.000,000; shares $10 par; 601,120 issued; 501,000 shares pooled. Admitted to quotation on Boston Curb, for 91.020 shares, January, 1913. Annual meeting in January. First Nat'l. Bank, Boston, registrar; Ex. Trust Co., Boston, transfer agents.

Property: 20 claims, partly patented, 400 acres, 5 miles from Warm Springs and 10 miles N. W. of Butte. Ore occurs as a sulphide in 5′ fissure-quartz vein, between monzonite and aplite, assaying 4-8% copper, 6 oz. silver and 2 oz. gold.

Development: by 60′ Jack Pot shaft and 150′ tunnel. Assessment work only done.

GISH CHROME MINE **MONTANA**

See **United States Chrome Co.**

GLADSTONE MINES & REDUCTION CO. **MONTANA**

Address: A. F. Dow & Co., 10 State St., Boston, Mass.

Officers: Charles Stoddart, pres.; L. R. Davidson, v. p.; Dr. F. J. Carr,

sec.-treas.; with W. F. Sikes, J. H. Carr, W. M. Decker, and E. H. Hechler, directors.

Inc. in Arizona. **Cap.** $1,000,000; $1 par.

Property: 8 patented claims, 12 miles from Sheridan, Madison county.

Development: on the Gladstone claim consists of four tunnels, known as the 900, 700, 650 and 570′; levels are connected by raises, said to block out ore to the value of $200,000. The vein is from 12 to 60″ wide, and ore carries gold and silver in proportion of 9 to 1. Ore assays from $8.65 to $101.36 per ton, the average being from $15 to $20.

Equipment: includes a 10-mile electric transmission-line bringing power from Virginia City; two 150 h. p. and several small motors; 12 drill compressor, tramway and a complete 125-ton mill consisting of crusher, Hardinge ball-mill, Dorr classifiers, etc., cyanide plant, filter, and dwellings.

The prospectus and accompanying letters indicate that most of the directors are physicians or druggists of Buffalo, N. Y., who appear to have invested personally. The circular states: "This ore is actual gold value, like so much wheat in an elevator waiting to be ground into flour," and "it is a conservative statement that our mines will not be exhausted in 50 years of operation." "As a rule there is more value below than above." "At the last calculation we should be able to divide $700 per day among the shareholders—more than 30% per year." "We have a clean financial slate." Though the efforts of this company to make a profitable mine seem to be sincere they arouse suspicion by the publication of such absurd statements and estimates which are not at all likely to be fulfilled.

GLENGARRY MINING CO. **MONTANA**

(Succeeds the Montana-Scotch Bonnet M. Co.)

Address: Foster Bld., Miles City, Mont. **Mine address:** F. A. Hancock, supt., Cooke, Mont.

Officers: J. T. Hamilton, Miles City, Mont., pres.; Charles Daly, v. p.; J. E. Campbell, sec.-treas. with C. H. Loud and F. A. Hancock, directors.

Inc. Sept. 1918, in Mont. **Cap.** $1,500,000; $1 par; 198,275 issued; 375,000 in escrow for payment of property. Annual meeting, 3rd Tuesday in January.

Property: the Scotch Bonnet mine, 20 claims, 12 patented, partly fractional, 402 acres, in the New World district at Cooke City, Park county. Ore hauled by truck to Gardiner 53 miles, thence by rail to smelter. Ore carries chalcopyrite with gold, silver and copper, occurring as contact metamorphic deposit, between porphyry and granite, dipping 60°-78° N. E. An average is said to be $16 gold and 13.47 oz. silver per ton with 8.65% copper, from near surface.

Development: by 1,445′ main crosscut tunnel to prove downward extension of ore, a block of ore containing about 10,000 tons said to have been opened. Operating 1921, making small shipments to smelter. Has 250 h. p. hydro-electric plant, and Ingersoll Rand compressor.

Examined by V. D. Williamson, 1920.

GOLD CROWN MINING CO., LTD. **MONTANA**

Probably dead. Described Vol. XII. A. A. Mayo, pres., Henderson. Mont.

GOLDEN CURRY LEASING CO. **MONTANA**

Address: M. I. Lydig, mgr., Elkhorn, Mont. Is lessor of the Golden Curry Cons. Mng. Co., which owns the property.

Property: the Sour Dough group, 9 claims, 162 acres, near Elkhorn, Jefferson county, Mont. Orebody 100′ wide is oxidized, lying between limestone and granite and dipping at 45°. Claims said to show 5 orebodies, 2 being developed. Ore is iron oxide carrying low values in gold and copper. It contains chalcopyrite and tenorite, such ore assaying 1.9% copper, 4 oz. silver and 0.35 oz. gold per ton, with 48% excess iron. Geology and history of property given in Bull. No. 527, U. S. G. S., Helena Mining Region, pp. 136 to 139.

Development: by open cuts and tunnels; total workings said to be 8,200'

Was under lease May 1, 1917 to the A. S. & R. Co., which gave it up November 1, 1917. During 1918, lessees mined 335 tons of ore assaying 0.75 oz. gold, trace of silver, and copper, 52% iron, and 16% insoluble, sold as a flux to the East Helena smelter.

Daily output in 1919 was 30 tons, employing 16 men.

GOLDEN EAGLE MINING & MILLING CO. **MONTANA**

Address: Mullan, Idaho. J. L. Martin, sec.

Officers: Emil Lennarson, pres.-mgr., Frederick Hartkorn, v. p.; J. L. Martin, sec.-treas.; with John Rolin and W. Hutchinson, directors.

Inc. Feb. 14, 1919, in Idaho. **Cap.** $1,000,000; par $1; assessable; 600,000 issued. Annual meeting February 14.

Property: 9 claims, 180 acres, at Keystone, Mineral county. Ore carries lead and silver, and has been opened by 75 and 200' tunnels. A prospect.

GOLDEN SUNSET MINING CO. **MONTANA**

Address: J. W. Ridinger, mgr., T. H. Thomas, sec., Iron Mountain, Montana.

Assessment of 2 mills per share was due Sept., 1920.

Property: several claims on Cedar Creek, 15 miles from Iron Mountain, Mineral county. Ore carries gold. Ground was located about 10 years ago and has been opened to a depth of 200'. A 25-ton ball mill was erected late in 1919.

GOLD HILL MINE **MONTANA**

Address: Frank Eichelberger, supt., Melrose, Mont.

Owned by J. J. Edson, Jr., Diamond Bank Bldg., Pittsburgh, Pa.

Property: 10 claims, 3 patented, in "Highland" section, Moose Creek district, 20 miles south of Butte, shows gold-quartz vein averaging $6.50 per ton, with payshoot 20' thick and 300' long in granite.

Development: by 500' incline shaft, at 10° dip with total of 1,400' of workings. 50,000 tons of ore developed. Has steam power and 50-ton mill.

Development work was done in 1920-'21.

GRAND VIEW MINING & DEVELOPING CO. **MONTANA**

Probably dead as letters sent to Twin Bridges, Madison county, Mont., are returned unclaimed.

Property: molybdenum-bearing claims, 11 miles E. of Twin Bridges, said to show a vein of porous and well-crystallized cerussite heavily impregnated with iron oxide, containing ½ to 1% crystallized wulfenite (molybdate of lead). Ore also carries gold and silver.

Development: little work, done to date and commercial value of deposit not known. Concentration may be complicated.

GRANITE BI-METALLIC CONSOLIDATED MNG. CO. **MONTANA**

Office: 821 Security Bldg., St. Louis, Mo. **Mine office:** R. S. Blitz, act. supt., Philipsburg, Mont.

Officers: Chas. G. Ewing, pres.; E. S. Orr, 1st v. p.; Jno. H. Dieckman, 2nd v. p.; F. D. Fusz, sec.; G. J. Tansey, treas.; with L. S. Mitchell, L. M. Rumsey, Jr., Jos. P. Hartnett, A. L. Shapleigh, W. C. Uhri and John P. Meyer, directors. Leigh Wyman, asst. sec.

Inc. April 6, 1898, in Montana. **Cap.** $10,000,000; $10 par; all issued. Shares transferred at company's office. Listed on St. Louis Stock Exchange. No dividends, no debts. Annual meeting in June at Philipsburg.

Property: over 2,500 acres at Philipsburg, Granite county, Mont. Is a merger of Granite Mountain and Bi-Metallic properties, which yielded over 4,000,000 oz. silver per annum in early days, total output being $50,000,000, of which $14,000,000 was distributed as dividends. Decline in price of silver resulted in practical suspension of work.

Geology: fissure veins in granite, adjoining a large area of limestone.

Best ore-shoot is said to be 4,400′ long. Ore is mostly sulphide containing silver with accessory gold and copper values.

Development: by 3 shafts to 1,800′ depth, and 2 tunnels, longest 8,800′. Greatest depth of workings, 2,250′.

Equipment: 100-stamp mill, 200-ton concentrator, flotation unit, and full mining equipment, etc.

Recent work being done by lessees, although in 1919, 2 shafts were sunk to 1,000′ to prospect for the manganese area, where zinc-silver ore is expected. In October, 1918, the new hoist bought for one of the new shafts was sold to the Jib Mining Co., of Basin.

Present company has made a courageous attempt to open virgin ground in the hope of developing new orebodies comparable with those which made the district famous. Despite a large expenditure for machinery and development work, results to date are unsatisfactory.

GREAT BUTTE COPPER CO. **MONTANA**

Described in Vol. XIV. Property sold at sheriff's sale Dec. 22, 1920, for $75,315 to the **Butte & Anaconda Copper M. Co.,** which see.

GREAT FALLS-BARKER MINING CO. **MONTANA**

Address: Hughesville, Mont.

Officers: S. R. Jensen, pres.; H. H. Roberts, sec. and mgr.; W. M. Johnson, treas.

Inc. 1916, in Montana. **Cap.** $250.000; shares $1 par.

Property: Liberty group of claims in Barker district, Cascade county, Mont., with past yield of $30,000.

Ore: contains lead, zinc, gold and silver. A flotation plant was to be erected but no recent returns secured.

GREAT FALLS IRON CO. **MONTANA**

Address: Theo. Gibson, Great Falls, Mont.

Inc. Sept. 11, 1917. **Cap.** $50,000; par $10; all issued.

Officers: Theo. Gibson, pres.; Donald Gibson, sec.

Property: 31 patented claims, about 800 acres on Running and Dry Wolf creeks, in Cascade and Fergus counties, 12 miles S. W. of Stanford on G. N. Ry. 54 miles from Great Falls.

Hematite iron ore carrying 60% to 68% iron, 0.014% phosphorus and no sulphur, occurs as contact metamorphic deposit between limestone and porphyry.

Development: workings 500′ long, and 5′ to 60′ wide, and to depth of 50′. See Bull. 715 F-U. S. G. S.

GREAT NORTHERN COPPER CO. **MONTANA**

Probably dead; letters sent company, returned unclaimed.

Property: the Great Northern mine, 1 mile north of Tava, Flathead county, Mont., developed by several tunnels, 200′ to 500′ long, on the strike of the vein. **Ore:** principally gold and copper.

GREAT WESTERN MINING & MILLING CO. **MONTANA**

Address: Lost Creek, near Chico., Mont., H. F. Lawrence, mgr. at last accounts.

Property: 6½ miles from Chico Hot Springs, Park county, Mont., at 7,500′ elevation. Nearest railroad is at Emigrant, 10 miles away.

Development: tunnel reveals a brecciated and somewhat altered, fine-grained, light-gray porphyry in which fine-grained molybdenite intimately associated with pyrite forms the matrix and permeates the individual fragments of brecciated material. Ore contains 5% molybdenite, and deposit is extensive. Low-grade copper-silver-lead ore was reported opened in 1920.

A mill using flotation was erected. 1917.

GREENDALE EXPLORATION CO. **MONTANA**

See Butte & London Copper Dev. Co.

Controlled by Rainbow Lode Development Co. When the Rainbow

Lode Dev. Co. wished to acquire the Butte & London property at Butte, Mont., several years ago, it was not practicable to recall a majority of the outstanding stock of that company and the Greendale Exploration Co. was organized to meet the emergency. The property of the Butte & London was transferred to this company, the Rainbow Lode Dev. Co. receiving 51% of the stock in return for certain development work (see Rainbow Lode Dev. Co.) the remaining 49% is held by B. & L. C. Dev. Co.

HAMILTON-MONTANA GOLD MINING CO. **MONTANA**

Idle. **Office:** Richard Daxon, mgr., Hamilton, Mont., at last reports, but letters returned unclaimed, 1919.

Property: company owns group of claims in Mineral county, Mont. developed by 400′ crosscut, driven to intercept a vein of copper and lead ore.

HECLA MINES **MONTANA**

Address: Knippenberg Syndicate, Glendale, Beaverhead county, Mont.

Property: the Atlantic, Cleves, and other mines, 10 miles W. of Glendale, formerly owned by Hecla Cons. M. Co., which for 20 years was a large producer of silver and lead, with considerable gold and copper, latter reaching 100,000 lb. fine copper yearly. Property paid dividends of $2,250,000 on an original investment of $40,000, but was bought, 1906, at sheriff's sale, for $28,000. About 65 men employed for a year or two, but the little ore found was low-grade, and the mine was again closed down, and abandoned, after some $300,000 had been spent.

Mine worked by lessees until 1912, when it was taken over by the Longmaid Bros. of Helena, who installed electric power.

Several hundred tons of copper-lead ore from smelter dump shipped annually.

HELENA MINING BUREAU, INC. **MONTANA**

Reported out of existence, 1922. Fully described in Vol. XIV. of this Handbook.

HEMLOCK SILVER-LEAD MINING CO **MONTANA**

Address: N. Knudsen, sec.-treas., Saltese, Mont.

Officers: Peter Peterson, pres.; W. J. Hughes, v. p.; with Nels Knudsen, Henry Northan and W. A. Lea, directors.

Inc. 1907, in Montana. **Cap.** $150,000; 10¢ par; assessable. Last call 1 mill per share, due Nov. 30, 1920.

Property: 3 claims on Packer Creek, 1½ miles from Saltese, Mineral county.

Development: 1,500′ of tunnels, a 250′ shaft with crosscut 220′ to the lode which is claimed to be 60′ wide and to carry silver and lead ore.

Friction in the company is said to have delayed operations. In 1920, ore was being opened in the tunnel.

HIDDEN TREASURE GROUP **MONTANA**

Address: W. J. Stephens, owner, Missoula, Mont.

Property: 9 patented claims in the Wallace district, near Clinton, Missoula county, said to show 5 veins with gray copper and bornite ores averaging 2 to 20% copper, $2 to $4 gold, and 2 to 20 oz. silver per ton, assorted for shipments.

Development: mainly on Hidden Treasure and Cascade claims, includes 2 tunnels in a steep mountain side, uppermost 558′ on vein claimed to be 50′ wide. Ore cut 80′ from portal and extends to face. Lower tunnel, 1,400′ long, follows the east vein, said to be 50′ wide. Crosscuts develop 1 other vein of 13′ width and drifts have opened up some rich spots and several hundred feet of concentrating ore. Total work 3,600′. Shipments began 1899 and ceased in 1907, and property has had but little development since.

HIGGINS & BIELENBERG MINE (H. & B.) **MONTANA**

See B. and H. Mines & Mill.

HIGHLAND CONSOLIDATED MINING CO. **MONTANA**

Office: 8 South Montana St., Butte Mont.

Officers: C. A. Hanswirth, pres.; J. T. Bluff, v. p.; W. G. Hoage, sec.-treas.; with Dr. T. J. B. Shanley and R. S. Booth, directors.

Inc. June 27, 1919, in Montana. **Cap.** $500,000; par $1; 260,000 issued for payment of property. Annual meeting 1st Tuesday after 1st Monday in October.

Property: company owns the Gold Run and 5 other quartz claims, and has an option on 11 others, 22 miles S. of Butte. The Highland district was first opened in 1865 and produced much gold. The Only Chance, held under option, is said to have yielded $1,000,000 from workings only 500′ deep; the Three Ply claim also under option is equipped with a 5-stamp mill.

Development: a 2,000′ tunnel is being driven to cut veins in Nevin hill at depths of 300 and 800′. Face is said to be in a highly-mineralized zone.

Company is banking on past records which it is to be hoped will be equalled.

HIGHLAND COPPER CO. LTD. **MONTANA**

Out of existence. Described in Vol. XIII.

HOMESTAKE MINING CO. **MONTANA**

Address: H. V. Edwards, Wallace, Idaho.

Cap. $1,000,000.

Property: on Trout creek, 22 miles W. of Thompson Falls. shows good copper ore occurring as "kidneys".

Development: by 900′ tunnel driven in 1920.

Equipment: includes a hoist, compressor, etc.

HORSE SHOE MINE **MONTANA**

Address: John McMillan, Superior, Mont.

Property: 70 acres, patented, 12 miles S. W. of Iron Mountain, Mont. This is a placer project equipped for hydraulicking and producing a little gold.

HUGO GOLD & COPPER MINING CO. **MONTANA**

Address: Richard W. Seideman, pres., Saltese Mineral county, Mont.

Officers: W. W. Wood, Wallace, Ida, v. p.; A. G. Seideman, sec.-treas., with A. B. Atwater and Peter Weber, directors.

Inc. 1907 in Idaho. **Cap.** $1,000,000; 10c par; assessable; 770,000 issued. Last annual meeting was on Nov. 1, 1920.

Property: 3 claims, carrying the extensions of the Boston-Colby vein system, next E. of the New York & Brooklyn mine, and one-half mile E. of Saltese. Claims carry 2 parallel veins, 300′ apart, 1 about 15′ wide, said to show copper carbonates, bornite and chalcopyrite, giving assays, from selected specimens of 2-57% copper. The second vein, proven by trenching, is said to be 12′ wide, and to carry a 3′ paystreak of ore assaying 12% copper, 6 oz. silver, and $8 gold per ton.

Development: by 195′ drift tunnel, 50′ winze, 60′ shaft and a 750′ crosscut tunnel, with 600′ farther to go to reach the first vein.

Equipment: water turbine with 14′ head of water, and 2-drill compressor.

Still a prospect, in which Eastern capital was reported interested.

IDAHO-MONTANA MINING CO., LTD. **IDAHO-MONTANA**

Address: Walter Keister, sec., Murray, Idaho.

Inc. Aug. 18, 1905, in Idaho. **Cap.** 1,000,000 shares; 10cts. par; assessable; 386,349 shares outstanding. Annual meeting 1st Saturday in September.

Property: 10 claims, unpatented, 200 acres in Shoshone county, Idaho, and Sanders county, Mont., showing lead-copper-silver ore in quartz veins. Developed by 1,200′ tunnel to depth of 540′.

In October, 1919, work was resumed in the Monitor tunnel, a crosscut being driven to cut the westerly extension of the Richmond vein at a depth of 1,200′; company is to do this jointly with the Richmond company.

Power was installed and development underway in 1920.

ILLINOIS GOLD MINING & MILLING CO. MONTANA

Address: E. G. McAnulty, sec., Carthage, Ill.

Officers: R. H. McAnulty, pres.; E. G. McAnulty, sec.-treas., with Dr. A. Saley, M. M. Wallace, and J. F. Williams, directors.

Cap. $1,000,000; par $1.

Property: 143 acres, patented, in West Fisher district, Lincoln county. Ore carries gold and silver. Only assessment work being done.

INDEPENDENCE COPPER-GOLD-SILVER MING. CO. MONTANA

Address: Deer Lodge, Powell county, Mont.

Officers: I. S. Eldred, pres. and gen. mgr.; C. H. Williams, v. p.; E. Scharnikow, sec.; C. E. Larabie, treas.

Inc. 1907, in Montana. **Cap.** $900,000; shares $1 par. Assessments to date 10 mills per share.

Lands: 120 acres in the Oro Fino district, 12 miles S. of Deer Lodge and 5 miles E. of 2 railways, include the old Independence mine located 1870, which is a patented tract of 102 by 2,200′. Examined in March, 1917, by Lucian Eaves.

Development: includes shafts and tunnels, one being 550′ long, and showing vein entire length, from 2 to 4′ wide, carrying gold and silver. The last 20 tons shipped assayed $20 gold. Ore can be concentrated 3½ into 1 giving concentrate with excess of iron.

Property for sale, or lease and bond.

INDEPENDENCE COPPER GROUP MONTANA

Address: G. F. Stannard, Kalispell, Mont.

Propertry: 4 claims, 1 patented, 8 miles N. E. of Eureka, Lincoln county. Tunnels total 850′. Ore contains 3.5% copper, $1 gold, and 3 to 6 oz. silver per ton. Idle at last accounts.

INDIAN QUEEN MINING & SMELTING CO. MONTANA

Letters unclaimed at office, Butte, Mont. Mine near Apex, Beaverhead county, Mont.

Officers: Thos. F. Stephens, pres., treas. and gen. mgr.; Wm. Robertson, v. p.; Thos. W. Ellis, sec.; A. H. Stephens and T. J. Ellis, directors, at last report.

Inc. July, 1904, in Montana. **Cap.** $450,000; shares $1.50 par; non-assessable; issued, $228,000.

Property: the Indian Queen mine, 2 claims, 40 acres, and a 3-acre mill-site, in the Utopia district, Beaverhead county, owned jointly by this company and the Anaconda Copper Mining Co. The mine shows granite, intrusive in quartzite and dolomite, having 2 contact deposits between granite and limestone, of 8 to 10′ average width, carrying malachite, azurite and chalcocite, estimated by management to average 8% copper. 10 to 12 oz. silver and $1 to $4 gold per ton. Mine was opened 1867, and has been worked intermittently by lessees.

Development: by shafts of 150′ and 220′, and 820′ tunnel, with about 1,600′ of workings. Idle at last accounts.

INGERSOLL MINING CO. MONTANA

Idle. **Address:** Allen Pierse, Great Falls, pres.; or E. A. Shaw, Great Falls, sec.

Is a silver-lead property in the Little Belt range.

INTER-MOUNTAIN COMPANY MONTANA

Office: 26 Pittsburgh Bldg., Helena, Mont., at last report.

Company is a mining exploration and exploitation organization incorporated in 1909, to develop a large silver mine somewhere in Montana, and officers stated that it had gold mines to sell.

INTERMOUNTAIN ENG. & DEVELOPING CO. MONTANA

Address: L. S. Ropes, mgr., Helena, Mont.

Property: the Bell Boy gold mine in Stemple district, Lewis and Clark count.

INTER-MOUNTAIN MINING CO. MONTANA

Address: 518 Ziegler Bldg. Spokane, Wash.; and care P. L. Hoffman, supt.; Iron Mountain, Mineral Co., Mont.

Directors: John Hays, R. G. McIntosh, F. C. Daeufer, sec-treas., with W. G. Griffith and Donald Callahan. E. C. Gnaedinger, supt.

Inc. 1915, in Montana, to take over the holdings of the Amador Copper & Gold Mining Co. Cap. $2,000,000; $1 par; asesessable, 1,621,800 issued. An assessment of 1c. was levied in November, 1918, others in March and June, 1919., also ½c. in April and Sept., 1920. Shares 2c. asked, 1920.

Dividends: $16,218 in 1916; none since.

Property: 6 patented and 9 unpatented claims on Cedar creek, 10 miles S. of Iron Mountain, Mont., said to show a vein of copper and silver ore in quartzite, dipping 60° with E. W. course. Shoots are from 2' to 11' wide. Average assay of sorted ore is 15% copper.

Development: by tunnels, shaft, etc., totaling over 8,000', A 4' to 6' orebody was opened on the 400' level for 250', carrying good copper ore and a 100' winze sunk on this shoot in July, 1919. Reserves a.e given as at least 30,000 tons. No. 1 tunnel was extended during 1920, disclosing a promising vein.

Equipment: includes 250 h. p., water power and 450 h. p. electric power, 2-mile flume and pipe-line, delivering water under a 310' head, with 2 hoists, compressor, pumps, saw-mill, and about 15 mine buildings. A 100-ton concentrator, employing a Callow flotation unit, treats the ore.

Production: $100,022, in 1917, making $212,714 in all, plus shipments worth $2,000 or over per carload at intervals in 1918 and 1919.

Employs 75 men normally, when output is 150 tons daily.

INTERNATIONAL MINING CO. MONTANA

Office: Bozeman, Gallatin county, Mont.

Officers: J. W. Wilcox, pres.; S. J. V. B. Henderson, v. p.-treas.; Samuel F. Walker, sec.-gen. mgr., with Harvey M. Farriss and A. Badgley, directors, all of Bozeman, Mont.

Inc. Oct. 2, 1902, in Montana. Cap. $600,000; shares $100 par; fully paid and non-assessable.

Property: 12 claims, 240 acres, well timbered, in Springhill mining district, Gallatin county, Mont., said to show gneiss, quartzite and shale, fissure and contact veins, opened by 380' to 1,800' tunnels, and 5 shafts of 80' to 800', showing sulphide ores.

Company developing an ore shoot, at last accounts, said to carry 26% lead, 8 oz. silver, and $8 to 67 gold per ton. The Lone Star group adjoining the International is practically under the same ownership. Letters to company unanswered.

IOWA-MONTANA DEVELOPMENT CO. MONTANA

Probably dead; letters sent former address, Fraser, Iowa, and mine address. Jefferson Island, Madison county, Mont., returned unclaimed.

Officers: at last accounts, T. J. McGinnis, pres.; F. H. Hoeffner, sec.; E .H. Daniels, treas.; all of Fraser, Iowa, and John Young, J. D. Morrison, F. Wood, directors. J. D. Morrison, mgr., Butte, Mont.

Inc. June. 1915, in Iowa. **Cap.** $75,000; shares $50 par. Is a leasing company. Company obtained a 3-year lease, 1915, on the Bismark mine of the Montana-Illinois Copper Mining Co., which was absorbed in 1918 by Liberty-Montana Mines Co. The Iowa Mountain is probably out of business.

According to the U. S. Geological Survey, the mine is 23 miles S. of Jefferson Island, in the Tobacco Root Mountains. Molybdenite was found in the ore shoot to a depth of 600', occurring as a film on quartz.

IRMA MINES (THE) MONTANA

Address: Cooke, Mont. Active in mid-1921.

IRON MASK LEAD MINING CO. MONTANA

Address: Troy, Mont.

Officers: G. F. Stannard, pres.; H. W. Dickey, v. p.; Robert Gregg, sec.

Cap. $150,000; $1 par; assessable.

Property: 4 claims, 10 miles S. of Troy, showing veins carrying zinc, and lead-silver ore, also manganese. Development by tunnels. Leased to G. L. Goshow, of Indiana, at last accounts.

IRON MOUNTAIN TUNNEL CO. **MOUNTAIN**

Purchased in July, 1915, by Federal Mining and Smelting Co., which see.

IRONSIDE MINE **MONTANA**

Owned by **Sheils & Ironside Mining & Milling Co.**, which see.

JACK RABBIT MINE **MONTANA**

Address: Warren Graeter, Argenta, Mont.

Property: a well-known mine in the Argenta district of Beaverhead county, owned by the Conda M. Co., sold for $1,800 at sheriffs sale in Jan., 1921, to Warren Graeter. Prospects are said to be good.

JARDINE GOLD MNG. & MLG. CO. **MONTANA**

Address: Silver Bow Block, Butte, Mont.

Officers: W. S. Hunnewell, pres.-treas.; H. C. Bacorn, v. p.- gen. mgr.; with J. E. Stevenson and F. W. Bacorn, S. D. Bacorn (sec.), directors.

Inc. 1914, in Arizona. **Cap.** $2,000,000; $1 par. The company has no bond issue or debts and is financed for all current needs. It has spent over $250,000.

Property: 26 claims, 23 patented, containing 353 acres, at Jardine, Park county, Mont. Title was obtained by present company in 1917, workings cleaned up and re-timbered, and new development work done adding largely to ore reserves.

Geology: quartz veins in schist, with general north and south strike and westerly dip. Ore is partly oxidized and partly arsenopyrite.

Development: over 3 miles of underground workings including 21 cross-cut tunnels and drifts on veins.

Equipment: includes belt-driven compressor, 40-stamp mill and cyanide plant for gold ore, 20-ton concentrator for tungsten ore, hydro-electric plant now generating 325 h. p.; all machinery at mines and mills being operated by electric power; offices, residences, boarding-house and bunk-houses for employees,

Production: a 20-ton concentrator was operated for the first six months of 1918, producing tungsten concentrates, together with crude tungsten ore, of a value of $52,000. During the latter half of 1918 the concentrator treated 3,500 tons of gold ore that ran from $10.03 to $12,98 per ton. In 1920, the mill was treating 150 tons daily, netting $15,000 per month, but was closed in December.

JEFFERSON & TETON MINING CO. **MONTANA**

Address: Clancy, Mont.

Inc. 1920, in Montana.

Property: 7 claims, including the Willard mine on Warm Springs creek, near Clancy, Jefferson county. Ore carries silver, gold, and lead.

Development: by 150′ shaft. Work underway in 1921.

JEFFERSON MINES CO. **MONTANA**

Address: Angus McLeod, care Butte & Superior Mng. Co., Butte, Mont.

Officers: H. Gysbert Klenze, pres.; Angus McLeod, v. p.; J. K. Claxton, sec.-treas.

Inc. in Montana. **Cap.** $100,000; par 10¢.

Property: 4 groups of claims, 700 acres, in Whitehall district, Jefferson

Development: by 300′ shaft.

JEFFERSON MONTANA COPPER MINES CO. **MONTANA**

Address: Corbin, Jefferson county, Mont. C. K. McCormick pres.; P. A. Bell, supt.

Property: 16 patented claims, in Colorado mining district, 3 miles from Corbin, shows fissure veins, 3-5′ wide in granite. The course of the ore-body is N. E.-S. W., with dip of 60-70°. Developed to depth of 540′ by vertical shaft, and electric power installed.

No recent information available.

JEWELL MINING & MILLING CO., LTD. MONTANA

Office: 436 Peyton Bldg., Spokane, Wash.

Officers: C. E. Morby, pres.; C. C. Baldwin, v. p.; J. A. Powers, sec.

Cap. $250,000; 25c par; non-assessable.

Property: 10 claims and millsite 1½ miles from Eddy, Sanders county, and 36 miles E. of Burke, Idaho. Examined by F. C. Calkins and D. F McDonald. **Geology:** 20′ vein is in quartzite and shale. Three shoots of silver-lead ore have been opened.

Development: is by tunnels, one 1,300′ long.

Equipment: 2-drill compressor, oil engine, jackhammers, pump and living quarters for 25 men. Work was resumed in March, 1920, after several months shut-down.

JIB MINING CO. MONTANA

Office: Balfour Bldg., San Francisco, Calif. **Mine address:** Basin, Jefferson county, Mont.

Officers: A. E. Spriggs, pres.; C. G. Weidinger, sec.; Sol Genzberger, treas., with J. F. Cowan, and A. E. Spriggs, directors; O. F. Brenton, supt.; F. K. Derby, cons. eng.

Inc. Nov. 19, 1917, in South Dakota. **Cap.** $3,000,000; $3 par; 600,000 issued . Security Transfer Co., New York, transfer agent and registrar. Annual meeting, third Wednesday in November.

Property: the Hope, Katie and Jib mines, 17 claims, patented at Basin, Mont. Group has been idle for 20 years, after producing $2,000,000. Reported by owners that 400,000 tons of ore is blocked out. Claims show a fissure vein in granite, 30′ wide, with ore that assays 1½% copper, $2 to $4 gold, and 4 to 10 oz. silver. Examined by A. A. Blow, A. L. Pierce, R. M. Atwater, Jr., F. K. Derby, W. G. Nebeker and J. C. Adams.

Development: by vertical shaft 600′ deep, and 6,000′ of workings. Some rich ore was opened on the hanging wall, August, 1919, near water-level, 35 tons yielding $13,374, and 620 pounds, $6,200. The average from this place is said to be $150 per ton, but this rich ore is irregular in occurrence.

Equipment: includes electric power obtained from the Montana Power Co., two 600-gal. centrifugal mine pumps, 250-h. p. hoist, bought from the Granite Bi-Metallic Company, and two 2,300 cu. ft. compressors. The old mill is to be re-built and modernized by adding a flotation plant of 2 units, making daily capacity of 300 tons.

Company has been financed by Utah capital. Ore was being mined for shipment in October, 1919. Lessees did most of the work during 1920, and opened good ore at 300 and 400′ depth. There were 35 men employed early in 1921.

KALISPELL-TROY MINING CO. MONTANA

Address: Leonia, Idaho.

Officers: D. R. Keeler, pres.; G. F. Stannard, v. p.; A. W. Keeler, sec.-treas., Kalispell, Mont., with T. S. Hand, J. W. Carey, J. Brinkhouser, W. Hogan and Stanley Wood, directors.

Cap. $60,000; 20 cents par.

Property: 21 claims, 13 miles W. of Troy, 1 mile from Leonia, Idaho. Ore carries lead, silver, and zinc. No recent data available.

KEATING GOLD MINING CO. MONTANA

Address: J A. Murray Estate, Butte, Mont.

All the property was sold under mortgage foreclosure in July, 1917, and in July, 1918, the statutory year for redemption had expired. Property was bid in by the late J. A. Murray, Butte, Mont., who was the holder of company's bonds, and company is entirely without cash or assests of any kind, but has not been dissolved. Thus ends the life of a company that spent six years mining a strong vein with good values, producing several million dollars worth of ore, but without a profit to the company. See description in Vol. XVII.

KENDALL LEASING CO. **MONTANA**

Address: Kendall, Mont. Owned by A. B. Fox and S. D. Whipple. Frank Bryant, supt., Kendall, Mont.

Has lease on the Kendall mine, owned by the Barnes-King Dev. Co. Work confined to ground above 100′ level. Normally employs 15 men and has 175 h. p. electric equipment. Mined 7,152 tons of gold ore in 1918.

KING & QUEEN MINING CO. **MONTANA**

Now **Pitt Copper Mining Co.**, which see.

KING SOLOMON MINING CO. **MONTANA**

Dead. See description in Vol. XIII. The mine in the Lump Gulch district, near Helena, was operated by P. A. Danaker and others in 1920, who shipped some ore.

LADYSMITH COPPER MINING CO. **MONTANA**

Company dissolved. Fully described Vol: XII. Formerly operated near Elliston, Powell County, Mont.

LAST CHANCE COPPER MINING CO. **MONTANA**

Probably dead; letters sent officials returned unclaimed.

Officers: Geo. Champagne, pres.-mgr.; Saltese, Mont., Sterret Napton, sec.-treas. Missoula, Mont.

Cap. $1,200,000, shares $1 par.

Property: 6 claims, 2 patented, adjoining the Ben Hur mine, 4 miles north of Saltese, Mineral county, Mont.

Developed by shallow shafts and a 2,300′ tunnel, the workings said to show a 30′ vein of silver lead ore faulted in the tunnel, but a winze shows an 18″ streak of ore said to carry about $100 per ton in values. Company reported past shipments of about $150,000.

LEE MOUNTAIN MINE **MONTANA**

Address: W. Lee Heidenrich, Rimini, Mont. Also R. P. McDonald, attorney, Spokane, Wash.

Property: 6 patented claims at Rimini, Vaugh district, Lewis and Clark county reported to be bonded to New York capital in 1920. Located in 1864.

Geology: a quartz vein in quartz-monzonite, dipping 70° with course S. 70° W. Ore is a sulphide carrying 0.15 oz. gold, 12 oz. silver, 6% lead, and 4% zinc.

Development: by 1,200′ tunnel to depth of 660′, and 3,000′ of workings. **Equipment:** steam power, compressor, pump, etc.

Production: $1,500,000 in past 40 years. Lessees, in 1919, found small orebody and shipped considerable ore. Further exploration underway in 1920-21.

LEGAL TENDER CONS. MINES CO. **MONTANA**

Address: H. A. Galway, pres., Butte Mont., or Wm. Stussy, sec., Butte, Mont. J. D. Courtney, supt., Clancey, Mont.

Property: in Lump Gulch district, closed in 1920, but reported refinanced, 1921. Quartzose ore containing very rich argentiferous galena, zincblende and rich silver minerals occurred in narrow fissure veins in granite. The output in recent years carried but 25 to 35 oz. silver per ton. A pay streak, 6 to 18″ thick, cut on the 400′ level in 1920, yielded two carloads assaying 169 oz. and 479 oz. respectively shipped to East Helena smelter. The vein is 4-6′ wide, vertical, and merges westward with a "silica reef".

Employs 25 men normally and has 75 h. p. electric power.

Option to Furnace Creek Oxide Copper Co., held 1919, was cancelled.

LEROY GOLD & COPPER MINING CO. **MONTANA**

See same title in Idaho.

LEVIATHAN GOLD MINING CO. **MONTANA**

Address: Lessee, Ben W. Wilson, Jefferson Island, Mont.

Mine is held under $70,000 bond and lease, by B. W. Wilson, on which payments were made as due in 1919.

Officers: Chas. E. Morris, Pony, pres.; J. L. Templeman, v. p., Miner

Blk., Butte, Mont.; Wm. Morris, treas., Pony, Jas. A. Flint, sec., Pony, Mont.

Property: 6 patented claims, 105 acres, at Mammoth, Madison county, carried an E.-W. vein with 45° dip, cutting through gneiss. Vein shows 4' to 20' of copper-silver ore with gold values.

Development: by 700' tunnel and 2,000' of workings giving depth of 400'

Equipment: includes hydro-electric power plant, compressor, and 100-ton concentrator.

Appears to be another name for Leviathan Copper Mining Co., controlled in Waterloo, Iowa. A report by W. H. Winchell estimated reserves at 12,000 tons of $30 ore on dump and twice that amount blocked out in mine. His sampling gave ore content as 2.7% copper, 4.1 oz. silver and $17.20 gold per ton. Mine is an old one, located 1864. Company was developing property as well as mining and shipping ore at last accounts.

LIBERTY COPPER CO. MONTANA

Office: J. F. Ferguson, Wallace, Idaho.

Officers: F. J. Luedke, pres.; Charles Luedke, v. p.; J. F. Ferguson, sec.-treas., with C. B. Spear, directors.

Cap. $150,000; 10 cents par; assessable; 800,000 issued. Annual meeting, third Monday in June.

Property: 8 claims, 160 acres, near the Amazon-Dixie mine, Mineral county, Mont., shows a quartzite cut by a fissure vein with auriferous copper ore. Worked by tunnels. A prospect that was closed down in 1919.

LIBERTY METALS CO. MONTANA

Address: Troy, Mont.

Officers: G. M. McKenna, pres.; J. T. Sugars, v. p.; J. F. Powers, sec.-treas.; also directors.

Inc. May 10, 1919, in Montana. **Cap.** $500,000; $1 par; 325,000 issued. Annual meeting, third Tuesday in August.

Property: 8 claims, 150 acres, 51 patented, 5 miles south of Troy, Mont. About $6,000 has been spent on property to date.

Geology: main vein is a contact between a diabase dike and Burke quartzite, and has been traced on surface for 2,200'. Ore carries gold, silver, copper, lead and manganese. Ten other veins are said to be exposed and to vary from 6 to 48" wide.

Development: by 3 tunnels totaling 250' in length. A steam plant, compressor, and drills are to be installed.

A prospect in which some rich ore was reported opened up in 1919.

LIBERTY MINING CO. MONTANA

Formerly Mike Horse Mining Co., reorganized May, 1919.

Described in Vol. XIV. Mine is now under bond and lease to the **Sterling M. & M Co.**, which see.

LIBERTY-MONTANA MINES CO. MONTANA

Address: B. W. Wilson, gen. mgr., 552 Phoenix Bldg., Butte, Mont.

Officers: J. W. Brown, pres., R. F. D. No. 8, Waterloo, Iowa.

Inc. 1918, in Montana. **Cap.** $3,000,000; $1 par.

Property: (1) the Mammoth mine, 3 patented claims and one millsite, 55 acres, at Mammoth, Madison county, Mont., formerly owned by the Leviathan Gold Mining Co. of Pony, Mont., (2) the Bismarck mine, 10 claims, millsites, and placer ground, 20 miles from Jefferson Island, and (3) the White Chief mine, 8 claims, near the Bismarck. Water and timber are plentiful. Country is mountainous.

Development: the Mammoth mine has 3 tunnels cutting strong gold veins, cutting schists and gneiss, and carrying free milling gold ore near

surface changing at 200′ in depth to chalcopyrite ore with gold and silver values, averaging $28 per ton. No. 1 tunnel is 500′; No. 2, 700′; No. 3, 550′.

Equipment: an electric transmission-line from the Madison Power Co.'s line extends to the Mammoth mine, 7 miles distant, a saw-mill, cutting lumber for new 200-ton flotation concentrator, and full equipment for mine and mill. An aerial tram is planned to carry ore from the two mines to the Mammoth mill.

The Mammoth mine located 1864, produced gold until 1900, but was hampered by copper in ore. According to J. H. Trerise, the mine has 225,000 tons above tunnel and 212,000 tons on the dump, that will net $770,000.

LITTLE GOLDIE MINE — MONTANA

Address: M. R. Ostronick, Twin Bridges, Mont., owner and mgr.

Property: 3 claims, 54 acres, in Goodrich Gulch, Madison county Mont., said to show 2″ to 18″ fissure veins, running E.-W., and assaying as high as $114 in gold, silver and lead. Ore occurs in gneiss and limestone formation.

Development: by 200′ tunnel, several drifts, and raises. Equipped with compressor.

Shipments: in 1915, reported to have averaged $80 per ton, amounted to $30,000. Owner estimated 6,000 tons of ore blocked out, at last report.

LIVERPOOL SILVER MINES CO. — MONTANA

Offices: No. 11 Montana Bldg., Helena, Mont.; and W. G. Burns, 27 State St., Boston, Mass. Operated by Eichelberger and Fryberger, Helena. William Murray, supt.

Officers: J. W. Brien, pres., Essex, Ontario; J. F. Quinn, v. p.; J. E. Simpson, treas.; with Ralph Rawlings, C. E. Fryberger, cons. eng.; H, M, Ferry, P. E. Wagner, R. T. Hollis, C. Z. Potter, C. J. Trauerman, Joseph Reinham, H. S. Hirschman, C. H. O. Meyer, H. G. Gallagher and Frank Eichelberger, directors. W. J. Burns, sec.

Inc. May 17, 1919, in Delaware. **Cap.** $250,000; par 10c.; non-assessable; 2,250,000 issued. Metropolitan Trust Co., Boston, transfer agents and registrar. The U. S. Manganese Corporation owns 50% of the shares, paid for by 8% preferred stock.

A prospectus issued by J. D. Crowley & Co., Boston, shows that the directorate includes several members of the U. S. Manganese Corp. The share selling campaign ended in 1920, and was said to have been "clean and successful in every respect".

Property: the Liverpool mine, 7 patented claims, 80 acres, in the Lump Gulch district, 1½ miles from Clancey. Company took over the Lump Gulch Mining Co., property, May, 1921, for $100,000, making first payment.

The Lump Gulch tract contains 37 acres, has a 250′ shaft and contains the eastern end of the Liverpool vein.

Geology: a fissure-vein in granite, 4 to 7′ wide, dipping 85° N. and with E.-W. course. Oreshoots are reported to be 300 and 600′ long, with 18″ of ore that carries 10% lead and 35 oz. silver.

Development: by 750′ vertical shaft and 5,000′ of workings. Reserves are officially estimated at 40,000 tons. Shaft is to be re-timbered and sunk to 1,000′. Rich ore was opened on the 750′ and 500′ levels during 1920.

Equipment: 250 h. p. electric power, geared air hoist, 600 cu. ft. compressor, pump, shops, and quarters for employees.

Operations were resumed in June, 1919, and ore mined from 400 to 750′ levels. In September, the old dumps, said to contain 10,000 tons of 9 oz. silver ore, were being sorted for shipment to smelter at East Helena.

Production: by mid-1920, the daily output of ore was about 40 tons. The May yield was 17,000 oz. of silver.

Mine shut down March, 1921, and new company being organized, 1921.

LOST RANCH & TUNNELSITE MINE — MONTANA

Address: Harvey Sullivan, Grant, Beaverhead county, Mont.

Property: 9 claims in the Bloody Dick sections, in Upper Horse Prairie, 5 miles from Brenner, shows gold, silver, lead copper ore in narrow fissure veins (2" to 3') in porphyry. The ore carries brittle silver, argentite and mixed sulphides in streaks 8" to 12" thick, the ore as shipped carrying 44 to 1,300 oz. silver, 4 to 20% copper, 60% lead.

Development: totals 1,200', including 420' tunnel, with 300' back, blocking out 100 tons of ore with 39 tons stoped. No recent returns.

LUKENS-HAZEL MINING CO. **MONTANA**

Address: Oscar Nordquist, supt., Libby Mont.

Officers: C. E. Lukens, pres.-treas.; J. H. Town, v. p.; W. Jennison, sec., with H. L. Faust and Oscar Nordquist, directors.

Cap. $1,600,000; $1 par; assessable.

Property: 17 claims, 280 acres, all patented, with millsite and water-rights, on Shaughnessy hill, 8 miles S. of Libby, Mont.; is an old property lately re-opened. Formation is quartzite, cut by veins whose ore carries galena, sphalerite, and pyrite.

Development: by 2,000' main tunnel and over 10,000' of workings. The main orebody is said to average 5' in width for a length of 1,130'. Reserves are officially estimated as 150,000 tons worth over $2,000,000, averaging $8 to $15 per ton.

Equipment: water, brought 1½ miles through a 36" pipe, drives the 250-ton mill, which contains rolls, jigs, tables and flotation unit.

Production: initial shipment of 3 cars of concentrates to East Helena was made in Jan., 1921. Employs 100 men.

LUMP GULCH MINING CO. **MONTANA**

Address: T. J. Chestnut, Clancey, Mont.

Officers: T. J. Chestnut, pres.; G. S. Haynes, v. p.; C. L. Beers, treas.; with A. Munson and R. Wanderer, directors.

Inc. 1906, in Montana. **Cap.** $500,000; $1 par.

Property: under lease and bond for $100,000 to **Liverpool Silver Mines Co.**, May, 1921.

LUMP GULCH SILVER MINES CO. **MONTANA**

Office: 37 Union Bank Bldg., Helena, Mont.

Mine address: Clancey, Mont.

Officers: Gustave Strobel, pres.; R. E. Smith, v. p.; R. A. Weisner, sec.-treas.; Geo. J. Shaffer, with J. W. Soltzenbach, E. E. Smith and R. A. McCray, directors. W. F. Word, cons. engr.; H. B. Emigh, efficiency engr.

Inc. Sept., 1919, in Montana. **Cap.** $1,000,000; $1 par; non-assessable; 500,000 issued. Nat'l. Security Co., New York, registrar and transfer agent.

Property: the Muskegon, Mariner and Mary Tate mines. 14 claims adjacent to the Free Coinage mine of the Amalgamated Silver company, at Lump Gulch, Jefferson county, 2 miles from Clancey and 11 miles S. W. of Helena. The elevation is 4,300 to 5,000'.

Company also has lease and bond on the Baby Helena mine adjoining the Liverpool.

Development: by a 200' shaft on the Mariner. At 100', crosscuts are said to have cut 4 veins, the main one apparently a continuation of the Liverpool-Free Coinage-Little Alma vein. The Muskegon claim has a 260' shaft, which was unwatered and connected with the Mariner shaft by a 350' drift in 1920. Some high grade silver ore has been opened.

The fiscal agents for this company are Curtis, Packer & Co., of New York, the same firm that was so optimistic over the Amalgamated nearby.

LUPFER MINING CO. **MONTANA**

Address: Whitefish, Flathead county, Mont.

Officers: George Hoffman, pres. and mgr.; Mike Sullivan, v. p.; Pete Hoffman, sec., with E. Boettcher and John Roeder, directors.

Inc. 1906, in Montana. **Cap.** 500,000 shares; par value 15c; 250,000 issued.

Property: 160 acres, about 14 miles W. of Whitefish. Developed by

150′ shaft, showing a well defined vein of copper ore, 3′ wide in porphyry and limestone, said to assay 2% copper, 3 oz. silver with a trace of gold. Has a small steam hoist and air compressor. Idle, owing to lack of funds.

MADDEN SCRATCH GRAVEL MINES CO. **MONTANA**

Idle since 1916. **Address:** Helena, Mont.

Officers: Jas. Madden, pres.; Peter Scharenbroich, v. p.; Wm. Muth, sec.-treas., above, with Theo. Starter, L. P. Wells and E. Edwards, directors.

Inc. March 16, 1916, in Montana. **Cap.** $300,000; $1 par; outstanding 170,000. Annual meeting, third Monday in June.

Property: 3 patented claims, 50 acres known as the Jacquemin group, in the Scratch Gravel Hills, 8 miles from Helena, said to show gold ore in fissure veins in granite. The claims are said to have been worked in a haphazard manner by Jacquemin.

Development: 160′ incline shaft, and 340′ tunnel.

MAGINNIS MINE **MONTANA**

Address: W. A. Young, lessee, Gilt Edge, Mont.

Mine owned by Dartmouth Land Co., of Great Falls, 75%, and A. M. Halter, 25%; is a well known gold mine, which produces 100 to 150 tons of rich ore yearly. Normally employs 10 men and has 60 h. p. steam and gasoline power.

MAMMOTH MINING CO. **MONTANA**

Address: George Austin, Spokane, Wash.

Officers: A. H. Featherstone, pres.; G. J. Heyfron, v. p.; John Ferguson, sec.-treas, with Dr. W. A. Smith, Jesse Freeman, Dr. C. R. Mowery directors. J. Austin, mgr.

Cap. $125,000; 10c par; assessable. Annual meeting, first Thursday in August.

Property: 7 patented claims, 7 miles N. E. of Bonita, Missoula county, containing veins from which ore was shipped that returned 28 to 37% lead and 5 to 6 oz. silver.

Development: by shafts, one 124′ deep, tunnel, etc. Assessment work only done in 1920. Mine is close to the railway.

MARYSVILLE GOLD MINING CO. **MONTANA**

Idle. **Address:** Ted Collins, Helena, Mont. **Mine office;** Marysville, Mont.

Officers: Geo. O. Freeman, pres.; Ted E. Collins, sec.-treas.; L. S. Ropes, supt.-cons. eng.

Inc. 1911, in Montana. **Cap.** $1,000,000; shares, $1 par; 527,000 issued. **Bonds:** $350,000, 6-year, 8%, authorized up to October, 1917. Taken off New York Curb, August, 1918.

Property: the Annie Dillon mine, 30 claims, 430 acres, in Marysville district, adjoining the Belmont. Company had $10,000 in treasury at last account.

Development: mainly by tunnels. About $120,000 said to have been spent in exploration.

Option held by Marysville Gold Mining Syndicate on the property was forfeited, 1921.

McCAFFREY MINING & SMELTING CO. **MONTANA**

Address: S. B. McCaffrey, pres., La Salle & Bureau R. R. Co., La Salle, Ill.

Company owns the California, Phil Sheridan, New Cottage and East Doddington claims, in the Cataract district. Jefferson county, Mont., 2½ miles from Basin. Development work slight, though veins are well defined. Idle for several years but leasing property under consideration.

MEXICO-COEUR D'ALENES MINING CO. **MONTANA**

Letter returned from former address: R. N. Tutt, Kansas City, Mo.

Officers: L. F. Burnham, pres.; Stella Resium, v. p.; R. N. Tutt, sec.-treas.; Joe Kran, asst. sec.

Cap. $1,000,000; $1 par. Annual meeting January 10.

Property: 5 claims on Swamp creek, Sanders county, 18 miles E. of Burke, Idaho, with veins of lead-silver ore of usual Coeur d'Alene type.

Development: by 232′ tunnel. No recent work reported.

MIKE HORSE MINING CO. **MONTANA**

Reorganized May, 1919, as **Liberty Mining Co.**, which has leased its property to the **Sterling M. & M. Co.**, which see.

MINES DEVELOPMENT CO. **MONTANA**

Out of business. Had bond and lease 1915-16 on **Moffit Group**, which see. Fully described in Vol. XII, Mines Handbook.

MINES OPERATING CO. **MONTANA**

Address: Alfred Frank, Newhouse Bldg., Salt Lake City, Utah. **Mine address:** H. A. Frank, sec., Daly Bank Bldg., Butte, Mont.

Officers: Alfred Frank, pres, and gen. mgr.; C. W. Whitely, v. p.; with John MacGinniss, and E. L. Newhouse, Jr., directors; B. H. Grant, supt.

Inc. 1916, in Delaware. **Cap.** $100,000; $100 par.

Property: a bond and lease on the Bullwhacker and Butte-Duluth (which see) mines on E. side of Butte. In 1919 and 1920 daily output to the Anaconda company's leaching plant was 500 tons of 2% ore.

Property shut down since May, 1921, will reopen in 1922.

MISSOURI MINE **MONTANA**

Address: J. H. Pankey, via Virginia City, Madison county, Mont.

Property: a few miles N. E. of Virginia City, is said to have shipped high-grade gold-silver ore for years. In 1918, a 10-stamp cyanide mill was installed. No recent information.

MITCHELL & MUSSIGBROD, INC. **MONTANA**

Address: Louis Mussigbrod, pres., Garnet, Mont.; J. Mokenland, v. p., Warm Springs, or Albert Galen, sec., Helena.

Property: a mine in First Chance mining district, Granite county. Has 60 h. p. steam plant and K. & K. flotation plant, installed 1919. Operated 1919, treating gold-silver ores in a 10-stamp mill.

MOFFIT GROUP **MONTANA**

Owner: J. W. Moffit, Box 6, Butte, Mont.

Mine: 8 miles from Twin Bridges, Madison county, Mont., was under bond and lease 1915-16 to Mines Development Co., now out of business.

Ore: said to average 2% copper. Over 600 tons have been shipped. Idle several years.

MOHAWK MINING CO. **MONTANA**

Address: S. G. Torgerson, Cooke, Mont. Apparently succeeds **Republic Mining Co.**, which see.

MONARCH MINING & POWER CO. **MONTANA**

Address: Eichelberger & Fryberger, operators, Montana Block, Helena, Mont.

Officers: P. N. MacDonald, pres.; J. E. Burgess, v. p.-treas.; Dr. C. E. Richardson, sec., with R. M. Davy, C. E. Fryberger, and Frank Eichelberger, directors. Charles Anderson, supt., Elliston, Mont.

Inc. Dec. 21, 1918, in Delaware. **Cap.** $100,000; $10c par; all issued. Metropolitan Trust Co., Boston, transfer agents and registrar. The U. S. Manganese Corporation owns 51%.

Property: 20 claims, 370 acres, 14 miles S. of Elliston, Mont., on W. slope of Bison mountain.

Geology: a fissure-vein in granite, 8 to 10′ wide, with 80° N. dip and S. 82° E. course. Ore-shoots are 310 and 600′ long, and carry $1.50 gold, 12 oz. silver, 10% lead, and 1.3% copper.

Development: by 400′ and 1,400′ tunnels, to be extended; and 3,500′ of workings, opening mine to depth of 1,200′. Reserves blocked out are given as 38,000 tons, and a total of 62,000 tons, averaging $16 per ton.

Equipment: steam power plant, 600 cu. ft. compressor, hydro-electric plant, and jig-back aerial tram. A 200-ton flotation mill was built in 1919.

The mill operated during part of 1920, but in Jan., 1921, work was suspended, due to lack of funds.

Production: smelter returns from previous owners totaled $600,000. Ore shipments of 25 tons daily resumed in October, 1919.

Company is connected with the Liverpool Silver Mines Co., which see, both re-opening old mines. The public is offered stock by Boston brokers whose publicity agent is a busy and hard worker, with a lively imagination.

MONITOR TUNNEL CO. **MONTANA**

Company defunct. See Vol. XIV.

MONTANA-CLINTON COPPER CO. **MONTANA**

Company forfeited bond on claims and the property was surrendered to original owner, C. L. Friederichs of Helena, Mont. Company shipped 168 carloads of ore netting $140,000 at smelter up to October, 1914. See full description in Vol. XIII, of this Handbook.

MONTANA CONSOLIDATED COPPER CO. **MONTANA**

Office: 51 Wall St., New York.

Officers: J. V. Allen, pres.; E. P. Haas, v. p.; J. A. Clark, sec.; T. F. Lee, treas.

Inc. 1906, in Maine. **Cap.** $1,000,000; shares $1 par; all issued.

Property: the Comet and Grey Eagle mines, 699,73 acres in the Cataract district, about 7 miles N. W. of Boulder, Jefferson county, Mont.

Ores: are mainly galena and sphalerite with associated pyrite and chalcopyrite, and the Comet is popularly credited with having yielded a gross output of $13,000,000. **Ore reserves:** said to be 1,350,000 tons, averaging $20 per ton.

In 1915 M. K. Rogers, of Los Angeles, Cal., took an option on 75% of the capital stock and began an active rehabilitation of the mine and mill. Soon afterwards the New York brokerage firm of Baruch & Co., since dissolved (bankrupt), acquired minority holdings and began advertising the venture; they succeeded in driving the stock up to nearly $2 a share, in the belief that Rogers stock was securely escrowed, when suddenly a large block of stock was thrown on the market and quotations dropped to negligible levels.

The Comet mine was unwatered in 1917, and company was said to be prepared to spend $100,000 in mine development. Crosscuts from the 976' shaft have never been driven far enough to reach the main vein on the lower levels.

The vein is a large one and the property promising enough to warrant deep development. Clark, Dodge & Co. were said to be interested in the property, but have publicly disclaimed any interest whatsoever in the stock on the market.

The company's holdings were acquired and exploration undertaken in 1907 on the report of A. A. Blow, in which the hope was expressed that copper ores in paying quantity would be found in depth. The 1917 activity was the result of the abnormal price of zinc, and work at the mine was subordinated to the retreatment of the 100,000 tons of tailings from the old mill for extraction of their zinc content. The geology is described in Bull. 527, U. S. G. S., p. 114, 1913.

The property has a decided speculative value as a mine. In 1918, the 400 and 500' levels of mine were reopened, and the mine produced 100 tons of ore daily; in 1919, development was continued on the 600' level, and the mine yielded 20 to 25 tons daily, the ore being hauled to the G. N. railway for shipment. A 150-ton mill was planned. The Comet was closed down Aug., 1919, but was reopened and shipping in June, 1920, as the silver content of the ore was ample to pay expenses.

MONTANA COPPER-SILVER CO. **MONTANA**

Address: E. R. Purnell, supt., Helena, Mont.

Mine in Scratch Gravel hills, Lewis and Clark county, Mont., 8 miles

from Helena, shows quartz veins in quartz-monzonite, carrying ores with pyrite and chalcopyrite and gold-silver values.

Development: by shaft and drills. Equipped with hoist. Idle at last accounts.

MONTANA GOLD HILL MINING CO. **MONTANA**

Probably dead. Letters unclaimed at former address: 609 - 1st Ave., Spokane, Wash.

Officers: E. V. Lambert, pres.; A. G. Benson, v. p.; J. W. Sarginson, sec.-treas.

Cap. $100,000; 10c par.

Property: 7 mining claims and a millsite 138 acres, in the Deep Creek district, 14 miles from Iron Mountain and Superior, Mineral county. Surface exposures are said to be encouraging.

Development: by tunnels aggregating several hundred feet, opening some $22 gold ore.

Equipment: includes smithy, sawmill, dwellings, and 50-ton mill completed in November, 1919.

MONTANA-ILLINOIS COPPER MINING CO. **MONTANA**

Absorbed by **Liberty-Montana Mines Co.**, which see.

MONTANA MANGANESE CO. **MONTANA**

Operated the Sharktown mine of the **Beaver Creek Mng. Co.**, in Philipsburg district, during 1916-17.

MONTANA MILLING & SMELTING CORP. **MONTANA**

Address: Gustaf Johnson, pres., Cone Butte, Mont.

See **Bliss Mining Co.** Organized to put up a 250-ton mill in the Cone Butte district, Fergus county, Mont.

MONTANA MINES CO. **MONTANA**

Formerly the **Beaverhead Montana Copper Mining Co.**, whose holdings were taken over, share for share.

Address: care Ray A. Cobban, Butte, Mont., sec.-treas., at last accounts.

Cap. $100,000; shares $1 par. Company obtained a lease and bond on the old Jack Rabbit mine at Argenta, Beaverhead county.

Development: by a 3,025′ tunnel driven to cut a mineralized diorite dike. In 1917 company shipped ore that returned 10% copper and 12 oz. silver.

MONTANA MINING ASSOCIATION **MONTANA**

Senator C. S. Muffly, pres.; Winston, Mont; Copeland C. Burg, secretary, Helena, Mont. Association does no mining, but was organized in 1919 to aid the industry of the State.

MONTANA MOLYBDENUM CO. **MONTANA**

Address: Chico, Park Co., Mont.

Property: in Emigrant canyon, 5 miles from Chico. An open-cut and 300′ tunnel developed a deposit containing thin veinlets of molybdenite in a decomposed porphyry. Two small concentrating mills, one employing flotation, gave indifferent results.

MONTANA MORNING MINING CO. **MONTANA**

Address: 514 Hyde Block, Spokane, Wash. Stanley T. Wood, mgr., Troy, Mont. and 353 Munsey Bldg., Washington, D. C.

Officers: Jos. Rosslow, pres.; W. W. Dook, v. p.; E. W. Smith, sec.-treas. Stanley T. Wood and D. S. Wood, directors.

Inc. 1915, in Washington. **Cap.** $300,000; 20c. par; 1,006,000 shares issued. Transfer office as above.

Property: 8 claims, 4 miles W. of Troy, Lincoln county, reported to show 3 well defined orebodies in a contact deposit partly developed by 1,000′ of workings to depth of 225′. Ore opened contains copper, gold, lead, zinc, and silver.

The mine closed down since 1917, was to be reopened late in 1921 and ore shipped to the Snowstorm mill.

MONTANA OREWAY MINING CO. **MONTANA**

Address: Wm. P. Jahnke, Wisdom, Mont., pres. and mgr. **Mine office:** Briston via Wisdom, Beaverhead county, Mont.

Officers: W. P. Jahnke, pres.; J. B. Scott, v. p.; Fred W. Scott, sec., Chicago, Ill., I. D. Rankin, treas.; preceding, with Frank Kimball, B. F. White and Thos. Fay, directors.

Inc. 1909, in Arizona. **Cap.** $1,000,000; shares $1 par; issued, 950,000.

Property: 7 claims, 5 patented, 100 acres, and a 25-acre millsite, known as the Straight Tip group, in the Big Hole basin. Claims show a mineralized diorite dike carrying copper oxide ores, with lead and small values in silver and gold between quartzite and serpentine.

Development: by a 3,025′ tunnel. Also 2 shafts 200′ apart, one 100′ and another 130′ deep, showing ore 8 to 36″ thick, assaying $32 per ton in gold, silver, lead and copper.

Equipment: includes a 35-h. p. steam plant, with 1-drill air compressor. There are 6 small buildings. Mill to be erected, at last accounts.

MONTANA RADERSBURG MINING CO. **MONTANA**

Address: Townsend, Broadwater county, Mont.

Officers: A. E. Spriggs, pres.; Helena; Fred Allen, v. p. and supt., Townsend; B. E. Mathews, sec.-treas., with Hugh Broderick, C. A. Whipple, Sol. Genzberger and L. A. Sarecky, directors.

Inc. Nov., 1914, in Montana. **Cap.** $300,000; shares $1 par; $100,000 stock donated to treasury. Annual meeting, in November. Operating expenses in 1914-1915, $10,000; receipts, none.

Property: 5 claims, unpatented, 100 acres, in Broadwater county, said to show gold, silver, lead, zinc ore in a fissure vein in lime and quartzite. Vein has a N.-S. strike, dips 20°, and is said to be 12′ wide, with average assays per ton of $2 gold, 50 oz. silver, 20% lead, 2% zinc.

Development: 500′ incline shaft with 1,500′ underground workings. Management claims 200,000 tons of probable ore, with 100,000 tons already blocked out.

Equipment: includes a 40-h. p. gasoline hoist. Management states the company is preparing to erect a mill.

Production: said to have been $300,000 in gold and silver up to the shutdown of property in 1908. Only development work done in 1919.

MONTANA SCOTCH BONNET COPPER & GOLD M. CO. **MONT.**

Fully described in Volume XIV. Succeeded by **Glengarry Mining Co.**, which see.

Property: sold Aug., 1918 to Robert McKay, who formed the Glengarry Mining Co., Montana Scotch stockholders get $150,000 or about 5c. per share.

MONTANA SILVER-LEAD MINING CO. **MONTANA**

Former address: 605 Dekum Bldg., Portland, Oregon.

Officers: H. G. Lougee, pres.-treas.; R. Naylor, v. p.; O. E. Heintz, sec., with J. Bingham and C. B. Roosa, directors.

Inc. Oct. 17, 1906, in Washington. **Cap.** $1,000,000; $1 par; 900,000 issued.

Property: 6 claims, 120 acres, in the Cabinet range, near Libby, Lincoln county, Mont., 16 miles from railroad.

Geology: contact vein in quartzite and slate. Orebody said to be from 2′ to 20′ wide, and pay-shoot on surface 600′ long. Ore is a sulphide, assaying upwards of 5% lead, 5 oz. silver, $2 gold, and 4% zinc.

Development: by 2 tunnels, 750′ and 1,300′ long, reaching depth of 1,100′ with total workings of 2,050′. Lower tunnel was being extended to cut ore opened above, but mine was shut down in 1918. No later returns.

MONTANA STATES MINING CORPORATION **MONTANA**

Office: William Muth, sec.-treas., Bailey Blk., Helena, Mont. **Mine office:** Alhambra, Jefferson county, Mont.

Officers: R. A. Bell, pres. and gen. mgr.; R. Horsky, v. p.

Inc. May, 1911, in Montana. **Cap.** $5,000,000; shares $5 par; issued, 120,000 shares.

Property: 38 claims, partly patented, 700 acres, in the Warm Springs district, 6 miles from a railroad. Country rock is a quartz monzonite of the

Boulder batholith, cut by a rhyolite dikes and showing quartz veins with mineralization along the walls.

Development: by numerous shallow shafts, and short tunnels, with about 2,300′ of openings. Ores are mainly galena, sphalerite and tetrahedrite, with a chalcedonic quartz gangue, reported by management to carry up to 22% copper, 10% lead, 8% zinc, 16 oz. silver and $16 gold per ton.

Idle, 1919.

MONTANA UNITED MINING CO. MONTANA

Address: J. G. Kirby, pres., Willimantic, Conn.

Cap. 150,000 shares; $1 par; all issued.

Property: 240 acres, patented, 9 miles east of Deer Lodge, adjoining the Emery mine, shows a fissure vein varying from a streak to 7′, average width 3′-4′.

Ore: gold, silver, lead, zinc and much antimony. Said to have 20,000 tons ore blocked out that will average $20 per ton, including zinc.

Equipment: includes 50-h. p. hoist, 300-cu. ft. compressor, and all necessary boilers, buildings, etc. The mine is idle, needing money for a mill and further development.

MOULTON MINE (NEIHART) MONTANA

See **Cascade Silver M. & M. Co.**

MOULTON MINING CO. MONTANA

Address: W. A. Clark, owner, Miner Blk., Butte, Mont.

Is a W. A. Clark corporation, owning and operating the Moulton mine, at Walkerville, a suburb of Butte, Mont. Has 219 h. p. electric power, employs 20 men outputting about 40 tons of silver, zinc and lead ore daily.

MOUNTAIN VIEW OR JOHNSTON GROUP MONTANA

Address: Alex J. Johnston, Butte, Mont.

Property: 6 patented claims in Bear gulch, near Twin Bridges, Madison county. The vein is a contact between limestone and granite. Ore is a sulphide, and carries 1½% copper, with some gold and silver.

Development: by 250′ vertical shaft and 2,400′ tunnel, opening ore to depth of 900′. Idle in 1919.

MT. THOMPSON GOLD MINING & MILLING CO. MONTANA

Address: E. S. Rinehart, 658 Colorado, St., Butte, Mont.

Officers: Dr. E. S. Rinehart, pres.; John W. Franks, v. p.; C. L. Franks, sec.-treas., with A. L. Thomas and Jos. Hunter, directors.

Inc. 1916, in Mont. **Cap.** $1,000,000; $1 par.

Property: 10 claims, the Rhinehart mine, in tract 6,000′ long, situated on Cataract Creek, 4½ miles from Basin, on the Great Northern R. R., Jefferson county, Mont.

Geology: ore is a complex mixture of galena, pyrite, some chalcopyrite, and much sphalerite, in small shoots in an E.-W. fissure vein in granite. The ledge is said to be 12′ to 25′ wide, and is a quartz-tourmaline silver-lead.

Development: by 1,400′ Copper Hill tunnel, with 35′ crosscut 300′ in, exposing one of the main veins and a 160′ crosscut at 800′ in, tapped the center vein which shows ore on which a raise is being driven to surface.

Equipment: 14-h. p. gasoline engine, small compressor, etc.

Company claims 200,000 tons of ore blocked out that samples $32 for 500′. Planned erection of mill 1917-18, run by water power. Not favorably regarded as vein is lean and orebodies small. Further work was to be done in 1920-'21.

MT. WASHINGTON MINE MONTANA

Near Wickes Montana. See Angelica M. & D. Co.

NANCY HANKS & MONTANA MNG. CO. MONTANA

Office: H. A. Bellows, Suite 711, 53 Park Row, New York. **Mine office:** Garnet, Mont.

Directors: Rudolph Schalk, J. O. Delamater and J. T. Thatcher. N. O'Connor, sec; H. A. Bellows, treas.

Inc. Oct. 28, 1916, in Maine. **Cap.** $1,000,000; $1 par; all issued. On July 16, 1919, 200 shares were sold in New York at auction for $23 the lot. On Dec. 22, 1920, at New York, a lot of 15,000 shares sold for $35. On Jan. 26, 1921, $19,000 of 10%, first mortgage bonds were sold for $1,000 the lot.

Property: company holds about 93% of the stock of the Nancy Hanks Mng. & Mlg. Co. Latter company owns 10 claims, 5 patented, at Garnet, Granite county, Mont., 12 miles from Bearmouth.

Geology: quartz vein in granite, from 1 to 8′ wide, said to carry an ore-shoot from 100 to 130′ long. Ore carries gold, silver, and copper; and is reported to average $68 per ton, partly in free gold and partly as telluride of gold, associated with pyrite, etc.

Development: by 100 and 500′ shafts; total workings about 4,000′. Ore reserves are estimated at 20,000 tons blocked out and stope fillings.

Equipment: 2-cylinder Anaconda hoist, 3-drill compressor, pumps, etc. Proposed at last report, to erect a 20-ton mill and hoist good for 1,500′ depth.

Production: the Nancy Hanks mine was opened 20 years ago, and yielded $500,000 from workings only 80′ deep. Mills were built for the treatment of the lower-grade ores, but extreme friability of the ore caused a high percentage of fines in crushing, resulting in a loss of about 40% of the value in milling, with the imperfect methods of that period. After an 18 years' shut-down a new company secured a lease, and option on a large block of shares, sank the shaft to depth of 400′, and mined ore yielding between $150,000 and $200,000. The present company purchased control completing payment Dec. 4, 1917, sank 100′ deeper and extracted about $130,000 of shipping ore. Due to the high cost of labor and materials the mine was shut-down in March, 1918.

A mill ½ mile away from mine was secured early in 1919, and remodeled. In April, the mine was unwatered and milling begun on low grade ore and that from a 5,000-ton dump. Mill savings were not satisfactory owing to oil flotation being used after Wilfleys and mill was shut down, 1919. Mine fully described in U. S. Geological Survey, Bull. 660-F.

NATIONAL TUNGSTEN & SILVER MINING CO. **MONTANA**

Supposedly operating near Butte, Mont., but no information obtainable from Butte Chamber of Commerce, or other sources.

NEIHART CONSOLIDATED SILVER MINING CO. **MONTANA**

Address: Dan Tracy, Pearce Coal Co., Great Falls, Mont.

Officers: Dan Tracy, pres.; J. E. Dawson, v. p. W. A. Brown, treas.; L. M. McDonnell, sec., with William Thornton and F. R. Van de Putte, directors. John Drenville, supt.

Property: the Hartley mine, 7 claims in the Neihart district of Cascade county.

Development: by 300′ shaft, with drifts and stopes at each 100′. Has electric equipment. A 4′ shoot of ore was opened on the 200′ level in Oct., 1919, said to contain an 18″ streak assaying 100 oz. per ton. Rich shoots were opened at 200 and 300′ in 1920 and several months reserves blocked out.

Production: prior to 1920, about 150 cars of 100 oz. ore when silver was 50 cents an ounce.

About 20 carloads during 1920 realized $60.000 net; 1921 output averaged 15 cars a month, the ore averaging 70 oz. silver and some gold and lead. About 55 men employed.

NEIHART SILVER MINING CO. **MONTANA**

Address: R. O. Waller, res. mgr., Neihart, Mont. H. L. Mawry, pres. Butte, Mont.

Property: the Blackbird, Broadwater and Silver Belt mines in the Neihart district of Cascade county. Ore carries silver and lead. Company spent about $80,000 to the end of 1920.

Development: by shaft and tunnel. A 4.000′ drift connects the Broadwater and Silver Belt. Some rich ore was opened on the 100 and 200′ levels in 1919. Ore reported 4′ wide, with 35% lead and 50 oz. silver.

Mine was closed in Dec., 1920, to await financing.

NEW COPPER SILVER CO. **MONTANA**

Address: Helena, Mont.

Officers: W. C. Bardon, pres.; Z. B. Melborn, v. p.; J. R. Wine, sec.-treas. Company acquired the holdings of the defunct Copper-Silver Montana Mining Company at receiver's sale in 1914

Property: 7 claims, 130 acres, adjoining the Lexington and Sacajewea, in the Scratch Gravel district, 1 mile from Great Northern railway, and 5 miles north of Helena.

Geology: claims show granite and monzonite, reported to carry numerous fissure veins, dipping N. W. and S. E. All veins are reported mineralized at surface, carrying melaconite, azurite and malachite. Mine has a 500′ shaft, cutting at 300′ a vein estimated to average 4.5% copper, 12 to 100 oz. silver, and $1 to $55 gold per ton.

Equipment: includes a 30-h. p. steam hoist and a gasoline engine. Operations were stopped during the war, but company hopes to resume in 1922.

NEW VICTOR EMPIRE M. & M. CO. **MONTANA**

Address: P. S. Rose, sec., Libby, Mont.

Officers: W. B. Dilly, Branson, Las Animas Co., Colo., pres.; W. R. Sampson, act. mgr.

Inc. in Montana. **Cap.** $60,000; 10c. par; assessable. In Jan., 1921, W. B. Dilly, secured an option on 400,000 shares.

Property: 5 claims, on Granite creek, near the Lukens-Hazel mine, 12 miles from Libby, Lincoln county. Veins are in slate and contain silver-lead ore.

Development: by 1,340′ adit to be extended 600′ to reach a depth of 950′, and get under an iron capping showing on the surface.

NEW VULCAN MINING CO. **MONTANA**

Officers: H. A. Arnold, pres., at last report; G. M. McDonald, v. p.; Hugh Monroe, sec.-treas., with O. L. Jones, C. B. Etnier, J. L. Bailor, and B. E. Vaill, directors.

Cap. $150,000

Property: 7 claims, 7 miles from Superior on C. M. & St. P. and N. P. railroads, Mineral county. Ore carries gold, silver, and copper in veins, developed by 2,000′ of tunnels, etc. No recent returns secured.

NEW YORK & MONTANA COPPER MINING CO. **MONTANA**

Address: care E. J. Mathews, 1007 Hoge Bldg., Seattle, Wash. Mine near Corbin, Jefferson county, Mont.

Inc. 1903, in Delaware. **Cap.** $1,000,000; shares $1 par.

Lands: about 250 acres, including the Erickson, Scioto and Copper Gulch groups, opened by 3 two-compartment shafts, said to have a good showing of medium-grade ore. A plant costing $30,000 was to be erected to treat mine and custom ores, at last accounts.

NEW YORK-MONTANA MINES CO. **MONTANA**

Address: Bannack, Beaverhead county, Mont.

Officers: F. B. Howell, pres.; C. H. Smith, v. p.; P. C. Hanson, sec.-treas., with Samuel Barker, Jr., and W. C. Ebaugh, directors. C. W. Stallings, supt.

Is a reorganization of the Bannack Gold Mining Co., which in Jan., 1918, was in financial difficulties. Title and Guaranty Trust Co., New York, transfer agent and registrar.

The first discovery of gold in Montana was made in the Bannack district in 1862, and in that year the placers are reported to have produced $600,000 in gold. Quartz mining began very shortly after. In 1863 a 6-stamp mill was in operation. A reasonable estimate from availible data puts the total production of the district to 1905 at not less than $4,000,000. From 1905 to 1913 the production reported is approximately $2,000,000. The ores have been of value almost wholly on account of their gold, but they contain also some silver, lead and copper. The district has been comparatively inactive dur-

ing the last twelve years. The Bannack property has been operated in the past in a desultory manner by owners and lessees.

Property: the Golden Leaf group of 8 patented claims, adjacent to the town of Bannack at an altitude of 5,935′, a part interest in 2 claims, the Junction millsite, with underground rights, also an additional area of 200 acres, besides the underground rights in Excelsior and Horace Placer millsites. Nearest shipping point is at Grant, 12 miles from Bannack, on the Pittsburgh-Gilmore Railroad, which connects with the Oregon Short Line at Armstead.

Geology: near Bannack, Paleozoic limestone is intruded by a mass of syenite about 1¼ miles in diameter. The contact deposit on which the company's claims are located extends around the border of the syenite intrusion. The orebodies are irregular masses in the limestone and vary in width from 1′ to 30′ and even 40′, averaging about 10′. The high-grade bodies vary in length from 50′ to 100′; the milling orebodies are of much greater extent. The best ore is usually in the widest parts of the vein, and is for the most part very soft, requiring little blasting though the ground stands well without timbering. A large tonnage of shipping ore, estimated at over $1,300,000, has been removed from the property, leaving reserves of ore of milling grade. See U. S. G. S. Bull. 574, pp. 72-75.

Development: approximately 17,000′ of undergrouud workings to a depth of 600′. The Priscilla tunnel, the main working adit was driven 800′ to the contact at an elevation of 90′ above creek level, and cuts the contact 250′ below surface, though the highest point of contact on the surface will be 800′ above the Priscilla tunnel.

Ore reserves: were estimated Feb. 1, 1917, as 130,700, tons, averaging $7.34 per ton, with a net realizable value of $632,750. There were also 100,000 tons of probable low-grade ore at $6, 5,000 tons medium grade at $20, and 1,000 tons high grade at $100 per ton, a total of 106,000 tons of a net value of $535,000. The value is principally in gold, the silver contributing 50c to $1 per ton. No account has been taken in above estimate of ore below the Priscilla tunnel level. In May, 1918 a winze was said to be down over 160′ in rich ore.

Equipment: a well-equipped surface plant, also a reduction plant; the first unit of the cyanide plant has a daily capacity of 150 tons. The plant, which started operations May 5, 1917, uses the continuous counter-current decantation process. Power for mine and mill is furnished by a hydro-electric plant at the mill, water being obtained from Grasshopper creek, 2½ miles above the mill, furnishing a net working head of 39′. During the winter, when water is not available, a Diesel oil engine will furnish the power.

Milling costs were estimated not to exceed $2 per ton; mine and overhead costs not to exceed $1 per ton. Average mill-heads were estimated at $10 per ton, with an extraction of over 90%. A plant of 9,000 tons (yearly) capacity was under erection in 1918.

Mine is well developed and ore reserves, are estimated sufficient for 4 years' operation. The possibility of developing new orebodies seems good, since less than ⅛ of the mineralized contact area owned by the company has been prospected, and no work goes below the water-level. Using modern methods and under an efficient management, the Bannack mine should make a profit. Shut down and tied up by litigation with farmers over water supply.

NEW YORK-MONTANA TESTING & ENGINEERING CO. MONT.

Office: Montana Bldg., Helena, Mont.

Officers: and directors: Charles E. Fryberger, pres.; Frank Eichelberger, v. p.; Ralph T. Hopkins, sec.-treas.

Inc. Jan., 1917, in Montana. **Cap.** $100,000; $1 par; fully paid and nonassessable; 91,000 issued, all owned by U. S. Manganese Corp. Bonds, $35,000, first mortgage 7½, due Jan. 1, 1922. U. S. Manganese Corp. owns $15,000 of bond issue and $8,000 of issued is still in treasury of New York-Montana Company. Transfer agent and registrar—company office at Helena.

Dividends: 7% each on April 20 and July 20, 1919.

Property: consists of a concentration mill, and lands at Stedman, a suburb of Helena. This concentrator was operated as a custom plant during the war, treating manganese ore from the mines of the Clark-Montana Realty Co. of Butte, the concentrates being shipped to the U. S. Steel Corp., and the Miami Metals Co. at South Chicago. The company also made a high-grade chemical manganese concentrate used in electric dry cells. The managers expect to develop a market for this class of ore and compete with foreign supplies.

Concentrator remodelled in 1919 to work on sulphide ores from the Rimini district, and will treat other custom ore from the various districts around Helena, including a second-class product of the Liverpool Silver Mines Co. which has a mine at Clancey. The New York-Montana company also conducts an ore testing laboratory, testing ores on both a laboratory and a commercial scale. Plant was closed at end of 1920 until metal prices improve.

NORTH BUTTE EXTENSION DEVELOPMENT CO. MONTANA

See under Butte and Superior Mng. Co., in this volume.

Shares of little value. Company fully described in Volume XIV.

NORTH BUTTE MINING CO. MONTANA

Business office: Suite 3300, 120 Broadway, New York.. **Statutory office:** 604 Alworth Bldg., Duluth, Minn. **Mine office:** 14 West Granite St., Butte, Mont.

Officers: Robert Linton, pres.; Joseph B. Cotton, v. p. and gen. counsel; Frederic R. Kennedy, sec.-treas.; Henry B. Paull, auditor; Norman B. Braly, gen mgr.; Lester D. Frink, supt. Directors: Robert Linton, Francis DeC. Sullivan, William D. Thornton, Joseph B. Cotton, William F. Bartholomew, G. Ashley Tomlinson, Thomas F. Cole, Henry B. Paull and Frederic R. Kennedy. Transfer office: American Trust Co., Boston. Registrar: Old Colony Trust Co., Boston. Stock is listed on Boston Stock Exchange.

Inc. April 5, 1905, in Minnesota. **Cap.** $9,000,000; $15 par; 430,000 issued.

Comparative General Balance Sheet—Years ending December 31:

Assests

Year	Property	Granite Mtn. shaft	Invest.	Metals on hand	E. Side Devel.	Other Current	Total
1920..	$9,184,801	$150,260	$121,082	$2,141,250	$494,136	$356,708	$12,448,239
1919..	9,185,185	172,275	121,082	2,683,328	415,749	189,999	12,767,618
1918..	9,172,586	188,845	90,000	1,688,157	233,384	498,906	11,871,878
1917..	8,983,930	214,292	99,600	707,969	99,117	1,382,580	11,487,488
1916..	8,980,470	231,765	9,600	2,766,435	.....	733,317	12,721,587
1915..	8,986,265	256,945	9,600	1,569,643	.....	259,032	11,063,485
1914..	8,921,783	228,239	9,600	1,074,819	.....	88,357	10,322,798

Liabilities.

	Capital Stock	Current	Surp. and Res. for depletion	Total
1920.....	$6,450,000	$1,309,379	$4,688,859	$12,448,239
1919.....	6,450,000	1,051,580	5,265,092	12,767,618
1918.....	6,450,000	720,194	4,701,684	11,871,878
1917.....	6,450,000	184,349	4,853,139	11,487,488
1916.....	6,450,000	984,575	5,287,018	12,721,588
1915.....	6,450,000	731,067	3,882,418	11,063,485
1914.....	6,450,000	731,027	3,141,771	10,322,798

Comparative Income Account.

	Revenue	Operating expenses	Net income	Dividends	Surplus
1920.....	$3,101,404	$3,677,637	$ 576,233	.....	$1,740,626
1919.....	3,584,775	3,021,367	563,408	.....	2,826,863
1918.....	5,517,328	5,238,783	278,545	$ 430,000	2,693,393
1917.....	4,615,216	3,974,090	641,127	1,075,000	433,874*
1916.....	7,121,259	4,640,664	2,479,595	1,075,000	1,404,595
1915.....	4,155,522	3,027,875	1,217,646	387,000	740,646
1914.....	3,084,774	2,726,559	358,215	635,000	276,785
1913.....	5,182,674	3,744,897	1,437,777	820,000	617,777

* Deficit.

The net working capital in 1919 was $1,941,883, compared with $1,556,870 in 1918. On Sept. 30, 1920, the total was $1,536,900.

In Feb., 1921, company took a 1.75% interest, ($700,000) in the Copper Export Association's $40,000,000 bond issue.

Dividends: paid since organization of company per share: $1.25 in 1905; $7.25 in 1906; $6 in 1907; $3 in 1908; $4 in 1909; $1.10 in 1910; $1.20 in 1911; $1.70 in 1912; $2 in 1913; $1.50 in 1914; 90c in 1915; $2.50 in 1916; $2.50 in 1917, and $1 in 1918. Total, $35.90 per share, or $14,657,000.

Property: consists of two groups of claims, the Speculator group of about 220 acres on Butte Hill, and the East Side of Sarsfield group, about 936 acres. Also owns a smelter-site consisting of 2,216 acres, near Whitehall, and water-rights about 18 miles from Butte, 8 miles from Anaconda, and near the tracks of the C. M. & St. P. Railway and the Northern Pacific Railroad.

In order to give a more regular outline to the company's property and to avoid controversies over extra-lateral rights, exchanges of acreage have been made between the North Butte and Anaconda companies and agreements have been made between the North Butte and Tuolumne companies covering the ownership and rights to certain parts of the Jessie vein. An undivided one-half interest in the Granite Mountain claim was acquired from the Lewisohns, the company to sink at its own expense the existing shaft from the 500′ to the 2,000′ level and make certain connections and explorations, the title to the shaft remaining with the North Butte company. During 1912 and 1913 company purchased by cash payments and 20,000 shares of the company's stock the entire undivided interests in the lode claims in the Butte East Side mineral area; and in 1917 also purchased the property of the Butte-Monitor Tunnel Mining Co., consisting of 8 claims.

Eastside Group

Eastside Group: It is believed that these claims carry the easterly extension of numerous big ore-bearing veins opened in properties contiguous to this tract. The group lies about 2 miles east of Anaconda hill, and covers the mountain slopes between the bed of Silver Bow creek and the Continental Divide; it is adjacent to the A. C. M. Co.'s Tropic mine, the Butte Main Range Co. and the Pittsmont mine of the East Butte Co. Development work has been in progress at this property for the past 3 years, and includes a 900′ four-compartment shaft sunk on the Sarsfield claim at a point about 150′ east of the Continental Divide. At this level, over 10,000′ of cross-cutting has been done in two directions, to explore the ground on both sides of the Continental fault. Exploration was suspended late in 1920, as the 700′ and 900′ levels in granite had opened well mineralized veins, but of low grade. Work so far has cost $500,000, of which $80,000 was spent in 1920. Deeper work is needed here, as in the adjacent Main Range ground, where rich ore was cut on the 900′, 1,200′ and 1,600′ levels.

Eastside equipment consists of a 125 h. p. electric hoist, compressor,

and two 225 h. p. electric pumps of 600 gal. capacity, one on the 700′ and one on the 900′ levels.

In 1920 the company shipped several hundred tons of 2.2% copper ore from the Bertha mine.

Speculator Group.

The Speculator Group, or Butte Hill property, is traversed by a number of fault-veins, mostly belonging to the Blue Vein series. These veins carry high-grade ore in shoots, which have thus far been remarkably persistent in depth. The ores carry much primary chalcocite, frequently massive, with considerable quantities of enargite and smaller proportions of other sulphides. All ores carry silver and lesser values in gold. The veins are 'heavy', requiring close attention and timbering with square-sets, monthly timber used being about 1,000,000′ board measure. No waste is hoisted, all being used for dry-filling.

Exploration of the vein system has shown the neccessity of thorough drifting along the veins at considerable depth, and development on all levels down to the 3,400′ has opened profitable orebodies.

The principal ore supply comes from the following veins, named in their order of occurrence from the south boundary of the mine northward; Speculator, Adirondack, Sioux Chief, Edith May, Jessie, Gem, South Croesus, North Croesus, Snowball, and Berlin. Of these, the Speculator, Sioux Chief, South Croesus, and Snowball belong to the older or Anaconda vein system; the others are well-known members of the Blue Vein, or Northwest fault-vein series. The Edith May and Jessie veins were the principal ore producers of the North Butte in the early operations of the company.

The **Edith May** vein is opened on the 400, 600, 700 and 800′ levels, and at 200′ intervals from the 800′ to the 3,600′ level. The vein varies in width from 5 to 42′, the greater width occurring above the 2,000′ level. A good body of ore was opened on the 700′ level, where a width of 8½′ average 3.6% copper for a distance of 240′. Below the 700′ level the vein was of little value until the 1,200′ level was reached, after which a marked improvement was noted. Many of the stopes above the 2,000 level were practically all first-class smelting ore for a distance of 1,000′. The 2,000′ level showed a slight decrease both in value and in length of ore-shoots. At the 2,200′ level the vein splits into a hanging and a foot-wall vein. Metal contents of the foot-wall vein are low below the 2,400′ level, while the hanging-wall vein carries good ore on all levels down to the lowest level now opened. On the 3,200′ level, 4.1% of ore has been exposed for a distance of 1,086′, the average assay being 5.1% copper. The 3,400′ level development has encountered ore of a similar character. In 1920, 4½ to 8% ore was opened, crosscutting was done on the 3,600′ level, and the vein opened in January, 1921.

The **Jessie** vein ranks next to the Edith May in production. Where opened on the 700′ level in the Gem crosscut, the Jessie vein was 10′ wide and held bunches of 6% ore. The ore-shoot has been found on all levels from surface to 2,200′ level. On the 1,800′ level, it is stoped for 1,400′, changing in character below this depth and showing considerable sphalerite in the drifts to the west. The drift on the 2,000′ level opened an 1,100′ ore-shoot 6′ wide, carrying 6% copper and 7.5 oz. silver. The 2,200′ level shows low-grade ore only; the 2,600′ drift W. showed 4′ of 3.5% copper ore, displaced by a fault 15′ from the crosscut and not yet recovered; while 300′ of drifting east disclosed only small bunches of high-grade ore. On the 2,800′ level the vein where cut by a crosscut from the Granite Mountain shaft showed a total width of 6′, with 3′ of ore assaying 11% copper and 10 oz. silver per ton.

The **North Croesus** vein is opened by drifts on all levels from the 1,600 to the 2,800′, developing a large and important orebody. On the 1,800′ level the ore-shoot is 8½′ wide, averaging 3% copper and 8 oz. silver per ton; on the 2,000′ level it is 300′ long, averaging 10′ thick, 3% copper and 6 oz. silver.

This shoot has been developed down to 2,200′, and on the 2,400′ level another shoot, 300′ east of the one just mentioned, shows 2′ of 3% ore with 7 oz. silver per ton. This shoot has been opened on the 2,600′ level for a length of 400′, varying in width from 3 to 5′, and averaging 3.5% copper. The vein also contains considerable quantities of zinc ore, from which shipments have been made from time to time.

The **South Croesus** vein has been mined from 1,600 to the 2,400′ level with the best showing at the 2,200′. Here two shoots are developed, one 270′ in length with an average width of 3′, the ore containing 5.5% copper and 5.5 oz. silver per ton; the other, 240′ long, averaging 3½′ in width and assaying 3.2% copper and 4 oz. silver per ton. On the 2,400′ level, a 3′ body of ore has been exposed for 200′, averaging 2.5% copper.

The **Gem** vein showed no ore of commercial importance above the 1,600′ level, and the 1,800′ level had about 6′ of 4.5% ore. It is developed to a small extent on the 1,800′, 2,000′, 2,600 and 2,800′ levels. The vein is irregular in size, and where developed has been broken by cross-faults. The Adirondack vein, like the Gem, shows no commercial ore above the 1,600′ level, but has been mined from this horizon down to the 2,800′. On the 2,400′ level the ore has been opened for 600′, varying in width from 2′ to 12′, and averaging 4% copper. On the 2,600′ level the shoot is over 300′ long, varying in width from 4′ to 7′, and containing 3.8% copper. Drifting on the 3,000′ and 3,200′ levels has opened 2′ of high grade ore for a length of 200′.

The **Snowball** vein has characteristically high silver content. It was first cut on the 1,800′ level in 1910, since which time it has been developed and worked from the 1,400′ down to the 2,800′ level. The shoot varies in length from about 800′ to over 2,000′. On the 2,200′ level it has been worked for a length of over 2,000′, of which 740′ averaged 5′ of ore assaying 8% copper. On the 2,600′ level the shoot is over 1,000′ in length, varying in width from 2 to 4′ and averaging about 4% copper. On the 2,800′ level the vein has been exposed showing 500′ of ore 3′ wide assaying 4.3% copper and 7½ oz. silver per ton.

The **North Berlin** vein was opened in 1916 on the 2,200′ level. Since that time this vein has been developed on all levels from the 1,800 to the 2,800′, inclusive. On the 1,800 and 2,000′ levels drifting exposed bunches of ore, but none of commercial value. On 2,200′ level, an ore-shoot 500′ long and 4′ wide has been developed, with an average assay of 5.5% copper and 11 oz. silver. On the 2,400′ level the shoot now developed is 800′ long, of an average width of 3′, and assays 4.2% copper and 5.5 oz. silver. On the 2,600′ level ore has been exposed for a distance of 450 ft., having an average width of 3½′ and assaying 2.6% copper and 3.8 oz. silver. The crosscut on the 2,800′ level shows 250′ of ore assaying 3.5% copper, and 4 oz. silver per ton.

Development: is extensive aggregating many miles of workings. New development averages about 20,000′ per year. The four-compartment Granite Mountain shaft, which is the principal working shaft, is 3,700′ deep, with levels opened at the 400, 600, 700, 800, and at 200′ intervals down to and including the 3,600′ level. In 1915 a new electric hoist was installed at the Granite Mountain shaft, the largest electrically-driven hoist in America. It is capable of operating to a depth of 5,000′, hoisting 7 tons of ore, and making a round trip in about 2 minutes.

Following a serious fire at the Granite Mountain shaft in 1917, the work of fire-proofing this shaft was commenced and completed in January, 1918. This work consisted of 1,500′ of concrete of monolithic construction, while the "chippy" compartments of the upper part of the shaft were gunited (cement coating sprayed on).

The Speculator shaft, the other operating shaft, has been deepened to 3,000′, with levels at 200′ intervals, from and below the 1,400′ point, develop ing all the veins in the mine. The Speculator shaft has a 128′ steel headframe standing on a 41 by 60′ concrete foundation, equipped with self-dump-

ing skips and pockets, with daily capacity of 1,500 tons of ore. No waste is hoisted, as it is used for underground filling.

The 500′ Jessie and 500′ Adirondack shafts are idle, and of no present value. The Gem shaft, 2,200′ deep, is used for ventilation, and a connection has also been made with the Rainbow shaft on the 2,000′ level for purposes of ventilation. These two shafts, as well as the Speculator, are provided with reversible fans. The whole system of ventilation in the mine has been greatly improved, and good working temperatures prevail.

Standardization of mining methods at the North Butte was discussed by Robert Linton in the Aug., 1920, "Min. & Met." of the A. I. M. & M. E.

Equipment: the main machinery plant and buildings are at the Speculator shaft. The engine-house has a 20-ton traveling crane, and a 32 by 72″ Nordberg-Corliss duplex-cylinder hoist, operating two cages, in counterbalance, with two 5-ton Kimberly skips swung under, and good for a depth of 3,500′. An 18 by 36″ duplex-cylinder auxiliary hoist operates a double-deck cage in a third compartment, for handling men, material, and timber, and the shaft has a fourth compartment for ladders and pipes.

The compressor-house has air-compressors with piston efficiency of 9,860′ of free air per minute, reduced to a pressure of 80 lb per sq. in., capable a contract by which the company pays the smelter charges to Anaconda, and five 100 h. p. boilers. Miscellaneous buildings include a machine-shop, smithy, carpenter shop, planing mill, and a plate-shop for repairing skips, all thoroughly equipped.

Under normal conditions, an average of 1,550 men are employed. The North Butte ore is smelted at the Washoe works of the Anaconda company under a contract by which the company pays the smelter charges to Anaconda, and the copper itself is turned over to North Butte and sold by the United Metals Selling Co. for its account.

Production:

	Ore, tons	Copper, lb.	Silver, oz.	Gold, oz.	Copper, per lb. Net Cost, c.	Copper, per lb. Sell Price, c.
1920.....	315,217	16,666,819	693,633	1,004	17.64	18.72
1919.....	287,787	14,331,254	633,214	914	....	....
1918.....	453,338	20,680,695	891,157	1,374	20.92	24.73
1917.....	296,750	14,493,452	662,845	959	17.36	27.18
1916.....	560,673	24,498,181	1,049,574	1,712	15.57	23.29
1915.....	378,161	19,235,285	940,632	1,122	13.12	16.70
1914.....	337,372	18,421,761	1,092,300	1,107	11.50	13.74
1913.....	454,984	28,318,321	1,602,164	1,567	9.76	15.08
1912.....	425,248	26,480,123	1,377,468	1,367	9.65	16.37
1911.....	410,694	24,816,669	1,134,300	1,281	9.97	12.56
1910.....	408,528	25,267,092	988,190	1,196	10.36	12.77

Zinc production in 1916, 1,652 tons of ore for 412,953 lb. spelter.

Although the grade of the ore mined is lower than that produced in the early years of the company's operations, the total amount of copper now produced compares very favorably with the record year.

NORTHERN VALLEY MINING CO. MONTANA

Officers: S. F. Mallette, pres.; Godfrey, Ill.; Walter K. Mallette, v. p.; Anaconda, Mont.; H. W. Wilson, sec.-treas., Twin Falls, Idaho.

Inc. 1912, in Arizona. **Cap.** $1,000,000; shares $1 par; 600,000 shares issued. Controlled by the American Metal Mining Ass'n of Arizona.

Property: consists of the holdings of the defunct **Amazon-Montana Development Co.** in Amazon district, near Boulder, Jefferson county, Mont. Idle and no work contemplated in near future, according to last advice.

NORTHWESTERN METALS CO. MONTANA

Bankrupt. Entire property reported sold by court for $22,000, July,

1916. Fully described in Vol XI, Copper Handbook.

OBELISK MINING CO. **MONTANA**

Address: William Hogan, supt., Basin, Mont. J. H. McBarron, pres., Butte, Mont.

Property: the Obelisk mine, 1½ miles E. of Basin, Jefferson county, close to the G. N. R. R. Ore carries silver bearing lead and zinc sulphides, cementing brecciated "porphyry" and aplite. The zinc blende carries the silver.

Development: by 400′ shaft with levels at 150 and 250′ and by 400′ tunnel. One level opened 6′ of 58 oz. silver and 2% lead ore. Two 50-ton shipments in 1920 to Anaconda were valued at $1,100 each and two in March, 1921, yielded $2,600.

OHIO KEATING GOLD MINING CO. **MONTANA**

Address: P. O. Box 1711, Butte, Mont. Mine at Radersburg, Broadwater county, Mont.

Officers: J. E. Oppenheimer, pres.; J. S. Cohen, v. p.; C. H. Smith, sec.-treas., with B. E. Calkins and W. M. Tuohy, directors.

Cap. $800,000, increased Dec., 1910, from $500,000. Company had $113,924 debts, July, 1914, and stockholders changed stock from non-assessable to assessable with an initial assessment of 15 cts. per share.

Property: a promising, though small gold mine, producing some copper from pyrite ores found as shoots in strong fissure veins in igneous rocks. According to the late Fred T. Green, who examined the property, the probable ore in mine is valued at $486,151 with $116,914 worth of ore blocked out (6,680 tons) and $90,000 worth of $4 ore on the dump.

Development: to 500′ level, with about 3,800′ of drifts and crosscuts.

Equipment: includes electric and steam pumps, electric hoist, mining cars and tools. No recent news.

OLYMPIA MINING CO. **MONTANA**

Office: Princeton, Granite county, Mont.

Property: Lillian and Banner claims in the Philipsburg district. Tunnel said to cut 3 veins, one 20′ wide, carrying galena, silver and gold values. Some development was done in 1917. Idle since.

O. & M. MINES CO. **MONTANA**

No longer active. Fully described in Volume XIII. See Liberty Mining Co. in Volume XIV and **Sterling M. & M. Co.** in this volume.

ORIGINAL BANNACK MINING CO. **MONTANA**

Office: 302 D. F. Walker Bldg., Salt Lake City.

Officers: Lorenzo Price, Jr., pres.; A. J. Bruneau, v. p.; E. F. Mobley, sec.-treas., with W. L. Smith and Ambrose Nord, directors.

Inc. in Utah. **Cap.** $1,000,000; shares $1 par; assessable; 600,000 shares outstanding. Listed on Salt Lake City Exchange.

Property: 9 patented claims in the Bannack mining district, Bannack, Beaverhead county, Mont., adjoining the Bannack Gold Mining Co., and said to have the extension of the latter's ore zone. Credited with a production of $350,000. Management claims there is an ore-shoot 1,800′ long and from 50 to 125′ in width, containing "hundreds of thousands of tons of ore, that will average $11 per ton." value mainly in gold, with some copper, a statement that is considered to be a gross exaggeration. Developed by 300′ shaft.

Equipment: included a 325 cu. ft. compressor and a 25-h. p. gasoline hoist.

See geological conditions, under New York-Montana Mines Co.

PATTEN MINING CO. **MONTANA**

Address: A. J. Johnson, pres., Butte; J. K. Heslet, Butte, or Earl B. Patten, v. p., Phillipsburg, Mont.

Owns a promising silver property in the Flint Creek district, near Phillipsburg. Idle, 1920.

PAY BACK MINING CO. MONTANA

Office: 40 W. 6th. Ave., Helena, Mont.

Officers: Gustave Strobel, pres.; R. A. McCray, v. p.; R. E. Strobel, sec.-treas.; H. B. Emigh, cons. engr.; R. A. Weisner and L. Strobel, directors.

Inc. 1911.

Property: the Pay Back mine, in Lump Gulch district on Clancey Creek, 1¾ miles west of Clancey. Ore was originally shipped by ox team to Corinne, Utah, from old 130′ shaft. Company sinking new shaft 500′ east, on same lead, in wide body of quartz, thoroughly leached and low grade. From the experience of producers in Lump Gulch district, management hopes to strike higher grade ore below water level at about 100′ in depth. Drifting will then be done below the old workings which will give a depth of about 235′ below the surface.

PHILIPSBURG MINING CO. MONTANA

Office: 821 Security Bldg., St. Louis, Mo. **Mine office:** R. S. Blitz, supt., Philipsburg Granite county, Mont. A. E. Fritzberg, asst. supt.

Officers: John P. Meyer, pres.; John H. Dieckman, v. p.; G. J. Tansey, sec.; F. D. Fusz, treas., with John J. Taussig, Max Kotany, L. M. Rumsey, Jr., C. G. Ewing, E. S. Orr, A. L. Shapleigh, Edward Barklage, directors.

Inc. 1910, in Missouri. **Cap.** $50,000; shares $1 par; all outstanding. Annual meeting, fourth Friday in March.

Company is successor to **Hope Mining Co.**, one of the earliest companies formed in Montana. Mine is credited with past production of $4,000,000 in silver.

Property: the Hope, Algonquin, Bryant, True Fissure and Horton mine, 450 acres at Philipsburg, containing ore in contact deposits and quartz fissure veins between limestone and granite. Ore carries gold, silver, copper, zinc, lead, and manganese.

Manganese ore is of the nodular variety of pyrolusite and psilomelane. Company was the largest producer of manganese ore in Montana.

Development: by several shafts, deepest 500′, and a number of tunnels.

Equipment: 350-ton mill with grizzlies, gyratory crusher, trommel with 1½-in. holes, in which the ore is washed, sorting-belt, rolls, elevators and trommels, Harz jigs, tables, thickeners and bins. Crude ore assays 32% Mn. and 35% SiO_2; wash ore, 41% Mn. and 18% SiO_2; and concentrate, 49% Mn. and 9% SiO_2. Three Holt tractors haul ore 2.67 miles from the mine to the mill, at a cost of 72c. per ton, equal to 27c. per ton-mile. Up to 500 men have been employed.

Production: amounted to 55,000 tons of manganese ore, 1916-1918 inclusive from the Algonquin and 13,000 tons from the Bryant, and up to 2,000 tons per month in 1920, until the shut-down in October, due to the market.

PILOT BUTTE MINING CO. MONTANA

Company dissolved. See Vol. XII, this work.

PITT COPPER MINING CO. MONTANA

Formerly the **King & Queen Mining Co.**

Office: John A. Lathwood, 30th & Wayne Sts., Pittsburgh, Pa. L. C. McHeffry, supt. in charge, Keystone, Mont.

Officers: W. S. Markley, v. p.; W. D. Brew, sec.; J. H. B. Phillips, treas.

Inc. Feb. 22, 1905, in Montana, practically as a reconstruction of the Montana Mining & Development Co. **Cap.** $1,000,000; shares $1 par.

Property: 15 claims, partly patented, 188 acres and a 20-acre millsite, well timbered, 3½ miles from Keystone, the nearest rail point, in the Spring Gulch district, 9 miles N. W. of Superior. Property carries limestone, quartzite and shale with contact deposits between quartzite and limestone. The deposit under development, of 8′ estimated average width, shows copper, lead and silver ore with malachite, chalcocite, chalcopyrite and galena, re-

ported to average 4.5% copper and 12 oz. silver per ton with gold content ranging up to 8 oz. per ton.

Development: by 1,200′ crosscut tunnel opening up 4′ of 4.6% copper ore that carries 9 oz. silver and 11% lead. This tunnel, planned to be driven 1,600′, has cut the vein 460′ below the old workings and intersects several veins. A 200′ raise gives ventilation with the upper workings now abandoned. The main workings total 5,000′.

Equipment: includes an 80-h. p. boiler, 25-h. p. hoist, 6-drill duplex air compressor and 100-ton mill. There are several small mine buildings and a saw-mill.

Development work was in progress, 1916-20. No recent returns received.

PITTSMONT COPPER CO. **MONTANA**

Controlled by **East Butte Copper Co.**, which see.

Office: 1126 Farmers Bank Bldg., Pittsburgh, Pa. **Mine office:** Butte, Mont.

Officers: R. H. Gross, pres.; J. H. Reed, v. p.; F. Ward Paine, sec.-treas.; R. T. Rossell, asst. sec.-treas.; Oscar Rohn, gen. mgr., with Wm. A. Paine, directors.

Inc. April 21, 1906, in West Virginia, as Pittsburg & Western Copper Co., and changed name, Jan. 21, 1908, to present title. **Cap** $6,000,000; par value $5, divided in 1,000,000 shares common stock and 200,000 shares 6% cumulative preferred stock. Initial dividend of $3. paid Dec. 1, 1917.

The East Butte Copper Co. owns $4,002,800 of the common, all the preferred stock. Annual meeting, first Monday in April, at Pittsburgh.

Company acquired the property of the Pittsburgh & Montana Copper Co., under foreclosure proceedings, July, 1909, selling it to the East Butte Copper Mining Co., which agreed to purchase bonds enough of the Pittsmont Copper Co., to fund its floating debt, aggregating at that time $2,300,000, and also agreed, until these bonds were fully paid for, to advance all funds necessary for development and operation of the property and interest on the company's indebtedness. In consideration of this agreement the Pittsmont Copper Co. contributed $4,000,000 of its common stock to the East Butte Copper Mining Co., the latter purchasing $1,000,000 of Pittsmont preferred stock and $110,000 of demand notes, issuing own stock therefor. This debt has now been paid off.

During 1918 East Butte paid Pittsmont $1,000,000 on account of rentals accrued. The latter in turn purchased from the former its entire issue of 200,000 preferred shares, $5 par.

Property: 267 acres of mineral and 160 acres surface rights and a lease of mineral rights on right of way of N. P. Ry. crossing the property at Butte. Also a property at Elkhorn, containing low grade gold ore, with 150-ton mill built 1917, but not operated as yet.

POLARIS MINE **MONTANA**

Address: Jack Mercer, supt., Dillon, Beaverhead county, Mont.

Property: a famous producer of gold-silver ore. A cyanide mill was erected in 1919.

PONY MINING & MILLING CO. **MONTANA**

Formerly **Garnet Gold Mining Co.** Ole Peterson, owner, St. Louis, Missouri.

Property: 19 claims at Pony, Madison county; idle at last accounts. Is said to have yielded over $700,000. Development is by tunnels.

Equipment: water power, compressor, 20-stamp mill, etc.

PORPHYRY DIKE GOLD MINING CO. **MONTANA**

Address: James Breen, pres.-gen. mgr., Spokane, Wash. M. S. Gunn and Carl Rasche, directors. S. R. Brown, supt.; M. A. Evans, mill foreman.

Cap. $650,000; $1 par.

Property: 19 claims, 18 patented, 7 miles S. W. of Rimini, and 17 miles from Basin, the nearest rail point. The formation is peculiar being a rhyolite lava flow containing numerous egg-shaped masses, technically called

spherulites, netted with quartz threads carrying gold; the rock itself also carries clay films and quartz films, containing gold. A large quantity, possibly 6,250,000 tons, of this ore has been exposed by surface workings and tunnels. Over 20,000 tons of this ore milled in a 10-stamp mill in former years gave a recovery of $2.45 gold per ton. A 300-ton ball-mill plant, driven by electric power, was erected late in 1917. Mining costs are low, probably not over 75c., and ore mills easily and cheaply so that property ought to pay if a large enough tonnage were handled.

POTOMAC COPPER CO. **MONTANA**

Office: 73 Hirbour Bldg., Butte, Mont.

Officers: Wm. P. Jahn, pres.; Paul A. Gow, v. p.; J. J. Harrington, sec.; George E. Palmer, treas., with N J. Bielenberg, John Harrington, and W. I. Higgins, supt., directors.

Inc. Nov. 30, 1918, in Montana. **Cap.** $1,500,000; $1 par; 950,000 outstanding. Application made for listing on New York Curb. Security Transfer and Registrar Co., 66 Broadway, New York, transfer agent and registrar. Annual meeting, second Tuesday in March.

Receipts during 1919, were $156,568, mostly from sale of 312,987 shares. Disbursements were $91,092. Of this, $51,895 was for payroll and supplies, and $23,700 for property payments. The cash balance was $18,847, plus $46,625 for demand notes and subscriptions secured, a total of $65,472.

Property: 20 claims, about 300 acres, in the Copper Cliff district, Powell county, Montana, 12 miles north of Bonita, Mont., on N. P. R. R., and 8 miles from Potomac, terminus of a branch line of the C. N. & St. P. R. R. Examined by W. H. Weed and P. A. Gow, 1919.

Discovered in 1881, the property was desultorily operated until taken over by an English syndicate in 1900, when selected ore was sorted and shipped.

Geology: ore occurs in six well-defined fissure veins cutting quartzite, and in faults between this and an impure limestone. The veins occur clustered in a zone of sheeting, 1,200′ or more wide, and a mile long. The ore mineral is enargite, accompanied by famatinite,pyrite and some copper glance. A great outcrop of mineralized brecciated quartzite, 100′ high, 400′ long and about 100′ thick, and known as the "Copper Cliff," is estimated to contain over 300,000 tons of 2½% copper ore, with $2.50 per ton in gold. The reported gross value of the ore in this "Cliff" is $5.000,000. A second ore zone, cut by the Copper Cliff tunnel, shows 40′ of 2¾% ore with $2 gold.

Development: by several tunnels and shaft. The lowest, No. 4, is 1,700′ long, and is the main outlet for the property. It reaches a depth of 400′ to 1,000′. During 1920, this adit cut 30″ of 17% and 4′ of 4% ore. No. 3 tunnel is 1.200′ long, and 170′ above No. 4. It is connected with the Copper Cliff shaft. At the Leonard mine a 100 ′ shaft exposes a 10′ vein with 60° N.-W. dip and good average grade.

Equipment: steam and electric power, an excellent 4-mile wagon-road to Potomac, and an old logging railway grade much of the way, which is available for a railroad. An 11-mile tranmission-line will be put in 1922. 100 h. p. steam plant, compressor, and dwellings.

Company estimated that with 90% recovery, milling 10 to 1 and recovering 90% of value of concentrate paid for by smelters, the ore will have a gross value of $9.42 per ton and a net profit of $3.65 per ton.

Property covers an entire mining district, showing veins with commercial amounts of profitable concentrating ore and a promise of very large additional tonnages by development work. It is a very promising property.

PRICKLY PEAR MINING CO. **MONTANA**

Office: care J. C. Murray, pres., Helena, Mont. Mine P. O. Jefferson City, Jefferson county, Mont.

Officers: J. C. Murray, pres.; Lee Dever, v. p.; H. M. Brooks, sec.-treas.

Property: the Prickly Pear mine, 2 miles from Jefferson, opened by a

350′ tunnel, showing gold and silver-bearing copper ore. Has no power equipment. Production not reported for several years.

PRINCEMONT MINING CO. **MONTANA**

Property near Noxon, Sanders county, is listed under Idaho, as it is really a part of the Coeur d'Alene district.

RAINBOW LODE DEVELOPMENT CO. **MONTANA**

Office: 807 Lonsdale Bldg., Duluth, Minn. **Mine office:** 14 West Granite St., Butte, Mont.

Officers: Edward C. Congdon, pres.; G. A. Tomlinson, v. p.; James Wanless, sec.-treas., with Thomas F. Cole, Walter B. Congdon, directors.

Inc. Nov. 9, 1912, in Delaware. **Cap** $1,500,000; increased June 1, 1915, from $800,000; shares $10 par, issued $800,000. **Bonds:** $400,000, 1st mortgage 5-year convertible 6% due June 1, 1920, convertible into stock at par, and $80,000 2nd mortgage authorized, $47,000 issued. Annual meeting, first Tuesday in June.

Property: 10 claims, including the Third Sphinx, Michigander, Moral, Valley Queen, Carn Brea, Sarah, Wedge, Hidden Treasure and Wanda claims, with fractional interest in the Lone Star Claim. The group lies east of the Butte & Superior property and is supposed to carry an extension of the Rainbow lode.

Equipment: at Rainbow shaft includes a 300-h. p. double drum hoist good for 2,500′, 2 electric hoists, air compressors, combined capacity of 1,650 cu. ft. per min., one 400 gals., and 1,200 gals. pump, blacksmith shop, carpenter shop, change house and office.

During 1916 the company completed its Butte & London contract, and now owns 51% of the Greendale Exploration Co. stock, which latter company owns the Greendale Placer claim and the Six O'Clock claim immediately south. It paid for this stock according to the contract by sinking the Butte & London shaft to 1,600′ and crosscutting to the north and south boundaries of the Greendale Placer claim on the 1,500′ level.

The crosscut at the 1,500′ level of the Rainbow shaft was extended to the north boundary and a few feet of drifting done from it along veins which looked promising. The drainage drift on that level from the North Butte was completed.

While quartz-filled veins of various dimensions were found in several parts of both the Rainbow and Butte & London and open cuts gave trifling assays of gold, copper and zinc, no ore was found of commercial importance.

In order to complete the Butte & London contract, it was found necessary to raise more money than was provided for in the first mortgage. Consequently, the second mortgage was authorized, and the amount outstanding on it, $47,000, was advanced by two of the large stockholders so that the contract might be completed and the Rainbow company get control of the Glendale placer claim.

Although no ore has been found to a depth of 1,500′ on the Rainbow group and 1,600′ on the Greendale Placer claim, nevertheless, the officers feel that still deeper development will reveal pay ore. Company is now inactive.

RAMPART MOUNTAIN MINING CO. **MONTANA**

Office: 821 Security Bldg., St. Louis, Mo.

Officers: J. P. Meyer, pres.; Felix Coste, v. p.; E. C. Rowse, sec.

Cap. $500,000; shares $1 par; $250,000 outstanding.

Property: 10 patented claims, 135 acres, in Park canyon, Silver Bow county, Mont., about 4 miles east of Butte, said to show fissure veins in granite. Ore contains gold, silver and copper The Rocky Mountain claim is reported to show a vein about 100′ wide, supposedly the continuation of the Spread Delight vein of the Main Range.

Development: by 1,500′ of workings to depth of 400′. Tunnel said to show copper ore assaying up to 7% with high silver value. Work resumed 1920, on lower tunnel to open up downward continuation of oreshoots mined above.

Is a promising tract for deep development by tunnel work, as the veins show pay ore at the surface.

RAVEN COPPER CO. **MONTANA**

Property sold, August, 1915, to the Anaconda Copper Co., for $65,000, and company liquidated. Fully described in Vol. XI., Copper Handbook.

RED MOUNTAIN CONS. MINING CO. **MONTANA**

Address: Rimini, Lewis and Clark Co., Mont.

Property: at Rimini, closed from 1888, until reopened in 1920.

RELIANCE MINING & MILLING CO. **MONTANA**

Officers: D. M. Adams, pres.; Box 386, Butte, Mont.; Frank Eichelberger, v. p.; J. F. Barnes, sec., with J. C. Lane and J. W. Higgins, directors.

Inc. April 17, 1913, in Montana **Cap.** $150,000; shares 10c par; non-assessable; 1,325,000 issued. Control reported in hands of D. M. Adams and P. H. Kenny.

Property: the Reliance and Sunnyside group of claims, in the Moose Creek section, Silver Bow county, 18 miles south of Butte, showing veins of copper-silver-lead-zinc ore in carboniferous limestone. The new property—the Sunnyside, whose ore carries silver principally, is considered to have much merit.

Development: by shaft and crosscuts, in which water has been troublesome. During 1917, $12,415 was spent and more money is needed for further exploration.

REPUBLIC MINING CO. **MONTANA**

Apparently reorganized as **Mohawk Mining Co.**, which see.

Address: Cooke City, Mont. R. H. Young, mgr. W. E. Renshaw, supt.

Property: the Mohawk mine, a group of claims near Cooke City, Park county, and 50 miles by road to rail at Gardiner. By May, 1920, there was 5,000 tons of $100 gold-silver-copper ore ready for shipment, and by July it was being hauled to rail.

Equipment: engines, compressor, dwellings, orebins, and twenty 2½ ton trucks.

REVENUE CONSOLIDATED MINING CO. **MONTANA**

Address: G. D. B. Turner, Norris, Mont.

Property: near Norris, Madison county, closed in 1917 on account of excess of water and lack of power, since obtained from the Montana Power Co. Gold yield from depth of 200′ said to be $2,500,000. Four oreshoots are exposed. Four winzes are in ore below 200′ depth. Sinking was under way in February, 1920.

Equipment: 700 cu. ft. compressor, 100-h. p. electric hoist, etc. Mine is under option to Revenue Mines, Inc.

REVENUE MINES, INC. **MONTANA**

Address: Howard S. Candee, 43 Exchange Place, New York City, or G. D. B. Turner, trustee, Norris, Mont.

Has lease and bond on Revenue mine, owned by Revenue Cons. M. Co.

REVIAS CREEK MINING & POWER CO. **MONTANA**

Former mine near Dixon, Sanders county, Mont.; fully described in Vol. XI. Copper Handbook.

RICHMOND MINING, MILLING & REDUCTION CO. **MONTANA**

Office: 404 Sherwood Bldg., Spokane, Wash., and Delage, Idaho.

Officers: J. E. Codd, pres, and treas.; H. W. Claussen, v. p.; C. H. Maloy, sec.; B. N. Sharp (mgr), and P. W. Peterson, directors.

Inc. in Washington. **Cap.** $1,500,000; $1 par; increased from $1,000,000 in February, 1920; 1,011,000 issued.

Profit in 1917 was $93,360, and $8,370 in 1918. **Dividends:** $48,000 in 1917; $8,400 in 1918; none since; total, $92,400.

Property: on Idaho-Montana line 6 miles from Saltese, Mineral county, Mont., and 1½ miles from Adair, Idaho, connected with C., M. & St. P. R.

R. by 8,800′ aerial tram. Company owns 7 claims, 6 patented, and millsite, total of 140 acres.

Development: 2,200′ of tunnels, 500′ of shafts, 2,000′ of drifts, and 600′ of raises. Lowest depth is 570′, and total workings are 6,000′. Vein shows on surface for 2,200′, of which 400′ is being developed. Reserves are estimated as sufficient for 50 tons daily for a year. New work in 1918, amounted to 1,685′. A peculiarity of the mine is the presence of small but persistent stringers of high-grade ore on each level, indicating the existence of rich ore lodes below according to report.

Equipment: 2-h. p. gasoline hoist, 80-h. p. compressor, 8,800′ aerial tram of 240 tons daily capacity, etc.

Production: 4,600 tons in 1917 worth $292,117; and 3,912 tons in 1918, assaying 8.4% copper, 0.189 oz. gold and 0.64 oz. silver, or $23 per ton, totaling $90,535. Idle in 1920, as increased treatment charges, together with low metal market absorbed profits.

RIPPLE CONSOLIDATED MINING CO. — **MONTANA**

Address: J. C. E. Barker, lessee, Neihart, Mont.

Property: 10 claims, 6 miles from Neihart, Cascade county. Ore carries galena with high silver values. Reserves estimated at 30,000 tons. A 100-ton mill was planned in 1919.

In January, 1920, ore yielding $18 per ton net was being sent to the smelter at East Helena, and earnings were said to be equal to 25 cents a share. Further shipments were made, but in November a change of management took place as company finances were low, and the McBarron management unacceptable to certain stockholders.

ROBERT EMMET COPPER CO. — **MONTANA**

Address: Amazon, Jefferson county, Mont. Wm. Q. Ranft, pres.; at last reports; John J. Schmitt, sec.-treas.

Cap. $3,000,000; shares $5 par.

Property: 6 claims, patented, 90 acres, carrying veins in granite, not far from the andesite contact. The main vein has a generally N.-E. strike, developed by a 500′ shaft, showing a shoot of ore on the 350′ level. A 1,200′ tunnel having about 1,000′ of laterals shows a 10′ vein carrying copper, silver and lead ore.

Five feet of silver-copper ore was opened during 1920.

Equipment: includes 10-drill air-compressor, electric plant, with transformers for 60,000-volt current. Idle at last accounts.

ROCK ROSE MINING & MILLING CO. — **MONTANA**

Address: 32 Union Bank Bldg., Helena, Mont.

Company is controlled by the **Cruse Cons. Mining Co.**

Officers: Jas. J. Cruse, pres.; J. M. Nilan, v. p.; R. A. Weisner, sec., Helena, Mont.; E. D. Phelan, treas.; L. S. Ropes, cons. engr.

Inc. in Montana. **Cap.** $1,000,000.

Property: the Rock Rose and Looby mines, Grass Valley district, 4½ miles west of Helena; 6 claims, 3 patented, and 3 claims under option. The ground is traversed by many veins and porphyry dikes. Dandy claim has 117′ shaft with 300′ drift and crosscut exposes 2 veins, one of silver-lead, the other of gold ore. Galena vein is 6″ to 4½′ wide, averaging 2½′.

Ore: silver lead carrying $14.07 to $57.79 per ton. A total of 196 tons of ore shipped in July, 1906, June, 1907, July, 1908, yielded $4,234 smelter returns.

Development: by 300′ Helena shaft with a 125′ drift, exposing ore for 75′, in part lead and in part copper ore that carries 4½ to 10% copper. The gold vein is 2-3′ wide and reported to average $25 per ton. The vein is traceable by 6 pits for 378′ across the claim.

Equipment: 80-h. p. boiler, compressor, etc. complete. Buildings include engine house, ore sorting house, boarding and bunk houses. The freight rate is but $1 per ton for team, R. R. and loading. Water is handled by 1-2 hours pumping each day.

The mine is shallow and worthy of development.

ROSE CONSOLIDATED MINING CO. MONTANA

Address: 1131 W. First Ave., Spokane, Wash.

Officers: S. H. Twedell, pres.-mgr.; Frank Olney, v. p.; P. S. Rose, and C. H. Olney, directors. F. L. Olney, sec.

Cap. $200,000; par 10c; assessable. Annual meeting May 10.

Property: a gold-tungsten mine, 10 claims, 26 miles E. of Libby, reopened August, 1916.

Equipment: 10-stamp mill and concentrators, to be enlarged, 1919, by addition of Hardinge tube mill and flotation plant.

This is a small mine that can make a profit from its gold, plus a fair amount from tungsten, when the market is favorable.

Production: total about $25,000 to March, 1919.

Company has no debts, but was idle in 1921.

ROYAL BASIN MINING CO. MONTANA

Office: Makeever Bros., 170 Broadway, New York, and Journal Bldg., Boston, Mass. **Mine office:** Maxville, Granite county, Mont. Walter Neal, mgr. The Montana Phosphate Co., formed in 1915 to treat phosphate beds near Maxville, is controlled by same interests as Royal Basin.

Cap. $2,000,000; $1 par.

Property: the North Star mine of 2 lode claims, 90 acres, in Wymans gulch, within the Missoula forest reserve and 3 miles east of the Drummond branch of the N. P. R. R. Also owns the Northern Bell mine, a silver property near Princeton. Claims show a fissure vein 15′ to 40′ wide, in 3 upper tunnels, 100′ vertically apart. A new lower tunnel cut the vein 800′ in and at a depth of 700′. At this point the vein carries concentrating ore 12′ wide with a paystreak of sulphide ore, assaying 7½% copper, and 5 to 70 oz. silver, per ton. The smelter returns for over 1,100 tons shipped showed 5.14% copper.

Mine is equipped with a leaching plant using sulphuric acid to get the copper into solution and depositing electrolytic copper as cathode plates in tanks direct from the solution.

Reported leased for 5 years, from April, 1916, to **Northwest Cons. Mines Co.**, Spokane, Wash. No recent returns.

ROYAL COPPER MINING CO., LTD. MONTANA

Office: Wallace, Idaho. Mine near Belknap, Sanders county, Mont. John H. Nordquist, pres.

Property: 12 claims, patented, near Thompson Falls, shows a vein of about 18′ surface width, traced 1,500′ on company land, carrying copper and lead carbonates and sulphides, said to average 6% copper and 18% lead, with small values in silver.

Development: by prospect tunnels of 50′ and 600′. The property is a prospect on which assessment work only has been done for several years past.

ROYAL MINING CO. MONTANA

Former Address: Mohawk Bldg., Spokane, Wash. **Mine office:** Potomac, Missoula county, Mont. Letters returned, marked "Gone".

Officers: John H. Wourms, pres.; J. M. Long, v. p.; J. H. Pelletier, sec.; with Sam Seidenfeld and Dennis Reardon, directors.

Inc. Nov. 10, 1916, in Washington. **Cap.** $1,000,000; $1 par; 600,000 issued.

Property: 17 claims, 3 patented, 320 acres, 6 miles N. of Clinton, on N. P. R. R. and 4 miles S. of Potomac, Mont., on C. M. & St. P. R. R. Formerly known as the Charcoal, which shipped $18,000 worth of ore some 20 years ago.

Geology: quartz vein in granite 4′ wide, dipping 50° with N.-S. course. Ore assays 150 oz. silver, 6% copper, 20% lead and $5 gold per ton.

Development: by 2-compartment shaft to 200′ depth, and 800′ tunnel.

Equipment: includes 600′ hoist, boiler, 225 cu. ft. compressor, and quarters for all employees.

Production: shipments totaled over $40,000 to mid-1918. One car of silver-lead ore shipped in 1919.

RUBY & COLUMBIA MINES CO. **MONTANA**

Dead. Property held by **Basin-Montana Mines Co.** (which see), which secured possession after Ruby & Columbia had forfeited all rights for noncompliance with terms of lease.

RUBY GULCH MINING CO. **MONTANA**

Address: Zortman, Phillips county, Mont.

Property: in the Little Rockies, Mont., 60 miles from railroadat at Malta. Ore occurs in a wide lode of altered porphyry. It contains from $1 to $3 per ton in gold and is mined cheaply. In Jan., 1919, 200 men were employed, and the output was $30,000 per month. Cyanidation is employed at the mill.

RUNNING WOLF MINE **MONTANA**

Address: Paris Gibson, owner, Great Falls, or F. C. Whittaker, Stanford, Mont.

Property: iron-bearing claims on Running Wolf and Dry Wolf creeks, 12 miles S. W. of Stanford and 54 miles S. E. of Great Falls, at an altitude of 5,200 and 8,000′. According to L. G. Westgate, in Bull. 715 (1920) of the U. S. Geological Survey, the iron ore occurs in tabular bodies at the contact of porphyry and limestone. Orebodies average 20′ in width. The ore is a reddish-gray hematite, assaying from 35 to 68% iron, up to 0.107% phosphorus, and 1.90 to 12.95% silica; and is suitable for steel manufacture. An approximate tonnage of 2,340,000 is estimated.

SACAJEWEA GOLD & COPPER MINING CO. **MONTANA**

Letters returned from former address, 11 Broadway, New York. Mine near Helena, Mont. Col. Henry Altman, pres. and gen. mgr.; W. J. Anson, sec.

Cap. $5,000,000; shares $10 par.

Property: 47 claims in the Scratch Gravel district, adjoining the Copper-Silver Montana Mining Co. Idle some years, and no data available.

SAGINAW COPPER CO. **MONTANA**

Jackson, Beaverhead county, Mont.

Officers: Geo. North, pres.; E. M. Frank, sec.-treas., with Elmer North and Kenneth Campbell, directors.

Inc. Jan., 1916, in Montana. **Cap.** $125,000; $25 par.

Property: 5 claims, including the Saginaw mine, in Beaverhead county, shows fissure veins in porphyry, with E.-W. strike, dip 35° and 3′ average width. Developed by a 300′ incline shaft.

Equipment: includes steam hoist. Shipped 19 cars of ore in 1915, average assay, 11% copper. No figures available since.

ST. JOE GOLD-COPPER M. & M. CO. **MONTANA**

Probably dead, as letters sent former office, Wallace, Idaho, are returned unclaimed.

Property: 9 claims, well timbered, on Kelly Creek, near Saltese, 3 miles west of the Monitor mine, and one-half mile from a railroad, showing 2 strong veins.

ST. LAWRENCE COPPER MINING CO. **MONTANA**

Office: H. M. Lancaster, mgr., Saltese, Mineral county, Mont.

Officers: Henry M. Lancaster, pres.; S. B. Holbert, v. p.; F. W. Dewart, sec.; N. P. Hyndman, treas., with John Sloan, H. F. McLain and E. N. Ohl, directors.

Inc. Oct. 19, 1917, in Montana. **Cap.** $1,000,000; $1 par; 924,505 issued, increased to $1,500,000 in January, 1920. Annual meeting, September 2. Operating expenses during 1918 were $81,184.

Property: 8 claims, 1 patented, 160 acres, 5 miles S. W. of Saltese, the nearest rail point.

Geology: claims show quartzite cut by a vertical fissure vein 6′ wide,

carrying gold and copper. Ore-shoots are from 85 to 100' long, and carry both sulphide and oxide ore, assaying 8% copper and $3 gold.

Development: by 3,000' of work including tunnels 748 and 1,360' long, connected by raise and opening mine to depth of 480'. Shrinkage stoping is used.

In 1921, a drift was run easterly on the vein in the lower tunnel, and cut high grade chalcopyrite ore in December. It is considered that only the top of the main orebody has been worked, and the new exploration is to open it beyond a monzonite dike east of the east end-line of the Silver Lake claim.

Equipment: includes a small compressor.

Production: 1,250 tons in 1917, and 1,500 tons to March, 1919. Eight men were employed during the winter of 1920-'21.

ST. LOUIS MINING & MILLING CO. MONTANA

Address: Marysville, Mont.

Property: the famous Drumlummon mine, that produced $20,000,000 in the period, 1885-1895. In 1918 a little ore was extracted from a lower tunnel. Mine reopened 1921.

Equipment: 25-stamp mill and cyanide plant.

ST. PAUL MONTANA MINING CO. MONTANA

Probably idle, as letters sent to company's office, Maiden, Fergus county, Mont., are returned.

Officers: C. W. Amos, pres., St. Paul, Minn. Wm. Biadin, St. Paul, Minn., sec.-treas., with L. P. Ordway and E. B. Coolidge, gen. mgr., directors.

Inc. in Arizona. **Cap.** $50,000; shares $100 par; 500 issued.

Property: 2 patented claims, at Maiden, said to show gold ore in contact deposits between porphyry and limestone. Developed by a 450' vertical shaft, with 5,000' of workings. Ore claimed to assay $4 to $30 per ton and property is said to have produced $4,000,000.

Equipment: includes hoist, air-compressor, and 50-ton cyanide mill. Operated under lease at last accounts.

ST. REGIS COPPER MINING & MILLING CO. MONTANA

Probably dead, as letters are returned unclaimed from company's former offices, Missoula, Mont., and St. Regis, Mineral county, Mont.

Officers: S. J. Wilson, pres.; F. W. Wilson, sec.-treas.

Inc. May, 1901, in Montana. **Cap.** $300,000; shares $1 par; in half preferred and half common stock.

Property: 5 claims; also a 15-acre millsite and miscellaneous lands, 180 acres, on the Northern Pacific railway, shows quartzite and shale, with 2 orebodies of 6' estimated average width, carrying chalcopyrite ore said to give average assays of 8% copper, and $1.50 gold per ton.

Development: by tunnels of 60', 380' and 600'.

SALTESE CONS. MINING CO. MONTANA

Office: J. R. Bean, sec., Mullan, Idaho.

Officers: G. A. Turner, pres.; O. V. Manring, sec.-treas., with W. H. Smith and H. E. Ferris, all of Spokane, Wash., directors. J. O'Brien, mgr.

Inc. in 1911. **Cap.** $150,000; 10c par.

Property: 6 claims, 3 miles N. E. of Saltese, acquired from Black Traveler Copper Mining Co. in December, 1917, for $10,000. Shows 2 parallel veins, one about 6' width, having a strong gossan.

Development: by 2 croscut tunnels, the upper cutting a vein of 12' estimated width, carrying copper ore, mainly chalcopyrite, giving assays of about 3% with richer streaks assaying up to 32.4% copper and 15.8 oz. silver, with traces of gold. In Dec., 1917, an orebody was cut that carried 4' of ore averaging 4.5% copper, 2 to 5 oz. silver, and $6 gold per ton. Shipments were to have started in 1919.

Equipment: includes engine, compressor, drills, shops, and living quarters.

SALTESE MINING & MILLING CO. **MONTANA**

Office: 22 Symons Blk., Spokane, Wash. **Mine:** near Saltese, Mineral county, Mont.

Officers: J. C. Johnson, pres.; Wm. Dixon, v. p.; O. V. Manning, sec.-treas., with J. B. Ward and G. A. Turner, directors.

Inc. March, 1911, as the successor of the Saltese Cons. Copper Mng. & Mlg. Co. **Cap.** $1,500,000; shares $1 par; assessable. Levied an assessment of .02c. per share, Jan. 12, 1914.

Property: 12 claims, 240 acres, east of Mullan, near the National mine in the St. Regis district, about 8 miles N. W. of Saltese.

Development: by 2 tunnels aggregating 1,400′. The lower one, 655′ in length, opens a 13′ vein, probably the Black Traveler vein, at 460′ from the portal, which is said to show 5′ of high-grade copper ore. The tunnel was being extended to cut the big iron-capped vein seen on the surface.

Developing with a small force, 1915-16, but nothing heard of operations since. Property considered promising.

SCRATCHAL SILVER MINE **MONTANA**

Address: H. O. Flickinger, Philipsburg, Mont., who with George Nevelng and John Ingman own the mine.

Property: in the Philipsburg district of Granite county. Rich ore, up to 300 oz. silver per ton, has been shipped. Fire destroyed the surface plant in 1920.

SCRATCH GRAVEL CONS. GOLD MINES CO. **MONTANA**

Formerly the Scratch Gravel Gold Mining Co.

Address: Sidney Norman, Spokane, Washington.

Inc. 1920, in Montana. **Cap.** $2,000,000; $1 par; 800,000 issued. The transfer with the old company was on a share for share basis. Shares 5c. bid, 7c. asked, 1920, on Butte Stock Exchange.

Property: known as the Head property, 34.7 acres, lies 2 miles N. W. of Helena, on same fissure vein as the Franklin mine belonging to the Cruse estate.

Development: to 500′ depth, by 3 incline shafts, 90′, 50′ and 500′, with 800′ of drifting. Only high-grade ore is shipped, the low-grade being stored for the mill which was constructed from a plant erected by another company nearby.

Ore reserves were estimated in Jan., 1917, by C. E. Fryberger, as $944,509 in ore blocked out and $1,939,311 probable above 500′ and down to 600′ depth. Rich ore was sent to the smelter occasionally during 1917 and 1918. No work was done by the company during 1919 and 1920, but resumption expected in 1922.

Equipment: steam power, to be replaced by electricity, and $10,000 of new machinery to be erected in 1922.

Production: $340,000 in gold from above the 250′ level; also $69,000 by lessees.

SCRATCH GRAVEL GOLD MINING CO. **MONTANA**

Being dissolved. See **Scratch Gravel Cons. G. M. Co.**

SELWAY-BOND COPPER GROUP **MONTANA**

Letters returned from former address: Herbert B. Selway, or H. A. Bond, Armstead, Beaverhead county, Mont.

Property: 12 claims, 240 acres, situated 1½ miles from Armstead, Mont. Claims cover 4,000′ on the course of several E.-W. fissure veins, 3′ to 3½ wide that cross beds of quartzite, schist and limestone. Ore carries 3 to 9% copper.

Development: by 130′ shaft and several shallow openings, all said to show ore. Two shafts at water level show 3½ to 10% ore. An open-cut has yielded 250 tons of ore. No late returns secured.

SHEEP CREEK GOLD & SILVER MINING CO. **MONTANA**

Address: G. W. Oxcell, pres., Wise River, Mont.

Property: the Sheep Creek mine, in the Vipond section of the Wise River district of Beaverhead county, 3½ miles from the Montana Southern Ry.,

and 65 miles from Anaconda. Ore carries silver and lead, and some gold and copper.

Development: by 2-compartment incline shaft.

Equipment: engine, pumps, hoist, compressor, etc.

SHEILS & IRONSIDE MINING & MILLING CO. MONTANA

Office: Dr. F. A. Ironside, 16 North Main St., Butte, Mont.

Officers: John Sheils, pres.; Stanley Ironside, v. p.; F. A. Ironside, sec.-treas.

Inc. 1913, in Montana. **Cap.** $500,000; shares $1 par; 446,000 issued.

Property: 6 claims, 2 patented, 120 acres, situated 13 miles N. E. of Butte, and an equal distance from Boulder, Jefferson county, show a fissure-vein with ore shoots 250′ and 90′ long occurring in granite. The granite is cut by an almost vertical dike, greatly altered and mineralized, having a maximum width of over 50′. The ore occurs entirely in the dike, not as a segregation, but in quartz veins running with the dike, within it or at its margin. Orebody is 3′ to 5′ wide and carries silver, lead, copper, zinc and some gold.

Reported on by W. L. Creden, H. D. Morse, C. J. Stone; also by H. S. Morris.

Development: by 3 tunnels, main one 1,850′ long, with several stopes, and a 50′ winze with 200′ of drifting at the bottom, said to have opened rich ore.

Equipment: includes hoist, 3 drills, electric power, and a 100-ton concentrating mill.

Production: for 1915-16 amounted to 476 tons averaging 4.3% copper, 26.6 oz. silver, and $4.40 gold. Shipped about 40 tons of concentrates monthly in 1917, and until mine was closed, February 1, 1918.

In 1920, mine was optioned to P. A. Danaher and M. L. Leyding of Helena, and high grade ore found 800′ below the surface.

SILVER BOW SECURITIES CO. MONTANA

Address: J. J. Harrington, sec., 73 Hirbour Block, Butte, Mont.

Inc. Oct. 2, 1916, in Mont. **Cap.** $1,500,000; par $100. Issued $116,500.

Company was organized to finance the development of the properties of the Tuolumne Mining Co.

Statement of Jan. 24, 1922 shows assets to include 245,269 shares of Tuolumne stock; $5,000 Tuolumne bonds; cash and accounts receivable $9,670, with expense for 5 years of $9,466.

SILVER BUTTE MINES CORPORATION MONTANA

Office: Sherwood Bldg., Duluth, Minn.; W. D. Gibson, gen. mgr., 61 Hirbour Block, Butte, Mont.

Officers: Gust Carlson, pres.; W. D. Gibson, v. p.; John W. Neukom, sec.-treas., with I. Freimuth and Paul A. Gow, directors. C. J. Zachow, asst. sec.

Inc. April 14, 1920, in Delaware. **Cap.** $1,500,000; $1 par; 350,000 outstanding.

Is a reorganization of the Butte-Ballaklava Copper Co. Company purchased the bonds of the latter company and foreclosed the mortgage, Oct. 2, 1920. Stockholders of the Butte-Ballaklava Co. were offered an exchange of stock, share for share, on payment of 50c. cash with each share of Butte-Ballaklava. Company owned all but 1,500 shares of the Corbin Copper King Mng Co., which company was dissolved and its holdings, viz., the Hidden Treasure group, transferred to the Silver Butte.

Property: the **Ballaklava** mine at Butte, and the **Hidden Treasure** group of claims near Corbin and Wickes, Mont. The Hidden Treasure ground shows 3 orebearing copper veins in quartz monzonite, with pay ore in several faces, from which ore can be shipped when mine is working.

The Ballaklava property includes the Burke and Ballaklava claims, about at Butte and can produce shipping ore from this and the other veins of the property. It is likely to produce considerable tonnage of high grade ore.

Development: the Hidden Treasure shaft is 400′ deep, with crosscuts on the 135, 233 and 400′ levels, exposing three westward dipping parallel veins; the easternmost, or Duluth vein of the property is not cut. The Chicago vein is opened by drifts on each level and by a 110′ tunnel and winze. The vein is 28′ wide on the 133′ level and smelter returns show 19.6 oz. silver and 8.9% copper. On the 235′ level a shoot of 19 oz. silver and 14.1% copper ore is exposed for 50′ by drifting. The ore occurs in bands, in a vein 60′ wide, on the 400′, opened for 80′ west, developing 21% ore, with 22 oz. silver. The Butte vein is 5′ wide on the 235′, is 10′ thick on the 400′, and well mineralized, but non-commercial. The Boston vein is 18′ wide on the 105′ level, and 22′ wide on the 400′ and carries 5% copper ore with 10 oz. silver, but no ore has been mined. The Duluth vein is 5′ wide where exposed by open cut work. The shaft is to be deepened, stoping begun and ore shipped, as soon as the market for metal improves.

Reported Oct., 1921, that company had taken over a valuable coal property and railroad line, near Bozeman, Mont.

The Ballaklava property includes the Burke and Ballaklava claims, about 6½ acres in eastern part of Anaconda hill, adjoining Mountain Chief, Modoc and High Ore mines of the Anaconda Copper Co. Property willed to Bishop Carroll of the Catholic Church ,who sold it for $400,000 cash to this company.

Claims form a narrow tract 1,860′ long running with the veins on the northeastern slope of Butte hill. The Burke vein crosses the claim of that name and has been worked in the Modoc mine. There are 4 veins, but one of which is generally workable. This vein is generally correlated with the Jessie, but complex geologic conditions led to a lawsuit with the Anaconda Co. for ownership of the rich orebody mined on the 800′ level. This suit was settled by a division of the orebody, Nov. 28, 1913.

The Ballaklava shaft is 1,625′ deep, with a level at 1,800′ driven on a winze. The mine is connected on the 800′ level with the Modoc mine of the Anaconda, and on the 1,200′ level with the West Colusa. This crosscut is used for drainage.

Equipment: includes a double-drum hoist, operated in counterbalance, driven by a 300-h. p. motor, designed to hoist an unbalanced load of 5 tons, at a speed of 800′ per minute, from a depth of 3,000′. There also are a 165-h. p. auxiliary double-drum hoist, good for 1,500′, and a 10x12″ auxiliary steam hoist, 2 air-compressors, with cross-compound air cylinders, each driven by a 100-h. p. motor, and an electric station pump. The auxiliary steam plant includes a cooling tower for water.

Production: begun April, 1910, was continued until stopped by injunction, granted the Anaconda Copper Co., in August, 1910. During this period shipments to the Pittsmont smelter (East Butte), were about 125 tons daily, of ore assaying about 8% copper and 12 oz. silver per ton, this being the highest average grade of ore produced by any Butte mine for that year. Producing about 250 tons daily in 1916, mainly from 800′, 1,000′, 1,200′, and 1,600′ levels.

Shut down in recent years, but some ore mined on the 2,200′ level by a crosscut from the Modoc shaft; a fire at the latter stopped all work.

SILVER CABLE MINING CO. **MONTANA**

Address: 116 East Cedar St., Missoula, Mont.

Officers: J. D. Corbett, pres.; J. W. Kennedy, v. p.; Carl C. Mott, sec.-treas., with H. E. Chaney, and W. J. Rhoades, directors.

Cap. $1.250,000; $1 par; assessable, 8 mills per share payable April 16, 1921. Listed on Butte Exchange. Annual meeting, first Saturday in July. Shares 5c. bid, 1920.

On Nov. 30, 1919, company had $355 on hand, having spent $10,371 and received $10.000 from assessment No. 13.

Property: 7 claims in east Coeur d'Alene district, just over the Montana line on the eastern slope of Bitter Root Mts., 5 miles from the Northern Pacific R. R.; part of the land lies in Idaho. Said to have a high body of

silver, lead and zinc ore, from 500′ to 700′ high, proved for over 200′ in length, and from 4′ to 6′ wide. Ore is said to average better than 15% zinc.

Development: by 1,500′ tunnel, raises and drift in ore. Reported developing in 1920; 700′ new work in lower tunnel was unsatisfactory, but 15′ of good ore was opened in crosscut 100′ higher, and continued 25′ before mine was shut down.

SILVER DIKE GROUP MONTANA

Property: claims on Carpenter creek, near Neihart, Cascada county controlled by American Z. L. & Sm. Co., which see.

SILVER FISSURE MINING CO. MONTANA

Address: A. W. S. Cochrane, sec., 30 Broad St., New York.

Property: near Polaris, Beaverhead county, Mont., known as the Polaris mine, formerly operated by F. Aug. Heinze, carries silver and gold.

Shut down 1915, but leased to and operated by Silver Fissure Silver Mining Co. (which see), since 1918.

SILVER FISSURE SILVER MINING CO. MONTANA

Idle, 1920. **Address:** Seligman & Meyer, 61 Broadway, New York.

Officers: A. I. Seligman, pres.-treas.; J. Blanner, v. p.; D. J. Ferguson, sec., with J. F. Mercer and P. Mangone, directors H. W. Chadwick, asst. sec.; Glen Anderson, mgr., Butte, Mont.

Inc. in Delaware. **Cap.** $1,000,000; par $1; all issued. Annual meeting first Monday in November. Bankers Trust Co., transfer agt.

Property: the Polaris mine, 6 patented claims, 150 acres, in Beaverhead county, owned by the Silver Fissure M. Co. Ore reserves, July, 1918, reported as 69,620 tons containing 1,507,300 oz. silver and 1,300 oz. gold. A 50-ton mill, employing chloridizing roasting and hyposulphite leaching was erected during 1918. Small shipments made in 1919. Property is a good one, but its operation is greatly hampered by its remote situation.

SILVER KING MINING CO. MONTANA

Address: H. E. Bauman, mgr., Townsend, Mont.

Inc. 1919, in Idaho.

Property: the Jawbone, an old lead-copper-silver mine, in the Hassel district of Broadwater county, said to have produced $100,000 up to 1919. Development under way from an 800′ tunnel in 1919 and 1920. A mill was to be erected to treat the ore, said to be 2′-3′ thick all along the tunnel.

SILVER PICK MINING CO. MONTANA

Address: Hugh Daly, 73 E. Park St., Butte, Mont. Dave Anderson mgr.

Property: the Julia Silver mine, an old producer near Elliston, Powell county, developed by 400′ shaft. The 300′ level opened a 4′ vein. Reserves are estimated at 300,000 tons.

Equipment: 100 h. p. steam power, hoist of 600′ capacity, compressor, etc.

Production: about $300,000 between 1910 and 1914. Several carloads shipped to East Helena and Anaconda in 1920, ran 54 oz. silver per ton with 4% copper, 8% lead and $10 gold. 20 men employed.

SILVER ROCK MINING CO. MONTANA

Address: Albert Nelson, supt., Deborgia, Mont.

Officers: Lionel C. Simpson, Camden, N. J., pres., Walter J. Clarke of Philadelphia, sec.-treas.

Inc. 1920. **Cap.** $1,250,000.

Property: the Rock Island mine, 146 acres, 6 miles from Deborgia, Mineral county. Ore carries silver, lead, and copper.

Development: by 900′ of old workings, and a new 400′ shaft. Reserves are given as 40,000 tons. In 1921, company purchased machinery and was prepared, it is said, to spend $100,000 on development.

Production: several cars of ore averaged 16.6 oz. silver, 62.8% lead, and 1.6% copper.

SILVER SPRAY MNG. & MLG. CO. MONTANA

Address: Henry Auerbach, pres., Dillon, Mont. L. D. Lyons, mine mgr.

Property: the Silver Spray mine, 20 miles S. E. of Dillon, Mont. Shows 6 veins, 2' to 5' thick.

Development: an 80' shaft opens up 3' of shipping ore.

SILVER TIP MINING CO. **MONTANA**

Described in Volume XIV. Consolidated with Troy Mng. Co. and J. P. Lead Co., as **Cons. Silver-Lead M. Co.,** which see.

SILVER TRAIL MINING CO. **MONTANA**

Address: Basin, Mont.; J. Asher Cowen, v. p.-mgr., Salt Lake City, Utah.

Inc. 1919, in Montana. **Cap.** $500,000; par $1.

Property: 5 claims, 3 miles S. of Basin, Jefferson county. Ore carries silver and gold.

Development: by tunnel, one nearly 400' long, being driven to cut the Silver Blue vein, which assays high in silver and fair in gold; 3½ tons shipped from these cuts assayed 112 oz. silver, and 14 tons, 36 oz. silver and $3 gold per ton.

SMOKEHOUSE MINING CO. **MONTANA**

Subsidiary of the **Davis-Daly Copper Co.,** Butte, Mont., q. v.

SNOWSHOE MINE **MONTANA**

Address: Libby, Mont. L. H. Faust, State Board of Education, Helena, Mont.

Is an old silver-lead mine that produced $1,080,000 before shut down by litigation. Has 200-ton mill and full equipment.

SNOWSTORM MINES CONSOLIDATED **MONTANA**

Office: Old National Bank Bldg., Spokane, Wash. Operating Dept.; R. E. Walters, asst. mgr.; L. E. Warner, mill supt.; Jack Grills, mine supt., all at Troy.

Officers: Leo Greenough, pres. and gen. mgr.; W. J. Wakefield, v. p.; W. J. Beaton, sec.-treas., with M. D. Hall, James Broad, H. P. Greenough, and R. E. Walters, asst. gen. mgr., directors.

Inc. in 1916. **Cap.** $625,000; 25c par. Annual meeting third Tuesday in January. Share 9c bid, 1920.

Company was organized to take over the Snowstorm Mining Co. and to acquire under bond and lease the Banner and Bangle claims, at Troy, Lincoln county, Mont. Of the capital stock, 1,500,000 shares were issued to Snowstorm Mining Co. stockholders in full payment for the corporation's assets. Proceeds of sale of 1,000,000 shares not transferred to the former Snowstorm holders has been devoted to developing and equipping the Banner and Bangle property. Payments on this mine are $100,000 on Nov. 20, 1920; and $125,000 a year later, with a royalty of 10%.

Property: the Banner & Bangle mine. Also owns the old Snowstorm holdings at Larson, Idaho; and 25 claims, 7 millsites, 2 power-sites, 5 water-rights, and other holdings about 6 miles S. of Troy, Mont. Ore contains lead, silver, and zinc.

Development: at the Banner and Bangle property includes 6 long tunnels. No. 7, over 1,900' long in 1919, is to be the main working adit, and is expected to cut the vein at 2,500' from the portal. Ore reserves are said to be considerable.

Equipment: includes a 6-mile railroad, 1,200-h. p. hydro-electric plant, compressor, and 300-ton concentrating plant, mine change-house, boarding house, bunk-houses, etc.

Production:

Year	Ore milled, tons	Lead concts., tons	Zinc concts., tons	Gold, oz.	Silver, oz.	Lead, lb.	Zinc, lb.
1920....	30,876	3,410	872	272	109,829	3,480,444	605,499
1919....	62,009	4,557	1,848	600	145,577	5,786,555	962,160
1918....	65,342	5,093	3,644	561	164,605	6,060,484	2,474,969
1917....	61,647	2,933	3,150	445	89,980	3,927,559	1,826,903

It would seem as if company has a good mine and equipment, and is making every effort to develop it thoroughly. Profits so far have not been large, and payments due on property are heavy, but dividends are expected in the not far distant future.

Employed about 20 men, 1921.

SOLAR MINING CO. **MONTANA**

Address: A. P. Heywood, Helena, Mont.

Inc. 1920, in Mont. **Cap.** $250,000.

Property: Stemwinder mine in Greenhorn district, near Helena, Lewis and Clarke county. Shipped siliceous silver ore in 1919-20.

SOUTH BUTTE MINING CO. **MONTANA**

Address: Butte, Mont. John G. Williams, M. E. Riley and Arthur Howell, directors, at last accounts.

Inc. May 25, 1906, in Minnesota. **Cap.** $500,000; shares $100 par. Company was organized by the Great Northern Railway interests, and has had much litigation, with various individuals and corporations, including the Butte Central Copper Co., East Butte Mining Co., P. D. Morgan, T. B. Thomas, and others, winning practically all of the suits. Property was leased to the Montana Consolidated Mining Co., but nothing of particular value was developed, and the latter-named company was liquidated.

Property: includes the Surprise placer claim, but company's chief asset consists of mineral rights to a narrow strip along the Great Northern right-of-way. Idle at last accounts.

In 1920 company obtained an injunction against Thos. B. Thomas for attempting to patent the Resurrection claim.

SOUTHERN CROSS MINE **MONTANA**

J. C. O'Brien, supt., Southern Cross, via Anaconda, Mont. Owned by Anaconda Copper Co.

Employs 85 men normally and produces 90 tons daily.

SPOKANE-MONTANA MINING CO. **MONTANA**

Officers: J. O. Hamilton, pres., Peyton Bldg., Spokane, Wash., D. E. Burns, v. p.; Fred Ludwein, sec.-treas., with Wm. Gumm and Andrew Kuklo, directors.

Cap. $1,000,000; $1 par. Annual meeting October 15.

Property: 2 claims, 2 miles from Basin, Jefferson county, Mont., developed by tunnels on veins in granite. Ore contains galena with gold and silver values.

SPOTTED HORSE MINING CO. **MONTANA**

Address: Maiden, Mont. S. B. Coolidge, mgr.; C. L. Carstens, mine supt.; H. J. Mamill, mill supt.

Inc. in Arizona. **Cap.** $50,000; $100 par.

Property: an old and well known gold mine, 35 acres, 1 mile from Maiden, in Judith mountains. (See Geol. of Judith Mts., Montana, by Weed & Pirsson, U. S. Geol. Survey.)

Development: by 450′ shaft. Five distinct oreshoots extend to No. 7 level. Reserves are given as 20,000 tons.

Equipment: the mill contains crusher, rolls, Chilean mill, and Dorr counter-current decantation system of cyanidation, treating 120 tons daily.

Production: monthly output of concentrate is 30 tons, assaying from $200 to $800 per ton. Costs are reported as $2 per ton for mining, and 90 cents for milling. Worked part of 1919 and yielded some ore, 1920-'21.

STEARNS & KING MINE **MONTANA**

Address: G. W. King, Iron Mountain, Mont.

Property: a gold prospect 3 miles N. E. of Cobden, Mineral county, opened by 500′ tunnel.

STERLING MINING & MILLING CO. **MONTANA**

Succeeds the Liberty Mining Co. and Mike Horse Mining Co.

Address: Archie McDonald, mgr., Flesher, Mont., or Canyon Creek, Mont. U. J. Jones, supt.

Officers: F. W. Rader, pres., Ellensburg, Wash.; F. J. Sievers, v. p., Pullman; J. P. Clymer, sec.-treas.; U. J. Jones, mine supt.; with Geo. B. Cook and J. P. Clymer, both of Ellensburg, Wash., as trustees.

Property: 21 claims, including the Mike Horse mine, an old silver-lead producer, near Flesher, 50 miles N. W. of Helena, on main divide, Blackfoot county. Ore has to be hauled 36 miles to Wolf Creek on the Great Falls branch of the G. N. Ry., at a cost of $14 per ton.

Development: by over 4,000′ of tunnels, etc. No. 3 was in 1.175′ by Sept., 1920, and had cut the Mike Horse vein. No 1 and 2 tunnels also cut 6′ of ore.

Equipment: 125 h. p. steam plant and a 100-ton mill run one shift, 1919. Shipped several cars lead concentrate, 1919.

SUMMIT DEVELOPMENT CO. — **MONTANA**

Address: A. J. Reeder, Minneapolis, Minn., or A. H. Jones, supt., Virginia City, Mont.

Property: the Shafter and Marietta gold-silver mines in Summit district, near Virginia City.

SWASTIKA MINING CO. — **MONTANA**

Address: Philipsburg, Granite county, Mont. W. W. Williams, mgr.

Officers: W. I. Power, pres.; F. R. Andrus, v. p.; C. E. Hansen, sec.; W. W. Kroker, treas.; the officers are the directors.

Inc. April, 1913, in Montana. **Cap.** $500,000; shares $1 par; 407,043 outstanding.

Property: 3 claims, 1 patented, known as the old Basin mine, and held under long term option, shows a 4′ vein of argentiferous copper ore, oxidized to carbonates near the surface, exposed for 100′ on the 150′ level.

Development: consists of a 190′ shaft, and 200′ of drifts. Ore averages 4% in copper, 1½ oz. silver, 50c. gold ton.

Equipment: includes electric hoist good for 500′, compressor and pump.

Mine was closed down in 1914, but at last accounts efforts were being made to increase capitalization and resume operations.

SYNDICATE COPPER CO. — **MONTANA**

Described in Volume XIII. Company dissolved. See **Tuolumne Copper Mining Co.**

TARBOX MINING CO. — **MONTANA**

Office: Shoshone Bldg., Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: Richard Daxon, pres.-mgr. A. H. Fox, v. p.; J. F. Ferguson, sec.-treas., with J. A. Lewis, W. W. Adams, and F. J. Davey, directors.

Inc. in 1890. **Cap.** $2,000,000; $1 par; 1,600,000 issued; assessable. Last assessment (No. 40) of 3 mills per share payable July 20, 1921. Annual meeting, third Monday in July. Listed on Butte Exchange.

An option on 60% of the issued shares was given to J. R. Hall during 1920, to net shareholders 27c. per share. The optionee was to spend $100,000, but abnormal conditions compelled a postponement. Meanwhile, the company is spending $2,000 a month on development.

Property: 12 claims on Packer creek, 3 miles N. of Saltese, Missoula county. Large bodies of low grade zinc-lead ore occur in the mine. Ore carries galena and zinc blende, copper and gold coming in at 800′. Vein at surface is 10′ to 30′ wide and filling is quartz and siderite. Examined by F. J. Davey in 1918.

Development: by 800′ two-compartment shaft and winze sunk 200′ below bottom level. At last accounts the ore shoot on the 1,000′ level was 9′ wide and had been opened for a length of 160′; one third of the vein is shipping ore. It is estimated by management that 110,400 tons of ore between the 600′ and 800′ levels, plus that shown by recent development, and 5,000 tons on dumps, will average 2.85 oz. silver, 7.3% lead, and 7.6% zinc. By 1921, a 3′ shoot of clean lead-silver ore had been opened on the 800′ level.

Equipment: includes sawmill, steam hoist and compressor, gasoline-driven mine fan, pumps, water power plant, living quarters for 50 men (12 employed), and a 150-ton concentrator to be built.

Mine idle from March 15, 1920 to Oct. 15.

TENDERFOOT COPPER MINING CO. MONTANA

Address: John Whitted, pres. or R. W. Berry, sec., Great Falls, Mont.

Property: 10 mining claims, 4 patented, near Monarch, Mont., containing gold and silver bearing copper ores. Developing only.

THOMAS CRUSE MINING & DEV. CO. MONTANA

Address: Helena, Mont.

Officers: Richard Cruse, pres.; Carolyn B. Cruse, v. p.; W. J. Cooke, sec.; J. J. Cruse, treas, with C. B. Nolan, E. J. Lange, and E. D. Phelan, directors.

Inc. in Montana. **Cap.** $1,500,000; $1 par; all issued.

Property: the Franklin and Helena mines, in Marysville and Scratch Gravel districts, Lewis & Clark county; also claims on Jackson creek, Jefferson county; and patented oil claims in Carbon county, a total of 1,735 acres. Examined by W. F. Word of Helena. Ores are principally gold and silver bearing.

THREE FORKS COPPER MINING CO. MONTANA

Probably inactive.

Address: Copper City, Broadwater county, Mont. Herbert G. Dunbar, supt., Three Forks, Mont.

Property: a group of claims, at Copper City, 7 miles north of Three Forks. Developed by 400′ shaft. As shaft is in lead material from top down, the lode is said to be 200′ wide. Sulphide copper ore appears at 325′, or 25′ above water level. Company planned extensive prospecting on 400′ level.

The ore is somewhat bismuthiferous, assaying up to 20% copper, with small values in gold and silver.

Equipment: includes steam power and an air compressor. No recent returns received.

TICON MINING CO. MONTANA

Controlled by Jas. A. Murray Estate of Butte, Mont.

Property: 1 fractional claim, about 2 acres, lying between the Bell and Wild Bill mines of the Anaconda and the Speculator and Edith May claims of the North Butte. Mine has a 700′ incline shaft on the vein with levels opened at 300′, 500′, 550′ and 600′, said to show 4′ of good ore in the bottom. Work was stopped by an injunction, secured by the Anaconda Copper Mining Co. Idle since 1916.

TIMBER BUTTE MILLING CO. MONTANA

Address: W. A. Rossberg, mgr., Miner Block, Butte, Mont.

Is the operating company for mill treating ores from all the W. A. Clark properties at Butte, Mont., handling 1,000 tons daily of zinc ore and as much copper ore.

TREASURE MOUNTAIN MINING CO. MONTANA

P. S. Rose, pres., Libby, Mont.

Inc. 1920. **Cap.** $200,000.

Property: adjoins the Lukens Hazel mine, 9 miles S. of Libby, Lincoln county, said to contain lead-silver ore.

TREDENICK DEVELOPMENT CO. MONTANA

Address: Cooke, Mont.

Operating in summer of 1921.

TRIANGLE MINING & DEVELOPMENT CO. MONTANA

Letters returned from former office: 8 Allen Blk., Missoula, Mont. Mine office: Clinton, Mont.

Officers: R. B. Hughes, pres and gen., mgr.; Oliver Blood, v. p.; H. Y. Gephart, sec.-treas., with David C. Smith, E. C. Mulroney, F. C. Robb and Geo. E. Sullinger, directors. Henry E. Kuphal, engr.

Inc. Aug. 25, 1906, in Montana. **Cap.** $500,000; increased later to $1,-

200,000; shares $1 par, non- assessable; issued $665,000. Debentures, $150,000 6%, $38,000 issued. Annual meeting, third Monday in February.

Property: 13 claims, 10 unpatented, 230 acres, well-watered and partly timbered in the Wallace district, 2½ miles from a railway, in 3 groups, known as the Triangle group of 8 claims, and the Hill group of 5 claims, 2 miles N. E. of Clinton and 17 miles E. of Missoula. The company also owns land in the town of Clinton.

The claims contain fissure veins cutting granite and altered sedimentary rocks near the contact with a large batholith of granite. The veins show chalcopyrite and bornite associated with hematite, siderite, and quartz in altered granite. The Triangle group shows a 16′ vein, opened by a 640′ tunnel with back of 450′. At the face the vein is 14′ wide and assays 2% copper, ½ oz. silver and 40 cts. gold, while an 8″ streak averages 15.04% copper, 3.20 oz. silver and 24 oz. gold and a 4′ footwall streak averages 4.65% copper, 12 oz. silver and 80 cts. gold.

Development: by a 140′ crosscut and 540′ drift tunnels and 40′ shaft, estimated to block out 25,000 tons ore. The Grass Widow claim has 513′ of crosscutting and 300′, 75′ and 100′ drifts. The Hill group has a 300′ drift tunnel.

Equipment: includes a 40-h. p. boiler and an Ingersoll-Rand air-compressor, besides several mine buildings. Idle since 1917.

TRIUMPH GOLD MINING CO. — **MONTANA**

Address: Lyman V. Loomis, Philipsburg, Mont., or G. D. Loomis, sec., Philipsburg, Mont.

Property: the Harper mine at Philipsburg, Granite county. Ore carries silver and a little copper and gold. Dumps are said to contain 100,000 tons, assaying 11 oz. silver, with 30c. to 60c. gold and some tungsten.

Equipment: two 40-h. p. boilers, hoist, pump, compressor, etc.

Working at the end of 1920.

TUOLUMNE COPPER MINING CO. — **MONTANA**

Principal office: 73 Hirbour Bldg., Butte, Mont.

Officers: Wm. P. Jahn, Milwaukee, Wisc., pres.; Daniel Coleman, v. p.; J. J. Harrington, sec.; Frank K. Wilson, treas.; Paul A. Gow, mgr.; Walter Harvey Weed, cons. engr. Directors: Ed. Hickey, Wm. P. Jahn, Frank K. Wilson, Paul A. Gow, John Harrington, F. X. Girard and Dan Coleman.

Inc. June 4, 1906, in Arizona. **Cap.** $800,000; shares $1 par. Company reorganized in May, 1916, with capital of $2,500,000, shares $1 par; outstanding 1,986,806 shares. A bond issue of $500,000, 7%, 5 year, convertible into stock at $2 a share, was authorized Dec., 1919, due March 1, 1925. Listed on Boston Stock Exchange and the New York Curb. State Street Trust Co., Boston, transfer office; Beacon Trust Co., Boston, registrar. Annual meeting, second Monday in March, at Butte, Mont.

Financial statement, years ending Dec. 31:

Year	Revenue	Expenses	Depre. & Dep.	Deficit
1920.....	$314,798	$258,994	$77,466	$76,511
1919.....	217,586	306,277	76,173	164,864
1918.....	199,557	166,870	97,680	64,993

	Assets			
Year	Property & plant	Development etc.	Current	Total
1920.....	$3,704,534	$13,950	$65,842	$3,704,534
1919.....	3,626,136	18,000	24,962	3,669,108
1918.....	3,479,586	.....	54,172	3,533,758

	Liabilities				
Year	Capital	Current	Reserves	Surplus	Total
1920.....	$1,986,804	$43,907	$405,924	$1,251,498	$3,704,534
1919.....	1,986,806	21,367	333,458	1,327,477	$3,669,108
1918.....	1,960,115	364	257,285	1,315,994	3,533,758

Operating expenses for 1921 were $151,794 of which $26,624 was charges to mining and $83,754 to development.

Financial statement for 1921 shows assets, $3,918,490; acct's pay., outstanding bonds and reserves for depletion and depreciation, $691, 861; capital stock outstanding, $1,985,954; surplus, $1,239,675.

Dividends: 45c per share in 1911, 20c per share in 1913.

History: company was formed to acquire and mine the Tuolumne claim, which carries the Jessie vein. This and other veins were worked from 1909 to 1918, to a depth of 2,680', with a production of 207,969 tons of ore yielding 21,761,190 lb. copper, 658,194 oz. silver, averaging 5.25% copper and 3.11 oz. silver. All work was stopped January 1, 1918, because increased cost of operating and declining grade of ore did not permit sufficient profit.

Following a reorganization of the company in 1916 the Main Range and Colusa-Leonard Extension groups were taken over on very favorable development contracts, and in 1918 all outstanding interests in these groups were acquired and properties deeded to Tuolumne Copper Mining Co.

The Colusa-Leonard Extension group consists of 6 claims—the Maggie Placer, Golden Hematite, Little McQueen, Undine, Snowbird Placer and Syndicate. The property, though practically undeveloped, has a two-compartment shaft 1,200' deep. A connection has been made from this shaft to the Main Range shaft on the 700' level. The property is well equipped, and during 1919 was unwatered and developed on the 1,200' level. The claims contain the westerly extension of the Spread Delight vein at depth, and the Sinbad vein also traverses this tract.

The Main Range group consists of the 7 claims—Sinbad, Main Range Fraction, Spread Delight, Tent Peg, Rory O'More, Kingstella, and Lillie. This property has been partly developed from the Main Range shaft to the 1,200' level. A large orebody varying in width from 10 to 35' and 350' in length has been developed in the Spread Delight vein on the 700' to 1,200' levels. Stoping operations on orebody above the 1,000' level up to Jan. 1, 1921, yielded 89,222 tons which contained 3,750,753 lb. of copper, 787,436 oz. of silver, and 675 oz. gold, yielding $842,788 in net smelter returns. During the year 1920-21 the Main Range shaft was sunk to the 1,600' level and the vein drifted on for 320'.

Development: includes two 1,200' shafts, about 1,000' apart. The eastern or Main Range shaft has levels at 700, 800, 1,000 and 1,200' depth with drifts on the veins at each level. Considerable ore has been mined from above the 800' level, mainly from the Spread Delight vein, the figures being given in the accompanying table. On the 1,200' level is a 500 gal. motor-driven pump.

Sinking the main shaft to 2,000' was started in Jan., 1921.

On the 800' level the vein was 110' thick and showed a 6-8' orestreak on one wall which has not yet been developed. The main oreshoot in the middle of the vein shows from 15-35' of ore which has been stoped out up to the 700' level.

On the 1,000' level this vein is explored by a 590' drift and the oreshoot was found to be leached and broken by faulting, the ore averaging 15 oz. silver and 2% copper with a 6' band of 70 oz. ore on the sill floor.

On the 1,200' level the Spread Delight vein shows less quartz, and an ore shoot 25' wide.

In 1920 the company operations included 45' of shaft sinking, 1,035' of crosscutting, 799' of drifting, besides station cutting and raises. Returns from all ore mined above the 800' level, up to January 1, 1921, amount to $842,788.67.

In 1921 new work consisted of 1,875' of drifts and crosscuts, 350' of sinking and 6,500 cu. ft. of stations cut.

Ore assaying 4½% copper and 77 oz. silver per ton and running 15 oz. silver for a width of 15' was opened in the Spread Delight vein on 1,600' level during Dec., 1921. By March, 1922, the shaft had reached a depth of 1,775'.

In addition to the Spread Delight vein, four other large veins have been cut in this property, but are as yet undeveloped. Shipments have been made from the Sinbad vein, which shows a width of 20', and the Rory O More vein 40' wide, shows an ore-shoot 15' in width.

Equipment: the Main Range has a surface plant consisting of large double-drum electric hoist, 2,500 cu. ft. electrically-driven compressor, framing and carpenter shop with framer and saws electrically driven, blacksmith shop, machine-shop, warehouse, boiler plant, change-house, office, 80' head-frame and ore-bins.

Main Range Mine.

	Ore, tons	Copper, lb.	Sil. oz.	Gold, oz.	Aver. Cop. %	Aver. Sil. oz.	Aver. Gold oz.
1916.....	446	22,101	2,346.65	3.323	2.467	5.257	0.0074
1917.....	10,774	424,894	101,519.58	83.810	1.972	9.422	0.0078
1918.....	23,534	1,060,493	189,934.15	177.600	2.253	8.082	0.0075
1919.....	26,515	1,110,286	215,520.00	199.400	2.094	8.128	0.0075

Production for 1st quarter of 1920 was 218,827lb copper, and 31,519 oz. silver.

Operations in 1919 were interrupted by labor troubles.

The east side holdings of the company embracing 13 claims in the Colusa-Leonard Extension and Main Range groups, or a total of over 80 acres, are on the easterly extension of the copper vein system of the Butte hill. The property adjoins that of the Anaconda, East Butte, and North Butte, lies to the west of the Continental fault, and the extensions of the largest veins of the Butte hill have been proved in this property. Development has shown the existence of large orebodies of good grade, and the policy of vigorous development that has been adopted by the company will, it is believed, result in making another large producer and dividend payer in the Butte district.

Butte Main Range Copper Mining Co.

Officers: J. J. Harrington, pres.; A. F. Rice, v. p.; Frank X. Girard, treas.; Geo. E. Palmer, sec., with M. C. Smetters, Lyman J. Roscow, Herbert M. Fay, and E. P. Pennebaker, directors.

Inc. August, 1912, in Montana. Annual meeting second Monday in March.

Cap. $1,500,000; shares $1 par; 38,140 outstanding.

Property: consisting of 37 acres in Butte district has been sold to Tuolumne Copper Mining Co.. Assets of company now consist of 19,070 shares of the capital stock of Tuolumne company.

Colusa-Leonard Extension Copper Co.

Office: 46 E. Broadway, Butte, Mont.

Officers: W. W. McDowell, pres.; Guy W. Stapleton, v. p.; W. E. Reynolds, sec.; Meyer Genzberger, treas., with Jacob Kaufman, directors.

Inc. 1906, in Arizona. **Cap.** $5,000,000; shares $5 par; 957,028 shares outstanding.

Property: all property formerly held by company consisting of 43 acres in Butte district transferred to Syndicate Copper Co. for stock of latter company. Syndicate company stock was sold to Tuolumne Copper Mining Co. for 239,257 shares of its capital stock 213,229 shares of block of Tuolumne stock thus acquired have been distributed to stockholders of the Colusa-Leonard Extension Copper Co., and the balance of 26,028 shares, which now constitute the sole assets of the company have been deposited in the First National Bank of Butte, Montana, for distribution to the holders of 104,-112 shares of Colusa-Leonard Extension stock who have not yet participated in the distribution of the company's assets.

Syndicate Copper Mining Co.

All of the capital stock was acquired in 1918 by the Tuolumne Copper Mining Co., the assets consisting of 42 acres in the Butte district were transferred to the latter corporation and the Syndicate Copper Co. was dissolved in January, 1919.

The Tuolumne was financed by bond sales in 1921, enabling it to conserve its ore reserves until copper prices improve.

The Main Range shaft is to be sunk to the 2,400′ level and crosscuts driven at 2,200′ and 2,400′ levels, as geologic evidence indicated that the richer ores of this section of the Butte district are deep seated. At 1,750′ the shaft cut a lead of good copper ore.

Management excellent and property very promising.

TWIN CITY MINING & MILLING CO. **MONTANA**

Address: Elliston, Powell county, Mont.

Officers: W. M. O'Connell, pres.; F. B. Hubbard, v. p.; E. J. P. Dwelly, sec.-treas., with P. H. McCauley, J. L. Hurd and John Churchill, directors; Allan McNaughton, gen. mgr.

Inc. in Montana. **Cap.** $500,000; shares $1 par; 300,000 issued. Annual meeting, April 4.

Property: 5 claims, 70 acres, patented, in Elliston district, 8 miles from Elliston, on east side of Telegraph creek. Ore occurs in granite, and management reports 6 veins, of which one is developed by 2 shafts, 185′ and 50′ deep, and a 250′ tunnel with 3 crosscuts. Total workings 525′, said to prove vein 18′ wide, traceable for 3,000′ and proven to 170′ depth, carrying 5% copper, 4% lead, 19 oz. silver and $3 gold per ton. Value is said to increase in depth and sulphide ores expected at about 300′.

Equipment: includes steam power, one 40-h. p. hoist and several buildings. Idle since 1915.

TYLER MINING & MILLING CO., LTD. **MONTANA**

Address: Albert Hausaman, sec., Burke, Idaho.

Cap. $1,000,000; shares $1 par; assessable. Two mills per share levied in February, 1920 and again in July, 1921.

Property: 8 claims, 17 miles from Burke, Shoshone county, but on the Montana side of the divide. Ore carries lead and silver and has been opened by over 800′ of workings.

TZARENA GROUP **MONTANA**

Owned by J. A. Murray estate, Butte, Mont.

Property: 7 claims, 79 acres, 2 miles S. W. of business center of Butte, and midway between the Gagnon, Bettie and other producing mines of the Anaconda company. Examined by W. H. Weed.

Ground is crossed by the strong outcrop of the Emma or Ancient vein, 80 to 100′ wide, which, judging by its geologic and other features, should contain as big and rich orebodies as the Rainbow lode. The eastern claims of property have all the essential characteristics observed on the eastern end of Butte & Superior ground. The country rocks are granite and aplite. Silver-bearing zinc ore should be found.

Development: the Brittania claim has a shaft 400′ deep, with temporary hoist and other machinery.

UNITED SMELTING & REFINING CO. **MONTANA**

Absorbed by American Smelting & Refining Co., and company dissolved. Owned East Helena (Mont.) lead smelter, which see.

UNITED STATE CHROME CO. **MONTANA**

Address: O. V. Miller, supt., Contact, Mont

Property: 13 claims, 250 acres, 34 miles up the Boulder river from Bigtimber, Sweet Grass county. Ore consists of chromite, occurring in a vein which Professor Clapp of the Montana School of Mines is reported to have said is traceable 30 miles, the outcrop being from 6,700′ to 9,200′ above the

sea. The ore is 3 to 12' wide, opened by 140' and 160' tunnels to depth of 90'.

Equipment: 10-stamp mill with concentrators erected in 1919; $13,000 spent on property in 1918. O. V. Miller, superintendent, places reserves at 800,000 tons. The Bonanza claims were sold to Barker & Purdy of Great Falls for $50,000, and the Miller & Roland group to Gish and Marlow for $75,000. The latter also took over the Bonanza group later on.

During 1920, company completed mine buildings, etc.

UNITED STATES COPPER MINING CO. MONTANA

Address: H. V. Edwards, Jr., pres., Gyde-Taylor Bldg., Wallace, Idaho. E. R. Day, sec.

Cap. $500,000; 10c. par; non-assessable, increased 1920 from $100,000; 10c. par.

Property: 3 patented claims on Clear Creek, Sanders county, 12 miles from Thompson. A 4 to 40' vein has been traced for 3,000' on the surface, carrying good copper content.

Development: by 200' tunnel on the vein, exposing 2 to 30% ore. A lower tunnel, 1,200' long, to cut the vein at a depth of 350', was to be driven in 1921.

UNITED STATES MANGANESE CORPORATION MONTANA

Offices: 27 State St., Boston, Mass.; Montana Bldg., Helena, Mont.; and 832 Colorado St., Butte, Mont.

Officers: Austin M. Pinkham, pres.; Ellery C. Wright, v. p.; C. Phipps, treas.; James Quinn, sec. Directors: Frank Eichelberger, Carl J. Trauerman, Harold G. Gallagher, Charles E. Fryberger and Brig.-Gen Henry M. Pellett. Board of managers: Frank Eichelberger and Charles E. Fryberger, mng. engrs., Helena, Mont., and Carl J. Trauerman, mng. engr., Butte, Mont. Transfer agent and registrar, U. S. Corporation Co., 65 Cedar St., New York.

Inc. May 17, 1918, in Delaware. **Cap.** $7,000,000; shares $10 par; consisting of 1,000,000 8% preferred, non-cumulative, participating and 600,000 common shares; 40,000 preferred and 500,000 common outstanding. Of the latter, 250,000 shares were set aside for acquiring the 2,500,000 shares (par $1) of Butte Detroit Copper & Zinc Co. Butte Detroit shares were exchanged at par in U. S. Manganese on a payment of 10 cents cash, i. e., Butte Detroit holders had to turn in 10 shares and $1 in cash to obtain one share of U. S. Manganese common stock, thus paying $250,000 cash to convert their stock into that of U. S. Manganese.

Dividends: 2% was paid April 27, 1919; and 2% July 27, 1919, 8% non-cumulative stock.

Business: this is a bonding company ostensibly organized to acquire and develop manganese properties and treat ores of same. Before the plans of company could be fully completed, the armistice was signed and it had to give up its manganese projects. It is at present examining and acquiring meritorious precious-metal properties. It holds 50% of the stock of the Liverpool Silver Mines Co., 51% of that of the Monarch Mining & Power Co., all of the shares and 55% of the bonds of the New York-Montana Testing & Engineering Co., 51% of Butte-Detroit Copper & Zinc Mining Co., and 66 2/3 of $300,000 bond issue of the Butte Central Mining & Milling Co., all of which are separately discribed. The outstanding shares of the U. S. Manganese Corporation includes the stock necessary to complete conversion of the Butte-Detroit Copper & Zinc Mining Co. shares.

Company will, it is said, endeavor to develop the field for high-grade manganese ore for dry batteries and chemical uses, a product commanding high prices in a domestic market, consuming 25,000 tons annually.

Property: in taking over the Butte-Detroit, the U. S. Manganese got the Ophir mine, which had been extensively opened to depth of 1,100', showing considerable zinc and manganese ore. (For details of development, see Vol. XIII). The Butte Central M. & M. Co., the operating company

for Butte-Detroit, had an old judgment against it, and late in 1918 the Ophir mine and mill, on which U. S. Manganese depended for its output of manganese, was sold to the Anaconda company for $57,000 at public auction. By law, the owners of the Ophir were allowed a year for redemption of the mine. According to the Davison Company, formerly of Boston, (out of business 1922) which promoted this bunch of interlocking companies, the Ophir mine contains 1,000,000 tons of black manganese, and pink manganese ore. The Butte-Detroit mill is reported to be capable of crushing 600 tons of ore and concentrating 250 tons daily. Crude ore carries 30% Mn. and concentrate 50%. On a delivery of 100 tons daily at Chicago "a net profit of $1,570" was expected, basis of manganese at $1.20 per unit ($60 per ton).

In January, 1919, it was announced that U. S. Manganese had a contract for the output of the Valley Forge mine in Montana, and the Monarch mine near Elliston, Powell county, Montana, 25 miles from Helena. A mill is being erected at the latter. The company's plans are ambitious, but———

In Oct., 1920, the Federal Govt. awarded company $21,157 through the War Minerals Relief Act. This was 15% of what was claimed.

VALENTINE MINING CO. **MONTANA**

Address: O. A. Olsson, sec., Gyde-Taylor Bldg., Wallace, Idaho. William Bland, pres., Henderson, Mont. A. L. Thurston, mgr., Deborgia, Mont.

Cap. $1,000,000; par $1; assessable; 2 mills per share called in June, 1921.

Property: the Rough Rider and Terra Firma mines, 7 claims, 5 miles from Deborgia, Mineral county, adjoining the old Rock Island mine.

Development: by 600′ tunnel and shaft. Prospects at end of 1921 said to be most encoouraging.

VALLEY FORGE MINING CO. **MONTANA**

Address: S. A. Mendenhall, mgr., Rimini, Mont.

Property: silver-lead-zinc mine in Ten-Mile district, 14 miles W. of Helena. Shipments were 80 tons daily of dump ore in 1920-'21.

VANDOR MINING CO. **MONTANA**

Address: E. B. Lindberg, Ringling, Meagher county, Mont.

Officers: J. F. Simmons, pres.-mgr.; J. F. Stuart, v. p.; E. B. Lindberg, sec.-treas., with J. J. Tucker and J. P. Kurtz, directors.

Cap. $1,000,000; par $1.

Property: 5 claims, 7 miles S. W. of Ringling, credited with production to mid-1918 of 16 carloads of ore averaging 6½% copper.

VERMILLION SILVER & LEAD MINING CO. **MONTANA**

Address: W. A. Kittrell, mgr., Trout creek, Mont.

Property: the Vermillion mine, 6 claims, 12 miles from Trout creek, Sanders county, carrying veins of gold-lead-copper-zinc ore, opened by tunnels. A 100-ton mill is run by water power. Ore shoot 3′-7½′ thick and 600′ long in main or lower tunnel. Operating in 1920.

WAR EAGLE GOLD & COPPER MINING CO. **MONTANA**

Property: 3 claims, 7 miles from Alhambra, in Warm Springs gulch, Jefferson county, Mont., shows strong fissure veins in granite. Mineralization is in bands of sulphide ore in soft altered granite, the ore consisting of pyrite and a little chalcopyrite, whose value is mainly in gold.

Development: by a 300′ tunnel, planned to intersect the vein at about 1,500′ and give a back of about 500′. Presumably idle, as letters sent company were returned unclaimed.

WAR EAGLE MINING CO. **MONTANA**

Address: as below.

Officers: J. C. Arbogast, pres., Harlem, Mont.; Ike Duncan, v. p., Chinook, Mont.; G. M. Everett, sec.-treas., Harlem, Mont.

Property: a gold mine, in the Little Rockies, near Landusky, Mont., that is under development. Has 20 h. p. gasoline hoist.

WESTERN RESERVE MINING CO. **MONTANA**

Office: Youngstown, Ohio. **Mine office:** Basin, Mont.

Officers: F. S. Merwin, pres.; C. Livington, v. p.; H. F. Duesinc, sec.-treas., with C. J. Burns, J. E. Richardson, A. F. Schontz, E. C. Welch, J. W. Kuhns, directors J. H. Hildebrand, supt.

Inc. in Ohio. **Cap.** $100,000; $1 par. Annual meeting, February 1. **Transfer office:** Youngstown, Ohio.

Property 3 claims, at Basin, Jefferson county, developed for gold, silver, lead and copper. The quartz veins in granite strike E. W. and dip N. Pay ore occurs in large and small bodies as shoots and streaks showing sulphides.

Development: by 2,700′ tunnel, greatest depth being 660′.

Equipment: includes a steam compressor. Plan driving 100′ tunnel and erection of concentration plant. Developing in 1916 and 1917. No recent returns.

WESTERN SILVER MINING CO. **MONTANA**

Address: Bert Alley, pres., Butte, Mont.

Property: the Stanislaus claim in Missoula gulch, in Butte, Mont. Shaft 300′ deep, shows 3′-4′ ore said to carry 3½ oz. gold per ton and 98 oz. silver per ton.

WESTERN SMELTING & POWER CO. **MONTANA**

Office: c/o. G. L. Tanzer, 601 Eitel Bldg., Seattle, Wash.; H. C. Reagan, supt., Cooke City, Park county, Mont.

Office: c/o G. L. Tanzer, 601 Eitel Gldg., Seattle, Wash.; H. C. sec.; G. B. Baker, treas., with C. J. Steeple, E. W. Gaylord, Joseph Schlenker, G. M. Moores, and C. A. Follett, directors. W. M. Tanzer, mgr.; F. A. Hancock, supt.

Inc. 1911, in Washington. **Cap.** $5,000.000; $1 par: 2,206,117 issued. Annual meeting, first Saturday in March. Expenses in 1916 were $89,592; $57,395 in 1917; $79,161 in 1918.

Property: a group of claims on Henderson mountain.

Development: by tunnels, and a main working adit being driven in 1921. Large orebodies are reported to be ready for mining.

In March, 1919, company reported that a 1,000-h. p. hydro-electric plant, 4 miles from Cooke, lumber mills producing 20,000 board feet daily, and 5-drill compressor at mine were all in operation. The 300-ton modern copper blast-furnace at Cooke City, Park county, was 90% complete by Feb., 1921. Company is highly optimistic as to the future.

WHITE CHIEF COPPER CO. **MONTANA**

Described in Volume XIII. Absorbed 1918 by the Liberty-Montana Mines Co., which see.

Inc. Sept. 1913. **Cap.** $1,000.000; shares $1 par.

WHITEHALL MINING, MILLING & DEV. CO. **MONTANA**

Address: Whitehall, Mont.

Officers: at last accounts, T. T. Gates, pres.; N. D. Root, v. p.; C. W. Hatch, sec., with Edward Ryan, Jesse Johnson, L. B. Knight, R. Edwards, J. M. Borden and James Ryan, directors.

Inc. June, 1914, at Whitehall, Mont. **Cap.** $500.000; shares $1 par; 200.000 shares in treasury; 250.000 shares were given for the mining property.

Property: 5 claims, about 3 miles N. E. of Whitehall, Jefferson county, is reported to have an orebody 36′ wide from which shipments have averaged $16 per ton. Idle at last accounts.

WHITLATCH GOLD CO. **MONTANA**

Address: A. R. Shennan, lessee, Box 351, Helena, Mont. Owned by C. W. Young, Chicago, Ill. Worked since 1912 under lease by Sherman Bros. (H. C., A. R. & Wm.), of Helena, Mont.

Property: the Whitlatch mine, at Unionville, 3½ miles south of Helena, Mont., located in 1864 and operated intermittently to date, has been a good

and profitable gold producer. The veins carry silicious gold ore, containing small silver values, developed by a 500′ shaft; recent work is mostly between the 400′ and 500′ levels; a new shoot was opened at 450′ in May, 1919.

Equipment: includes 80 h. p. electric plant, tramway, compressor, pump and hoist. Only 5 stamps of the 20-stamp mill and cyanide plant were worked in 1916, treating both Whitlatch and custom ores. Ore from the 400′ level was milled in 1917-18.

Employs 4 men and produces 300 tons a year of high grade gold ore.

WICKES-CORBIN COPPER MINING CO. MONTANA

Address: S. A. Balliet, 21-25 Union Bank Bldg., Helena.

Officers: S. A. Balliet, pres.; A. Major, v. p.; L. C. Henry, sec.-treas.; with N. Salvail and T. A. Grimes, directors.

Inc. July 9, 1907, in Montana. **Cap.** 5,000,000 shares; 10c. par; non-assessable; outstanding 3,633,900. Annual meeting, third Tuesday in June.

Property: 7 claims, 3 patented, 140 acres, 20 miles S. of Helena, and a half mile S. of Wicks, Mont. The claims show N.-S. and E.-W. fissure veins cutting granite, aplite, andesite and dacite. Ores carry gold, silver, copper and zinc.

Development: by Bunkerhill tunnel, 1,030′ long and Tulare tunnel, 700′; also 220′ shaft. Total workings, about 2,500′, greatest depth, 350′.

Production: test lot of 31 tons in 1917 returned 4.87% copper, 17.6 oz. silver, and 0.01 oz. gold, equal to $24.94 per ton. The cost was $4 per ton.

Appears to be a promising property.

WILLOW CREEK MINING CO. MONTANA

Address: Andrew Hedin of Spokane, mgr. and chief owner.

Property: Owns the Mountain Meadow group, 4 miles from Pony, Madison county, Mont., on Willow creek. Mine shows a 12′ fissure vein in granite carrying free gold with pyrite and chalcopyrite, both with gold values, in quartz gangue. Mine development includes 750′ crosscut. Property is on vein system of and adjoins the Carney Copper mine and the Reindeer Queen.

Has a small mill. Regarded as promising.

WILSON MINING & SMELTING CO. MONTANA

Address: William Burke, pres. and mgr., Saltese, Mont.

Officers: A. Burke, v. p.; G. W. Dougherty, sec. and treas.; M. Hays and G. Early, directors.

Inc. 1919. **Cap.** $200,000; par 10c.

Property: 2 groups of claims on Big Sunday, a branch of Silver and Big Thunder Creeks, about 2 miles from Saltese, Mineral county; 6 claims on a lead and silver vein form one group; 8 claims showing a shoot of copper, in the other group.

An assessment to pay for further exploration was levied in March 1918. Further work is being financed by C. A. Mayer of Watertown, S. D.

Development: by 2 crosscut tunnels, the lower in 500′. Driving will give a depth of 700′ below the discovery shaft, which is in ore.

WINDFALL PLACER MINING & DEVELOPMENT CO. MONTANA

Office: Missoula, Mont.

Officers: W. J. Johnson, pres.; Chas. Marsh, v. p.; A. J. Gibson, treas.; A. K. Anderson, sec.-mgr., with Cris Tandberg, directors.

Inc. in Montana. **Cap.** $1,000,000; $1 par.

Property: 620 acres of Placer ground and of water rights, dump, and timber lands, of which 300 acres are said to contain gold-bearing gravel, 8 miles from Quartz, Mineral county, and 3 miles from the N. P. and C. M. & St. P. railroads. The district is reported to have produced over $20,000,000 gold.

Geology: bedrock consists of soft shale, sandstone and quartzite, overlain in places by porphyry, above which is from 15′ to 40′ of gravel, averaging 30 cents a cubic yard. The gold is high grade, being 984 fine.

Development: ground has been opened by the "booming" system of moving gravel. Dumping facilities are good, there being a 1,200′ drop between the upper and lower ends of property.

Equipment: includes a 6,000 board feet sawmill and a 6,400′ flume. An average of 300 miners' inches of water is available for 7 months each year. A derrick is employed to lift up to 8-ton boulders; and in 1918 an hydraulic elevator of 5 tons capacity under a 300′ head of water was installed.

Production: approximates $260,000, from 200,000 cu. yd. Costs are estimated at 10 cents a yard.

No recent production figures are available.

WISCONSIN MONTANA MINING CO. — **MONTANA**

Office: Downing, Wis. **Mine office:** Superior, Mont.

Officers: A. O. Nichols, pres. and gen. mgr; D. McDonald, v. p.; D. C. Coolidge, sec.; Dr. P. A. Beebe, treas., and R. A. Cleveland, directors.

Inc. January 29, 1906, in Wisconsin. **Cap.** $50,000; shares 5c par. Annual meeting, first Tuesday in February.

Property: Coyote group, 16 patented claims, 320 acres, and 5-acre millsite, 1 mile from the Missoula river and about 10 miles east of Superior Claims show fissure veins cutting through limestone, slate and quartz: one reported as 70′ wide, with irregular shoots, assaying from 1 to 42% copper, with gold, silver, and lead values.

Development: by 1,300′ of tunnel work including laterals. A 3,000′ tunnel was planned. Was treating old tailing, 1919.

WOOD PLACER MINING CO. — **MONTANA**

Address: J. M. Flugstad, sec., Corvallis, Ravalli county, Mont.

Cap. $25,000; shares $1 par; non-assessable.

Property: 480 acres of placer ground on Hughes creek, Ravalli county, worked by drag-line scraper. Output in 1918 was $21,000.

YAHK VALLEY M. & M. CO. — **MONTANA**

Unknown at last address: S. H. Ehlers, Libby, Mont.

Cap. $250,000.

Property: a gold mine in Sylvanite district, Yahk Valley, Lincoln county, developed by a 1,000′ tunnel.

YELLOWSTONE GOLD MINING CO. — **MONTANA**

Address: Wm. F. Carr, sec., 305 Waverly Pl., Spokane, Wash.

Cap. $100,000.

Property: 200 acres of placer ground, in Emigrant district, Park county, about 30 miles S. of Livingston.

YELLOWSTONE MINING CORP'N — **MONTANA**

Address: W. E. Wholey, mgr., Cooke City, Mont.

Officers: W. E. Wolfenden, pres., Roanoke, Va.; Samuel T. Rhodes, sec., Roanoke, Va.

Property: the Stump mine, 15 claims, 300 acres, patented, in the New World mining district, near Cooke, Park county, containing silver-gold bearing copper and lead ores. Produced about 250 tons of shipping ore in 1919. Active in 1921.

NEBRASKA

OMAHA COPPER AND LEAD SMELTER — **NEBRASKA**

Owned by the Am. Sm. & Rfg. Co.

Office: 120 Broadway, New York. **Works address:** R. F. McElvenny, mgr., Omaha, Neb.

The lead furnaces have a capacity of 82,000 tons per annum. See A. S. & R. Co.

NEVADA

Nevada is essentially a mining state, as only a very small part of its area is fit for agriculture, while all its many mountain ranges are more or less mineralized. It contains a number of well known mining districts, long famous for their bonanza ores and while many of these districts are regarded as worked out, most of them are still producing. The most remarkable mines are those of the Comstock lode, whose wonderful orebodies were first exploited in 1865 and which are still productive. Goldfield and Tonopah are so recent as to be well known, Eureka, Pioche, Tuscarora and White Pine are but shadows of their former selves, though still producing gold and silver ores. Ely is the States great copper camp with Yerington a smaller, but notable producer.

The metal output of the state for 1920 was from 473 producers and exclusive of the Ely copper ores, the total amount mined was 883,384 tons of ore, an additional 2,597,236 tons came from Ely. Nearly half of the 172,540 ounces of gold produced in 1920 came from the mines of Nye county, but the copper ores furnished 23,009 ounces. Tonopah was the largest silver producer, Nye county yielding 4,903,987 oz.

The metal output for 1921 showed a decline of about 50%. The year was marked by intensive silver mining operations, notably at the Silver Horn, Argentite, Klondyke, Hornsilver, Divide and San Antonio camps.

The metal output of the State for the past three years follows:—

	1921	1920	1919
Gold.....	$3,340,000	$3,450,800	$4,393,900
Silver.....(oz.)	6,681,000	7,745,093	6,863,580
Copper.....(lb)	15,515,000	50,559,763	52,331,175
Lead.....”	7,803,000	21,263,700	15,349,370
Zinc.....”	.....	10,698,040	9,004,698
Total	$12,310,000	$23,879,512	$23,433,171

ACME CONS. MANGANESE ASS'N NEVADA

Address: Schellbourne, Nev. **Property:** a silver mine in White Pine county.

ADA H. MINING CO. NEVADA

Address: Spruce Mountain, via Wells, Elko county.

Operated in 1920. In 1921, lessees made occasional shipments of lead-silver ore.

ADAMS GOLDFIELD MINING CO. NEVADA

Property purhased, January, 1916, by the **Reorganized Cracker Jack Mining Co.**, which see. Stockholders of the Adams Co., were permitted to exchange their stock for stock of the Reorganized Cracker Jack Co., remaining outstanding at that time.

ADELAIDE STAR MINES, LTD. NEVADA

Liquidated. Fully described in Vol. XI, Copper Handbook.

ADELPHIA MINING & MILLING CO. NEVADA

Address: Ed. Arkell, mgr., Reno, Nev.

Property: in the Wedekind district, a few miles from Reno, Washoe county.

AETNA DIVIDE MINING CO. NEVADA

Idle. **Address:** Tonopah, Nev. George W. Allen, of Boston, Mass., president. Sponsored by John E. Allen & Co., 85 Devonshire St., Boston.

Inc. July, 1919, in Nevada.

Property: 6 claims E. of the Myra Divide, about 3 miles S. E. of Gold mountain, formerly owned by Onie Dougherty and Dick Finn.

AFTER-ALL MINES CO. NEVADA

Address: Tonopah, Nev.

Officers: Hugh H. Brown, pres.; Herman Zadig, v. p.; M. E. Albert sec.-treas., with J. H. Evans and E. A. Keenan, directors.

Inc. March 27, 1917, in Nevada. **Cap.** $1,000,000; shares $1 par; 700,000 shares issued; assessable. Annual meeting, April 3rd.

At the time of organization, took over the greater part of the holdings of the **Umatilla-Tonopah Mng. Co.** and the **Montana-Tonopah M. Co.** in Tonopah mining district.

AIREDALE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: G. W. Allen, pres.; J. H. Shepard, v. p.; C. R. Evans, sec.; John Barrier, treas.; with Wm. Forman, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares 10c par; none issued.

Property: 6 claims, 110 acres, south of the Eureka, South Divide and Hecla, and 2¾ miles S. E. of Gold mountain. Development confined to surface.

The entire capital stock of the Airedale Divide ($150,000), together with that of the Albany Divide, Hecla Divide, and St. Patrick Divide, was optioned to John E. Allen & Co. Boston Curb brokers.

AJAX DIVIDE MINING CO. **NEVADA**

Dead; see Vol. XIV. Surface indications of property were encouraging but, as company had no funds, the only work done was location holes. Stock sold to 60c. on Boston Curb but broke to 1c. when pooled shares were unloaded.

ALADDIN DIVIDE MINING CO. **NEVADA**

Address: C. N. Miller, Tonopah, Nev.

Inc. May 27, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c. par; assessable; 700,000 issued.

Officers: C. N. Miller, pres.; Gust Hanson, v. p.; with W. G. Robertson and E. N. Bannon, directors.

Property: 160 acres including Little Belle claims, 3 acres of inside territory adjoining the Gold Reef group; Star section near the Gold Zone shaft, and the Doughboy group, 13½ acres, surrounded by the Knox, Florence, and Smuggler mines. The Doughboy is the main holding. The Mornington placer ground along the Feather river in California, controlled by C. N. Miller and associates, is presumably included.

Development: shaft was started at about 200′ from the Knox shaft. A vein was cut at 12′ containing ore carrying free gold.

Reported to have acquired the California group of 5 claims in the Katherine district, Mohave county, Arizona, adjoining the Katherine mine on the north, Jan. 1, 1922.

ALASKA IMPROVEMENT CO. **NEVADA**

Office: Room 302, No. 65 Second St., San Francisco, Cal.

Bonded Rip Van Winkle mine, at Lone Mountain, Elko county, to Lone Mountain Mining Co., in March, 1916. Property produced $13,813 net to the Alaska Investment Co., making a total of $42,000 to date.

Operated 1919-20, but no details available.

ALBANY COPPER CO. **NEVADA**

Address is care F. Friedrich, Morningstar, Lyon Co., Nev., but mail is returned "unclaimed".

Officers: John E. Lutz, pres., treas. and gen. mgr., 1031 Mills Bldg., San Francisco; with F. Friedrich and Ulrich Keck, directors.

Inc. June 29, 1907, in Nevada. **Cap.** $200,000; shares 10c. par; non-assessable. Annual meeting, last Tuesday in November.

Property: 700 acres, with 400 acres miscellaneous lands, 3 miles from a railroad, in the Buckskin district, showing orebodies, carrying nickeliferous malachite and melaconite, estimated by management to average 3.5% copper, 2% nickel, 0.2 oz. silver and $2 gold per ton.

Development: includes 5 shafts, of 30′, 37′, 54′ and 253′ and 8 tunnels of 30′ to 188′ length, with total underground workings of 1,400′.

Equipment includes: a 15-h. p. gasoline hoist, good for 800' depth. Idle for years.

ALBANY DIVIDE MINING CO. **NEVADA**

Address: H. C. Pratt, sec., 85 Devonshire St., Boston, Mass.

Officers: W. E. Clark, pres.; Hon. E. P. Barry, v. p.; Dr. J. Q. Graves, treas.; H. C. Pratt, sec.; with Dr. Jesse L. Adams, O. O. Clark and Hon. Geo. Sengel, directors. C. R. Evans, asst. sec.

Inc. March, 1919, in Nevada. **Cap** 1,500,000 shares: 10c. par. Listed on Boston Curb. Registrar, Old South Trust Co., Boston, Mass. Transfer agent, Hanover Trust Co., Boston. Depositary of Fiscal Agent, Citizens Natl. Bank, Monroe, La.

Property: (1) Albany group, 4 claims in Divide section of Tonopah district, Nevada. (2) controls through 51% stock ownership, the **Mexarko Mining Co.** of Silver City, New Mexico, that owns the Langston mine, now under lease to Hecla Divide Co. (3) a 51% stock interest in **Gila Monster Mining Co.**, that owns 20 claims 334.72 acres, near Globe, Arizona. See description under above titles.

ALDA DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. E. Carter Edwards, res. agt.

Officers: G. H. Duell, pres.; J. L. Woodward, v. p.; W. E. Edwards, sec.-treas., with William Huggard and E. C. Edwards, directors.

Inc. April, 1919, in Nevada. Cap. $150,000; shares 10c par. **Transfer office:** 66 Broadway, New York City.

Property: 8 claims about 2¾ miles S. W. of Gold mountain. A prospect.

ALKALI MINES CO. **NEVADA**

Mail returned from Eureka, Eureka county, Nev.

Property: the Windfall mine, developed by a 500' shaft. **Ore:** contains gold, silver and lead.

Equipment: includes a crushing plant and 150-ton cyanide plant.

ALLIED DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Ninnis, v. p.; B. E. Garnett, sec.-treas., with Gust Hanson, directors. J. K. Turner, cons. eng.

Inc. Nevada. **Cap.** $150,000; shares 10c par.

Property: a prospect, consisting of 2 claims and a fraction just south of the Allied Divide.

ALLIED DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Ninnis, v. p.; B. E. Garnett, sec.-treas., with Gust Hanson, directors. J. K. Turner, cons. engr.

Inc. February 26, 1919, in Nevada. **Cap.** 1,500,000 shares; par 10c Listed on San Francisco Stock Exchange.

Property: 4 claims, southeast of Gold Zone and surrounded by the Liberty Bell, Mammoth, Divide Extension, and East Divide. Is said to be on direct trend of main Divide vein.

Development: 200' shaft sunk on Marquette claim.

Equipment: 20-h.p. gasoline hoist 10x10 compressor, tools etc., purchased from companies at Belleville and Candelaria.

ALLIED MINING & MILLING CO. **NEVADA**

Office: Lewistown, Mont.

Officers and directors: Albert J. Heinecke, pres.; Dave Trepp, v. p.-treas.-mgr., Goldfield, Nev.; E. G. Ivins, sec.

Inc. April, 1919, in Montana. **Cap.** $500,000; shares 10c par; 2,650,000 shares outstanding.

Property: the old McNamara mine located in 1880, consisting of 16 claims, 300 acres, on N. slope of Palmetto Mountains, in Lida district, Esmeralda county, about 17 miles S. of Silver Peak. Considerable production of lead-silver ore made in early days, Examined by Mark Brad-

shaw and J. E. Spurr. **Geology:** ore occurs in a contact vein between limestone and granite, the reported average content being 5 to 15 oz. silver and from 5 to 30% lead.

Development: by 3 tunnels connected by winzes, with total of 3,000′ of workings and greatest depth 250′. Reported that 30,000 tons of milling ore are available.

Equipment: includes 50-ton mill erected in 1920, using rolls, classifiers and concentrating tables.

Developing only, because of low price of lead. Company endeavoring, September, 1921, to raise $20.000 through sales of stock to double mill capacity.

ALPHA DIVIDE MINING CO. **NEVADA**

Office: 314 Clay Peters Bldg., Reno, Nev. Alex. S. Proskey, agent.

Property: a group of 5 claims, 2¾ miles N. W. of Gold mountain.

ALPHA MINE **NEVADA**

Owned by **Elko Mining Co.**, which see.

ALPINE DIVIDE MINING CO. **NEVADA**

Inc. April, 1919, in Nevada. **Cap** $150,000; shares, 10c par.

Property: 6 claims bounded on W. by the Doughboy and Treadwell, 1¼ miles slightly N. E. of Gold mountain. A prospect without known merit.

ALPS MINING CO. **NEVADA**

Address: Alex. Lloyd, supt., Pioche, Nev. Company controlled by Lloyd and other interests of Salt Lake City, and property acquired May, 1920.

Property: the Alps mine in Pioche district, Lincoln county, 2 miles E. of Pioche, said to have produced $1,000,000 from gold-silver-lead ore in early days. Three fissure veins occur in quartzite near, or in contact with the Yuba porphyry dike. Are reported to contain 5 to 10 oz. silver to each unit of lead.

Development: by 300′ two compartment shaft with levels at 150′, 200′ and at bottom. Old stopes are reported to extend for several hundred feet to a depth of 225′ and to contain fillings of considerable second class ore.

Equipment: includes 32 h. p. gas engine, hoist and 2-drill compressor.

ALTA SILVER MINING CO. **NEVADA**

Address: 1026 Mills Bldg., San Francisco, Cal.

Officers: Alex Wise, pres.; R. B. Worthington, sec.

Inc. 1872, in Cal. **Cap.** $216,000; $2 par; all issued; assessable.

Assessments levied have furnished necessary capital for repairs and development work.

Property: in Gold Hill section of the Comstock, Storey county, Nev.

Development: old workings and 2150′ shaft said to show gold-silver-lead ore. Drainage connection is made with the Sutro tunnel at 1,100′ level. Idle several years.

ALTO DIVIDE MINING CO. **NEVADA**

See Volume XIV. Absorbed by **New Alto Divide Mng. Co.**, which see.

AMALGAMATED DIVIDE MINING CO. **NEVADA**

Office: 312 Clay Peters Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; O. J. Clifford, v. p.; A. A. Smith, sec.-treas.; with H. D. Danforth and L. H. Bartholomew, directors.

Inc. in Nevada, 1919. **Cap.** $150,000; shares, 10c par.

Property: 34 acres, north of Sutherland Divide Extension and south of Roosevelt Divide; and 80 acres in Ben Hur section. A prospect on the outskirts of the district. Idle 1920.

AMALGAMATED PIOCHE MINES & SMELTERS CORP. **NEVADA**

Office: 63 William St., New York. **Mine office:** Pioche, Nev.

Officers: Wm. J. Palmer, pres.; Wm. B. Randall, v. p.; Victor B. Walders, sec.-treas.; Wm. F. Roberts, asst. sec.-treas.; H. S. Van Wagenen, mgr.

Inc. July 27, 1911, in Maine, to take over the properties of the Nevada-Utah, Ohio-Kentucky, and Pioche Cons. companies. It is the operating

company of the Con. Nev-Utah Corp.; property is described under that title. Transfer agent: Security Transfer & Registrar Co., New York.

Cap. $1,000,000; shares $1 par.

Operates the Pioche Pacific R. R. and Pioche Water Works, and derives income from lease on the Panaca claim granted the Combined Metals, Inc., which see.

Other lessees are operating on other parts of its property; in so far as mining operations are concerned, the company itself has been inactive since 1917.

AMERICAN-BRITISH CORPORATION **NEVADA**

Mail addressed to F. J. Abbott, Eureka, Nev., returned.

Property: 6 claims in the Adams hill section of Eureka district, S. of Bullwhacker and Eureka-Holly properties, purchased in 1920. It is reported that this company is also operating at Lone Mountain, Tonopah, and owns properties in Mexico.

AMERICAN DIVIDE MINING CO. **NEVADA**

Address: Allen Case, Tonopah, Nev.

Inc. 1919, in Nevada.

Property: 6 locations adjoining the Rand, and between the Croesus and Mizpah, ¾-mile N. E. of Gold mountain.

AMERICAN MINING & EXPLORATION CO. **NEVADA**

Office: Imlay, Nev.

Officers: M. J. Finnigan, pres.; Geo. H. Morgan, v. p.; E. A. Vail, sec.; B. F. Bauer, treas.; H. E. Clement, gen. mgr. Same management as Rye Patch Mines Co.

Inc. Aug. 1917, in Utah. **Cap.** $1,500,000; $1 par.

Property: the Imlay mine, 29 claims and 2 mill sites; also operated the Rye Patch mine, in the Star district, Pershing county, near Imlay, owned by the **Rye Patch Mines Co.**, which see for description and early day operations.

Development: by 200′ vertical shaft on the Imlay. Work at the Rye Patch, for a period of about 2 years, was exploratory in character, first by laterals and later by diamond drilling. Results were discouraging, and all work ceased in July,, 1921.

Equipment: includes 25-h. p, gasoline hoist, oil-compressor, 100-gal. pump and 50-ton dismantled Imlay mill.

AMERICAN PROSPECTING CLUB **NEVADA**

Offices: Room 735, 25 Broad St., New York and care J. B. Kendall, Goldfield, Nevada.

Board of governors: Warren R. Porter, A. G. Raycraft, Louis O'Neal, H. W. Huskey, W. C. Ralston, J. B. Kendall, and L. O'Neill.

Inc. 1919, in Nevada. **Cap.** 10,000 units of $100 each.

Company organized to finance and outfit prospecting parties to examine and prospect promising properties in various parts of Nevada. It is proposed to pay prospectors the regular wage of the district and give a bonus for discovery. The Club will also acquire and develop leases in proven areas.

In 1920 company organized the Benton Silver Mines Co. and held option on property in Blind Springs district, Mono county, California, near Benton. Option relinquished in October, and American Prospecting Club ceased field operations to await better times.

AMERICAN STANDARD COALITION M. CO. **NEVADA**

Address: Lorin Hall, Salt Lake City, Utah.

Property: controlled by the above, with Willard and John W. Scowcroft, of Ogden, Utah, is at Schellbourne, 40 miles N. of Ely, White Pine county. A 60′ vein carrying silver has been traced for 600′ on surface. Development by tunnel and some rich ore sacked in 1919. Closed down indefinitely.

ANACONDA DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev., last known address.

Inc. 1919, in Nevada.

Property: about 90 acres N. W. of North Divide and 2¾ miles N. W. of Gold mountain. Joint shaft being sunk with the Nevada Divide, down 75' in July, 1919. A prospect showing favorable looking shear zones.

ANCHOR DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: J. G. Crumley, pres.; R. W. Piercy treas., with George Wingfield and H. C. Brougher, directors.

Inc. 1919, in Nevada. **Cap.** $150,000 shares, 10c par.

Property: 4 claims and a fraction adjoining the Rosetta, Black Hawk, Portland, and Hercules, in the southern section of the field; patented application has been filed.

Development: by shaft, 50' deep in July, 1919. Equipment: 30-h. p. hoist 9½x12" compressor, etc. Operated in 1920.

ANDES SILVER MINING CO. **NEVADA**

Office: 261 Mills Bldg., San Francisco, Cal.; and Virginia City, Nev.

Officers: R. L. Rader, pres.; H. H. Noble, v. p.; Geo. P. Thurston, sec.; Well Fargo National Bank, treas.; Roy T. Kimball, and B. F. Nourse directors; Frank Higginson, supt.

Inc. Dec. 18, 1873, in California. **Cap.** authorized and outstanding, $100,000; shares $1 par; assessable. Assessment No. 92 levied in 1921 Registration Security Co., San Francisco, registrar. Annual meeting, 4th Wednesday in January. Stock is listed on San Francisco Exchange.

Property: 2 claims, patented, 22 acres, in the Virginia district, Virgina City, Storey county. Idle in 1920.

ANTELOPE GROUP **NEVADA**

Held by Louis W. Trankle, Yerington, Nev. Includes 23 unpatented claims, 430 acres in the Buckskin Range, Douglas county, 16 miles from Yerington.

Geology: the ore-bearing formation is a monzonite belt 4,200' wide, extending N. 7° W., dip 47° to east for 4½ miles, with diorite on the west and andesite on the east. This monzonite is highly altered, showing strong kaolinization and sericitization to depth of 150 feet, deepest working. Surface shows scanty copper carbonates throughout length and breadth, with small streaks of copper sulphide ore near footwall side. Water encountered in lower workings shows strong copper content.

ANTELOPE SPRING MINING CO. **NEVADA**

Officers: Wm. H. Fitch, pres.; Gust Holm, v. p.; John W. Geiger, sec. and mgr., Frisco, Utah; Allen C. Eakin treas.; preceding officers, Edith B. Brounzell, Fred Hubbard and E. R. Reitsch, directors.

Inc. April 11, 1906 in Utah. **Cap.** $300,000; shares $1 par; assessable; 200,000 issued; 8 assessments levied, amounting to 13c per share.

Property: 17 claims, partly patented, 15 miles from Humboldt House, Pershing county, developed by 3 crosscut tunnels, each reaching the 2 principal oreshoots. **Ore** carries lead, silver, copper, zinc and a little gold. The oreshoots occur on a limestone-shale contact, one shoot carrying zinc suphide, the other, 20% lead ore containing gold and copper.

Equipment: includes 75-ton concentrating and flotation mill.

Property idle owing to lack of funds.

ANTIMONY KING MINE **NEVADA**

Owned and operated by J. M. Pine, Austin, Nev.

Property: 8 miles S. of Austin, in Cottonwood canyon, Battle Mountain district, has been worked intermittently since 1871, and by present owner since 1912.

Ore: antimony, occurs in true fissure vein, filled with white and dark quartz, associated with stibnite and traceable for 900' on the surface. Country rock is a fine-grained silicious limestone, bluish-gray in color, with a little disseminated pyrite. Geology fully described, U. S. G. S. Bull, 594, pp. 75-76

Development: by 250' tunnel and 150' shaft, reported to have opened

up a 6½′ vein of shipping ore. The commercial value of these antimony deposits has yet to be proved. Presumably idle.

ANTIMONY & SILVER MINES CO. **NEVADA**

Address: at last accounts, care J. H. Stallings, gen, mgr., 2176 S. 7 E. St., Salt Lake City, Utah. Directors: Judge A. J. Weber, Dr. O. W. French and G. Y. Bullock.

Property: 3 groups, about 400 acres in Galena Canyon, near Battle Mountain, Lander county, said to carry large deposits of milling ore averaging $20 p. t. in gold-silver and high-grade antimony.

Development: by 1,500′ of workings, main tunnel being 350′ long.

Equipment: includes 60-ton amalgamation and concentration mill. Presumably idle.

ANTIMONY SYNDICATE **NEVADA**

Address: Mill City, Nev.

Property: the Black Warrior and Bloody Canyon antimony mines, 2 claims, 40 acres, in Pershing county, Nev. The Black Warrior mine in the Buena Vista district is developed by several tunnels to depth of 150′, with total workings amounting to 2,000′. Ore, partly oxide and partly sulphide, occurs in fissure vein in porphyry, with N. S. course and dip of about 80°. Equipment consists of 25-ton mill.

Output amounted to $92,500 in 1915, and $230,000 in 1916, the ore averaging 62½% in 1915, and 40% in 1916. Production for 1917 amounted to 161¼ tons.

The Bloody Canyon mine in the Star district is developed by 2,500′ of tunneling to depth of 300′. See **Pioneer Exploration Co.**

APEX DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. G. Crumley, pres.; W. V. Richardson, v. p.; R. W. Piercy, sec.-treas., with H. C. Brougher and George Wingfield, directors.

Inc. March 31, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par. 750,000 shares in treasury. Listed on San Francisco Stock Exchange.

Property: 13 claims, adjoining North Divide on S. W. and north of Wilson Divide.

Development: shaft was 365′ deep in December 1919, and showed seams of talc, of low silver value. Crosscuts totaling 530′ have been driven at 350′ level.

Equipment: electric hoist and air-compressor, etc.

Operated in 1920.

APEX EXTENSION DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c.

Owns 40 acres undeveloped ground.

ARCANE MINING CO. **NEVADA**

Idle.

Mine office: Pioche, Nev.

Officers: H. W. Rand, pres.; A. M. Cheney, v. p.; S. P. Kinney, sec.-treas.; preceding officers, Frank Holman, Frank Manning, directors. H. E. Freudenthal, res. agt. **Cap.** $100,000; shares 10c par.

Property: five claims, adjoining the properties of the Ohio-Kentucky and Amal. Pioche, through which the Susan Duster lode of the Ohio-Kentucky extends, with 45° dip to the south. The ore from the lode on the O. K. property is said to have had an average assay value per ton of 7% lead, 20% zinc, 20 oz. silver and $2.50 in gold.

Development: by 1,200′ of underground work. Company had planned to sink a vertical double-compartment shaft to the 650′ level, at which depth it hoped to cut the Susan Duster lode, 200′ distant from the Arcane-O. K. line. The O. K. company is said to have followed the lode to the property line.

Equipment: power house, 40-h. p. gasoline engine and air-compressor.

ARGENTINE DIVIDE MINING CO. **NEVADA**

Office: 314 Clay Peters Bldg., Reno, Nev.

Officers: A. S. Proskey, pres.; A. N. Salisbury, v. p.; H. E. Scott, sec.; E. F. Lunsford, treas., with S. F. Taylor, and L. Little, directors.

Inc. March, 1919, in Nevada. **Cap.** 1,500,000 shares; $1 par; 850,000 outstanding. Listed on San Francisco Stock Exchange.

Property: 2 claims, 28 acres, between the Divide Cons. and Mohawk. Examined, 1919, by A. H. Elftman, who reports that several veins cross the ground, and that pay-ore should be found at shallower depth than in other parts of the district. **Development:** by shaft:

Equipment: electric and gasoline power, 25 h. p. hoist, and compressor.

ARGENTOR-ROCHESTER MINES CO. **NEVADA**

Address: C. N. Miller, pres.-gen. mgr., Pacific Bldg., San Francisco, Cal.

Property: north of Rochester Merger group, is a part of the McNamara lease. Ore is quartz containing lead, silver and gold, the latter predominating. Average values of $18 to $45 for width of 4′ reported, February, 1921. Developed by crosscut, 680′ from portal of Stowell tunnel.

ARGENTUM MINING CO. OF NEVADA **NEVADA**

Company inactive. Mines and mill under bond and lease to **Candelaria Mines** Co., which see.

Property: includes Northern Belle and Holmes Mines, in camp of Candelaria, Mineral county, Nev., 9 miles from Redlich, on Tonopah & Goldfield R. R. Fully described, Volume XIII.

ARGONAUT HASBROUCK DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 60 acres in the Divide district, W. of Kendall Divide. In July, 1919, a 50 h. p. hoist, compressor, and accessories were ordered.

ARGONNE DIVIDE MINING CO. **NEVADA**

Mail returned from former address, Tonopah, Nev.

Officers: Frank Berry, pres.; C. W. Taylor, v. p.; T. A. Frazier, sec.-treas., with Charles Keilhofer, R. W. Cattermole, and H. H. Brown, directors. A. H. Elftman, cons. engr.

Inc. April, 1919, in Nevada. **Cap.** $300,000; shares 2c par.

Property: the Homestake-Gold Wedge group of 7 claims, purchased from Charles Kielhofer and others by a syndicate represented by M. B. Cutter, C. R. Miller, and Barron Hoopes, Jr., of the Tonopah Mining Co. Equipment from the Silver Plume shaft of the Tonopah company was brought to mine.

ARIZONA ANNEX SILVER MINES **NEVADA**

Name changed to **Sierra Silver Mines Corp'n,** which see. Only information obtainable is contained in a market letter issued by certain Boston brokers which states that geological formation is "identical with that of Arizona Silver." So far as we can find out, Arizona Annex has had only paper or stock selling existence.

Is one of a bunch of 5 or 6 queer companies, all with same promoters, one of whom was arrested for alleged fraud.

ARIZONA DIVIDE MINING CO. **NEVADA**

Office: 15 Broad St., New York.

Inc. in Nevada. **Cap.** 2,000,000 shares, 10c. par; non-assessable; 1,575,000 outstanding, of which 400,000 are underwritten for benefit of the treasury; 1,175,000 are issued or set aside for the Arizona Central Gold Mines Co., and to acquire property at Divide. As a reserve, 425,000 shares are held in treasury.

Transfer agent: Security Transfer & Registrar Co., New York.

Property: at Divide—the Military group of 5 claims, 1¼ miles S. of the Tonopah Divide. Examined by L. R. Robins and R. C. Knox. Two wide shear-zones said to cross the property, roughly parallel to the course of the Tonopah Divide shear-zone. "The Military is a geological 'gamble' of the same character as other Divide properties."

At Oatman, Arizona—17 acres, surrounded on three sides by the United Eastern. A quartz-calcite vein, 30 to 60′ wide, outcrops for 1,000′. A 304′ shaft has been sunk on a vein assaying $5 to $6 gold per ton. Shaft has a hoist, compressor, etc., adequate for depth of 1,000′.

ARIZONA EXTENSION SILVER MINES CO. **NEVADA**

Controlled by **Universal Silvers Co.**

Address: 265 Russ Bldg., Bush St., San Francisco, Calif.

Officers: (same as Arizona Silver Mines Co.), E. S. Van Dyck, pres., F. W. Lockwood, v. p.-supt.; C. D. Olney, sec.; M. E. Pratt, chief eng.

Inc. in 1919, in Nevada. **Cap.** $1,000,000; $1 par. Listed on Boston Curb January 10, 1920.

Property: 8 claims and 3 fractions, 170 acres, between the Arizona Silver, Cons. Silver, Inc., and Silver Reef Mines Co., in Buena Vista canyon, near Unionville, Pershing county. Report by J. S. Coupal on December, 1919, shows that flat bedded limestones between two rhyolite dikes, contain two flat orebodies that are partly developed. A fault-fissure running N. W.-S. E. across the property also shows some good ore.

Development: a dozen short tunnels, and 80′ shaft. The total work on orebody, assuming an average thickness of 12″, is said to block out 15,000 tons of 12.1 oz. ore.

Lawson, Van Riper and others, were arrested in March, 1920, for alleged fraud in this and allied promotions. See also under **Arizona Silver Mines Co.**

ARIZONA SILVER MINES CO. **NEVADA**

Office: 265 Russ Bldg., San Francisco, Calif. **Mine office:** Unionville, Nev.

Officers: Edw. S. Van Dyck, pres.-mgr.; F. W. Lockman, v. p.-supt.; Chas. D Olney, sec.; M. E. Pratt, engr., with A. L. Holbrook and J. J. Lodge, directors.

Inc. April, 1919, in Nevada. **Cap.** $1,000,000; $1 par; 300,000 shares issued; 200,000 shares in reserve. Bond issue of $200,000 owned by **Universal Silvers Co.** (q. v.) which also owns a stock interest. National Security Co., New York, transfer agents. Annual meeting, first Monday in May. Listed on San Francisco stock Exchange and New York Curb.

Dividends: initial of 3c per share on Dec. 15, 1919.

Property: 8 claims, 2 patented about 120 acres, in Buena Vista canyon, Pershing county, near Unionville, includes the Arizona mine, purchased from the **Sunset Mng. & Devel. Co.**, (q. v.), and together with the Wheeler mine, credited with a production of $5,000,000 from 1868-1880.

Geology: of the district is fully described in U. S. Geo. Sur. Bull. 414, by Ransome The ore occurs in a solid blanket vein in limestone, averaging 3′ in thickness and consists of quartz and calcite carrying pyrite and stibnite, with silver present as argentite and cerargyrite. About 5,000′ of work has been done, almost all of it in ore and report by Chas. D. Wilkinson, engineer for the Goldfield Cons. Mng. Co., made 1918, gives an average assay of 27.3 oz. silver per ton, with 26,600 tons in sight, containing about 728,900 oz. silver.

Equipment: The old stamp-mill has been remodeled, vanners and flotation machines discarded, and ore treated in a 20-ton cyanide unit. Improvements were to have been made during 1920, including the treatment of slimes and sands separately.

Production: $8,075 in 1919; $30,400 in 1921 ,to April.

Boston brokers, who early in 1920 were active in marketing the shares of this and allied companies, were arrested and fined (April 21, 1920) up to $1,000 each for illegally advertising stocks under the laws of Massachusetts. See **Arizona Extension Silver Mines Co.**

ARROW MINING CO. **NEVADA**

Reorganized in May, 1918, as the **Southeastern Mining Co.**, which see.

ARROWHEAD ANNEX MINING CO. **NEVADA**

Address: Divide Brokerage Co., Box 416, Tonopah, Nev.

Officers: J. M. Gilfoyle, pres.; B. D. Luce, v. p.; Pat Mooney, sec.-treas., with F. H. Connolly and A. G. Raycraft, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par; 100,000 shares offered at 7 cents each

Property: 4 claims, a short distance N. of the Arrowhead Mining Co. ground. In 1919, a shaft was sunk and a hoist erected; operations continued in 1920.

ARROWHEAD BONANZA MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: in the Arrowhead district of Nye county.

ARROWHEAD CONSOLIDATED MINING CO. **NEVADA**

Address: Ely, Nev.

Officers: J. Hy Goodman, pres.; Al. McCloy, gen. mgr.

Property: 1 mile S. of the Arrowhead Mining Co.'s ground, in Nye county. Indications are reported to be good.

Development: by shaft, 215' deep in September, 1920, with lateral work on this and the 115' level. A 4' ore shoot assaying better than $50 is reported. An 18 h. p. hoist is in use.

ARROWHEAD ESPERANZA MINES CO. **NEVADA**

A company reported organized late in 1919 to develop claims in the eastern part of the Arrowhead district.

ARROWHEAD EXTENSION MINING CO. **NEVADA**

Office: 130 Main St., Tonopah, Nev.

Officers: J. B. Kendall, pres.; M. J. McVeigh, v. p.-gen. mgr.; H. B. Chessher, sec.; A. G. Raycraft, treas., with H. D. Budelman, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; shares 10c par; 100,000 shares offered for sale at 7½c each in Oct., 1920, but not to be released until another 100,000 was sold at 15c or better.

Property: about 100 acres of unpatented ground adjoining the Arrowhead mine on the south and east. Surface showings "pronounced unusually promising by various and reputable mining men." Assays yielded from $1.20 to $67.50 and $71.55 per ton, the second and third sample being taken by W. H. (Bill) Hart and J. B. Kendall, respectively. All reports furnished by company are highly optimistic.

A shaft has been sunk to 150' and vein opened at 55'. Operated in 1920.

ARROWHEAD INSPIRATION MINES CO. **NEVADA**

Address: McGill, Nev. Max Herman, pres.-gen. mgr.

Property: in Nye county, on road from Tonopah to Arrowhead, shows highly mineralized porphyry carrying gold and silver. Operating 1920. Still a prospect.

ARROWHEAD MINING CO. **NEVADA**

Office: Tonopah, Nevada.

Officers: R. L. Jones, pres.; Peter Fox, v. p.-supt.; Chas. J. Blumenthal, sec.-treas., with T. F. Ryan, M. L. Davenport and E. Y. Foley, directors. Mark G. Bradshaw, cons. engr.

Inc. Sept., 1919, in Nevada. **Cap.** $150,000; 10c. par; 750,000 treasury shares. Transfers made at company's office. Listed on San Francisco Exchange. Shares sold at 20c. in January, and but 1c. in December, 1921, compared with 60¢ high and 6¢ low in 1920.

Property: 4 claims in the new Needles district, 60 miles E. of Tonopah, Nye county, and 4 miles S. of Twin Springs on the Lincoln Highway, between Tonopah and Ely. The general formation is andesite and rhyolite, showing 2 ore shoots in a vein 3 to 8' wide, which is faulted 160' W. of shaft. Ore is silver sulphide, reported to average $24 to $50, with streaks of higher grade.

Development: by incline 345' deep in September, 1921, with drifts on 4 levels. Small shipments are made periodically.

Equipment: includes 25 h. p. gas hoist. Other improvements, including a mill, are contemplated.

ARROWHEAD-RICO MINING CO. NEVADA

Address: E. R. White, Tonopah, Nev. See description in California section.

ARROWHEAD SILVER KING MINING CO. NEVADA

Address: Ely, Nev.

Property: a gold-silver mine, operated in 1920.

ARROWHEAD SILVER SIGNAL MINES NEVADA

A new company, whose ground, situated between the Arrowhead and Arrowhead Extension, is said to have good surface indications. Operated in 1920.

ARROWHEAD SYNDICATE MINES CO. NEVADA

Office: Ely, Nev.

Officers: C. L. Osterlund, pres.-mgr.; Peter Fox, v. p.; with C. B. Nance, J. E. Eudey and J. E. Fleige, directors. C. W. Martin, sec.; C. J. McFadden, treas.

Inc. Dec. 29, 1919, in Nev. **Cap.** $150,000; 10¢ par; 480,000 treasury shares. Stock transferred at company's office. Annual meeting, 1st. to 5th. in December.

Property: 4 claims, 80 acres, adjoining Arrowhead Mng. Co. on the S., in Arrowhead (Needles) district, Nye county, 60 miles east of Tonopah. Silver sulphide ores carrying a little gold in quartz veins cutting andesite prevail; formation said to be not unlike Tonopah.

Development: by 200' shaft . Equipped with 15-h. p. hoist.

Work suspended since Aug., 1920, for lack of funds; hopes to resume in 1922.

ARROWHEAD WONDER MINES CO. NEVADA

Address: W. H. French, pres., Mills Bldg., San Francisco. Cal.

Inc. 1920, in Nevada. **Cap.** $150,000; shares 10c. par. No debts.

Property: 7 claims N. E. of the Arrowhead Mining Co. Small shafts have been sunk on two promising veins, one of which is said to show 2' of $110 ore at depth of 25 feet. Veins are believed to be extensions of those on ground of Arrowhead Mng.Co.

ASHDOWN GOLD MINING CO. NEVADA

Address: Denio, Oregon. Geo. D. Mathewson, lessee, or T. S. O'Brien, Ashdown, Nev.

Property: in Warm Springs district, Humboldt county, 15 miles from Nevada-Oregon line, reported to have 125,000 tons of $5 milling ore blocked out. Small shipments of gold made in 1917-18. The old mine opened by 10 tunnels. A new mill is reported under construction. Was operating, 1920.

ASSOCIATED MINES DEVELOPMENT CO. NEVADA

Office: 617 Pacific Bldg., San Francisco, Cal. C. N. Miller, pres.; E. N Bannon, sec.

Inc. in Nevada. **Cap.** $500,000; shares $500 par.

Property: at Rochester, Pershing county, includes the Wild-Cat and Tiger patented claims, the Taylor Hill, Colorado and the Plainview-Plainsite group; also a stock interest in the Tohoqua mine, Leadville district. Washoe county, 38 miles N. of Gerlach, on the W. P. R. R. See **Leadville Mines Co.** for description.

ATLANTA-HOME GOLD MINING CO. NEVADA

Idle. **Address:** Delta Bldg., Los Angeles, Calif. **Mine address:** Atlanta, via Poche, Lincoln Co. Nev.

Officers: F. R. McNamee, pres.; M. Justice, sec.; E. M. Bray, treas.; J. J. Stumenbord, supt.

Inc. 1915, in Delaware. **Cap.** $2,500,000; outstanding 500,000 shares. Company was organized to take over the holdings of the Atlanta Cons. Gold Mng. Co.

Property: 11 claims, patented, 180 acres, at Atlanta, Lincoln county, 47 miles northeast of Pioche, shows a contact deposit between porphyry and limestone, said to average $2 to $4.50 per ton in gold, and is 50' to 80' wide.

proven for a length of 300′ and 200′ deep. Ore reserves claimed to be 320,000 tons.

Development: two shafts sunk 300′ apart, with drifts and crosscuts totaling 1,600′. **Equipment:** includes a steam hoist and compressor.

ATLANTA MINES CO. **NEVADA**

Reorganized 1918, and name changed to Reorganized Atlanta Mines Co., which see.

ATLANTIC DIVIDE MINING CO. **NEVADA**

Mail returned from last known address.

Officers: Wm. Forman, pres.; W. J. Douglass, v. p.; E. Marks, treas.; M. L. Cooper, sec., with Arthur G. Raycraft, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c. par.

Owns Wedge group of 50 acres.

AUREOLA MINES CO. **NEVADA**

Address: P. O. Box 791, Reno, Nev.

Officers: Anthony Elffner, pres.-gen. mgr.; Chas. Madison, v. p.; P. Y. Gillson, sec.-treas., with R. W. Stoddard and M. S. Gillson, directors. A. I. D'Arcy, cons. engr.

Inc. in Nevada. **Cap.** $100,000; 10c par.

Property: 5 unpatented lode claims, in Mineral county, 5 miles S. E. of Sodaville, the nearest rail point. According to Mr. D'Arcy, the ground shows 7 veins from 1 to 4′ wide, in grano-porphyry. Veins contain high-grade gold-silver ores. Two test shipments made to Western Ore Purchasing Company ran $67.61 and $148.38 per ton, respectively, the gold content averaging 1 ounce to each 20 ounces silver.

AURORA CONSOLIDATED MINES CO. **NEVADA**

A subsidiary of the Goldfield Cons. Mines Co.

All operations ceased October, 1918, as company could not make a profit owing to increasing high cost and low tenor of ore. The assets of the Aurora Cons. are to be liquidated and the proceeds applied on its indebtedness to the Goldfield Cons., amounting to $457,500, December 31, 1918. Mill sold, 1919, to Goldfield Dev. Co. and moved to Goldfield and indebtedness to the Goldfield Cons. at end of year reduced to $57,698.81, "a figure which represents what the management thinks may be salvaged in the future." Reports in spring of 1921 announce sale of other machinery. Fully described Vol. XIV.

AURORA MINES CO. **NEVADA**

Property sold and company out of business. Fully described, Vol. XIII.

AUSTIN DAKOTA DEVELOPMENT CO. **NEVADA**

Address: Valley City, North Dakota. **Mine office:** Austin, Nev.

Officers: C. E. Garvin, pres.; A. B. Cox, supt.-v. p.; with C. A. Newman, H. R. Bruns, S. H. Nelson and T. Carter Griffith, directors. F. W. Schlaberg, sec.-treas.; C. F. Littrell, supt.; G. J. Babcock, cons. engr.

Cap. $1,500,000; shares $1 par; 1,200,000 shares issued.

Property: 800 acres in the Reese River district, at Austin, Lander county. Ore is gold-silver in chlorite zone, in 2 parallel ledges, each 20′ thick and cut by several mineralized dikes in granite. Workings for about 400′ expose a quartz vein varying in thickness from 6 to 24″, and averaging $6 to $7 per ton.

Development: by the X-ray 2-compartment shaft, 330′ deep with 2,000′ of laterals; the O. K. incline shaft, 350′ deep, the 250′ Dalton shaft, sunk on a 6′ vein of milling ore and the 150′ Tesora shaft, sunk about 800′ from the Dalton. Operated 1919 and 1920. During 1920, development continued on the 200′ and 300′ levels, opening an 1,800′ oreshoot on the former.

Equipment: pump, 80-h. p. hoist, compressor, and storehouse.

Production: reported to aggregate $1,000,000.

AUSTIN GOLDFIELD MINING CO. **NEVADA**

Owns the Watt mine, operated by H. Lemaire, under lease, at last accounts.

Property: on N. side of New York canyon, Reese River district, Lander county.

Development: 300′ inclined shaft with 3 levels. Vein in dark quartzite ranges from 4″ to 12″ wide and consists of white quartz containing tetrahedrite, pyrite, chalcopyrite, and some blende and galena; dip 25° to 45° N. E.; strike N. 45° W. To end of 1915 over $15,000 worth of ore shipped by lessees is said to have averaged about $125 per ton, chiefly in silver.

Equipment: includes a 25-h. p. gasoline hoist.

AUSTIN MANHATTAN CONS MINING CO. NEVADA

See **Austin Manhattan Cons. Silver Mines.**

AUSTIN MANHATTAN CONS. SILVER MINES NEVADA

Formerly the Austin Manhattan Cons. Mng. Co., successor to the Manhattan Silver Mng. Co.

Address: Wm. A. Marshall, res. agt., Austin, Nev.

The Austin Manhattan company purchased the principal mining properties, first operated in the early 60's and credited with a production of $19,000,000, in and adjacent to Austin, in 1908, and started development work, but on too large a scale commensurate with the limited money on hand. See Copper Handbook, Vol. XI, and Bulletins 208 and 408, U. S. Geol. Survey. Result was a receivership begun in 1911, culminating in a public sale of the property 3 years later. It was purchased by one of the largest creditors. H. C. Fownes, German Nat'l Bank Bldg., Pittsburgh, Pa. who organized the the present company after expiration of the redemption period.

Property: 115 claims, 1,200 acres, 73 claims patented, in the Reese River district, at Austin, Lander county, shows in the Lander Hill section, a vein system of 5 fissure veins in granite, or quartz monzonite, N. W.-S. E. strike, dip 25° to 60° N. E. Maximum width of veins is 6′. Ore sulphide of silver, occurs in lenticular shoots. Examined by A. W. Daw, of London.

Development: 6,000′ tunnel, shafts and miles of crosscuts and drifts. Mine contains little ore blocked out. Workings are largely caved and inaccessible; but some workings were reopened, 1919-21.

AUSTIN NEVADA CONS. MINES CO. NEVADA

Successor to Maricopa Mines Co., Arizona, described in Vol. XIV.

Address: H. G. Richardson, pres.-gen. mgr.; Austin, Nev. **Inc.** in Nev. **Cap.** $3,000,000.

Property: principal property, 17 claims adjoining the Austin Manhattan group in Lander hill section of Reese River district, Lander county. Two distinct mineralized zones consisting of 12 parallel veins with $4 to $15 per ton in gold are known. In addition, reports early in 1921 announced the discovery at surface of a large porphyritic orebody, 100′ wide with high gold values and some silver.

Development: by over 3,000′ of tunneling. Equipped with a compressor plant. Under operation in 1920.

Company also controls the Prosperity group of 16 claims in the Wickenburg district, Ariz. Six known fissure veins in porphyry, 8′ to 30′ wide, are developed by 1,800′ of workings; chalcocite is the principal mineral. Equipment is on a small scale.

AZALIA MINING CO. NEVADA

Address: F. M. Berry, sec.-treas., Union Oil Bldg., Los Angeles, Calif.

Officers: F. W. Cole, pres.; S. E. Vermilyea, v. p.; with John Woodson and S. L. Carpenter, directors; Dee W. Minier, supt., at last advice.

Cap. $1,000,000; shares issued, 700,000.

Property: 4 claims, 8 miles N. W. of Platina, Yellow Pine district, Clark county, covering a vein in limestone, containing zinc-silver ore, for 3,000′. Developed by an 80′ incline shaft which passed over the ore said to be 6′ thick and faulted at a depth of 30′. Operated under lease by C. E. Cree in 1917.

Company was also developing a group of 9 claims about 1 mile below

the Cerro Gordo mine, in the Cerro Gordo mining district, Inyo county, Calif, where a 750' tunnel was driven to reach the contact. No recent returns.

AZTEC DIVIDE MINING CO. **NEVADA**

Office: State Bank Bldg., Tonopah, Nev.

Officers: W. H. Thomas, pres.; Lowell Daniels, v. p.; W. H. Fording, sec.-treas., with E. C. Simpson and H. H. Atkinson, directors. Rudolph Burton, supt.

Inc. in Nevada, 1919. **Cap.** $150,000; 10c par.

Property: 100 acres in group of claims lying west of the Hasbrouck Divide. **Development:** shaft sinking was in progress latter half of 1919. **Equipment:** well equipped with hoist and other machinery. A prospect.

AZURITE MINING CO. **NEVADA**

Address: J. W. McFatridge, mgr.-sec.-treas., 941 W. 35th St., Los Angeles, Cal. **Mine address:** Goodsprings, Clark county, Nev.

Officers: A. S. Black, pres. and purch. agt.; T. D. Knights, v. p.; preceding officers, M. P. Erwin, M. M. McFatridge and Samuel Yount, directors.

Inc. Feb. 7, 1911, in Nevada. **Cap.** $1,000,000; $1 par; 60.769 issued.

Property: 9 claims 174 acres and a 3-acre smelter site, in the Yellow Pine district, sections 26, 27, 34 in T. 24 S.; R. 57 E., 12 miles from Goodsprings and 20 from Jean on the Salt Lake Route. The mines adjoin the Boss mine on the east. Company bought the Nevada Copper Realty property, February 7, 1911.

Geology: carries plumbojarosite, a very rare mineral, carrying gold and platinum (see U. S. Geol. Survey Bull. 620). Ores carry gold, silver, copper, lead, zinc and platinum, lowest assay at the Azurite copper mine, said to be $3.60 gold, $4.50 silver, 27% copper, .03 oz. platinum. Ores occur in replacement orebodies of irregular size and shape, the largest 35x40' and 8 to 10' thick in thick-bedded limestones cut by porphyry dikes.

Development: by 3,160' of workings, including several tunnels, estimated to block out 8,800 tons, of 20% copper ore and 30% lead ore.

Shipments during 1914-'16 returned $38,000. In 1918-'20 the mine was operated by lessees on a 15% royalty basis.

BALEA GOLD MINING CO. **NEVADA**

Address: Mina, Nevada. J. H. Maller, sec.

Property: in Gold Range district, Mineral county, 9 miles from Mina, developed by 140' shaft to be sunk an additional 200' in 1921.

BAMBERGER EXPLORATION CO. **NEVADA**

Name changed in November, 1919, to Simon Bamberger Co.; owns the Gusset Patch group at Pioche, Lincoln county, leased until February, 1923, to **Black Metals Mines, Inc.**, which see.

BAMBERGER MINES CO. **NEVADA**

Address: Midas, Elko Co., Nev.

Officers: Moses Reinhart (Winnemucca, Nev.), pres.; M. J. Paisley, v. p.; W. F. Boyken, sec.-treas.; with Rich. Weston and W. H. Cooley, directors.

Inc. in Nevada. **Cap.** $150,000; par 10c.; 750,000 treasury shares. Transfers made at company's office; W. F. Boyken, registrar. Annual meeting, July 1st.

Property: 5 claims, 100 acres, adjoining the Gold Circle Coalition, in northwestern section of the Gold Circle district, Elko county. Ore is quartz, carrying gold and silver, and occurs in a fissure vein, 2 to 6' wide, in rhyolite. Opened by a 100' shaft and 150' tunnel. A production of $15,000 is reported.

BANKER DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Directors: D. J. Fitzgerald, A. H. Keenan, R. F. Wendaver, A. T. Goodin, and E. J. Ramsey.

Inc. 1919, in Nevada. **Cap.** $150,000; shares, 10c par.

Property: 4 claims W of Royal Divide and about 2 miles slightly N. E.

of Gold mountain, and adjoining the Clinton, Sioux, and Shamrock on the southeast. Is a prospect.

BANNER DIVIDE MINING CO. NEVADA

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: an undeveloped group of 3 claims in the southwestern part of the district. Is a prospect.

BATTLE MOUNTAIN MINES & DEVELOPMENT CO. NEVADA

Office: 617 Merritt Bldg., Los Angeles, Cal. **Mine office:** Battle Mountain, Nev., F. E. Perry, manager.

Officers: M. H. Whittier, pres.; F. B. Sutton, sec. **Inc.** 1916. **Cap.** $1,000,000. Is a close corporation.

Property: 20 claims, 9 patented, in Lewis mining district, Lander county, 16 miles south of Battle Mountain. Ore carries silver as stephanite, in shoots in qaurtz vein. Average value reported as 20 oz. silver and traces of gold and copper.

Development: by tunnels, from 700′ to 4,670′ long with a total of 28,000′ of underground work, said to have blocked out 50,000 tons of ore.

Equipment: included 200 h. p. Diesel engine, compressor and 125 ton mill, with flotation unit.

Last report in June, 1919; no work for two years past and sale of equipment and lease of mine is contemplated.

BAY STATE MINING & LEASING CO. NEVADA

Address: Sorn Neilson, Pioche, Nev.

Officers: C. P. Tasker, pres.; Sorn Neilson, v. p.-supt.; W. A. Byers, sec.-treas.; with W. A. Shaw and Capt. Hollowell, directors.

Property: Ida May group, including Bertha, Little Ford and Horn Silver claims, in the Jack Rabbit district, Lincoln county. The property has been opened by shafts and tunnel, and a depth of 100′ attained. Values of 15% copper, 10 oz. silver and $2 in gold are reported.

BEAR DIVIDE MINING CO. NEVADA

Mail returned from Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c.

Owns 2 claims, and a fraction adjoining Leadville Divide on east. A boom day "wildcat".

BELCHER DIVIDE MINING CO. NEVADA

(Originally Gold Mtn. Dev. Co.)

Fully described in Vol. XIV. In July, 1920, was placed on an assessable basis under name of **Reorganized Belcher Divide Mng. Co.**, which see.

BELCHER EXTENSION DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev. C. L. Richards, res. agt.

Officers: Andrew Walz, pres.; E. J. Roberts, v. p.; T. J. Lynch, sec.-treas., with Geo. Wingfield and H. C. Brougher, directors. J. G. Crumley, mgr.

Inc. March 29, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par; 1,300,000 issued. Listed on San Francisco Stock Exchange. New York Trust Co., registrar, $51,982 cash on hand July 1, 1919.

Property: 9 claims, 170 acres, north of Revert Divide. An adjoining property, the Belcher Divide, has utilized the deep shaft of the Extension for development purposes.

Development: by two shafts, 110′ and 300′ deep, total workings, 1,000′. Ore values of $13 to $32 are reported, and some shipments have been made to mills in Tonopah. Operated during 1919-'20.

Equipment: good electric hoist, etc. Regarded as an attractive prospect.

BELCHER MINING CO. NEVADA

Merged with Jacket-Crown Point-Belcher Mines Co., March 10, 1915, which in turn became a part of the **United Comstock Mines Co.** (q. v.), in 1920.

BELLE-HELEN MERGER MINES NEVADA

Formerly **Tonopah Kawich Mng. Co.**

Address: Tonopah, Nev.

Officers: M. M. Green, pres.; W. F. Gray, v. p.-gen. mgr.; Ed. W. McClave, sec.-treas.

Property: is a merger of holdings of the Tonopah Kawich Mng. Co. and of the **Pacific States M. & M. Co.**; the latter having been dissolved in Oct., 1920. Other property is said to be under option. All situated in Bellehelen district, Nye county, 50 miles E. of Tonopah, and show rhyolite lavas cut by parallel veins. On the Pacific States claims, the Midvale vein shows two high grade quartz streaks, 6" to 18", enclosed by pyritized milling ore; the States has total workings of 2,300', including 2 shafts and a tunnel crosscutting 3 veins at a depth of 360'. Reported, Nov., 1920, that a 1,400' ore shoot is exposed in tunnel, and that "there is nearly $400,000 worth of positive and probable ore in the mine". Two years ago, total cost was $35 per ton of ore mined.

Production: total from Pacific States said to have been $117,000, of which 1,423 tons, averaging $71.80 per ton, were shipped since 1917. The Tonopah Kawich, operating intermittently has made some shipments.

Operations are carried on both by company and lessees. A 50-ton cyanide mill is being erected.

BELLEVIEW DIVIDE MINES CORPORATION **NEVADA**

Mail returned from Tonopah, Nev.

Officers: W. J. Douglass, pres.; W. D. Moody, v. p.; J. G. Thompson, sec., with Roger Dougherty, I. S. Thompson, and Harry Powell, directors.

Inc. May, 1919, in Nevada. **Cap.** $200,000; shares 10c par.

Property: 8 claims and fraction in Bellehelen mining district, Nye county. Has 150' shaft and 50' tunnel. Ore shipped in 1919.

BELMONT BIG FOUR MNG. CO. **NEVADA**

Address: Carlin, Nev.

Officers: F. W. Spear, pres., P. O. Box 5, Santa Monica, Calif.; P. E. Dairs, v. p. E. E. Kappler, sec.-treas. with Geo. W. Jacobs, W. E. Maul, and Wm. Painter, directors. Frank Fagan, lessee, Carlin, Nev.

Inc. 1916, in Nevada. **Cap.** $125,000; 10c par; 800,000 shares outstanding.

Property: 16 claims, 320 acres, 7 miles west of Belmont, Nye county. Claims show granite cut by a N. S. fissure vein, which is 20' wide, and dips at 30°. Molybenite occurs disseminated through quartz and averages 2% MoS_2 besides silver and copper values.

Development: 150 and 400' tunnels. Mine operations were resumed July, 1919, under 5-year lease to Frank Fagan on a 20% royalty basis, and continued into 1920.

BELMONT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. B. A. Rives, res. agt.

Officers: J. H. Healy, pres.; J. H. Miller, v. p.; Allen Rives, sec.-treas.; with C. T. Stevenson and Zeb Kendall, directors.

Inc. March, 1919, in Nevada. **Cap.** 1,500,000 shares, 10c par, 750,000 shares in treasury; assessable.

Property: Bodie and Mustang claims, 36 acres.

BELMONT MILLING CO. **NEVADA**

Dissolved February, 1917, and all property and assets taken over by the Tonopah Belmont Dev. Co.

BEN EZRA COPPER & GOLD M. & S. CO. **NEVADA**

Address: Santa Paula, Calif., or Searchlight, Nev.

Officers: H. P. Balcom, pres.; J. L. Crane, v. p.; A. H. Stovall, sec.; Wm. Mackenzie, treas.-mgr.; with Wm. Schiells, E. A. Chase, Chas. Beckwith and A. Everett, directors.

Inc. Sept. 3, 1909, in Nevada. **Cap.** $1,000,000; $1 par; 883,000 outstanding. Annual meeting 3rd Saturday in August.

Property: 15 claims, 10 patented, 300 acres in Nob Hill section of Eldorado mining district, Clark county, 17 miles N. of Searchlight. Ore occurs

in fissure veins in porphyry dike said to be 100 to 150′ wide. Values are mainly in silver, with some copper and gold averaging $15 to $20 per ton.

Development: by 2,400′ of workings, including 660 and 500′ adits. A prospect. Idle, 1919-20.

BEN HUR DIVIDE EXTENSION MINING CO. **NEVADA**

Address: Tonopah.

Officers: Ed Malley, pres.; Ben. D. Luce, v. p.-mgr.; J. Clarence Kind, sec.; Albert Kelly, treas.; with John Barrier, directors.

Inc. March, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 5 claims adjoining the Ben Hur on the W. Has 22 h. p. hoist, compressor, etc.

BEN HUR DIVIDE MINING CO. **NEVADA**

Officers: C. W. Brandon, pres.; Albert Kelly, v. p.; R. J. Kelly, sec.-treas.; Roger Dougherty and Wm. McKnight, directors.

Inc. March 29, 1918, in Nevada. **Cap.** $150,000; 10c par; assessable; increased from $100,000. A 1c assessment levied April 1, 1921. Listed on San Francisco Stock Exchange.

Property: 6 claims in southeastern part of district, near the Chariot and North Ben Hur, and north of Gold Seam; held since 1902 by Watters and Dougherty. Early in 1921, 3 claims adjoining the Golden State group at Klondyke were taken over, and these are being prospected; the Ben Hur hoisting plant was installed for this purpose. Also in 1921, a lease for 3 years was taken on holdings of the Reorg. Divide Junior and arrangements made to work them through the Keystone Divide's 625′ shaft.

Development: on the Divide property by a 300′ shaft sunk on a quartz vein that assayed from $4 to $39 per ton. On the surface, this vein was 25′ wide and of great length. Crosscut at 200′ was in favorable formation, and the orebody was said to have improved at 250′. On the Klondyke claims, a shaft was down 110′, Aug. 1, 1921, and crosscutting was underway.

Equipment: 15-h. p. gasoline hoist, compressor, 2 machine-drills, buildings, etc., good for depth of 700′.

BENTON-RADFORD-SMITH GROUP **NEVADA**

Address: A. I. D'Arcy, Goldfield, Nev. A. L. Bocherding, mgr.

Inc. 1919, in Nevada. **Cap.** $40,000. Is an association of 20 members.

Property: placer claims in Tule canyon, Esmeralda county, containing gold bearing gravel at a depth of 20′ with some $6 material at 7′. Ground will be worked by drifting.

BEOWAWE SILVER MINING CO. **NEVADA**

Address: Beowawe, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; $1 par.

Property: 11 claims near Beowawe, Eureka county, developed by 140 and 180′ shafts. From 1917 to Aug., 1919, the mine yielded $85,000 worth of ore, with two cars ready at that date. No work reported since 1919.

BERRY MINING CO. **NEVADA**

Address: Midas, Nev. Is a gold-silver mine in Elko county, operated during 1919-20.

BERUNDY TUNGSTEN MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: L. B. Spencer, pres.-mgr.; C. E. Noble, sec.; with F. J. Siebert, directors.

Cap. $200,000; 10c par; assessable; 1,300,000 outstanding. Operating expenses for 1918 amounted to $5,000.

Property: 1 claim, 20 acres, in the Gold Range mining district, Mineral county, 10 miles S. W. of Sodaville.

Ore: occurs as scheelite in a quartz fissure vein in diorite, said to assay 2 to 4% tungsten. **Development:** by 200′ tunnel. **Ore reserves:** estimated at 3,000 tons of 2% tungsten ore.

BEST & BELCHER MINING CO. **NEVADA**

Office: 265 Russ Bldg., San Francisco, Calif. **Mine address:** John Matheson, supt., Virginia City, Nev.

Officers: W. H. Moise, pres.-mgr.; H. Zadig, v. p.; with W. H. Hannon, S. D. Landecker and H. L. Slosson, Jr., directors. Chas. D. Olney, sec.

Inc. July 27, 1863, in Calif. **Cap.** $201,600; par-$1; 185,151 shares outstanding and 14,849 in treasury; assessable. Transfers made at company's office; Registration Surety Co., registrar.

Property: covers 536′ on the strike of the Comstock Lode, at Virginia City, Storey county; is patented and lies between the Gould & Curry and the Cons. Virginia.

Company is a non-producer and with others on the Comstock Lode, has been consolidated to form the **Middle Mines Association,** which see.

BETTY O'NEAL MINES **NEVADA**

Office: 68 Devonshire St., Boston. **Mine address:** Wm. B. Cummings, supt., Battle Mountain, Nev.

Officers: Geo. W. Sias, pres.; Noble H. Getchell, v. p.-mgr., Battle Mtn., Nev.; Frank E. Nye, sec.-treas., acting as trustees under an Express Trust, declaration being executed at Boston, Mass., April 8, 1920.

Cap. $5,000,000; par $5; 800,325 treasury shares, of which 600,000 are held in reserve. Stock transferred and registered at company's office. Annual meeting in January. Current assets, as of Dec. 31, 1921, were $70,425, including $22,558 cash; liabilities were $457. Equipment is carried at $28,403.

Property: 18 claims, 5 patented, 360 acres, in Lewis district, Lander-county, 12½ miles S. E. of Battle Mtn., Nev. Is an old silver mine producing considerable high grade ore 1880-82′, idle until 1920, largely because of litigation. Shows 2 fissure veins, one up to 20′ wide on limestone-porphyry contact, carries antimonial silver ore, with a little copper. This occurs in 7 ore shoots, and contains 30 to 83 oz. of silver. Also owns 160 acres of ranch land below the mill site, and 160 acres in the Reese river section of Nevada.

Also, the Cash mine of the **Y. P. Mng. Co.** (q. v.), near Prescott, Ariz., held under lease and bond.

Development: in Nevada, by 400′ shaft and 4 adits; a fifth, the Getchell drain adit, being driven by present management to connect with shaft, will be 1,950′ long and give a total back of 1,500′; was 1,100′ in Dec. 1921. One highly optimistic report estimates reserves at 779,634 tons of partly developed ore between upper adit and 165′ level, based on 5′ average width, with an average value of $31.11 per ton (silver at 85c). Workings total 8,000′. The old 300′ shaft was unwatered to 150′ level in 1921 and level driven 600′ south, cutting high grade ore in Estella vein.

Equipment: hoist and 300′ compressor.

Management has cleaned up and retimbered caved workings and contemplates erection of a 150-ton mill in 1922. Examined by Frank Oliver, Leonard D. Sivyer, L. W. Getchell and J. E. Knapp.

BEVIS DIVIDE MINING CO. **NEVADA**

Office: 301 Nixon Bldg., Reno, Nev.

Officers: S. H. Wheeler, pres.; Wm. Woodburn, v. p.; E. H. Mead, sec.-treas., with C. T. Stevenson and F. H. Norcross, directors. Edward Bevis, supt.

Inc. April 4, 1919, in Nevada. **Cap.** 1,500,000 shares; 10¢ par: assessable; assessment No. 1, of 1c, levied Jan. 6, 1921. Listed on San Francisco Stock Exchange. Transfers made at company's office.

Property: 2 claims, 40 acres, S. of the Mammoth and N. of the Giant, show a "dike" or vein traceable across Zone and Reef groups into this tract, Equipped with electric hoist and compressor, but development apparently superficial. Idle, 1919-20.

BIG ACE DIVIDE MINING CO. **NEVADA**

Dead. See Vol. XIV. Property lost through failure to perform assessment work.

BIG BILL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: W. W. Booth, Sr., pres.; W. W. Booth, Jr., v. p.; T. J. Lynch, sec.-treas.; G. W. Burgan, supt.

Inc. June, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 4 claims, 70 acres, adjoining the Apex group, is a prospect.

BIG CASINO LEASING CO. **NEVADA**

In 1919 operated property of the **Big Casino Mining Co.** under lease, which has presumably been relinquished.

BIG CASINO MINING CO. **NEVADA**

Address: Morris W. Johnson, pres., 514 Burnham Rd., Mt. Airy P. O., Philadelphia, Pa. **Mine office:** W. W. Wishon, eng., Searchlight, Nev.

Officers: M. W. Johnson, pres.; H. C. Gibson, v. p.; Samuel Rosenbaum, sec.; S. Krelstein, treas., with John M. Sailer, J. H. Shinn, A. M. Townsend, Geo. D. Lewis, W. A. L. Barker and Geo. Flint, directors. Hamilton B. Sharps, mgr., 719 Drexel Bldg., Philadelphia, Pa.

Inc. Sept. 14, 1914, in Delaware. **Cap.** $1,500,000; shares $1 par; non-assessable; 1,000,000 shares outstanding.

Property: 10 contiguous lode claims and 2 millsites, situated about 4 miles E. of Searchlight, Clark county, shows a fissure vein, 5′ to 8′ wide, in andesite and quartz porphyry, near granite porphyry contact, carrying gold chiefly, with lead, copper and zinc, and silver sparingly.

Development: by main shaft, 550′ deep, with 6 levels.

Equipment: includes compressor, hoist, pump and 30-ton concentrating plant, with K. & K. flotation unit, installed 1918, by the Big Casino Leasing Co., which at one time operated the property under lease and bond. The mill ran 1 shift 4 days per week only, in 1919, owing to water shortage. Concentrate said to average 4.2 oz. gold; 14.1 oz. silver, 17.9% lead, 5.5% copper, 19.4% zinc.

Property under lease to W. M. Buley, 912 Baker-Detwiler Bldg., Los Angeles, Cal., who in spring of 1921 was reopening the mine, with M. D. Rossiter, supt.

BIG CHIEF CONS. MINES CO. **NEVADA**

Controlled by Clarence and Frank Berry, 250 First St., San Francisco, Calif. Jerry Coughlan, supt.

Inc. 1919, in Nevada. **Cap.** $2,000,000.

Property: Missing Link, Rico, Jackson and General Grant group, in Gold Circle district, Elko county. There are two vein systems; ore carries gold in the Jackson and General Grant claims, and silver in the Missing Link. The latter, 12″ to 25″ wide, is said to show values from $20 to $600 and on 3rd level an average of $100 for a length of 300′ The Jackson vein is 3′ to 12′ wide, with 2 ore shoots, 185 and 195′ long, with a general average value of $33 per ton reported.

Development: 300′ shaft on Missing Link and one of 225′ on the Jackson claim; total workings about 1,500′.

Equipment: installed April, 1919. In September, 1921, a 10-stamp mill had been ordered.

Examined by L. K. Kennedy, F. Jost and Frank R. Short, all of San Francisco.

BIG DIVIDE MINING CO. **NEVADA**

Dead. Described in Vol. XIV.

BIG HORN DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: R. Crumley, pres.; Fred Ames, v. p.; C. F. Pugh, sec.-treas.-mgr., with J. C. Williamson and J. C. McCabe, directors.

Inc. May 20, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 issued.

Property: Golden Star group, 3 claims, E. and S. of Ben Hur Divide. Is one of the many companies organized during the Divide boom.

BIG LEDGE DIVIDE CONSOLIDATED MINING CO. **NEVADA**

Address: William Oaks, supt., Sylvania mine, via Cuprite, Nev.

Inc. 1919, in Nevada.

Property: 2 claims, S. W. of Telephone Girl Divide, about 3½ miles S. E. of Gold mountain. Also a 5-year lease on the old Sylvania lead-silver mine, 35 miles S. W. of Cuprite, and 50 miles S. W. of Goldfield. Latter property was a good producer, but was idle for many years on account of its isolated position. Examined by D. E. Anderson, R. W. Clapp, R. J. Anderson and W. J. Cooper.

Development: work was started at the Sylvania in August, 1919.

BIG PINE MINING CO. **NEVADA**

Formerly operated by Mushett and Wittenberg.

Property: Big Pine claim at Manhattan, Nye county, covering the mineralized schist belt for 1,000'.

Development: the Mushett & Wittenberg 200' vertical shaft, sunk 350' from north end line of chain. Dimensions of the glory-hole show ore equal to 240,000 tons from surface to the 200' level. South of the shaft the known extent of the ore zone to the 200' level is 400' long and 60 to 75' wide, equal to 370,000 tons.

Mill: equipped with a 5x20' tube-mill, plates, classifiers, etc. Heads averaged $5.60, gold tailing 40c per ton. Tube-mill consumes 170 lb. pebbles per day.

Was producing 1919-20.

BILL NYE MINING CO. **NEVADA**

Address: Goodsprings, Nev. W. E. Allen, pres.

A report for the year ending December 31, 1918, showed: receipts, $2,121; cash on hand, $1,476; expenses, $1,225.

Property: the Akron group in Goodsprings district, Clark county, reported held under 3-year lease from November, 1918, with an option to purchase at $40.000.

Made shipments of lead-zinc ore in 1919.

BI-METALLIC DIVIDE MINING CO. **NEVADA**

Mail returned from former office at Tonopah, Nev.

Officers: B. H. Smith, pres.; J. K. Turner and J. M. Gilfoyle, v. p.'s.; Otto Falk, sec.-treas., with H. D. Budelman and W. H. Royston, directors.

Inc. May 5, 1919, in Nevada. **Cap.** $15,000; shares, 1c par.

Property: the Victor claim and 2 fractions near the Rosetta parallels the Hercules on west, and end-lines the South Divide on north. A promising vein is said to traverse the Victor claim.

BI-METALLIC MINE **NEVADA**

Address: P. A. Simon, Mina, Mineral county, Nev. Mine is located at Candelaria, Columbus district, Mineral county, Nev.

Property: 3 claims, 47 acres, unpatented, shows a vein in slate, course of vein is N. 5° W., dip 65°. Ore occurs in shoots and lenses, and is said to average 28 oz. silver.

Development: 2 incline shafts, 280' deep, equipped with gasoline hoist. Mine was operated by leasers, 1917-19. Is a promising property.

BINGO DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Inc. April, 1919, in Nevada

Property: a group of 2 claims surrounded by the Big Divide, Trilby, Champion and Belmont properties. Is a raw prospect, and probably a company on paper only.

BISCUIT MINING CO. **NEVADA**

Property: in Cherry Creek district, White Pine county, an old producer credited with a production of $1,000,000 in silver. Developed by 1,100' incline shaft.

The mine was reopened in 1919, together with various adjoining properties that have patiently waited for a return of high silver prices.

BLACK DIAMOND COPPER MINING CO. **NEVADA**

Dead. Fully described Vol. XIII.

BLACK EAGLE MINING CO. NEVADA

Mail returned from Rawhide, Nev.

Property: Black Eagle mine and mill at Rawhide, Mineral county, Nev., said to show gold ore. Treating 50 tons daily at the mill at last reports. Presumably idle, 1918-21.

BLACK FOREST MINING & SMELTING CO. NEVADA

Address: Wells, Nev.

Property: in Spruce Mtn. district, Elko county, 58 miles S. E. of Wells. Equipped with small lead smelter, idle since 1909. Shipped oxidized lead ore in 1919.

Claims were "jumped" in September, 1921, and litigation has ensued.

BLACK HAWK DIVIDE MINING CO. NEVADA

Address: Tonopah, Nevada. B. A. Rives, res. agt.

Officers: J. H. Miller, pres.; L. B. Spencer, v. p.; with C. B. Burkham, Zeb Kendall and P. H. O'Neill, directors. Allen Rives, sec.-treas.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 100 acres S. of Anchor group and due south of Gold mountain, 2¼ miles, adjoining the Hercules on south. Is a raw prospect.

BLACK MAMMOTH CONSOLIDATED MINING CO. NEVADA

Is a reorganization, Dec. 2, 1920, of the Black Mammoth Mng. Co., stock of which was non-assessable.

Address: I. Salinger, 705 Bank of Italy Bldg., San Francisco. **Mine office:** Manhattan, Nev.

Officers: Mo. Lesser, pres.; H. G. Clinton, v. p.-supt.; I. Salinger, sec.; with Frank T. Torpey and F. Ketelhut, directors. Wayne T. Wilson, res. agt., Nixon Block, Reno, Nev.

Inc. in Nevada. **Cap.** $150,000; 10c par; 839,000 shares outstanding; assessable; assessment No. 1, of ½c, was levied Dec., 1920, and No. 2, of ½c, was delinquent July 15, 1921.

Property: 8 claims, 100 acres, in the Manhattan district, Nye county. An 100' (Feb., 1921) shaft uncovered $25 gold-silver ore. Equipped with electric hoist, compressor, etc.

BLACK METAL MINES, INC. NEVADA

Main office: 516 Felt Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Nev.

Officers: W. F. Snyder, pres.; Ed. H. Snyder, sec.-treas., with Willard Scowcroft, R. J. Evans and Geo. W. Snyder, mgr., directors. Jas. Quirk, supt.

Inc. May 5, 1918, in Nevada. **Cap.** $99,000; shares 10c par; assessable; 990,000 shares outstanding, of which 550,000 are owned by Bristol Silver Mines Co. Two cent assessment levied in fall of 1920 and one of 1c became delinquent Aug. 8, 1921. Stock listed on Salt Lake City Stock Exchange. Annual meeting 1st Tuesday in January.

Property: about 250 acres, N. W. of Pioche, in Jack Rabbit district, Lincoln county, includes 6 claims, and the Gusset Patch group of the Simon Bamberger Co., held under a 5-year lease from February, 1918. A lease on the Day mine expired when this and other holdings of the Uvada Copper Co. were taken over by the Bristol Silver Mines Co.

Geology: ore occurs in a replacement deposit of irregular dimensions in limestone, the mineralized area extending to depth of 900' and for about 700' on the dip of the bedding, on the 325' level. Values are mainly in silver, with a little copper. The ore is desirable as a smelter flux, as it contains iron and manganese. As shipped in 1920, the silver content was 12 to 15 oz., although one pocket of 285 oz. ore was uncovered.

Development: about 2 miles of workings, including 600' tunnel and 1,200' shaft. Operations of the Black Metals company have been confined largely to the 325' level.

Equipment: includes hoist, 50 h. p. oil engine, drills and compressor. Reported shipping 50 tons daily in 1919, and about the same in 1920. Twenty men employed. Cost of mining stated to have been $4.15 per ton.

Production: from April, 1918, to November, 1920, totaled 17,602 tons with a net smelter value of $111,074, including one lot of shipping ore of 54 tons which gave returns of $17,000. Total to Jan. 1, 1922, about $190,000.

In spite of apparent prosperity, high costs made operations difficult in 1920. Reported early in 1921 that controlling interest in the Black Metal Mines, Inc., had been acquired by the Bristol Silver Mines Co., and that property was being operated by lessees. By August, 1921, company had resumed operations and weekly shipments of 350 tons were reported.

BLACK METALS MINING CO. **NEVADA**

Property: an old silver producer in Black Metal canyon, 3 miles N. of the Exchequer in Cherry Creek district, White Pine county, reopened in 1918.

Production: about 800 tons during 1918.

Operated under lease by F. W. Fletcher.

BLACK MOUNTAIN SILVER MINING CO. **NEVADA**

Address: of company and secretary, Box 111, Mina, Nev.

Officers: Louis W. Whiting, pres.-mgr.; Dr. A. E. Sparks, v. p.; W. W. Whiting, sec.-treas.; these comprise the directorate.

Inc. October 14, 1919. **Cap.** 1,500,000 shares; 10c par; 1,046,000 shares outstanding. Transfers made at Mina.

Property: 7 unpatented claims, 110 acres, in Black Mountain district, 2 miles N. of Marietta, Mineral county. The main vein, 5′ wide, is described as a contact fissure in diabase and altered sedimentaries, containing shipping ore said to carry 65 oz. silver and 20% lead, with some gold and copper. Still in the prospective stage.

BLACK PANTHER EXTENSION MINING CO. **NEVADA**

Address: Woodson & Carson, fiscal agents, 440 Gazette Bldg., Reno, Nev.

Officers: Geo. A. Ferris, pres.-treas.; Jas. D. Finch, v. p.; E. H. Abrams, sec.; with Kit Carson and R. H. McIntosh, directors.

In February, 1920, 20,000 shares were offered at 5 cents each.

Property: 5 claims, 3½ miles N. of Reno, Washoe county, said to carry the extension of the Black Panther vein. Col. Carson is also associated in the management of the Black Panther Mng. Co.

BLACK PANTHER MINING CO. **NEVADA**

Office: Gazette Bldg., Reno, Nev.

Officers: J. M. Molina, pres.; H. W. Miller, v. p.; J. A. Molina, sec.-treas.; with A. Marsal (supt.) and E. L. Drappo, directors. Kit Carson, fiscal agt.

Inc. in Nevada. **Cap.** $150,000; par 10c.

Property: 6 claims in the Peavine district, Washoe county, 3½ miles N. of Reno, shows a mineralized zone between andesite and granite. Chalcocite ore was opened on 165′ level, carrying 12% copper, fair silver value, some lead and gold. Developed by a 200′ shaft, to be continued to 500′. Equipped with an electric hoist and compressor.

Developing in 1921.

BLACK ROCK MINE **NEVADA**

Office: 526 Main St., Racine, Wis. Mine 6 miles east of Yerington, Nev. Property privately owned by Wm. D. Thompson, of Racine, Wis.

Property: 3 patented claims, 52 acres, in Mason district, Lyon county, show 3 parallel fissure veins in quartz-monzonite 2 of which of 6 to 10′ average width are traceable 2,600′. Developed by shafts, 80′ and 120′ deep, showing chrysocolla and chalcopyrite said to give returns averaging 6%-7% copper per ton.

BLUEBIRD CONSOLIDATED MINING CO. **NEVADA**

Mail returned from former address, Reno, Nev.

Property: the old Mexican mine at Ellsworth, Nye county, 11 miles W. of Ione and 14 miles N. of the Simon mine. A large production is reported from former operations and dumps are said to contain 17,500 tons of $39 silver ore. Tailings are said to be worth treating again—the third time. **Development:** by 500′ tunnel connecting with old shaft.

BLUE DICK MINING CO. NEVADA

Address: Don H. Petty, mgr., Hilltop, Nev., or Battle Mountain, Nev.

Property: Blue Dick mine at Hilltop, 20 miles S. E. of Battle Mountain, Lander county, reported to be shipping about 10 tons of 42 oz. silver ore daily. An air-compressor and machine drills were installed early in 1919.

Shipments of fluxing ore also made to Mammoth smelter, Kennett, Calif. Operated 1919-20.

BLUE HORSE MINING CO. NEVADA

Address: Tonopah, Nevada.

Officers: J. W. Plant, pres.; W. H. Bissel, v. p.; Frederic N. Lee, sec.; Roy H. Elliott, treas., with J. W. Matson and Geo. K. Allen, directors.

Property: in the Silverbow district on the W. side of the Kawich range, Nye county, 43 miles E. of Goldfield, shows a vein system in silicified rhyolite. One vein exposed for 1,500′ is 4-11′ wide, carrying free gold and ruby silver.

Development: by stripping and shafts 30 to 150′ deep. Expenditures to May, 1921, were $80,000. A pilot mill is in use and sinking of 300′ two-compartment shaft underway.

BLUE JACKET DIVIDE MINING CO. NEVADA

Office: A. S. Proskey, 314 Clay-Peters Bldg., Reno, Nev.

Organized in October, 1919. Owns 100 acres in N. E. part of district, near Lookout Divide claims.

BLUE LIGHT COPPER CO. NEVADA

Address: care C. W. Marsh, pres., Washington, D. C. **Mine office:** Mina, Mineral county, Nev.

Officers: Henry L. Dollman, v. p.; F. M. Baker, Carson City, Nev., sec.; Wm. C. Osborne, treas.; preceding officers, Chas. N. Van Cleave, Chas. E. Test and Richard Stegemeier, directors.

Inc. Oct., 1907, in Nevada, as successor of Blue-Light Mining Co. **Cap.** $2,500,000; shares $1 par.

Property: 14 miles from Mina, Mineral county, developed by 600′ shaft from which several carloads of rich carbonate ore have been shipped. Shaft reached sulphide zone in 1917, but workings had not yet passed through leached material. Mine is equipped with hoist, buildings, etc. Examined by R. W. Hadden. Idle, 1919-21.

BLUESTONE MINING & SMELTING CO. NEVADA

Office: 42 Broadway, New York City. **Mine office:** Mason, Nev.

Officers: D. M. Steindler, pres.; John Carson, v. p.-mng. dir. with J. B. Woddell, H. M. Marler and M. B. Davis, directors. H. M. Thompson, sec-treas.

Inc. May 18, 1917, under laws of Maine. **Cap.** $2,000,000; $10 par; 100,000 outstanding.

Property: 440 acres, 380 patented, including the Bluestone mine and a group of 20 claims adjoining the Mason Valley mine in Lyon county. Formerly owned by the late J. D. DeLamar. The Bluestone is the oldest property in the district, claims having been patented previous to 1890.

Geology: ore is mainly chalcopyrite, associated with considerable epidote, in a garnet-limestone gangue, there being practically no oxidized ores, even at the outcrop. Ore is uniform in character, and after a light roast is well adapted to magnetic separation. Drill-holes proved that ores extend to 750′ depth.

Development: mine has been opened to a depth of 540′ and has 2 miles of workings, including a 1,300′ main haulage tunnel, cutting an ore-shoot about 300′ wide and 500′ long at a point 300′ below the apex. This shoot is said to carry an 80′ paystreak of high-grade ore, ranging up to 20% in tenor, with balance of ore carrying 2.5% copper. Management estimated 1,600,000 tons of ore in sight, averaging 2.6% copper, in 1917.

Equipment: includes a 50-h. p. hoist, 25-drill electric air-compressor, and 800-ton flotation plant, which supersedes the old magnetic plant.

Company built 2½ miles of railroad from Mason to the mine in 1916.

September, 1919, were suspended in March, 1920.

Production: in 1919, up to time of stopping work, due to the market, monthly output was about 1,750,000lb of copper. Sale of metals during 1919 realized $494,913; there was a net loss of $248,601. Operations resumed

A suit brought December 1, 1919, by Martin J. Heller to recover commissions is still pending.

BLUSTER CONSOLIDATED MINING CO. **NEVADA**

Mine at Jarbidge, Elko county, Nev.

Officers: T. B. Beadle, pres.-gen. mgr.; Frank Benan, v. p.; Geo. Winkler, sec.; J. D. Goodwin, treas.

Property: the Bluster, or Winkler mine, with 2 principal claims, in Jarbidge district, 2½ miles S. of Jarbidge, shows gold ore in 4′ to 7′ veins in silicified rhyolite, said to assay $10 to $40 per ton. **Ore reserves:** management estimated 100,000 of milling ore, valued at $12 per ton, blocked out and on dumps, January, 1915.

Equipment: 10-stamp mill, sawmill, aerial tramway, electric power. A cyanide plant treats the tailings.

Idle, 1919-20. Property reported sold, September, 1921, to the **Bonanza Gold Mng. Co.**, of Los Angeles, Cal.

BONANZA DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with H. C. Price, directors.

Inc. in 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 4 claims, adjoining Golden State Divide, in Klondyke section of Divide district.

Reported March, 1921, to be under option to **Liberty Divide Mng Co.** A prospect.

BONANZA GOLD MINING CO. **NEVADA**

Address: S. A. Bostwick, Los Angeles, Calif., or R. A. Cook, Jarbidge, Nev.

Company reported to have purchased mine of the **Bluster Cons. Mining Co.** (q. v.). It is proposed to electrify plant and to increase size of mill.

BONANZA MINING CO. **NEVADA**

No returns received from former mine office, Winnemucca, Humboldt county, Nev. Company was controlled by Chas. Baagoe and D. F. Shiveley at last accounts.

Property: 5 claims, 5 miles from Winnemucca, shows a contact fissure vein 11-22′ wide and proved for length of 115′, between diorite-porphyry hanging wall and lime shale footwall. Development includes 3 shafts, deepest 215′ with crosscuts, a tunnel driven east from No. 2 shaft, 37′ deep and a winze sunk all in ore. Mine has no equipment.

BOSS EXTENSION MINING CO. **NEVADA**

Address: Al E. Buys, gen. mgr., Goodsprings, Nev.

Inc. Nov. 12, 1914, in Nevada. **Cap.** $1,000,000; $1 par; 558,500 issued. In December, 1916, company sold 100,000 shares, which were offered to the public at 11 cts.

Property: 3 claims, 60 acres, adjoining the Boss mine and between it and the Oro-Amigo mines in the Yellow Pine district, Clark county. Claims show a porphyry dike, whose mineralized contact with limestone is said to carry platinum-gold ore, like that of the Boss mine.

Development: by 40′ shaft and 2 tunnels (250′). No recent returns.

BOSS GOLD MINING CO. **NEVADA**

Address: Goodsprings, Clark county, Nev.

Officers: S. E. Yount, pres.; O. J. Fisk, v. p.; Lane C. Gilliam, sec.-treas.-mgr., with N. K. Potter and F. J. Kent, directors.

Inc. 1914, in Nevada. **Cap.** $1,000,000; $1 par; 408,500 outstanding. Annual meeting third Wednesday in January.

Financial statement January 1 1918, showed cash in bank, $3,725; Liberty bonds, $10,000; due from smelters, $1,149 Smelter returns; in 1916, $45,725;

in 1917, $70,806; in 1918, $17,546. Revenue from January to June 1919, inclusive, totaled $15,327. In July there was $11,096 on deposit plus $10,000 of bonds.

Dividends: $8,170 in 1916; $32,680 in 1917; $20,425 in 1918.

Property: 5 claims, 85 acres, unpatented, 12 miles W. of Goodsprings, and 3 miles from Platina.

Geology: orebodies consist of oxidized copper ore, mostly chrysocolla and limonite, and of gold-platinum-palladium ore in fine-grained siliceous gangue. The later ores contain a small quantity of bismuth plumbojarosite (a hydrous sulphate of iron and lead). The shoots can be mined separately. The orebodies occupy a nearly vertical zone of fracturing in the horizontal strata of dolomite, caused by quartz monzonite porphyry intrusions. The zone is 30′ wide on surface, 100′ long, with precious metal shoots confined to the 12′ resting on the footwall. For further details see "Eng. & Min. Journ." of August 20, 1919.

Development: by tunnels and over 6,000′ of workings. Reserves in one shoot, according to W. L. Uglow, were 1,000 to 2,000 tons, averaging 3.46 oz. gold, 6.4 oz. silver, 0.70 oz. platinum, and 3.38 oz. palladium. During first half of 1919, there was 330′ of work done.

Production: in 1916, 451 tons copper ore and 295 tons platinum-bearing ore; in 1917, 443 tons of ore yielded 107 oz. platinum (0.24 oz. per ton), and 400 oz. of palladium (0.9 oz. per ton); in 1918, 605 tons copper ore and 90 tons platinum-palladium ore, netting $6,040; in 1919, two cars of copper ore realized $1,139, and three cars of platinum-palladium ore $22,365.

The Overmire mill proved a failure, and the cost of handling the ore was so much higher than expected that the Palau Co. ceased operations early in 1918 and the mill has since been dismantled.

The present management has prospected for new orebodies since 1919, but met with little success.

BOSTON & ELY CONS MINING CO. NEVADA

A consolidation of the Boston-Ely Mining Co., Smokey Development Co., and Ely Northern Copper Co.

Office: 25 Broad St., New York. **Mine address:** Ely, Nev.

Officers: L. E. Whicher, pres.; C. C. Burger, v. p.; R. M. Atwater, Jr., treas., with W. W. Cohen, W. F. Bartholomew, Geo. R. Presby, H. W. Barrett, W. N. McGill and A. L. Kingsbury, directors. L. J. Corwin, sec. Raymond Guyer, gen. mgr.; S. H. Williams, mgr. at Ely; W. H. Boyle, supt.

Inc. 1919, in Delaware. **Cap.** $1,000,000; $1 par; 897,210 outstanding. N. Y. Trust Co., transfer agent; U. S. Corporation Co., registrar. Annual meeting, 3rd Tuesday in February. Stock listed on Boston Curb.

On Dec. 31, 1921 assets were $1,102,790; including property and improvements, $797,663; development $60,541, current $141,795. There were no current liabilities.

Property: 572 acres in Robinson mining district, White Pine county, about 140 miles from Cobre on the Southern Pacific R. R.

The Boston-Ely ground is 4½ miles from that of the Smokey group, the Nevada Consolidated and Consolidated Copper mines lying between. The Smokey and Ely Northern are 1/3 mile apart. All have rail connection nearby.

The mines had been idle for many years and are fully described in former volumes of this book; **Ely No. C. Co.**, Vol., VIII; **Boston-Ely**, Vol. XI; **Smokey Development**, Vol. XI.

Company also owns an interest in the **Colonial Silver Mines** at Oaxaca, Mex., and in some oil-lands.

Geology: the copper-bearing ores occur in contact deposits between limestone and porphyry, as well as in the porphyry itself.

Development: by 1,230′ shaft in the Boston-Ely, which, with drifts and machinery, cost $180,000; this shaft is 3,000′ from the Alpha shaft of Consoli-

dated Coppermines; by 1,800′ tunnel in the Smokey, costing $60,000; by 300′ tunnel in the Ely Northern costing $15,000.

Beginning April, 1920, all effort was concentrated on the Ely Northern, which is developed by 636′ tunnel cutting a copper-bearing limonite orebody 420′ from portal, and from which a 290′ shaft was sunk with levels at 50, 100, 200, and 280′. Workings totaled 2,700′ in July, 1921. Vein is 10-15′ wide, the ore assaying 5 to 8% copper . By October, 1921, ore reserves were 180,000 tons.

Equipment: at Ely Northern includes semi-Diesel compressor and hoists.

Outlook for company is considered favorable, as indications on the Ely Northern, possibilities in the Smokey, and proximity (3,000′) of the Boston-Ely to the Consolidated Coppermines Alpha mine, give it several chances to make a producer.

BOYER COPPER MINES CO. **NEVADA**

Address: Boyer, Churchill county, Nev. Arthur Howe Carpenter, cons. engr., 210 Noble Ave., Crafton, Pa.

Property: 49 claims, 1,000 acres, also a 10-acre millsite and 160 acres of placer lands, at Boyer, about 30 miles from Wonder, Nev., and 75 miles south of the S. P. R. R. at Winnemucca, in the copper belt of the Piute mountains, controlled by Crofton Umacke, of Reno, Nev., at last accounts.

Geology: covers a mile of the western end of a contact between whitish andesite and an underlying greenstone, or andesite, which shows copper pyrite peppering the rock. The ore bed has a dip of but 20° and a thickness of 100′ and is much altered, the footwall being a hard, silicious band. The lower 30′ carries 5% copper, but the orebody developed was figured by Prof. Carpenter and A. H. Carpenter to assay 1.7% copper and about 70 cts. per ton in gold. High-grade ore occurs in small iron-capped veins which extend up through the porphyry and carry a breccia of rock fragments cemented by copper glance and bornite.

Development: by tunnels, now inaccessible. Present company has done about 500′ of work on Treasury Box hill and exposed a faulted block of 200′ length, 100′ width and with 500′ depth on the dip, assaying as above. Property promising when railroad facilities are provided.

BRISTOL CONSOLIDATED MINES & SMELTING CO. **NEVADA**

Dead. Company owned 21 or more patented claims in the Bristol district, Pioche, Lincoln Co., which in 1911 were transferred to the Day Bristol Cons. Mines Co. See Bristol Silver Mines Co. for later history of property.

BRISTOL SILVER MINES CO., THE **NEVADA**

Office: 220 Felt Bldg., Salt Lake City. **Mine address:** Pioche, Nev. C. G. Gilmore, supt.

Officers: W. I. Synder, pres.; W. F. Synder, v. p.; E. H. Synder, sec.-treas.; Geo. W. Synder and R. J. Evans, directors.

Inc. 1919, in Nevada, and brought larger part of property of the Uvada Copper Co., then under lease to Black Metals Mines Co. **Cap.** $100,000; par 10c.; 800,000 issued. Stock is closely held. Company owns 550,000 of 990,000 issued shares of Black Metals Mines Inc., the ground of which adjoins. Ownership of this property, or part of it, has passed through many hands, but Snyder interests have been largely in control. Originally owned by Bristol Cons. M. & S. Co., it was transferred in 1911 to the Day Bristol Cons. Mines Co., and in turn to the Cons. California-Nevada Mng. Co. in 1915. The latter after a very brief struggle went into receiver's hands, and property was acquired by the Uvada Copper Co., which in 1918-19 leased it to the Black Metals Co.

Financial statement: purchase price of holdings, $96,000; acquisition of new machinery, $15,000. Indebtedness as of Oct. 1, 1921, $20,000.

Property: 324 acres, patented, in Jackrabbit district, Lincoln county, 16 miles N. of Pioche, includes Hillside, Gypsy, May Day and 5 other old mines. A series of limestone beds overlying shale and quartzite contains replacement deposits of oxidized and carbonate lead-silver ores, the May Day being

the most important. A typical assay return shows 13 oz. silver, 9% lead, 2% copper and 40c gold, with sufficient iron and lime to make ore desirable as a flux.

Development: by former operators totals several miles including a 3,800′ tunnel, to a depth of 700′. Present work began May, 1920, and has been centered on the May Day and Gypsy mines, the workings of which are connected, where a rich ore shoot, 4′ wide and 125′ long has been opened in the main channel; widths increasing to 30′ at junction of cross fissures. An incline has been sunk from the 600′ to 900′ level and it is proposed to connect the Hillside mine with main workings and to continue tunnel. Much of the exploratory work is being done by lessees. Total cost, including smelting, is about $12.40 per ton of ore.

Ore reserves: on Oct. 1, 1921, were 50,000 tons, assaying 40c gold, 11 to 20 oz. silver, 7.5 to 16% lead, and 1.7 to 2.5% copper, as compared with 20,000 tons in May, 1919.

Equipment: includes hoist and 2 compressors with 10 drill capacity driven by distillate engines; 9,000′ aerial tram connecting mines with the Pioche Pacific Ry. at Jackrabbit; all valued at $120,000. Company employs 40 men.

Production: in earlier days said to be $6,000,000; by present management, $161,000 net in 16 months ended Oct. 1, 1921, and now at rate of about $10,000 net per month.

BROHILCO SILVER CORPORATION **NEVADA**

Address: Dr. W. E. Harrison, Fallon, Nev.

Geo. Edson Porter, pres., M. B. Wilson and W. E. Harrison control the company. C. R. Olson, cons. engr.; Mr. Keith, supt.

Property: 5 scattered groups, 13 claims and fractions in Churchill county, 4½ miles S. E. of Broken Hills, Nve county, and 70 miles S. E. of Fallon, includes the Silver Leaf and Black Reef groups, 1½ miles apart. Gold-silver-copper occurs in veins, 4′ wide.

Development: consists of trenching and shallow workings, deepest about 100′. Late in 1921, small shipments of high grade ore were made to the Kansas City-Nevada mill at Bruner (or Phonolite).

BROKEN HILL DIVIDE MINING CO. **NEVADA**

Officers: John McGee, pres. and mgr.; J. C. Williamson, sec.

Property: 4 claims, adjoining the Anaconda Divide on N. E., 3 miles N. W. of Gold mountain. A prospect on outskirts of district.

BROKEN HILLS COMBINATION MINING CO. **NEVADA**

Address: 317 State Bank Bldg., Tonopah, Nev.

Officer: Wm. Forman, pres.; W. E. Edwards, v. p.; Wm. McKnight, sec.-treas.; with Jas. Logan and F. M. Maloney (cons. engr.), directors.

Cap. $150,000; 10c. par; 750,000 treasury shares.

Property: 6 claims in the Broken Hills district, 15 miles S. E. of Fairview, Churchill county, and N. W. of the Broken Hills Silver Corp. Supposed to cover the extension of the latter's vein system; main vein 7′ wide in andesite. Still in a prospective stage, March, 1921, at which time Tonopah brokers were offering first allotment of treasury stock at 7¢. The same offer was being made in June.

BROKEN HILLS MINING CO. **NEVADA**

Property now owned by **Broken Hills Silver Corp.**, which see.

BROKEN HILLS SILVER CORPORATION **NEVADA**

Successor to Broken Hills Mng. Co., for which see Vol. XIV. An example of what G. G. Rice did with other people's money. Information, from interested sources, is as follows:

Office: 259 North Virginia St., Reno, Nevada. **Mine office:** Broken Hills, Nev.

Officers: Ed. Malley, pres.; G. C. Ross, v. p.; J. T. Goodin, treas.; Eugene Grutt, sec., with C. E. Bingham and Jas. Boyd, directors. J. T. Whitmire, asst. sec.; Wm. H. Kinnon, mgr.; Otto E. Schiffner, supt.

Inc. May, 1920, in Nevada. **Cap.** $300,000; 10c. par; 1,400,000 issued. The Fidelity Finance & Funding Co. (a Rice organization) of Reno, Nevada, underwrote 2,000,000 treasury shares to net Broken Hills $380,000.

Financial statement: of April 4, 1921, shows total receipts of $161,900. Expenditures include part payment for property, $79,624, and all other, $82,276, leaving a balance of $225,147 due on property. The Fidelity company advanced $13,000 more, but on May 25, declined to carry out contract, leaving treasury without funds and company in debt for labor. Stock sold for 3¢ per share, May, 1921.

Property: the Broken Hills and Cracker Jack groups, 135 acres, formerly owned by Broken Hills Mng. Co., 15 miles S. E. of Fairview and 63 miles S. E. from rail at Fallon, also the Mt. Morgan and Mother Lode groups, 200 acres one mile away, all in the Broken Hills district, Churchill county. The B. H. mine under development since 1913, was acquired, 1920. Reported that mine has 9 veins, 6 under development. Management claimed that Broken Hill vein showed 9′ of $24 ore, the Fideity vein 6′ of $30 ore; the Belmont Cross 2 to 6′ of ore with a 9″ rich streak; all on the 150′ level. This ore apparently occurs in bunches, since shipments do not confirm these figures.

A report by Thompson says vein was opened for 2,100′ in length and 150′ depth, yielding 400 tons of 130 oz. silver ore, with $15 ore on dump and in workings to value of $101,000.

Development: by 4,500′ of work, including Broken Hills, 350′ shaft with 5 levels, developing Fidelity, and Broken Hills veins. Also the 150′ Belmont shaft, with 850′ of work, the 100′ Crown Point and 50′ Black Dog. **Equipped** with 2 heavy gasoline hoists.

Production: from 1913 to 1920, inclusive, about $70,000; 225 tons sorted ore shipped to Hazen returned 188.8 oz. silver and 19% lead, equal to $206.43 per ton.

After scandalous stock rigging operations in 1921, the State Corporation Commissioner of California refused to permit stock sales in that State. After Rice quit company, it engaged Wm. H. Kinnon of the Kansas City-Nevada Cons. M. Co. to examine and to take charge of mine. His sampling showed that mine held 7,092 tons of available ore of gross value of $132,225, with 11,092 tons in stope fills and dumps, valued at $202,225.

The Kansas City-Nevada Cons. is to treat Broken Hills ore at its Bruner (or Phonolite) 50-ton mill, 12 miles from the mine, on a 50-50 basis under Mr. Kinnon's management.

BROOKLYN MINING CO. **NEVADA**

Address: E. S. Shields, sec.-treas., 125 W. Broadway, Butte, Mont. Mine near Contact, Elko county, Nev. S. V. Kemper, pres.; W. A. Kemper, v. p.

Inc. 1898, in Montana. **Cap.** $500,000; shares $1 par; 213,000 shares issued.

Property: 7 claims, 75 acres in the Contact district, with ore deposits occurring on the contact between limestone and porphyry. This ore belt is about 18′ wide, runs E.-W. for several thousand feet, dips at 75° and is said to contain 8% copper with about 2 oz. silver and $1 gold per ton.

Development: by 196′ shaft with 600′ of workings, said to have developed 2,000 tons of ore. Idle for several years, awaiting the advent of railway, which is 40 miles away. Equipped with 25 h. p. boiler, 15 h. p. gasoline engine and hoist.

BROUGHER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. C. Brougher, pres.; George Wingfield, v. p.; Jas. Grimes, 2nd v. p., with G. A. Kernick and Gust Hanson (supt), directors. E. J. Erickson, sec.-treas.

Inc. March 16, 1918, in Nevada. **Cap.** $1,000,000; $1 par; 851,508 outstanding; assessable. Assessments No. 1 and 2, of 2¢ each, levied February

and November, 1921. Transfers made at company's office; Tonopah Banking Corp., registrar. Listed on San Francisco Stock Exchange. Annual meeting, first Monday in April.

Property: 7 claims, 72 acres, lying immediately north of the Tonopah Divide and southwest of the Divide Extension.

Development: since 1918, includes a main shaft of 500', a winze sunk a further depth of 296', and many feet of crosscuts, drifts and raises. Work going on at the rate of about 200' per month.

Equipment: electric hoist, compressor, drills, etc.

BUCK & CHARLEY MINING CO. NEVADA

Succeeded by **Rochester Buck & Charley Mines Co.**

BUCKEYE BELMONT MINES CO. NEVADA

Office: 1055 Spitzer Bldg., Toledo, Ohio, and Tonopah, Nev.

Officers: A. B. Tillinghast, pres.; W. B. Kober, v. p.; W. B. Voorhees, sec.; also directors. E. F. Rowley, treas.; Letson Balliet, mgr.

Inc. 1908, in Nevada. **Cap.** $2,000,000; $1 par; outstanding 700,000 shares. Annual meeting, first Thursday in January. Private corporation. Stock unlisted. Is a holding company, operating property formerly owned by Belmont Extension Mng. Co., now defunct, and holding interests in the Buckeye Eagle and Buckeye Tonopah companies. Reported in Oct., 1915, to have taken an option upon a drift gravel property in Plumas county, Cal.

Property: 15 claims, 13 patented, 300 acres, at Tonopah, adjoining the Tonopah Belmont on a portion of the east end line.

Ore: quartz with silver sulphides and gold occurring in fissures in trachyte. Veins strike E. W. and dip 30°. There are two large veins of low-grade ore with several rich stringers. No production to date.

Development: 3 shafts, 125', 900', and 1,234' deep, with 5,000' workings.

Equipment: includes 2 electric hoists of 52-h. p. and 120-h. p., one 40-h. p. gasoline hoist and two 8-drill air compressors.

Idle for a number of years but rumored that work had resumed summer of 1921, to explore for extension of orebody opened on Rescue-Eula ground.

BUCKEYE CONS. MINING CO. NEVADA

Address: W. O. Woodbury, pres., Reno, Nev.

One of the early day Comstock companies, its mineral holdings reported taken over early in 1922 by **Silver Hills Nevada Mines Co.**, which see.

Property: the Buckeye claim (patented 1869), 200 x 3,000' and several fractions, 30 acres, ¾ mile N. E. of Silver City, Lyon county, covers a part of the south end of the Brunswick-Occidental lode, developed by 650' incline. The orebody occurs in an andesite-rhyolite contact, with commercial gold-bearing ore averaging 14' wide. No work has been done below the 200' level since 1876. Early production is said to be $1,000,000; lessees are reported to have paid $200,000 in royalties during past 15 years.

BUCKEYE EAGLE MINING CO. NEVADA

Tonopah, Nev. Control held by **Buckeye-Belmont Mines Co.**, with same officers and directorate.

BUCKEYE TONOPAH MINING CO. NEVADA

Tonopah, Nev. Control held by **Buckeye-Belmont Mines Co.**, with some officers and directors.

BUCKHORN MINES CO. NEVADA

Buckhorn, Nev. Property shut down permanently, Feb., 1916. Plant dismantled. **Address:** George Wingfield, owner, Reno, Nev.

BUCKHORN SYNDICATE NEVADA

Address: E. B. Bronson, 111 Broadway, N. Y. City.

Property: a group of claims, 30 miles north of the Tonopah-Ely stage road. Shows ruby-silver ore in a deposit in porphyry. Developed to depth of 150' by tunnel and winze. Claims have abundant water and pine timber, and are about 2 miles west of the Stone Cabin Valley.

The Syndicate holds oil leases in Oklahoma.

BUCKINGHAM MINING CO. OF NEVADA. **NEVADA**

Address: Battle Mountain, Nev. C. W. Burge, supt.

Officers: Axel Johnson, pres.; Robt. F. Schmeiser, v. p.; Chas. F. Ayer, sec.-treas., 425 First Natl. Bank Bldg., San Francisco.

Inc. March 10, 1919, in Nev. **Cap.** $500,000; 25¢ par. Annual meeting, 1st Monday in March.

Property: 27 claims near Battle Mountain, Lander county, shows 2 veins, 2 to 15′ wide, containing gold-silver-lead ores, developed by shaft and tunnel.

BUCKSKIN DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 2 claims S. of the Pershing and W. of the Bullion Divide.

BUCKSKIN NATIONAL GOLD MINING CO. **NEVADA**

Address: W. J. Bell, National, Humboldt county, Nev.

Property: at the S. end of the National gold district. In fall of 1920, property was operated by lessees, who reached a 10′ vein by 900′ tunnel, about 300′ below surface. Ore carries ruby silver and free gold and is said to assay up to $100. One shipment of 9 tons yielded net return of $2,898. Work being continued thru 1921.

BUENA VISTA DEL ORO M. & M. CO. **NEVADA**

Address: Unionville, Nev. J. C. Skinner, pres.

Property: at Dun Glen, Pershing county. Old mines being reopened and operated through Golden Bell 176′ level. Claim to have 100,000 tons milling ore blocked out. A 25-ton Gibson mill was purchased, summer of 1920.

BUFFALO VALLEY MINES CO. **NEVADA**

Address: Lovelock, Nev. John T. Reid, mgr.; O. P. Richards, supt., Volney, Nev.

Inc. Jan. 7, 1916, in Arizona. **Cap.** $500,000; shares $1 par; 225,000 shares outstanding; Mines Dev. Co. of Nev. owns 60,000 shares.

Property: 25 claims, 500 acres, about 18 miles S. of Volney. Ore occurs in a quartz vein in limestone, 1 to 25′ wide, with N. S. course, and dip 35° W. Pay-ore occurs in shoots 100′ long, said to average $7.75 in gold.

Development: by 300′ shaft, reported to prove ore reserves of 25,000 tons.

Idle since 1917. Management plans resumption of operations as soon as normal working conditions prevail .

BULLION CONSOLIDATED MINES CO. **NEVADA**

Address: Goldfield, Nevada.

Property: in Lida (Tule Canyon) district, Esmeralda county, produced some lead-silver ore in 1919-20. Equipped with a concentrating plant, using Herman ball mill.

BULLION DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. Harry Price, res. agt.

Officers: W. F. Reading, pres.; S. A. Kimmel, v. p.; G. M. Reading, sec.-treas., with G. A. Bartlett, J. P. Bell, Roger Dougherty, directors.

Inc. March, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par. Listed on Boston Curb.

Property: Wonder group, 4 claims, 70 acres. Surface exposure of fissure veins reported to be well mineralized. A prospect of no especial merit.

BULLION GOLD & SILVER MINING CO. **NEVADA**

Office: 265 Russ Bldg., San Francisco, Calif.. **Mine address:** T. F. McCormick, supt., Virginia City, Nev.

Officers: H. L. Slosson, Jr. pres.-mgr.; H. Zadig, v. p.; with W. H. Moise and J. B. Shaw, directors. Chas. D Olney, sec.

Inc. Nov. 1904, in Calif. **Cap.** $100,000; par $1; all outstanding; assessable.

Property: on the Comstock lode, patented, at Virginia City, Storey county, between the Exchequer and Potosi, covers 944′ on the strike of the

lode below the Sutro tunnel level. Developed by 2,300' shaft. The ground above the Sutro tunnel was transferred by deed in 1920 to the upper Comstock Mng. Co.

Company is a non-producer and property has been merged with others on the lode into **Middle Mines Ass'n,** which see.

BULLION MINING CO. NEVADA

Address: Jean, Nev. **Gen. office:** 61 S. Main St., Salt Lake City, Utah.

Officers: F. L. Copening, pres.; R. P. Morris, v. p.; A. O. Jacobson, mgr., with H. W. Pingree and Willard Scowcroft, directors. M. C. Morris, sec.

Stock assessable. Four 1-cent assessments levied in 1918.

Property: at Goodsprings, Clark county, 8 miles from rail.

Ore: occurs in ledges between white and blue lime on bedding plane, carrying lead and zinc, and about 10 oz. silver to the ton.

The mill was closed down September, 1917. Late in 1919 there was a change of control, and operations up to June, 1920 had produced 5 cars of ore from a 4' vein; cars netted $400 to $1,250 each.

BULLSHEAD MINING & SMELTING CO. NEVADA

Address: 221 I. O. O. F. Bldg., Reno, Nev., or P. O. Box 67, Wells, Nev.

Officers: and directors: C. E. Mack, pres.; Mrs. M. M. Johnson, v. p.-treas.; L. E. Johnson, sec.; Herman Davis, mgr., Clover City, Nev.

Inc. Nov. 29, 1918, in Nevada. **Cap.** $10,000; 1c par; assessable; 613,675 issued.

Property: the Bullshead mines, 10 claims, 4 patented, in Spruce Mtn. district, Elko county, 16 miles from W. P. Ry., said to show lead-silver ore in fissure vein in carboniferous limestone cut by igneous rocks. Ores assay 4.8% lead and 28.4 oz. silver. Waste dump samples average 3.1% lead, 15.5 oz. silver per ton.

Development: by 1,900' Scorpion tunnel No. 2 and 4,200' of workings. Reserves were estimated Oct., 1919, at 10,000 tons, worth $600,000. Development continued until late in 1920, and was resumed in May, 1921. A new tunnel is said to have opened an orebody 2 to 8' wide, assaying 22 oz. silver and 59% lead. Lessees are also operating.

Equipment: complete; a 50-ton smelter was blown-in, Nov., 1919, using fuel consisting of 60% mountain mahogany and 40% coke, but closed down for the winter after making test run. Appears to be a meritorious promotion according to report of Herman Davis.

BULLWHACKER CONSOLIDATED MINES CO. NEVADA

Address: W. A. Barnes, Eureka, Nev.

Officers: W. A. Barnes, pres.; B. F. Shepherd, v. p.; J. B. Cottle, sec.-treas.; with E. S. McCurdy and Frank Romain, directors.

Inc. 1919, in Nevada. **Cap.** $600,000; $1 par; 35,000 shares issued. Stock listed on San Francisco Stock Exchange.

Property: 111 acres on Adams hill, Eureka district, Eureka county, under same general management as the Eureka Holly which it adjoins on the west. Includes the Bullwhacker and Silver West claims (patented) which, located 1869, produced $500,000 above the 300' level. Ore is silver-lead in limestone and only high grade was formerly exploited. Stope fills are said to average $38; there is said to be 35,000 tons of $20 ore also available.

Development: preparations being made to attack orebody through the Eureka Holly shaft at its 430' level; this will undercut Bullwhacker workings by 100'.

Equipment: complete surface plant; power and air obtained from Eureka Holly; ores to receive treatment in Eureka Holly mill, completed in 1921.

BURLINGTON-NEVADA COPPER CO. NEVADA

Idle. Property at Mason Pass, a few miles from Yerington, is developed by a 100' shaft, from which ore was shipped to the Mason Valley smelter.

BUTLER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. C. L. Lisle, res. agt.

Officers: A. I. D'Arcy, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas., with L. L. Dellinger and Anthony Ellfner, directors.

Inc. April, 1919, in Nevada. **Cap.** $15,000; shares, 1c par.

Property: the Woodbutcher claims, 40 acres, between the Rosetta and Operator mines. Reported to show a number of quartz "blow-outs" on the ground, and that the rhyolite-breccia, the ore-bearing formation, will be reached at shallow depth. A prospect.

In April 1921, company took over the Aureola group of 5 claims in Silver Star district, Mineral county, 5 miles S. E. of Sodaville. There are several parallel veins carrying silver-lead ore, one of which was opened by drift tunnel, 200' long at last report.

BUTTE DIVIDE MINING CO. **NEVADA**

Office. Tonopah, Nev.

Officers: W. F. Reading, pres.; S. A. Kimmel, v. p.; G. M. Reading, sec.-treas. and supt., with F. G. Corde and F. R. Lewis, directors.

Inc. April 24, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c. par. Listed on San Francisco Stock Exchange.

Property: 2 fractional claims, between the Belcher Divide and Revert. **Development:** a shaft 150' deep in August, 1919, cut 5' of $25,00 ore. Vein has a N. W.-S. E. strike.

A prospect, idle, 1919-1920.

BUTTE & ELY COPPER CO. **NEVADA**

General office: 1604 Alworth Bldg., Duluth, Minn. **Principal office:** 14 West Granite St., Butte, Mont. Mine P. O.: Kimberly, White Pine county, Nev.

Officers: Jos. B. Cotton, pres.; John D. Pope, v. p.; John W. Neukom, sec. and ass't. treas.; E. R. Grochau, treas.; H. A. Holp, asst. sec.; also directors.

Inc. July 27, 1905, in Montana. **Cap.** $500,000; shares $1 par; stock was made assessable, 1907. Is a subsidiary of the Consolidated Coppermines Co., which owns 422,625 shares. On December 31, 1920, had $13,640 in cash and $275,500 in Liberty bonds and notes receivable. Net income for 1920 was $4,310. Stock is listed on the Butte Mining Exchange. Annual meeting, first Monday in June.

Property: 12 claims, patented, 210 acres, in the Robinson district adjoining the Nevada Consolidated, White Pine county, includes a valuable water right, 20 miles distant, said to be capable of supplying 2,000,000 gal. daily; also 80 acres irrigable land near water rights.

Development: 3 shafts, 1 with steam hoist, 310' deep, showing disseminated ore. Mining was suspended late in 1907, but churn-drilling was carried on in succeeding years intermittenly, developing several bodies of low-grade disseminated ore, said to show an average of 1½% copper.

In 1916 the Nevada Consolidated Copper Co. mined for account of Butte & Ely 2,218 tons of ore from the Liberty Bell and Westphalia claims. This ore assayed 1,375% copper and yielded 39,777 pounds of electrolytic copper. As the Liberty Pit is extended westward, the above and several other Butte & Ely claims will be stripped and mined on the same terms as apply to mining of Cons. Coppermines Co. ore under its contract with the Nevada company.

BUTTE & YERINGTON COPPER CO. **NEVADA**

Office: care W. E. Wright, sec.-treas., 410 Phoenix Bldg., Butte, Mont. Mine at Yerington, Lyon county, Nev.

Officers: at last accounts, were W. C. Siderfin, pres.; preceding with Dr. Thos. B. Moore, Dr. Donald Campbell, John D. Pope, and Wm. Mitchell, directors; L. W. Trankle, supt.

Inc. Jan. 29, 1907, in Montana. **Cap.** $1,000,000; shares $1 par; fully paid; issued, $351,520. Annual meeting, third Wednesday in January.

Property: 2 groups of patented claims, one of 14 claims, about 4 miles east of and across the valley from Yerington and south of the Copper Mountain mine. The land has attractive surface showings, but is without deep development work.

The second group of 9 claims, is in the heart of the camp adjoining the Mason Valley mine and the Yerington Malachite Co's ground. This property is well located and has attractive showings of ore in the tunnels and on the surface outcrops. It has been idle since 1914.

CACTUS CONSOLIDATED SILVER MINES CO. NEVADA

Address: J. P. Kendall, Goldfield, Nev.

Inc. Dec., 1919.

Property: the Cactus View claims adjoining the Cactus Nevada on the N. W. corner. Surface exposures are said to show ore assaying from $10 to $900 per ton.

CACTUS LEONA SILVER CORP'N NEVADA

Address: Goldfield, Nev.

Officers: Wm. Koenig, pres.; Chas. J. U. Koenig, v. p.; both of San Francisco. Wm. Koenig is also a director of the Cactus Nevada S. M. Co.; and the superintendency of the two companies is the same.

Property: 5 claims in Cactus Springs district, Nye county, 24 miles E. of Goldfield, and adjoining the Cactus Nevada group on S. E. Main vein is said to be 50' wide at outcrop, and to return values of 20 to 60 oz. silver and $1 to $10 in gold.

Devolpment: by a retimbered, old 200' incline. The company began operations, summer of 1920, with working fund of $50,000.

CACTUS NEVADA SILVER MINES CO. NEVADA

Address: Jos. F. Nenzel, 702 Mutual Bk. Bldg., San Francisco.

Officers: Jos. F. Nenzel, pres.; E. O. Lindblom, v. p.; with J. A. Mackenzie, W. R. Dickinson and William Koenig, directors. W. T. Beane, sec.; John R. Magill, gen. supt.; Sol. Camp, mine supt.

Inc. 1919. **Cap.** $1,500,000. Transfer agt., Security Transfer & Registrar Co., New York.

On June 4, 1920 assets were: mining property, $750,000; equipment, $15,635; construction and development, $51,120; stock discount, $2,715; and cash, $1,776. Liabilities: capital stock, and accounts payable, $373.

Property: Bailey group of 7 claims, discovered in 1904, in Cactus Springs district, Nye county, 24 miles E. of Goldfield and 29 miles S. E. of Tonopah. According to J. M. Schumann, ore occurs in fissures and fault planes in andesite, and consists of galena, ruby silver and chalcocite in quartz. Mineralization is described as a zone 50 to 85' wide, traced for 1,400', with principal values on walls. Milling ore is said to run 12 to 15 oz. silver; some of higher grade exposed on 100' level.

Development: by 265' shaft; lateral work is not as yet extensive. Equipped with gasoline hoist.

In November, 1919, it was announced that an Eastern syndicate, headed by Joseph Fynney and Albert H. Cutter of 149 Tremont Street, Boston, had arranged to put up $280,000 for development and equipment of the property. It was stated that sufficient work has been done to ensure a production of over $2,000,000 in precious metals for each 100' of depth gained, which is "going some" for a prospect. In March, 1921, Fynney & Cutter were offering the stock at $1.75 per share. Mine was apparently closed down winter of 1920-'21.

CALAVADA COPPER CO. NEVADA

Address: Suite 926, No. 111 Broadway, New York. **Mine address:** Luning, Mineral Co., Nevada.

Officers: E. B. Bronson, pres.; B. E. Page, Los Angeles, Calif., v. p.; F. C. Hart, sec.-treas.; H. A. Geisendorfer, Luning, Nev., mgr., with H. Richardson, Boston; C. J. Bender, Philadelphia; and W. D. Kent, directors.

Inc. 1913, in Delaware. **Cap.** $2,500,000; $5 par; 35,000 shares held in treasury. Security Transfer & Registrar Co., New York, transfer agent.

Up to March, 1919, $364,044 had been spent on property.

Property: Copper Mountain group, 24 patented and 10 unpatented claims, 500 acres, in Sante Fe district, 8 miles E. of Luning, Mineral county, Nev., on the So. P. R. R., and the Darwin Unit, 9 patented claims, 180 acres at Darwin, Inyo county, Calif.

Geology: copper occurs as oxide and carbonate in vein, 40′ to 150′ wide, with sulphides at depth, in contact deposit between granite and limestone. Considerable oxidized ore has been developed between the 700′ and 1,000′ levels, which is sufficiently high-grade to mine and ship at a profit under normal conditions. Ten carloads from development work were shipped which ran from 6 to 10½% copper with small amounts in gold and silver.

Development: 1,000′ shaft, Copper Mtn., 100′ Cyclone shaft and prospect tunnels. Underground workings total 4,000′. Since February, 1915, 4,900′ of work was done, including 300′ of shaft sinking from the 700′ down; crosscutting and drifting on the 700′ and 1,000′ levels, and a winze sunk 400′ below the 1,000′ level. No large body of commercial ore was found.

Equipment: 60 h. p. hoist, air-compressor, mine and office buildings. Plan deepening the main shaft. Temporarily closed down.

CALEDONIA SILVER MINING CO. **NEVADA**

Office: 713 Mills Bldg., San Francisco, Calif.

Officers: R. L. Rader, pres.; Geo. P. Thurston, sec.

Inc. 1871 in California. **Cap.** $300,000; par $3.

Property: a gold-silver mine at Gold Hill, Storey county. Not operating, 1919-1920.

CALIFORNIA CRUDE OIL CO. **NEVADA**

Office: 809 McIntyre Bldg., Salt Lake City.

Officers: Frank B. Scott, pres.-mgr.; Jos. J. La Bee, v. p.; H. F. Cannon, sec.; C. O. Brunner, treas.; F. H. Stewart, supt., with Hy. Lewis, Geo. F. Stickley and Frank Ramsey, directors.

Inc. in Mass. **Cap.** $2,000,000; $1 par; assessable: 1,800,000 treasury shares. Transfers made at company's office; L. Wegscheider, registrar.

Company is operating under a 20-years lease from late in 1920, from A. A. Bass, owner, on a 20% royalty basis.

Property: the Silver Bar mine, 12 claims in the Santa Fe district, Mineral county, 30 miles W. of Mina, and 13 miles from Belleville. Surface shows a series of monzonite dikes cutting a dolomitic limestone formation; mineralization occurs along the dikes; a 4″ to 4′ vein shows gold-silver, with a little copper in quartz. Ore, carrying total of 3,000 oz. of silver and 20 oz. gold, has been shipped; average per ton, 200 oz. silver and 1% copper. Production prior to 1919 said to have been $30,000.

Development: by 400′ tunnel with 135′ back, and two shorter tunnels; workings total 700′. Main tunnel is to be extended to 1,000′.

CALIFORNIA DIVIDE MINING CO. **NEVADA**

Address: W. V. Richardson, Tonopah, Nev.

Officers: T. L. Oddie, pres.; A. E. Kane, v. p.; W. V. Richardson, sec.-treas., with H. H. Brown and William Cochran, directors Roy Hardy, supt.

Inc. April, 1919, in Nevada. **Cap.** $150,000, par 10c.; issued 300,000 out of 750,000 treasury stock.

Property: 100 acres south of the Toggery. Had $30,000 cash in treasury 1920 and was well equipped for sinking to 600′ level.

CALIFORNIA-NEVADA MILLING CO. **NEVADA**

Address: Rawhide, Mineral Co., Nev.

Officers: W. T. Seymour, pres.; B. Mason, v. p.; Ralph E. Crabtree, sec.-treas.

Cap. $200,000; $1 par.

A 25 ton custom cyanide mill it is to be erected at mouth of Rawhide

canyon, 5 miles from Rawhide, 9 miles from Rand and 7 miles from Eagleville. Permission for the sale of stock has been granted by the California Corporation Commission.

CALIFORNIA & TONOPAH MINING CO. NEVADA

Reorganized as New California Tonopah Mining Co., which see.

CALUMET DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: C. R. Evans, pres.; Frank T. Miller, v. p.; G. W. Allen, sec.-treas and res. agt., with E. W. Smith and Milton Detch, directors

Inc. April, 1919, in Nevada. **Cap.** $150,000 10c. par; 250,000 shares issued. Listed on San Francisco Stock Exchange. Last quotations, 1920, were 2c. and 1c. a share.

Property: 4 claims adjoining Gold Seam on W. and Eureka on S., 2½ miles S. E. of Gold mountain.

A part of original equipment was destroyed by fire; report of March 1921, states that mine is to be re-equipped and shaft to be sunk to 300'. See also under **Airedale Divide.**

CAMP BIRD DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev. H. B. Ruhl, agt.

Officers: H. B. Ruhl, pres.; J. W. Morris, v. p.; B. E. Garnett, sec.-treas., with W. E. Hill and W B Morris, directors

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

No information received as to property owned by company.

CANDELARIA MINES CO. NEVADA

Main office: 43 Exchange Place, New York. **Nevada offices:** Reno and Candelaria.

Officers: Chas. D. Kaeding, pres.-mgr.; R. C. Warriner, v. p.; with Frank M. Manson, O. W. Jones and Jos. F. Mann, directors. S. Rossiter, sec.-treas.; J. C. Peebles, asst. sec.-asst. treas., Reno, Nev.

Inc. Jan., 1918 in Nevada. **Cap.** $3,000,000; $1 par; issued 2,625,000 shares. Equitable Trust Co., New York, transfer agent. Stock listed on Boston Curb and traded in on New York Curb. Shares quoted at 55c high and 12c low in 1921. Annual meeting 3rd Monday in May.

Property: about 395 acres in the Candelaria district, Mineral county, on a branch of the Southern Pacific R. R., 20 miles long, connecting at Mina with the Tonopah & Goldfield R. R. The company owns outright the Lucky Hill group, Blanch claim and H. & G. millsite of 85 acres, the Lake and Doris Lode mining claims. Also owns under lease and bond the Mt. Diablo group, 115 acres, the Argentum group, including Northern Belle mine, 72 acres, and the Esmeralda Water & Milling Co., which latter supplies the camp with water from the White mountains by a pipe line, 27 miles in length. Workings total over 60 miles.

Geology: a pre-Cambrian complex, consisting of schists and various granite-porphyry intrusions, ranging from quartz-diorite to true granite, is overlain by a thick series of Paleozoic beds. These rocks are extensively intruded by dikes and masses of granite porphyry. The vein system is extensive and well defined with outcrops traceable for thousands of feet on the surface, and underground workings proving continuity downward, and large size of oreshoots.

Development: the Lucky Hill mine is partly developed by a crosscut tunnel 350' long, intersecting two veins, whose width is stated to vary from 8' to 40' and by a shaft 300' deep, showing good milling ore to a depth of 60' below the tunnel level, at which point vein dips out of shaft. Clean-up shipments made in 1919.

The Argentum mine has been developed to a depth of 1,460' and from 1878 to 1893 is said to have produced 300,000 tons of $50 silver ore from a continuous ore shoot. The Mt. Diablo is developed to a depth of 1,000'.

Ore: the principal value is in silver, occurring as chlorides and bromides with about $1 gold per ton. Recent developments on the 200' level, on the

Baldwin vein, at the Lucky Hill mine have opened a shoot of shipping ore 4' to 11' wide and 100' long. The Argentum tunnel No. 11 will be the main haulage way.

Reserves: after two years' development, are estimated to be 610,000 tons, jan. 1, 1922, of which 342,000 is broken ore in fills and dumps, averaging 9.7 oz. silver. The remainder, 268,000 tons, are in place above the 200' level and average 14 oz. silver, plus $1 gold.

Equipment: Lucky Hill mine is equipped with compressor plant, machine-drills, motor-trucks and 40-stamp mill. Machinery is to be electrified throughout, power being obtained from public service at Mina.

Production: prior to August, 1918, the Argentum and Diablo are estimated to have produced 445,000 tons of high grade ore, and the Lucky Hill, 9,000 tons shipping ore.

In spring of 1921, mines were thoroughly sampled and reserves estimated. In November, arrangement was made with the Rochester Silver Corporation by which funds up to $200,000 would be advanced for erection of a 300-ton cyanide plant against mortgage notes authorized by Candelaria shareholders. Machinery from Rochester Combined Co. mill will be used, and mill is to be ready to start, June 1, 1922.

CAPITAL DIVIDE MINING CO. **NEVADA**

Mail returned from former address: Tonopah, Nev.

Officers: W. J. Tobin, pres.; J. K. Turner, v. p. and cons. eng.; H. J. Coogan, sec.-treas., with P. C. Fisher and J. B. Kendall, directors.

Inc. May, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par, assessable.

Property: Opulense group, 3 claims and 2 fractions, bounded by the Policeman on N. W. and Romance on S. Is an undeveloped prospect of merit.

CARRARA MINING, MILLING & LEASING SYNDICATE NEVADA

Dead. Fully described in Vol. XIII.

CARRIE SILVER-LEAD MINES CORPORATION **NEVADA**

Address: C. R. Murdoch, First National Bank Bldg., Tonopah, Nev.

Officers: W. W. Travis, pres.; L. A. Rose, v. p.; C. R. Murdoch, sec.-cons. eng.

Inc. in Nevada. **Cap.** $100,000; 10c par; 500,000 shares issued. Listed on Salt Lake and San Francisco exchanges, and New York Curb.

Property: 5 claims, 10 miles N. W. of Millers and 8 miles from the T. & G. railway. Mine is an old one (1897). A 230' incline, with 3 levels, has opened 2 ore shoots in a granite-lime contact vein; the sulphide zone has not been reached. Assays returned up to 293 oz. silver, 16% lead, 10% copper and $8 gold.

Equipment: 40-h. p. engine, hoist, compressor, etc.

An advertising campaign to sell stock, at 4 to 7c. per share, was underway in April, 1921.

CARSON FREE GOLD MINING & MILLING CO. **NEVADA**

Address: E. E. Roberts, Carson, Nev.

Officers: E. E. Roberts, pres.; B. A. Boucher, v. p.; E. M. Perry, sec.; with Theo. Peterson and R. G. Affleck, directors.

Property: the Lucky Strike gold claims in Muldoon canyon, 1½ miles W. of Carson, Ormsby county. An 80' shaft has shown 18" of rich ore.

CASH BOY CONSOLIDATED MINING CO. **NEVADA**

Office: Nixon Bldg., Reno, Nev. **Mine office:** Tonopah, Nev.

Officers: J. H. Goldman, pres.; G. B. Thatcher, v. p.; E. H. Mead, sec.-treas., with E. M. Hall, directors. F. H. Norcross, res. agent; Ben Richardson, supt.

Inc. March 21, 1914, in Nevada. **Cap.** $2,000,000; $1 par; all outstanding assessable; assessments 16 and 17, of 1c. per share each, were levied April 15 and August 15, 1921. Stock sold 10¢ high, 3¢ low in 1921. Listed on San Francisco Exchange. Annual meeting, November, 21.

Company is a reorganization of the Tonopah Cash Boy Cons. Mng. Co.,

which suspended operations in 1914 with debts of $3,476, and 76,870 shares in the treasury.

Property: several fractions, patented, 30 acres, at Tonopah, Nye county, adjoins the Tonopah Merger on the W., Tonopah Victor on the S., and Tonopah, Extension on the N. **Ore:** gold-silver occurs in veins in rhyolite.

Development: by 1,646′ vertical shaft, with most of the recent work on the 1,527′ level, where crosscutting and drifts to the S. disclosed 4 distinct veins carrying ore of commercial grade reported to show higher value with depth. A total of 1,976′ of underground work was done from March to November, 1918. In 1920, there were 5 faces in ore on the 1,537′ and 1,646′ levels. The 1,527′ level showed 30 to 36″ of $68 to $89 ore, and the 1,646′ had 1½′ of $33 ore.

Equipment: includes 75-h. p. electric hoist and 3-drill air-compressor.

Production: in 1915, 150 tons, assaying $15 per ton; from March, 1916, to November, 1918, 1,740 dry tons were shipped having a net assay value of $13.41 per ton. Shipping 50 tons weekly in 1920, said to have a gross value of $25 to $30 per ton.

In March, 1921, suit was filed by the company against Tonopah Extension Mining Co., alleging tresspass, and involving the extralateral rights to a "valuable orebody." In December, Tonopah Ex. purchased Cash Boy holdings, paying 100,000 of its shares for 2,000,000 Cash Boy shares. Reported that Cash Boy will not dissolve.

Property is a promising prospect.

CENTENNIAL DEVELOPMENT CO. NEVADA

Ely, White Pine Co., Nev. Probably dead. See Vol XII.

CENTRAL DIVIDE MINING CO. NEVADA

Dead. Described in Vol. XIV.

CHALLENGE CONS. MINING CO. NEVADA

Address: 342 Mills Bldg., San Francisco, Calif.

Officers: Jas. Newlands, Jr., pres.; W. G. Morrow, sec.

Inc. November, 1873. **Cap.** $50,000; par $2; 25,000 shares issued. Annual meeting in November.

Property: at Gold Hill, Storey county.

CHAMP d'OR GOLD MINING CO. NEVADA

A French corporation which owned the Orleans mine at Hornsilver, Esmeralda county, sold in 1921 to **Orleans Hornsilver Mng. Co.** (q. v.), for a price said to be $40,000. Since 1915, mine had been operated under lease by Orleans Mng. & Mlg. Co.

CHAMPION DIVIDE MINING CO. NEVADA

Address: Goldfield, Nev. B. E. Garnett, agt.

Officers: F. C. Beedle, pres.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas.; with Albert Minnis and F. B. Grube, directors.

Inc. in Nevada. **Cap.** $150,000; shares, 10c par.

Property: 6 claims adjoin the Liberty, Marne and Pershing groups. A prospect with several shear zones on the claims.

CHARIOT DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: Wm. Watters, pres.; Zeb. Kendall, v. p.; R. A. Rives, sec.-treas., with A. E. Kane and C. T. Stevens, directors.

Inc. March 18, 1919, in Nevada. **Cap.** 1,500,000 shares 10c par, assessable. Listed on San Francisco Stock Exchange. Sales 2c high 1c low, 1921.

Property: 6 claims, adjoining the Ben Hur on N. E., about 2 miles S. E. of Gold mountain. **Equipment:** hoist compressor, etc. A prospect.

CHARLESTON HILL GOLD MINING CO. NEVADA

Address: J. P. Clough, National, Nev.

Property: of this company was operated under lease by the Charleston Hill National Mng. Co. in 1914, and under bond and lease in 1917, by the National Leasing Co. (q. v.), a George, Graham Rice promotion, which came

to grief in 1918. In October, 1919, a shipment of 5 tons sent to Selby, averaged $993.30 per ton. On dumps were 130 tons of $70 ore.

Reported June, 1921, to have been leased to H. Warren, of Winnemucca, Nev.

CHARLESTON MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Inc. August, 1917. One-half of the issued stock is owned by the Yellow Pine Mining Co.

Property: 9 claims, 36 miles from Las Vegas, said to show a 3′ vein of lead-zinc ore. Developed by shallow shafts, and worked under lease by Jas. McCoy on a 20% royalty basis, 1918-19.

CHARTER DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: a group of claims, reported by Elftman to show usual surface conditions and to be on direct extension of several veins.

CHEROKEE CONSOLIDATED COPPER CO. **NEVADA**

Mail returned from former Salt Lake City address.

Officers: D. W. Jeffs, pres.; W. P. Silver, v. p.; R. T. Thurber, sec.-treas., with M. E. King and R. A. Brown, directors, all of Salt Lake City.

Inc. July, 1917.

Property: 4 patented claims and a millsite in Lincoln county, 30 miles S. of Caliente and 6 miles E. of Leight Station on the Salt Lake Route, developed by three shafts, 150, 90 and 250′ in depth.

CHERRY CREEK SILVER MINING CO. **NEVADA**

Office: 611 Deseret Bk. Bldg., Salt Lake City, Utah. J. H. Moyle, pres. Henry D. Moyle, sec.; O. W. Moyle, treas.; J. W. Walker, mgr., Cherry Creek, Nev. Assessment ⅛¢ per share levied Dec. 1921.

Property: Mary Ann silver mine at Cherry Creek, White Pine county. The mine contains irregular orebodies in fissures in monzonite, with reported ore values of 35 to 100 oz. silver per ton. Developed by 777′ tunnel and winzes. Equipped with 35 h. p. gas engine, compressor, etc. Mine was a small producer in 1918 and 1919.

Lease of mine by the Exploration Syndicate No. 2, begun in 1919, has terminated.

CHICAGO-NEVADA TUNGSTEN CO. **NEVADA**

Address: care H. M. Bullesby & Co., 208 Lasalle St., Chicago, Ill.

Property: the Ragged Top and Besson group, 11 miles from Toulon, Pershing county, a station on the S. P. R. R., shows tungsten deposits.

Production: 550 tons in May and June, 1916. No recent information.

CHOLLAR GOLD & SILVER MINING CO. **NEVADA**

Address: 365 Bush St., San Francisco, Calif.

Officers: Herman Zadig, pres.; A. K. Durbrow, sec.

Inc. Nov., 1904 in California. **Cap.** $112,000; $1 par. Stock listed on New York Curb, but inactive. Annual meeting in January. On San Francisco exchange, sales were 10c. high and 3c. low in 1921.

Property: on the Comstock Lode, Virginia City, Storey county, adjoining Potosi on the N. and Hale & Norcross on the S. Has 700′ on the strike of the lode and is developed by an 1,800′ shaft. The Chollar and Potosi together are reputed to have produced $13,985,000 in early days.

Comstock Leasing Co. (q. v.) has purchased for cash the right to operate the Chollar property to a depth of 1,000′ for 30 years; this grant includes same arrangement with the Potosi G. & S. M. Co.

The Chollar company which will operate through the Sutro tunnel, was producing in 1919. In 1921, joined other companies in forming the Middle Mines Association, which see.

CHRISTMAS CONS. MINES CO. **NEVADA**

Address: Goodsprings, Nev.

Officers: Joseph Doran, pres. and mgr.; Geo. A. Steiner, v. p.-treas.; with Eugene Bernheimer, Arthur P. Wallace and F. M. Steiner, directors.

Property: apparently includes 4 claim groups, Old Christmas, New Christmas, Lead-Vanadate and Mountain Queen, in the Yellow Pine district, Clark county, 9 miles from Jean. The Old Christmas mine is said to have been a producer of silver-lead-zinc ore in former years, but the present interest of the company seems to be in lead vanadate ores found as replacements in limestones. Examined by Hy. M. Adkinson. A prospect.

CHURCHILL MILLING CO. **NEVADA**

Dissolved October, 1917. Plant taken over by Nevada Wonder Mining Co.

CLARKE DIVIDE MINING CO. **NEVADA**

Dead. Described in Vol. XIV.

CLIFFORD SILVER MINES CO. **NEVADA**

Address: Tonopah, Nev.

Property: the Clifford estate reported in January, 1921, to have been purchased by Howard A. Broughton acting for others. Consists of 14 claims, located in 1905, in Bellehelen district, Nye county, 40 miles E. of Tonopah; the BelleHelen Merger mines are about 5 miles south. Said to have produced "upwards of half a million dollars" of silver-gold ore. Property is opened by two 200' shafts and there is a small mill; was producing in 1919. New management is said to contemplate modern surface equipment, to be followed later by the erection of a new mill.

CLINTON DIVIDE MINING CO. **NEVADA**

Mail returned from former address: Tonopah, Nev.

Officers: C. W. Slack, pres.; F. H. Norcross, v. p.; I. Havens, sec.; Edward Strauss, treas., with F. S. Strauss, C. A. Clinton, J. P. Stinson and G. A. Bartlett, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; shares, 10c. par.

Property: Rex group, 5 claims, 2 miles northwest of Gold mountain, and north of the Sioux Divide,

COALITION DIVIDE MINES & DEVELOPMENT CO. **NEVADA**

Mail returned from former office; J. G. Brown, agt., Tonopah, Nev.

Officers: G. W. Warmoth, pres.; R. I. Pierson, v. p.; Robert McSherry, sec.-treas., with G. D. Olson, J. W. Kraner, E. J. Hoak and J. E. Post, directors.

Inc. in Nevada. **Cap.** $150,000; shares 10c. par.

Property: 6 claims, near Tonopah; also an old mine, 2 claims in Sante Fe district, near Luning, Mineral county.

C. O. D. CONSOLIDATED MINING CO. **NEVADA**

Organized in 1908 as merger of **Goldfield C. O. D. and Gold Bar Mng.** companies; Goldfield Cons. owned a 25% interest.

By action of the shareholders, July 15, 1920, this company, together with others, combined its interests with that of the **Goldfield Deep Mines Co.**, which see. The C. O. D. company is fully described in Vol. XIV.

COLORADO-NEVADA MINING & MILLING CO. **NEVADA**

Defunct. Fully described in Vol. XIII.

COLUMBIA DIVIDE MINING CO. **NEVADA**

Office: H. D. King, agt., Tonopah, Nev.

Officers: H. R. Grier, pres.; H. H. Atkinson, v. p.; H. D. King, sec.-treas., with A. I. D'Arcy and H. E. Clark, directors. R. Wilson, supt.

Inc. April, 1919, in Nevada. **Cap.** $550,000; shares 10c. par.

Property: the Giant King group, 3 claims adjoining Western Divide on N., and Hull City on S., a mile S. W. of Gold mountain. In December, 1919 the **Estaleah-Cerbat Silver M. Co.'s** property in Mohave county, Arizona, was taken over. The Divide property is a prospect.

COMBINATION DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: W. S. Philips, pres.; G. A. Nelson and D. Patterson, v. p.; H. W. Nelson, sec.; also directors. J. A. Patterson, supt.

Inc. 1919, in Nevada. **Cap.** 1,500,000 shares; 10c. par.

Property: 3 claims, 2 miles N. W. of Gold mountain, bounded on north and northeast by the Pyramid and Sunbeam. Developed by a shaft sunk in typical Divide breccia, with yellow jaspery quartz assaying up to $10.20 per ton at 30′ depth.

A report, September, 1920, announces that this company has acquired the Worthington group of 19 claims, in the Freiberg district, Lincoln county; six other claims are under bond and lease. A 12′ vein has been opened by several shafts, one of 185′; at depth of 50′, ore is reported to assay 12 oz. silver, 15% copper.

A fair prospect.

COMBINED METALS, INC. **NEVADA**

Office: 516 Felt Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Nev.

Officers: E. H. Snyder, pres.-mgr.; J. C. Jensen v. p.; H. S. Wiley, sec.-treas., with W. F. Snyder and Willard Scowcroft, directors, R. T. Godbe, supt.

Inc. 1917, in Nevada. **Cap.** $50,000; 5c par; assessable; 800,000 issued.

Property. the Panaca group of the Amalgamated Pioche Mines & Sm. Corp. (q. v.), 6 claims, 110 acres, at Pioche, Lincoln county, held under lease. **Ore:** occurs in veins and as a bedded deposit in limestone, averaging 27x90x525′.

Development: by about 4,000′ of drifts, crosscuts and raises. Reserves are estimated at 250,000 tons of refractory ore, assaying 0.04 oz. gold. 8.2 oz. silver, 8% lead, 18% zinc, 14.0% iron. This ore cannot be profitably marketed at smelters, and the management contemplates erecting its own plant.

Equipment: includes 200-h. p. steam hoist, 700 cu. ft. compressor.

Production: to Jan. 1, 1922, about $63,000.

COMMERCIAL MINES AND MILLING CO. **NEVADA**

Address: M. T. Kane, Manhattan, Nye county, Nev. Operates under lease the Stray Dog, Indian Camp, Crescent and Riley fractions, also the Eagle mill of 20 stamps and a pebble mill.

COMO CONSOLIDATED MINES CO. **NEVADA**

Address: Como, via Dayton, Nev.

Officers: S. F. Taylor, pres.; Gurney Gordon, v. p.-mgr.; W. R. Grant, sec.; J. W. Davey. asst. sec.-treas., with H. G. Humphrey, directors.

Inc. October, 1916 in Nevada. **Cap.** $1,500,000; $1 par; issued 1,000,000 Listed on San Francisco Exchange. U. S. Corp. Co., transfer agents and registrar. Annual meeting, October 1. At a special meeting of stockholders held on April 19, 1920, an issuance of 35,000 share 8% preferred stock, at $10 per share, was authorized, proceeds to be used for purchase of additional property.

254,000 shares were sold at auction in New York, Jan. 12, 1922, for $21 the lot.

Property: 440 acres at Como in the Silver City, Palmyra district of Lyon county, 12 miles S. E. of Dayton.

Geology: ore is mixed oxide and sulphide, carrying gold and silver, in quartz veins in andesite. Two ore shoots of fair size have been uncovered on the property. The sulphide zone was reached at 300′. Gold and silver are present in equal values; copper and zinc also appear in varying amounts.

Development: by inclined and vertical shafts to a depth of 350′; also a 4,000′ tunnel (Boyle), which when extended 600′, will give total back of 500 to 700′. In fall of 1920, the management reported reserves of 200,000 tons of $10 to $12 ore.

Equipment: complete for mining, and a 100-ton cyanide mill employing crusher, 10-stamp ball-mill, agitators, Oliver filter, etc. A good recovery is made at a cost of $2 per ton.

Production: reported that bullion shipments of $25,000 to $30,000 monthly were made for a few months, summer of 1920.

Operations were suspended indefinitely on September 15, 1920, because of high cost of production.

COMO GROUP MINING CO. NEVADA

Address: 20 Fordonia Bldg., Reno, Nev.

Officers: C. P. Ferrel, pres.; W. S. Schuyler, v. p.; W. G. Edwards, sec.-treas., with J. H. Rae, and J. H. Rae, Jr., directors.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: 6 claims, 120 acres, four adjoining Como Cons. on the east in Lyon county, A strong vein traverses three of the claims for 4,500' and a large quantity of ore is said to be opened.

COMSTOCK DIVIDE MINING CO. NEVADA

Address: Tonopah, Nev.

Officers: W. J. Douglass, pres.; W. H. Simmons, v. p.; E. Gregory, sec.-treas., with Jas. Boyd and Wm. Watters, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: the Jim claim and 2 fractions adjoining Wild Horse group, Mizpah, and Rand Divide, a mile N. E. of Gold mountain.

COMSTOCK ELDORADO MINING & MILLING CO. NEVADA

Address: Ed. Manning, Reno, Nev.

Officers: C. P. McColm, pres.; J. H. Gray, v. p.; C. C. Bridgeman, sec.-treas., with R. M. Preston and J. Parker Lewis, directors. Carl Stoddard, gen. mgr.

Inc. in Nevada. **Cap.** $150,000; par 10c.

Property: a lease and bond on the Flora Temple mine in Comstock district, Storey county, adjoining Comstock Silver on the south. Company has also taken over the Rain and Dixen lease and option on the Lager Beer mine, comprising the German, Bell Hill ond Sebastopol patented claims, and covering several hundred feet of the Succor vein. Work was begun on the 150' level of the 700' Lager Beer incline which has opened an orebody, 8 to 14' wide, assaying $8.01 in gold per ton; 7,500 tons are said to be available. This mine is accessible also through the Cook and Gray tunnel, intersecting incline on the 400' level. Flora Temple has not been developed below the 200' level.

Equipment: electric hoist. A 10-stamp mill is contemplated.

The Lager Beer section was taken over under joint agreement with Spearhead G. Mng. Co., by which latter acquires property a few hundred feet to the east.

COMSTOCK EXPLORATION CO. NEVADA

Office: 516 Sutter St., San Francisco.

Officers: Dr. R. N. Murphy, pres.; R. J. Kilby, sec.; J. I. Keating, supt.-res. agt.

Inc. April 14, 1920, in Nevada. **Cap.** $150,000; par 10c.

The property consists of 6 claims at Virginia City, Storey county, and adjoins the Hale & Norcross on the west.

Reported, October, 1921, that suit had been brought vs. Comstock Leasing Co. with claim of extralateral rights.

COMSTOCK EXTENSION MINING CO. NEVADA

Address: F. J. De Longchamps, Reno, Nev.

Officers: A. F. Eske, pres.; E. L. Drappo, v. p.; F. J. DeLongchamps, sec.-treas., with H. W. Noble and Angelo Scanavino, directors.

Inc. January, 1921, in Nevada. **Cap.** 1,500,000 shares of which one-half is in treasury. Annual meeting in February.

Property: 12 claims at head of Sullivan canyon, 12 miles S. of Virginia City, shows 2 fissures in andesite, one carrying principally gold, the other silver. Developed by two shafts and tunnel. Lessees were operating late in 1921

COMSTOCK FLORIDA MINES CO. **NEVADA**

Address: G. S. Clack, gen. mgr. Virginia City, Nev.

Reported that this company, incorporated for $300,000, is to reopen the Florida mine, worked originally 60 years ago, on the Comstock lode, Storey county. Mine adjoins the Hayward, and is 3 miles S. W. of the United Comstock's Imperial mine. The main vein is said to be 175′ wide, and is to be attacked through old tunnels; the ore carries mainly gold, with average value of $20 per ton. No. 2 tunnel to cut orebody 400′ deep was in 170′ in September, 1921.

COMSTOCK FRACTURE MINES CO. **NEVADA**

Inc. December, 1919, in Nevada, by C. A. Garrett, T. B. Gordon, Gurney Gordon, F. M. Kleppe, and O. R. Vaughn. **Cap.** $75,000; 20c. par.

No information has been received as to property.

COMSTOCK & GOLD HILL UNITED MINES CO. **NEVADA**

Address: Virginia City, Nev.

A new 1920 incorporation, reported to have taken over 22 claims near Gold Hill, Storey county, including the Bell (Muhlbeyer) group. The claims cover an andesite-diorite contact and adjoin the Crown Point and Kentucky mines; four-fifths of ore value is gold. Some shipments made in 1920, by company and lessees.

COMSTOCK LEASING CO. **NEVADA**

Address: Virginia City, Nev. H. B. Bulmer, mgr.

Property: 2 patented claims on the Comstock Lode, at Virginia City, Storey county, owned under a grant purchase from the Potosi Gold & Silver Mng. Co., and the Chollar Gold & Silver Mng. Co., covering the mineral rights for a depth of 1,000′ for a term of 30 years; property then reverting to original owners. Company is defendant in a suit over extra-lateral rights brought by Comstock Exploration Co.

Ore: occurs in fissure vein with diorite foot and andesite hanging wall; veins run N. E.-S. W. and contain gold-silver ores. **Development:** by 2,000′ tunnel to depth of 400′.

Equipment: includes electric hoist, 100-ton cyanide mill.

COMSTOCK MIDDLEMINES **NEVADA**

Error for Middlemines Association which see.

COMSTOCK MILWAUKEE MINING CO. **NEVADA**

Incorporated by J. H. Hutchinson, H. H. Haasher and W. E. Lyons, all of Reno, Nev., with capital of $300,000 to take a lease on the Milwaukee mine, E. of Silver City, Lyon county, and near the Buckeye mine. The Milwaukee is opened by a 350′ incline.

COMSTOCK-PHOENIX MINING CO. **NEVADA**

Office: Provo, Utah. Mine at Six Mile Canyon, Virginia, City, Nev.

Officers: O. Raymond Knight, pres.; Geo. H. Drysdale, v. p.-mgr.; with Knight Starr Jordan, J. Wm. Knight, and F. M. Manson, directors. R. E. Allen, sec.-treas.

Inc. 1909. **Cap.** $1,000,000; $1 par; all outstanding.

Property: 3 patented claims in the Silver Star district, 2 miles from railroad, on what is believed to be a cross fissure, about 1 mile from the Comstock lode. The main vein has a N. E.-S. W. course. Several distinct ore shoots have been encountered that vary from 1 to 8′ in width, and assay up to 50 oz. silver, with some gold.

Development: by 800′ shaft, tunnel and raises. One drift on the 800′ level extends westward in the direction of the Comstock.

Equipment: electric hoist, compressor, tram and buildings.

Production: shipments from 1909 to 1914 amounted to $400,000, with net returns of $250,000. Old company paid dividends of $102,516. Present company, which is a reorganization in January, 1917, of the old company, has not issued any reports.

Small shipments being made by the company and by lessees operating in old stopes.

Idle, 1919-20.

COMSTOCK RELIANCE CO. NEVADA

Address: G. S. Clack, Virginia City, or Reno, Nev., who is also interested in Comstock Florida.

Property: in the Comstock district, Storey county, shows 2 veins, 2 to 4' wide, the widest one said to be the extension of the Hayward ledge. Is developed by 150' shaft and 2 tunnels, 400' and 500' long.

COMSTOCK SILVER MINING CO. NEVADA

Office: 310 Reno Natl. Bank Bldg., Reno, Nev. Mine office: Virginia City, Nev.

Officers: Frank M. Manson, pres.-treas.; Frank W. Royer, v. p.-cons. engr., with J. W. Manson and A. B. Harlan, directors. J. C. Peebles, sec.; Geo. H. Drysdale, supt.

Inc. April 25, 1919, in Nevada. **Cap.** $150,000; 10c par; about 500,000 treasury shares; assessable. Transfers made by company at Reno. Stock listed on San Francisco Stock Exchange. Total expenditures to June, 1921, about $25,000.

Property: 11 claims and fractions, largely patented, S. E. of Gold Hill, Storey county, includes the Overland, Scheels and Underground-Cosmopolitan-Jumper groups, owned or controlled, and embraces the Occidental (Brunswick), Underground and Succor lodes, cutting hornblende-andesite. The ore is quartz carrying gold and silver in a vein, width of 4' and up; the average assay value of milling ore is $9. In earlier days, these groups have produced about $1,750,000 in bullion from a comparatively shallow depth.

Development: in addition to old workings including the 550' Overland shaft, present management has sunk a 370' incline on the Cosmopolitan, with total workings of 1,000' to June, 1921. The Scheels group also is under development.

Equipment: includes electric hoists, and on the Overland, a 10-stamp mill, assay office and other buildings.

COMSTOCK SUPERIOR MNG. CO. NEVADA

Address: 446 Gazette Bldg., Reno, Nev.

Officers and directors: G. S. Clack, pres.-mgr.; LeRoy Keene, v. p.; O. U. Pryce, sec.-treas.

Inc. June 12, 1919. **Cap.** $200,000; 10c par; assessable; 200,000 issued. Annual meeting, July 1.

Property: 6 claims, 110 acres, 7 miles S. W. of Virginia City, Storey conty, said to show a contact deposit between granite and limestone schist, averaging $5 gold, 2% copper, and 50 oz. silver. Property adjoins the Southwest Comstock Extension on S. W.

Development: by tunnel and shaft; total workings less than 500'.

Equipment: electric power, 75-h. p. compressor, etc.

COMSTOCK TUNNEL CO. NEVADA

Address: Franklin Leonard, Jr., 25 Broad St., New York.

On Sept. 23, 1919, the Protective committee announced that if 80% of the bonds were deposited with the Security Transfer & Registrar Co. of 66 Broadway, New York, as trustee, the mortgage would be extended for 10 years, and bonds stamped accordingly. This would avoid selling the property under terms of the mortgage, but on Nov. 12, the property covered by the mortgage was sold at public auction on behalf of the bondholders' protective committee, consisting of Franklin Leonard, G. B. Burbank, S. F. Gascoigne, L. N. Clark, and D. C. Catlin. On Nov. 26, it was proposed to reorganize as the Comstock Tunnel & Drainage Co.

COMSTOCK TUNNEL & DRAINAGE CO. NEVADA

A reorganization of the Comstock Tunnel Co. No information available. See Vol. XIV.

CONFIDENCE DIVIDE MINING CO. NEVADA

Mail returned from Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: a tract of undeveloped ground, 2 claims, adjoining the

Sutherland on south, and capped by wash. A raw prospect, but well located.

CONGRESS COPPER CO. **NEVADA**

Address: Rumball & Co., 50 Congress St., Boston, Mass. Purchased the Electrolytic and Neversweat mines at Luning, Esmeralda county, in 1917. Both properties are developed and have produced shipping ore. Neversweat mines described in Vol. XIII. Assessment work only done in 1920.

CONGRESS DIVIDE MINING CO. **NEVADA**

Office: Tonopah. Nev.

Officers: C. A. Gray. pres.; G. A. Barlett, v. p.; H. J. Bartlett, sec.-treas., with Zeb Kendall and Roger Dougherty, directors.

Inc. March, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par. Transfer office, 419 Crocker Bldg., San Francisco, Cal.

Property: 3 claims, north of Calumet and west of Albany and Bullion. Examined by A. H. Elftman. Developed by shaft and levels at 100' and 150'

CONQUEROR CONS. MINING CO. **NEVADA**

Office: Goldfield, Nev.

Directors: John P. Sweeney, P. J. Somers, Jr., and others.

Property: in northern part of Goldfield district, Esmeralda county, covering a portion of the Columbia Mtn. fault, opened by shafts. First discovered in 1905, and operated 1914-15; inactive for years. Late in 1920, judgment for $5,411 was secured vs. company by J. P. Sweeney, and reorganization reported underway in May, 1921.

CONSOLIDATED CALIFORNIA-NEVADA MINING CO. **NEVADA**

Presumably dead.

Inc. 1915, to take over the Day Bristol properties, bought in by bondholders' committee at sheriff's sale in 1915. In Feb., 1916, owing to inability to ship ore already mined and to secure funds from sale thereof, mines closed down and company went into receivers hands, and property taken over by Uvada Copper Co. See Bristol Silver Mines Co., for recent history.

CONSOLIDATED COPPERMINES CO. **NEVADA**

Office: 120 Broadway, New York. **Mine office:** Kimberly, White Pine county, Nevada.

Officers: Joseph B. Cotton, pres. and gen. counsel; Thomas A. Merritt, v. p.; Robert Linton, v. p.-mgr. dir.; Fred R. Kennedy, sec.; Ernest R. Grochau, treas.; Samuel Brenner, asst. sec.-asst. treas.; E. P. Mathewson, cons. engr.; H. S. Munroe, gen mgr.; E. A. Hewitt, supt.

Directors: (1922) Fred R. Kennedy, E. P. Mathewson, Martin Paskus, Arthur J. Selfridge; (1923) Isaac W. Bernheim, Samuel Brenner, Isidore Hernsheim and Robert Linton; (1924) Joseph B. Cotton, Edwin F. Gray, M. A. Lorenzo, Thos. A. Merritt.

Inc. May 20, 1913, in Delaware. **Cap.** $20,000,000, increased May 3, 1921, from $8,000,000; $5 par; privilege of conversion of bonds, issued or to be issued, into stock is allowed; of the old capitalization, $4,893,875 was oustanding. Bonds authorized $3,500,000, 1st mortgage 7% convertible, due 1928; $2,988,600 outstanding December 31, 1919 ($511,400 converted and retired), redeemable by lot at 110 plus accrued interest on any interest day.

Early in 1921, company undertook to refund its outstanding bonds and replenish its treasury; it authorized a 15-year $10,000,000 bond issue at 8% and offered $5,000,000 of these bonds to its stockholders in amounts at par equal to the stock held by each, convertible into stock after August 1. It was provided also that bonds of former issue would be exchangeable par for par for the new bonds. The subscription date was extended to June 20, but apparently company was unable to place this new issue, although stockholders were notified that $600,000 was absolutely essential to float current indebtedness, meet bond interest and carry properties to July 1, 1922.

Guaranty Trust Co., New York, transfer agent; Bankers Trust Co., New York, registrar. Stock listed on New York Curb. Annual meeting, first Tuesday after first Monday in May.

Company was unable to meet its bond interest due Aug. 1, 1921.

Financial Statement: during the year ended December 31, 1919, copper, gold and silver sold realized $511,950. There was an operating deficit of $363,000, and a general company deficit of $250,420. Combined balance-sheet of Consolidated Coppermines and Giroux Consolidated shows current assets totaling $2,490,659, and liabilities $1,763,930. Assets include Liberty bonds and War Savings Stamps, $480.217; cash, $109,707; supplies, $227,578; accounts and notes receivable, $123,603; metals, $1,457,944. Notes payable were $400,000; accounts payable, $170,027; and advances on copper, $1,193,-904.

At end of 1920, excess of current assets was $7,199; cash on hand was $1,045. Receipts for the year totaled $74,046; bond interest was $209,202 and general expenses, $68,124; making a deficit of $203,280.

Company was unable to meet its bond interest due Aug. 1, 1921.

Property: including 7 claims acquired in 1919, Coppermines company owns in fee 1,151 acres of mining properties and claims, and 619 acres of unpatented lode locations, together with 2,565 acres of ranch lands having valuable water-rights, and 520 acres of other surface lands. A portion of these holdings acquired through stock exchange from the New Ely Central Copper Co. It also controls, through its stock ownership of over 99%, the Giroux Consolidated Mines Co., 2,000 acres of patented mining claims and 1,800 acres of ranch lands, which have valuable water-rights; and through its stock ownership in the Butte & Ely Copper Co., 209 acres of patented mining claims. The total area of claims, exclusive of the Mexican properties, is 3,979 acres of patented mining claims and 4,885 acres of ranch lands, beginning 2 miles west of Ely.

The Sultana mine, the Mexican property of the Giroux company, 11 claims, comprising about 459 acres of mineral lands, includes the San Jose mine, about 1 mile W. of Copete, in the Sierra de Oro, 25 miles E. of Carbo and about 35 miles from Hermosillo. Property shows a contact vein of 50 to 100′ width, between limestone and phorphyry, opened by 3 shafts, No. 2, the main working shaft, sunk on an incline, 1,200′ deep. The San Jose mine shows, in the bottom level, a vein of about 40′ width, carrying oxidized ores to shallow depth, succeeded by sulphides. The Mexican property as a whole shows low-grade copper ore with fair gold value. Total production to January, 1908, was $542,000. Mines have not been in operation for several years, owing to unsettled political conditions in Mexico.

Geology: there are three classes of ore deposits occurring on the Nevada properties (1) chalcocite disseminated in porphyry forming concentrating ore similar to that of the Nevada Consolidated Co., lying in large continuous masses that can be mined at low cost, some by open-pit steam-shovel methods, others by underground methods; and (2) heavy sulphide ore, high in iron and higher in copper than the disseminated ore; and (3) direct smelting ore in fissure and replacement deposits in limestone at or near limestone-porphyry contacts.

The porphyry ore is very friable and readily amenable to concentration. The Morris and Brooks orebody has a proven length of over 2,000′, a width of 400′ and depth of 100′ to 175′, but drilling has not yet been extended downward to the bottom of the orebody, along the south side. Another large orebody has been proved on the west end of the Liberty Eureka pit on the Ora and adjacent claims. Drilling has disclosed considerable ore in the ground between these two orebodies, and farther east on the Minnesota and adjoining claims drilling and underground work has exposed sulphide ore in the Old Glory mine. However, the lands are so extensive that only a small part of the property has been throroughly drilled.

Contact and limestone replacement orebodies have been developed only in the Alpha. The ore-bearing zone has been developed for a length of 650′ and width of 200′ and has been found to extend from the 850′ to the 1,550′ level, it being the only mine in which deep exploration has been done to explore this limestone-porphyry contact. It is considered that the Copper-

mines Co. has several thousand feet along the south contact and a similar length along the north contact, much of which is favorably regarded. Regular shipments of this direct smelting ore were commenced in the spring of 1917, since when 89,924 tons of 7.72% ore have been shipped, yielding 13,205,318 lbs. of copper. It is estimated that over 500,000 tons of 7% oxidized ore are available.

Development: porphyry ores have been developed by over 100 drill holes, totaling 66,936′; also by extensive underground work on the Morris-Brooks, Minnesota, Old Glory, and other claims. The Morris-Brooks mine was opened in 1917, and worked until January, 1919 to test the adaptability of the branch-raise caving system, and to provide ore for the Kimberly mill, wherein experiments were made to determine the best treatment. During this period, 408,590 tons were mined and milled. Future extraction will be by stripping and steam-shoveling. Reserves in this mine have been estimated at over 2,000,000 tons. New work from January, 1919 to May, 1920, was only 119′, done solely in connection with ore extraction. The total is 63,496 feet.

The Alpha mine has extensive lateral workings on the 700, 1,000, 1,100 1,200, and 1,300′ levels. The Alpha No. 1 shaft is 1,200′ deep, and No. 2 is 1,840′, including 400′ additional completed March, 1920, and decided upon after the ground had been drilled. During 1919, extensions in the Alpha were 12,671′, and during 4 months in 1920, 1,335′; total, 33,552′. Exploration has proved definitely the existence of a series of N. W.-S. E. slip-planes in the altered zone (probably due to faulting), along which commercial bodies of ore are found. These slips have been followed vertically for a distance of 450′. During 1919, and up to May 1, 1920, development continued on the 1,000, 1,100, 1,200 and 1,300′ levels. On the 1,000′ level new ore was cut 250′ W. of any previously found on this level; on the 1,100′ level, 8 % ore was followed in one drift for 130′; on the 1,200 level, continuous ore, from a few feet to 45′ wide, has been exposed for over 300′, the longest body of ore yet opened in the mine. The ore discovered in this period carries a copper content of 4% to something over 9%.

Diamond drilling on the 1,300′ level of the Alpha mine was initiated in May, 1919, and in 12 months 6,264′ were drilled, about one-half in the altered zone and one-half scout holes. The presence of high grade ore to a depth of 1,555′ was proven, and every hole encountered commercial ore. Of the 5 holes reported, with depths of 380′ to 570′, one passed through 33′ of 8.09% and a second, 65′ of 6.85% ore.

In the Taylor mine, the shaft has been opened to the 250′ level, and 1,327′ of lateral work was done in 1920 on this and the 150′ level. A considerable body of 5% chalcopyrite was found carrying better than average gold and silver values.

Some work was done at the Pilot mine, in 1918 and 1919; operations ceased January, 1920.

Ore reserves (May 1, 1920):

Class of ore	Tons	Copper, %
Fully developed porphyry	9,870,135	1.41
Partly developed porphyry	9,699,000	1.25
Total	19,529,135	1.33
Heavy sulphide	200,000	3.00
Alpha oxide	500,000	8.00

Mine equipment: at No. 2 Alpha shaft includes a 26x48″ Allis-Chalmers double-cylinder hoist, capable of handling 5-ton skips in counter-balance to depth of 1,800′, at a hoisting speed of 1,500′ per minute; also a 20x48″ Allis-Chalmers hoist for the cage.

Pumping equipment consists of two pumps of 600 gallons and one of 1,200 gallons capacity per minute at the main pumping station on the 1,200′ level. There is also an 800-gal. pump on the 1,400′ level.

A three-mile private railway connecting the principal shafts with the

Nevada Northern Railway, has grades averaging about 1.5%. Equipment includes several Porter locomotives of 600 tons tractive power, and sufficient ore-cars for present requirements.

Ore treatment: careful concentration tests were made on the porphyry ores by J. M. Callow, of Salt Lake, whose results were used in re-modeling the old mill at Kimberly. Concentration is principally by flotation. The re-modeled concentrator having a capacity up to 1,000 tons per day, was worked until January, 1919. During the last four months of operation, the mill recovered 82.31% from 1.336% ore. Concentrate carried 18.33% copper and 9.39% moisture.

The company employed Frederick Laist of the Anaconda Copper Mining Co., to design reduction works. His conclusions are based on (1) the concentration of 2,000 tons daily of 1.4% porphyry ore; (2) the concentration of 150 tons daily of 2.9% sulphide ore; and (3) the smelting of 150 tons daily of Alpha 7.5% oxide ore. Assuming that these ores can be delivered at reduction works at $1.10 per ton for the first, $5 for the second, and $10 for the third, for a period of not less than 10 years, Mr Laist recommends building a concentrator to handle 2,000 tons daily of porphyry and 150 tons of sulphide; also a 3,000-k. w. power-plant, and a 500-ton reverberatory smelting plant for concentrates and oxide ore. The equipment will include waste-heat boilers, turbo-generators, coal-dust fired reverberatories, and Great Falls converters. These works will be at Kimberly, thus saving the cost of freighting to Ely. The total estimated cost of producing copper is given as 12.35¢ per pound. The cost of the work would be $2,500,000. In November, 1919, E. P. Mathewson became consulting engineer and director, and has concurred in Mr. Laist's plans. It was hoped to complete the plant by mid-1922, but the necessary funds have not been available.

Direct smelting ores as well as the concentrates from the Kimberly concentrator have been treated at the Steptoe plant of the Nevada Consolidated Copper Co. under a five-year contract made in 1917.

Nevada Consolidated agrees to mine and treat for account of the Cons. Coppermines, from properties at the west end of Liberty Pit, 415,000 tons of ore during the period ending August 15, 1918, and after that date at least 75,000 tons per year. Coppermines company reserved the right to cancel the contract any time after August 15, 1918, upon giving three months' notice.

Production: during 1919, by the company and its lessees from the 3 mines, Morris-Brooks, Alpha and Ora (Liberty Open Pit), was 115,662 tons of ore, yielding 3,897,934 lb. copper, 890 oz. gold, 4,573 oz. silver, 3,473,269 lb. zinc, 53,643 lb. lead and 27,071 lb. manganese. During the first four months of 1920, a total of 912 tons only were mined by lessees. As in other low grade copper properties, operations were much curtailed, and practically ceased on Dec. 31, 1920.

See also supplementary statement under addenda.

CONSOLIDATED CORTEZ SILVER MINES CO. NEVADA

Offices: 80 Maiden Lane, New York City; Russ Bldg., San Francisco; Reno Natl. Bk. Bldg., Reno, Nev.; and Cortez, Eureka Co., Nev.

Officers: F. M. Manson, pres.-treas.; F. C. Hunter, sec.; W. H. Englebright, supt.

Inc. 1919, in Nevada. **Cap.** $2,000,000; $1 par; 1,500,000 outstanding, March, 1920. Security Transfer & Registrar Co., New York, transfer agt.

Property: the Cortez group at Cortez, Nevada, in Eureka and Lander counties. The group consists of 49 claims, 38 patented, 790 acres. Company also owns water-rights and millsites formerly owned by the Tenabo Mill & Mines Co. It includes the old Garrison, Mt. Tenabo, St. Louis, Fitzgerald and Arctic mines, which have yielded over 7,400,000 oz. silver and $500,000 gold from 125,000 tons of ore, since 1864. Milling was stopped in 1892 and all operations in 1895. Lessees extracted the remaining rich ore during 1901 to 1916.

Geology: the orebodies occur as irregularly sinuous replacements of

uplifted limestone, overlaid by massive beds of quartzite, whose outcrop forms cliffs along the mountainside. A porphyry dike deflects one orebody. See description and illustrations by Emmons, U. S. Geol. S. Bull. 408, p. 103.

Development: by 4,000′ Garrison main tunnel, attaining a vertical depth of 800′, with 7 levels above, and Arctic tunnel, 2,500′ (Nov., 1921), 350′ below; total workings are 15 miles. The Arctic tunnel driven to explore orebodies exposed above, has cut two of the secondary fissures in the limestone, containing primary sulphides, and has penetrated the porphyry dike. A raise is being driven to connect with the Garrison tunnel.

Reserves: estimated at 68,000 tons of 17 oz. ore on dumps and in a few blocks underground; also 120,000 tons of tailings, carrying 7 to 10 oz. silver.

Equipment: includes complete mining and milling plant, rehabilitated 1920-21, and a new compresor added.

Management is unusually competent, Mr. Manson being head of the Western Ore Purchasing Co., and chairman of the Rochester Nevada Silver Mines Co. The re-working of old stope-filling and the exploration of 1,400′ of virgin ground below the old workings offer excellent speculative possibilities.

CONSOLIDATED IMPERIAL MINING CO. **NEVADA**

Address: 342 Mills Bldg., San Francisco, Calif.

Officers: Jas. Newlands, Jr., pres.; W. J. Morrow, sec.

Inc. 1919, in Calif. **Cap.** $200,000; $1 par; all issued.

Property: at Gold Hill, Storey county, developed by 600′ shaft. Reported active 1919-20.

CONSOLIDATED MAYFLOWER MINES CO., THE **NEVADA**

A reorganization of the Mayflower Bullfrog Consolidated Mng. Co., effected 1917.

Main office: Pioneer, Nev.

Officers: John S. Gibons, pres.; W. J. Tobin, v. p.-sec.-treas. and gen. mgr.; with C. W. Taylor, M. H. Ollmert and W. O. Lamping, directors.

Inc. in Nevada. **Cap.** $250,000; 10¢ par; assessable; 1,500,000 shares outstanding. Seven assessments, 1¢ per share, levied up to Aug. 20, 1921, beginning with two in 1918. Listed on New York Curb and San Francisco Exchange. U. S. Corporation Co., New York, registrar. Transfers made at main office. Annual meeting, July 18, 1921.

W. J. Tobin, who is also president of the Reorganized Pioneer Mines Co., reports in January, 1921, that the indebtedness of the Cons. Mayflower had been reduced from $18,000 to $10,000 in 10 months.

Property: 11 patented claims, 200 acres, in Bullfrog district, Pioneer, Nye county. Oxidized and free-milling ore occurs in veins with N.-S strike and dip of about 20° E., carrying mainly gold with a little silver and copper. The vein is 4′ wide, and assays said to average $8 to $12 per ton. Examined by J. B. Kendall and R. C. Cameron.

Development: about 3,500′ of workings, including 4 shafts, 100′ to 530′ in depth. In 10 months ending February 1, 1921, development was confined to the 100′, 200′ and 300′ levels in the deep shaft. A crosscut tunnel also has been driven to cut the Starlight vein, said to show 5′ of $11 ore near the surface. Throughout 1921, development was continued in main shaft on all levels, including the 400′, and in the Starlight workings. Property has been thoroughly sampled. Reserves estimated to be 80,000 tons of $10 ore.

Equipment: includes 25 h. p. hoist, 8-drill compressor and 4,000′ pipe line. A 15-stamp mill with Wilfley tables has been remodeled and is said to make an 80 to 85% recovery.

Production: prior to 1921, was 10,000 tons averaging $14 per ton from the 200′ and 300′ levels. From March 1, 1921, mill has operated intermittently on a one shift basis.

CONSOLIDATED NEVADA-UTAH CORPORATION **NEVADA**

Office: 63 William St., New York. Mine at Pioche, Lincoln county, Nev., and Frisco, Beaver county, Utah.

Officers: Victor B. Wallder, pres.; Wm. B. Randall, treas.; Wm. F. Roberts, sec.; Jos. W. Kay, F. A. Dillingham, W. J. Palmer, directors, H. R. Van Wagenen, supt.

Inc. 1913, in Virginia. **Cap.** $6,000,000; shares $3 par; issued $3,936,396; in treasury, $1,163,604; reserved for bond conversion, $900,000; authorized bond issue $90,000, 1st mtge., 6%; issued, $499,867. Transfer agt., Security Transfer & Registrar Co., New York. Company without funds, and was unable to meet interest on outstanding bonds, May, 1919. Property closed down since 1918. Shares listed on New York Curb. At public auction in New York, on Dec. 10, 1919, 1,200 shares were sold at $60 the lot, and $1,400 bonds for $55 the lot. On Jan. 9, 1921, 300 shares realized $4 the lot.

Company is a reorganization of the Nevada-Utah Mines & Smelters Corporation, which went into bankruptcy in 1912, and whose holdings were sold under judgment proceedings for $100,000 to the new company. Stockholders in the old company subscribed 50cts. in cash for each share held, and deposited their old stock, received bonds for the cash paid by them and 200 shares of stock in the new company for each $100 subscribed.

Property: 3 groups of mines, owned through control of subsidiary companies; the Pioche group at Pioche, including several productive mines that are largely developed; the Imperial group, including the Comet mine, in Frisco district, Beaver county, Utah.

The Amalgamated Pioche Mines & Smelters Corp., organized to operate the properties of the Cons. Nevada-Utah has been inactive since 1917. Part of the holdings are leased to the Combined Metals Inc., and Black Metals Inc.

Fully described in Vol. XIII.

CONSOLIDATED SILVERS, INC. NEVADA

Controlled by **Universal Silvers Co.**

Address: Unionville, Nev.

Officers: Edw. S. Van Dyck, pres.-gen. mgr.; Marcus Grossbaum, v. p.; Robt. Arnold, sec.-treas., 14 Kilby St., Boston.

Inc. in Nevada. **Cap.** $500,000.

Property: the Silverton group of 3 claims, 60 acres, in Unionville district, Pershing county, adjoins Silver Reef on W. and Arizona Extension on S., said to show a silver bearing vein, 3-6′ wide and covers part of the "Arizona" blanket vein, 3′ thick, dipping at 18 to 30° lying limestone, 25′ above rhyolites.

In 1922, company was consolidated with Sinclair Silver Consol., as **Consolidated Mining and Refining Co.**

See **Universal Silvers** for general opinion of these queer promotions.

CONSOLIDATED SPANISH BELT SILVER MINING CO. NEVADA

General Office: Marion, Ohio. **Mine office:** 308 State Bank & Trust Bldg., Tonopah, Nev.

Officers: Jules V Barnd, pres.-mgr.; John Seifert, v. p.; John V. Wilson, sec.-treas.; with John A. Hoover, Frank O'Neill and Hy. G. Mohr, directors. Associate directors: Chas. A. Klunk, S. S. Fox, Hugh Lisse, H. L. Kuenzli, J. F. Ross, Cantwell Lash and F. D. Standish, Chas. Kirchen, cons. engr.; Hugh H. Brown, res. agt., Tonopah, Nev.; E. J. Schrader, supt.

Inc. Oct. 23, 1916, in Nevada. **Cap.** $1,000,000; $1 par; 775,000 shares outstanding. Transfers made by company at Tonopah; Nevada First Natl Bank, Tonopah, registrar. Annual meeting, first Monday in June.

The fourth annual report for calendar year 1919, gives total receipts, $141,252 and expenditures, $139,788; under the former, sale of stock accounts for $116,293. Current assets were $59,888, and liabilities, $23,445. A total of $300,000 is reported to have been expended to date.

Property: 10 claims, 2 patented, 175 acres, formerly known as the Barcelona mine, in Spanish Belt district, Nye county, 7 miles from Manhattan and 50 miles N. of Tonopah.

Geology: country rock is limestone and granite. Ore occurs in fissure veins with N. E.-S. W. strike and dip of 42°. According to official report, 3 orebodies have been uncovered, carrying gold and silver values of $20 to $30 per ton; the latter largely predominating. In the main Barcelona vein, ore is found in lenses, 1′ to 20′ wide, 50′ to 500′ long; ore is banded quartz with sulphides of iron, zinc, copper and lead. The ore is largely of milling grade, but stringers of high grade occur.

Development: by former workings of the Barcelona mine, first opened in 1871, amount to 2,000′, including the 250′ San Pedro shaft. Present management has driven a 1,280′ drainage tunnel, sunk the San Pedro shaft to 535′, and made connection with Barcelona workings; total workings, 8,500′. During 1921, the 350′ level was opened and work largely confined to this and the 145′ level. Probable ore tonnage is placed at 70,000.

Equipment: electric hoist and compressors. A new 50-ton, 10-stamp mill began operations in Sept. 1921. Ratio of concentration is said to be about 30 to 1; 60% of values recovered on tables 35% by flotation.

Property is credited with past (prior to '89) production of $500,000. Two cars of high grade, of a gross value of $9,776, were shipped early in 1920. Examinations have been made by Chas. Kirchen, Fred Searles, Jr., S. F. Hunt and E. L. Fletcher.

Apparently a legitimate enterprise, but some claims made for the property are fantastic and the stock sales campaign is weird.

CONSOLIDATED VIRGINIA MINING CO. **NEVADA**

See Consolidated Virginia Mng. Co. of Nevada.

CONSOLIDATED VIRGINIA MNG. CO. OF NEVADA **NEVADA**

Successor to Consolidated Virginia Mining Co.

Offices: 787 Mills Bldg., San Francisco and Virginia City, Nev.

Officers: Zeb. Kendall, pres.; Victor Etienne, v. p.; A. P. Swain, sec.-treas., with H. G. Humphrey and Frederick Vincent, directors.

Inc. November, 1904, in California; reinc. with change of name, Jan. 15, 1921, in Nevada. **Cap.** $2,160,000, increased from $216,000 on reincorporation; par $1; all issued; assessable. Stockholders of old company received 10 shares of new stock for each share of old. An assessment of 3¢ was levied May 19, 1921. Stock transferred at San Francisco office and by Security Transfer & Registrar Co., New York; registrar, Registration Surety Co., San Francisco. Annual meeting, first Monday in January. Listed on San Francisco Stock Exchange.

Assessments of former company, of 10¢ each, were levied, Jan. 20, 1919; March 15, 1920, and May 19, 1921. In July, 1919 the company was reported out of debt for the first time in 30 years. **Dividends** by former companies amount to $78,213,600.

The levying of assessments on the stock of both the old and new companies on the same date caused some comment at the time and no explanation of this action has apparently been forthcoming.

During 1919, total receipts were $310,144, with cash balance of $192, on Jan. 1, 1920. Net earnings from ore treated were $216,903. In 1920, revenue from mill was $259,687, and early in 1921, an available cash surplus of $75,000 was reported.

Property: a considerable part of the California claim and the Con. Virginia claim, covering 1,310′ along the Comstock Lode at Virginia City, under the same management and operated in conjunction with the Ophir Silver, Union Cons., and Mexican Gold & Silver companies, which see.

Development: by 2,900′ shaft and several miles of workings. Exploration on 2,700 and 2,900′ levels was stopped in 1919, and concentrated on the 2,150′ level and above to 1,600′. A rich shoot was opened on the former, and has been followed to 2,250′ by a winze, and also for 120′ beyond the fault. Eight faces in the mine were yielding $15 to $50 ore; and on the 1,650′ level there was 11′ of $50 ore in Feb., 1921.

Recent development totals are: 9,200', 3,275' and about 5,000', for 1919, 1920 and 1921, respectively.

The general plan of operation for 1921 is to open the old workings above the Sutro drainage tunnel and block out the large tonnage of low-grade ore remaining from previous work on the East vein and Comstock lode. A considerable amount consists of stope filling. All work below the Sutro tunnel, corresponding to the 1,650' level of the C. & C. shaft, is to be suspended.

Equipment: includes electric and steam power, hoist, compressor, pumps. Ore is treated by Mexican Milling Co., in which the Cons. Virginia has a one-third interest; the cyanide department was enlarged in 1919.

Production: in 1919, was 15,640 tons; in 1920, 17,706 tons of $20 ore were treated. Gross production during 1921 was $339,000.

CONSOLIDATED WEST EXT. SIMON MINES CO. NEVADA

Address: Mina, Nev.

Officers: F. J. Solinsky, pres.; J. H. Walsh, v. p.; G. W. Dwight, sec.-treas.; Geo. F. Thompson, mgr.; directors. A. H. Elftman, cons. engr.

Inc. May, 1919, in Nev. **Cap.** $150,000; shares 10c par; 955,816 outstanding.

Property: Thompson & Walsh group, S. W. of the Simon Silver-Lead, reported to show an outcrop 70' across and to carry extension of the Simon contact, and also the Harvey & Taylor gold vein.

Development: a 200' shaft cut ore at 100' below surface, that assayed 2% lead and 2 oz. silver per ton. **Equipment:** gasoline hoist, etc.

No information since early in 1920.

CONTACT COPPER CO. NEVADA

Address: Hutchinson, Minn., and Contact, Elko county, Nev.

Officers: S. G. Anderson, pres.; Wm. Schultz, v. p.; Sam G. Anderson, Jr., sec.-treas., with J. A. Lindenberg and J. A. Jorgenson, directors.

Cap. $1,000,000; shares $1 par.

Property: two groups, the Lucie, 11 patented claims, and the Blue Rock, 8 patented and 5 unpatented claims, at Contact, said to show copper carbonate ore in veins.

Development: the Lucie group has a 145' shaft, said to show ore all the way to the bottom. The Blue Rock has 2 shafts, 50' and 30' deep, both said to show ore. No production to date.

CONTACT SILVER MINING CO. NEVADA

Address: Mina, Nev.

Officers: Fred W. Fall, pres.; Robt. W. Faron, v. p.; R. R. Gamble, sec. treas.; Ernest Rackliff, mgr., with Frank M. Andrews, directors.

Inc. May 7, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 5 claims, 100 acres in Simon (Bell) mining district, 6 miles S. E. of the Simon Silver Lead mine, said to show gold-silver-lead ore in a contact deposit in limestone and andesite. A prospect.

CONTINENTAL DIVIDE MINING CO. NEVADA

Mail returned from former office, Tonopah, Nev.

Officers: U. W. Harwood, pres.; F. J. Reilly, sec.-treas.; with M. A. Mears, directors.

Inc. June, 1919, in Nevada. **Cap.** $150,000; shares 10c. par.

Property: 5 claims adjoining the Hull city and the Cheyenne. A prospect.

COPPER CANYON MINING CO NEVADA

Office: 25 Broad St., New York City. **Mine address:** Battle Mountain, Nevada.

Officers and directors: C. C. Burger, pres.; R. M. Atwater, v. p.; L. E. Wicher, treas., E. Sommer Schmidt, gen. mgr., with Wm. W. Cohen, Herman Aaron, C. N. Edge and E. N. Skinner, directors. S. L. Sherman, sec.

Inc. Nov. 4, 1916, in Delaware. **Cap.** $1,000,000; $1 par; 900,000 shares outstanding. Calumet & Hecla Mng. Co. owns a considerable interest, said to be 65,000 shares.

Registrar Transfer Co., transfer agt. and registrar. Stock listed on N. Y. Curb. Annual meeting, third Tuesday in February.

Financial statement as of Jan. 1, 1921: assets included—property, equipment and development, $1,320,580; current, $69,146; receivable, but not due, $62,554. Current liabilities were $4,823. Reserves for depreciation and depletion were $66,732. Surplus (from sale of stock) was $380,725. Current assets and liabilities at end of 1919 were $150,958 and $9,679, respectively.

Property: (1) Copper Canyon group, comprises 19 patented claims, 160 acres; also 2 unpatented claims and one water right 432 acres total, all in Copper Canyon, Battle Mountain district, Lander county. Formerly owned by the Glasgow & Western Mining Co. Purchase price was paid out of first year's production. First worked in 1882.

Copper Canyon claims show 3 veins, the Virgin, Superior and Estes, varying from 10′ to 30′ in width; the first two with a N.-S. course and dip of 60° to 80°, have ore shoots about 150′ long. The Estes orebody is 100′ long, and 20′ wide, the ore being a mixed sulphide and oxide, containing enargite, chalcocite, chrysocolla, malachite and cuprite, averaging 5% to 15% copper.

(2) Copper Basin group, 5 miles S. W. of Battle Mountain, and 8 miles N. E. of Copper Canyon, covers a hilly tract showing a small intrusive mass of granitic porphyry cutting shale, quartzite, and limestone, altered by contact metamorphism and showing several faults. This group comprises 27 patented (493 acres) with 95 unpatented claims (1679 acres); also 20 unpatented placer claims of 402 acres, and 17 mill sites, a total of 2,659 acres. The company has 31 claims, 517 acres, under option.

(3) a camp site of 280 acres owned in fee, and 3 water rights.

(4) a gold property, near Copper Canyon, acquired in 1922.

The Copper Basin claims are only in initial state of development. The orebodies are not of conventional disseminated type such as Ely, Ray, Miami, etc., but are richer, thinner vertically and possibly disconnected. They occur mainly in inclined beds of shale and in altered porphyry. The shales alternate with barren quartzite and contact metamorphic rocks. This irregularity, and the permeability of the rocks, greatly affects the susceptibility of the primary sulphide to enrichment.

Development: (1) at **Copper Canyon,** by 2 old inclined shafts, 200′ and 600′ deep and a vertical shaft started in 1917. Workings total 3,500′, with greatest depth of 570′.

(2) At **Copper Basin,** comprises the 200′ Widow shaft and 2,874′ of work; Chase and Goff shaft, 200′ deep, with 3,045′ of work; Sweet Marie shaft, 295′, with 3 levels and 3,976′ of work; Contention 130′ shaft, with 2,748′ of work; Hawkeye tunnel 403′ and a 600′ water tunnel. Thirteen churn drill holes, aggregating 3,257′, show that orebodies average 50′ thick and that the enriched zone is 50′ to 75′ below the surface. All workings total 13,942′.

Ore reserves as estimated May 1, 1921, were 500,000 tons of 2.68% copper ore, and about 1,000,000 tons assaying 1 to 1½%, at Copper Basin; and 200,000 tons of 3% copper ore at Copper Canyon.

Equipment: (both properties) includes a number of small gas hoisting engines, 100′ compressor, 250 h. p. distillate engine, etc.

Production: from Copper Canyon mine, 22,487 tons of ore averaging 9% copper and making from April, 1916 to January 1, 1919, about 3,000,000 lb. copper, sold for $536,699.

Copper Basin is a very promising property, and the Copper Canyon is worthy of further deep development.

Carl O. Lindberg, Ralph Nowland and Augustus Locke, are the consulting engineers of the company.

COPPER METAL MINES CO. **NEVADA**

Idle. Mail returned from former address at Goodsprings, Nev.

Officers and directors: S. B. Stewart, pres.; Peter Clegg, v. p.; J. B. Jensen, sec.-treas., at last accounts.

Inc. Dec. 20, 1916. **Cap.** $1,000,000; shares $1 par; 400,000 shares issued.

Property: 11 claims, 220 acres, in Ivanpah district, about 35 miles S. W. of Goodsprings, Clark county only slightly developed and claimed to show a 3′ contact vein between granite and porphyry, assaying 6% copper and 6 oz. silver with a trace of gold.

COPPER MOUNTAIN MINE NEVADA

Address: Ed. La Patt, Ed. Schultz and Mrs. J. L. Woodward, owners, Goldfield, Nev.

Property: 5 patented, 12 unpatented claims, 340 acres, 18 miles from rail at Nolan, Mineral county, developed by 3 shafts, with over 6,000′ of workings, showing copper ore of 4 to 8% tenor.

Production: shipments to September, 1919, amounted to over $100,000. From 1917, property was under option to Jumbo Copper Mtn. Mng. Co. subsidiary to Jumbo Extension Mng. Co., which is said to have expended $130,000 in development, but, failing to meet $50,000 payment, forfeited its equity in property, October, 1919, and it reverted to owners.

COPPER PEAK MINING CO. NEVADA

Office: Goodsprings, Nev.

Officers: R. A. Andrus, pres.-treas.; W. E. Allen, v. p.-mgr.; P. H. Springer, sec., with P. S. McClanahan, directors, all of Goodsprings, Nev.

Inc. in 1916, in Nevada. **Cap.** $1,000,000; $1 par; outstanding 520,000 shares.

Property: 6 claims, about 120 acres, on the south and east slopes of Olcot Peak, Yellow Pine district, 10 miles N. of Goodsprings, Clark county. **Ore:** is a high grade copper carbonate occurring in chambers and kidneys embedded in limestone. The highest assay of the 5 cars sorted ore shipped was 25% and the lowest was 14% copper.

Development: by 6 adits with total of 600′, the longest being 150′. Property has been worked intermittently for a number of years and efforts have been made to finance some consistent plan of development.

COPPER PRINCE MINING CO. NEVADA

Office: 53 City and County Bldg., Salt Lake City, Utah. W. W. Barton, sec.

Property: south of Austin, Lander county, developed by 235′ tunnel. Six assessments were levied up to July, 1918, but company gives out no report of recent operations. A prospect.

COPPER SHIELD MINING CO. NEVADA

Address: Care Dr. C. I. Douglas, 415 E. Third St., Salt Lake City, Utah. **Mine office:** Contact, Elko county, Nev.

Officers Dr. C. I. Douglas, pres.; U. U. Hiskey, v. p.; C. R. Strock, sec.-treas.; H. M. Shields, mgr., and J. A. De Valley, directors.

Inc. 1907, in Nevada. **Cap.** $1,000,000; shares $1 par; issued, 610,000. Annual meeting, second Tuesday in April.

Property: 11 claims, 200 acres, in the Salmon River district, developed by 4 shallow shafts, deepest 73′, and several tunnels, with a total of 646′ of workings, showing 4 veins in monzonite porphyry dikes in granodiorite, said to carry up to 40% copper and 2 to 6 oz. silver per ton. Oregon Short Line railroad is 37 miles distant Presumably idle.

COPPERSIDE MINE NEVADA

Address: Schwartz & Renaux, owners, Goodsprings, Nev. Otto F. Schwartz, mgr.

Property: 60 acres in Yellow Pine district, Clark county, shows a vein said to be from 1 to 8′ thick, and to average 25 to 30% copper. With only shallow workings and practically no equipment, the mine is reported to have produced $17,622 worth of ore in 1917, which netted the owners $3,940.

Was shipping in 1919, and apparently active in 1920.

CORNFORTH BELLEHELEN SILVER MINE NEVADA

See **Pacific States M. & M. Co.**

CORNUCOPIA DIVIDE MINING CO. NEVADA

Main office: 311 Bk. of Italy Bldg., Oakland, Calif.; Nevada office: First Natl. Bank Bldg., Tonopah, Nev.

Officers: P. W. Pray, pres.; C. E. Butler, v. p.; W. B. Harrington, sec.; J. C. Downey, treas., with Dr. W. F. Schwarner, directors, all of Oakland.

Inc. May, 1919, in Nevada. **Cap.** $150,000; par 10c.; non-assessable. Stock sold by permission of the State Corporation Commission of California.

Property: 4 claims, and fractions, 2 miles N. E. of the Tonopah Divide mine, and 3 claims in the W. Divide section, 11 miles from Tonopah. In the former, ore occurs in a shear-zone in rhyolitic breccia, samples returning up to $5.80; in the latter, 18" to 4' fissures have been followed, showing values of $10 to $200, largely in silver.

Development: 2 shafts, 285' and 116', one on each group; each fully equipped with hoist, etc.

CORNUCOPIA MNG. CO. OF NEVADA — **NEVADA**

Address: Luning, Nev.

Inc. May 23, 1919, in Nevada, by N. M. Wiley, Francis O'Boyle, and T. R. Pledge. **Cap.** $150,000; 10c par.

Property: a group of claims in the Simon district of Mineral county, developed by a new 100' shaft in andesite, and an old 75' incline which revealed fair value. Equipped with 6 h. p. hoist. A prospect.

COTTONTAIL MINING CO. — **NEVADA**

Address: J. J. Burk, Reno, Nev.

Officers: J. J. Burk, pres.; R. M. Preston, v. p.; A. Hankammer, sec.-treas. C. K. Jarvis, supt.

Property: one claim in fee, and 6 under option, on Rebel creek, westerly slope of the Santa Rosa Mtns., Humboldt county, 50 miles N. of Winnemucca. Two drift tunnels, 490' apart vertically, have opened a 5' vein, said to assay $23 per ton, 4/5 of which is gold. High grade is being shipped. Equipped with a small mill.

COWDEN & DEEGAN MNG. CO. — **NEVADA**

Address: D. C. Pomeroy, owner, Denio, Ore.

Property: 5 claims, 3 miles S. of the Oregon line, in Humboldt county, said to show granite cut by a quartz vein 6 to 48" wide, running $5 to $40 in gold per ton.

Development: by tunnels to depth of 500'. Estimates give 1,500 tons of ore blocked out. Plan sinking shaft 200' and drifting.

Equipment: includes 24-ton stamp mill. Reported to have produced some high-grade ore.

CRAVEN COPPER CO. — **NEVADA**

P. H. Craven, pres. Property near Winnemucca, Humbolt county, slightly developed, said to carry high-grade copper ore. Idle during the war, but operations to be resumed.

CRESCENT DIVIDE MINING CO. — **NEVADA**

Address: J. K. Turner, Goldfield, Nev.

According to latest reports, was operating the property of the **Silver Coin Mng. Co.**, which see.

CRESSON DIVIDE MINING CO. — **NEVADA**

Office: Goldfield, Nev.

Officers: C. S. Sprague, pres.; J. K.Turner, v. p.; Ben Gill, sec.-treas.; with C. A. Leager and L. L. Dellinger, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares, 10c par; 750,000 in treasury.

Property: Ideal claims adjoining Reno and Jim's Divide, and 2 fractions 1,500' S. of S. W. corner of Tonopah Divide. An undeveloped prospect, but well located.

CROESUS DIVIDE MINING CO. — **NEVADA**

Address: Tonopah, Nev.

Property: an undeveloped tract 3,000' E. of Tonopah Divide, and adjoining the High Divide on the west. A prospect.

CROESUS-EUREKA MINING CO. — **NEVADA**

Property sold to **Eureka-Croesus Mining Co.**, q. v.

CROESUS EXTENSION MINING CO. NEVADA

Address: R. M. Bradley, Austin, Nev. Company being organized in December, 1919.

Property: 4 claims on Prospect mountain, W. of the Eureka-Croesus.

CROWN CHARTER DIVIDE MINING CO. NEVADA

Address: F. C. Beedle, Goldfield, Nev.

Property deeded to **Crown Divide Mining Co.**, which see.

CROWN DIVIDE MINING CO. NEVADA

Formerly Crown Charter Divide M. Co.

Office: Goldfield, Nev.

Officers: F. C. Beedle, pres.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas., with T. F. Potthoff and A. Ninnis, directors

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par. Security Transfer & Registrar Co., transfer agt.

Property: 6 claims, 115 acres, adjoining the Mohawk and Belcher on N. W. and N. E., respectively, and 3,000′ N. W. of the Tonopah Divide. Examined by J. K. Turner.

Development: ground contains two well-defined and mineralized veins. The main vein is considered to correspond with the course of the "silver" vein of the Tonopah Divide. Developed by shaft.

Equipment: gasoline hoists, tools, etc., purchased from companies at Belleville and Candelaria, in Nevada. No recent information.

CROWN GOLD & SILVER MINING CO. NEVADA

Address: Mills Bldg., San Francisco, Calif.

Inc. Dec., 1919, in Nevada, by Rudolph Danmyer, C. M. Cross, E. A. Judd and V. R. Grant. **Cap.** $150,000; 10c par.

No information available as to property.

CROWN MINES NEVADA

Address: Golconda, Nev. Owned by Jos. H. Playter, mgr., and Walter G. Urige.

Property: 15 claims about 200 acres, 12 miles S. of Golconda, Humboldt county, said to carry a fissure vein in andesite from 25-60′ in width. Ore occurs in shoots, 40-300′ long, said to average $8-$12 in gold and silver.

Development: by about 2,000′ of underground work, including a 700′ tunnel, which is being extended to gain further depth. Management reported ore reserves of 150,000 tons, averaging $6-$10 per ton in June, 1919. Report of February, 1921, states that "extensive development and "installation of large milling plant" are to begin.

CROWN POINT GOLD & SILVER MINING CO. NEVADA

Succeeded by **Jacket-Crown Point-Belcher Mines Co.**, which see.

CUMBERLAND DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: T. L. Oddie, pres.; A. E. Kane, v. p.; Warren Richardson, sec.-treas., with D. T. and P. J. Donovan, directors

Inc. 1919, in Nevada.

Property: 4 Keystone claims, 50 acres, next to the Sutherland and N. of the High Divide Annex.

CUNAPAH MINING CO. NEVADA

Address: Montello, Nev.

Officers: P. O. Perkins, pres.; S. C. Sherill, v. p.; G. W. Lynch, sec.-treas.; J. M. Bowker, mgr

Inc. 1916, in Utah. **Cap.** $50,000; shares, 10c par; 205,000 issued. Listed on Salt Lake Exchange.

Property: 5 unpatented claims in Lucin district, Elko county, Nev., near Utah border. Is in same hill as Salt Lake Copper & Tecoma Consol, mines and shows limestone intruded by porphyry and granite. Ore occurs in "breaks" in limestone near contact.

Development: by 250′ shaft and several tunnels, said to show a lead-

silver vein in limestone. Several carloads of ore shipped to June, 1917, averaging 25% lead and 2 oz. silver per ton.

Company installed compressor, hoist and power plant, and was to sink a shaft in 1918. No recent returns.

CUPRITE COPPER CO. **NEVADA**

Supposedly dead. No recent returns. Described in Vol. XII.

CUPRITE ESMERALDA SULPHUR CO. **NEVADA**

Presumably organized to operate property at Cuprite, Esmeralda county and is apparently intimately connected with the **Cuprite Sulphur Corporation,** which see.

Reported, November, 1921, that John J. Olsen and E. Z. Parker, who had operated under name of J. J. Olsen & Co., had been indicted and convicted in the Federal Court, New York, for misuse of the mails. They have been released under bond. Others are implicated.

CUPRITE SULPHUR CORPORATION **NEVADA**

Mail returned from 50 E. 42nd St., New York City. F. S. Taggart, vice-president, at last account.

Inc. 1917 in Delaware. **Cap.** $2,000,000.

Property: a sulphur deposit near Cuprite, Esmeralda county. Reported September, 1920, that the promoters had been indicted by a Federal jury in New York, on the charge that mails had been used to defraud. See **Cuprite Esmeralda Sulphur Co.**

CYANIDE MINE **NEVADA**

Address: Eureka, Nev. Mine in the Eureka district, Eureka county. Lead-silver ore, carrying gold, was produced in 1919. Operating in 1920.

DAHL PLACERS **NEVADA**

Address: Jas. Dahl, owner, Copper Canyon, via Battle Mountain, Nev.

Property: 25 claims, 1,500 acvres, 700 patented, at Copper Canyon, Lander county, credited with a production from 1910 to 1919, of $485,000 in placer gold. Gross earnings in 1918 were $74,381.

Gravel occurs in small narrow channels of unknown extent.

Development: by 1,500′ tunnel and 60′ vertical shaft. The giants have a daily capacity of 200 yards. Recent information not available, but presumably operating in 1920.

DANDY DIVIDE MINING CO. **NEVADA**

No information obtainable. Probably a "paper" company only.

DARKEY MINE **NEVADA**

Owned by W. S. Holmquist and M. W. Johnson. W. S. Elliott, mgr.; Walter Geddes, supt., at last accounts.

Property: 9 claims, 180 acres, in Elko county, about 9 miles E. of Decoy, developed by 65′ shaft, shows a blanket deposit of manganese ore, in limestone formation. Owners shipped 562 tons of ore, averaging 45% from Oct., 1916, to March, 1917; shipments continued to June, 1918.

Property leased to W. S. Elliott and W. Geddes. Installed a hoist and shipped from Decoy on the Nevada Northern R. R. Probably idle.

DAVIDSON MINING CO. **NEVADA**

Dissolved. Holdings taken over by **Prince Cons. M. & S. Co.,** July, 1918.

DAWN MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Inc. by Fred A. Hale, Jr., Albert Munzebrock, N. B. Hunter, H. K. Riddall and S. E. Yount. **Cap.** $50,000; $28,000 outstanding in 1919.

Property: the Midnight group of 3 claims in Yellow Pine district, Clark county. Ore carries carbonates of zinc and lead. Shipping in 1919-20.

DAY BRISTOL CONSOLIDATED MINES CO. **NEVADA**

Dead. Property originally owned by Bristol Cons. M. & S. Co., was acquired in 1911, and in 1915 taken over in turn by the Cons. California-Nevada Mining Co. See Bristol Silver Mines Co. for later information.

DAYTON PLACER RECOVERY CORPORATION NEVADA

Dead. Described fully in Vol. XIV.

DEER LODGE GOLD M. & M. CO. NEVADA

Address: Ben L. Corum, sec., Utah Savings & Trust Bldg., Salt Lake City, Utah. W. S. Ramer, pres. Stock assessable and 22 assessments have been levied, the last of 1/3c. per share, on Dec. 5, 1921.

Property: in Lincoln county, Nevada. Except for annual assessment work, company is presumably inactive.

DELAWARE MINING CO. NEVADA

Idle. H. H. Hunter, mgr., Lovelocks, Pershing county, Nev.

Property: 200 acres, in Seven Troughs district, near Vernon, Humboldt county. Ore occurs in veins 5-7′ wide, said to average $18-$20 per ton.

Equipment: includes the Darby mill 4½ miles from the mine. Management was planning to explore the Delaware veins at depth at last accounts.

DEMIJOHN CONSOLIDATED MINING CO. NEVADA

Offices: 410 Savings & Trust Co. Bldg., Salt Lake City, Utah. Mine at Pioche, Lincoln county, Nev.

Officers: Fred W. Price, pres.; J. Thomas, v. p.; W. M. McCrea, sec.-treas., with Owen A. Bailey, F. E. Parish, O. P. Soule, directors.

Cap. 1,000,000 shares; 10c par; assessable. Assessment No. 9 levied February, 1918. Listed on Salt Lake City Stock Exchange. Sales 1½c. high, 1c. low, 1921.

Property: 9 claims, 7 patented, 2 miles W. of Pioche, said to show lead-silver-gold ore. The ore is making into the lime from the hanging wall of a fissure 40′ wide and varies from 1″-2′ in thickness. A selected sample assayed 52% lead, 80 oz. silver and 0.12 oz. gold. The main vein traversing the property has a N.-S. strike and dips to the E .Mineralization, though persistent, is not in commercial quantity, save in narrow streak noted.

Development: 300′ shaft, drifts, crosscuts and winzes to the 500′ level.

Equipment: hoist, air compressor and all necessary machinery. Small shipments made in 1915. Property closed down and resumption of work indefinite.

DESERT CHIEF CONSOLIDATED MINING CO. NEVADA

A reorganization of the **Desert Chief Mng. Co.** Merged December, 1919, with other companies to form the **Yellow Tiger Consolidated Mining Co.**, which see.

Inc. in Nevada. **Cap.** $1,500,000; par $1; assessable.

Property: of the Desert Chief Mng. Co. consisted of 30 patented acres in Diamondfield esction of Goldfield district, Esmeralda county. Foreclosed on judgments in 1914, but property redeemed and reorganization effected, March, 1915, on an assessable basis.

New company, Desert Chief Consolidated, in 1915 and 1916, acquired properties of the **Goldfield Ruby Hills Co.** and **Black Ants Gold Mng. Co.**, making its total holdings 130 acres.

Development: 100′ shaft only work recorded. H. A. Riedel was president.

DESERT KLONDYKE MINING CO. NEVADA

Address and transfer office: Tonopah, Nev.

Officers: R. H. Tune, pres.: W. Lucot, v. p.; C. N. Miller, sec.-treas.; with A. F . Price and Gerald B Hartley, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: Annex and Annex No. 1 claims in Klondike section of Divide district, 6 miles south of Gold mountain.

DETROIT DIVIDE MINING CO. NEVADA

Mail returned from former address: care J. B. Evans, Tonopah, Nev.

Porperty: 6 claims at Divide, 2¾ miles due west of Gold mountain, and also the Carbonate silver-copper mine in the Providence range, near the California-Nevada line, and 3 miles from the Salt Lake Route. A large

vein has been opened, showing 3' of $75 silver and $15 copper ore. Development is by tunnel, and a compressor plant was at work in December, 1919.

DEXTERETTA MINES CO. **NEVADA**

Probably dead. Formerly held **Nevada Mother Lode Co.** group at Cherry Creek, near Ely, Nev. See Vol. XIV.

DEXTER-UNION MINES CO. **NEVADA**

Address: Manhanttan, Nev.

Officers: S. R. Moore, pres.; H. H. Brown, v. p.; C. T. Lawrence, sec.-treas., with C. F. Wittenberg and R. Fred Brown directors.

Inc. 1912 in South Dakota. **Cap.** $1,000,000; shares $1 par; 800,000 shares issued.

Property: 16 patented claims, 270 acres, in Manhattan district. Ore contains gold and silver said to average $15 per ton. Lessees reported to have produced $40,000 worth of ore from the Union No. 4 claim. Idle for several years.

DIAMONDFIELD BLACK BUTTE REORGANIZED MNG CO.

Office: Goldfield, Nev.

Officers: J. B. Giblyn, pres.; with H. T. Gillman, Bartlet Smith and L. L. Dillinger, directors. Geo. B. Hutchings, sec.-treas., 25 Broad St., New York.

In 1918, control was acquired by former president, C. S. Sprague, but extensive development planned was not carried out. Control now in hands of Mines Selection Co. (q. v.), a holding organization fathered by Weir Bros. & Co.

DIAMONDFIELD DAISY GOLD MINING CO. **NEVADA**

Idle. **Address:** 61 Broadway, Ney York City.

Officers: Albert J. Seligman, pres.-treas.; C. R. Woodin, v. p.; W. M. Hoagland, sec., with F. E. Horton, directors.

Inc. 1910, in Nevada, as reorganization of the Goldfield Daisy Mng. Co., of Goldfield Nev. **Cap.** $1,000,000; shares $1 par; 850,000 issued. Listed on New York Curb and San Francisco Exchange. Shares quoted at 2c throughout 1920. No sales, 1921.

Property: 3 patented claims, 60 acres, at Goldfield, was under lease to the **Justice Gold Mines Co.**

DIAMONDFIELD MINING & MILLING CO. **NEVADA**

Merged into the Goldfield Great Bend Mng. Co., in 1915.

DIAMONDFIELD TRIANGLE MINING CO. **NEVADA**

See **Reorganized Diamondfield Triangle Mng. Co.**

DIVIDE ANNEX MINING CO. **NEVADA**

Company dissolved. See **Reorganized Divide Annex Mng. Co.**

DIVIDE BOY MINING CO. **NEVADA**

Address: Tonopah, Nev.

Unable to locate officers or holdings, etc.

DIVIDE CHARTER MINING CO. **NEVADA**

Office: Tonopah, Nev. H H. Brown, res. agt.

Officers: J. E. Adams, pres.; J. H. Miller, v. p.; Allen Rives, sec.-treas., with Zeb Kendall, H. H. Brown, and F. M. Manson directors.

Inc. March, 1919, in Nevada. **Cap.** 1,500,000 shares; 20c. par, assessable: 750,000 outstanding.

Property: 5 claims, 100 acres, S. of the Kendall and N. of Bonanza group. Samples from outcrops assay up to $10 per ton. Examined by J. B. Higgins.

DIVIDE CITY MINING CO. **NEVADA**

Office: F. Pittman, agent, Tonopah, Nev.

Officers: J. H. Miller, pres.; Zeb. Kendall, v. p.; Allen Rives, sec.-treas.; George Wingfield, J. E. Adams, F. M. Manson, directors.

Inc. March 10, 1919, in Nevada. **Cap** 1,500,000 shares; 10c. par, as-

sessable. Listed on San Francisco Stock Exchange. Shares quoted 2c. high and 5⁄8 low, in 1921.

Property: 5 claims and 2 fractions north of Tonopah Divide ground; patent applied for in 1920. Developed by 140′ shaft.

DIVIDE CITY TOWNSITE CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Wm. Watters, pres.; J. H. Miller, v. p.; J. E. Adams, sec.-treas.; Allen Rives, asst. sec.-treas., with W. J. Douglass and Zeb Kendall, directors.

Inc. March 10, 1919, in Nevada. **Cap.** 350,000 shares; $1 par; 100,000 pfd. non-assessable, and 250,000 com. assessable.

Property: company is not a mining concern, but owns surface rights for townsite purposes on ground of the Divide City Mining, a portion of the Dividend, Horseshoe, and neighboring properties.

DIVIDE CONSOLIDATED MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; F. W. Manson, v. p.; J. E. Adams, sec.-treas.; with William Watters, Richard Finn(supt.), directors. A. H. Elftman, cons. engr.

Inc. May 28, 1918, in Nevada. **Cap.** 1,500,000 shares; 10c. par; assessable, 750,000 outstanding. Listed on San Francisco Stock Exchange. Stock quoted at 3c. high and 1c. low, in 1921.

Property: the Empire group, 8 claims, 2,000′ due N. of the Tonopah Divide, and just N. of the Tonopah Mining Co.'s ground. Reported that two of the master veins of the district cross the ground, while four cross-veins opened in adjoining ground undoubtedly persist into the Empire tract. Parts of the veins are well mineralized, and yield good assays, which indicates that pay-shoots should be found in the underlying breccia.

Development: at a depth of 180′, the shaft of the Divide Consolidated was in the typical ore-bearing material of the district, a silicified highly-oxidized rhyolite-breccia, and samples ranged from $9 to $48 per ton. The crosscuts from the shaft on the 200′ level cut 4 veins, with values, but not in payable quantity. The ground breaks and stands well; little or no timbering being needed, and a 6′ round in lateral work is not unusual.

Equipment: 50-h. p. electric hoist, 8 drill compressor, etc, one of the best plants in the district.

DIVIDE CONTACT MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919 in Nevada.

Property: a group of 4 claims, on outskirts of district and over 3 miles southeast of Gold mountain. A prospect.

DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Zeb. Kendall, pres.; F. K. Pittman, v. p.; B. A. Rives, sec.-treas., with J. H. Miller and C. T. Stevenson, directors. Edward J. Bevis, supt.; Andrew Walz, cons. engr. in charge.

Inc. February 21, 1918, in Nevada. **Cap.** 1,000,000 shares; 10c par. 800,000 issued. Listed on San Francisco Stock Exchange. Sold 63¢ high, 19¢ low, 1921. Columbia Trust Co., registrar; Registration Surety Co., San Francisco, transfer agt.

Property: 3 claims, 20 acres, adjoins Tonopah Divide on N. Examined in July, 1919, by Andrew Walz, for Hayden, Stone & Co., which bought 40,000 shares. Vein strikes N. 10° E., and is in rhyolite-breccia.

In January, 1920 company acquired an option on the May Day prospect, situated at the summit near the Luning-Rawhide road.

Development: by 425′ main (Kendall) shaft, which failed to find extension of Tonopah Divide vein. In May, 1919, a 40′ ore zone was located 600′ N .of main shaft, on which Caldwell shaft was sunk for 200′. Although "strikes" were occassionally reported, ore was not found in commercial quantity. In March, 1921, discovery of ore shoot, 4′ to 8′

wide, 120′ long, between 100′ and 200′ levels was announced, with values from $25 to $100, and 495 tons were reported to have yielded $41,373 gross, up to Aug. 15. Stoping began Sept. 1, and output for month said to be about $48,000 from 625 tons of ore.

The Kendall shaft is well placed for deep development, and a cross-cut is being driven to cut the Caldwell lode 200′ below existing workings, or 420′ level.

Equipment: electric hoist, compressor, etc.

DIVIDE FRACTION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: M. J. Sullivan, pres.; G. A. Cole, v. p.; H. J. Coogan, sec.-treas., with H. C. Heidtman and F. J. De Lonchamps, directors.

Inc. April, 1919, in Nevada. **Cap.** 1,500,000; 10c par, non-assessable.

Property: 5 fractional claims, adjoining the Toggery and Operator groups.

DIVIDE GOLD DYKE MINING CO. **NEVADA**

Office: 206 Clay Peters Bldg., Reno, Nev.

Officers: R. M. Preston, pres.; Charles Kielhofer, v. p.; A. Murtaugh, sec.-treas., with C. F. Stevens and C. W. Skene, directors.

Inc. in Nevada, 1919. **Cap.** $150,000, 10c par.

Property: 4 claims E. of the Gold Wedge, and 2½ miles S. E. of Gold mountain. A prospect.

DIVIDE LEADER MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: F. E. Baker, pres.; H. E. Loufek, v. p.; V. M. Place, sec.-treas.

Inc. in Nevada. **Cap.** $150,000; shares, 10c par.

Property: two groups, one 2¼ miles E. and the other, 2 miles S. of Gold mountain. Surface shows well defined veins.

DIVIDE SYNDICATE MINING CO. **NEVADA**

Office: Russ Bldg., San Francisco, Cal.

Officers: W. A. Sherman, pres., Charles Kielhofer, v. p.; F. H. Lathrop, sec.-treas., with William Lichtenberg (supt.), A. A. Heer, directors.

Inc. March 8, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c. par; assessable. Listed on San Francisco and Los Angeles Stock exchanges. Transfers made in company's office.

Property: 3 claims, 55 acres, adjoining the Rosetta on the northwest. Tract has several veins on it.

DIXIE DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: C. S. Sprague, pres.; C. A. Leager, v. p.; Ben Gill, sec.-treas.; with I. K. Turner and B. W. Ward (supt.), directors.

Inc. March, 1919, in Nevada. **Cap.** $150,000, shares 10c par; 750,000 in treasury; 200,000 issued.

Property: 3 claims and fraction, 50 acres W. of Portland 2½ miles southwest of Gold mountain. A prospect.

DOCTOR DIVIDE MINING CO. **NEVADA**

Mail returned from A. K. Warner, res. agt., Tonopah, Nev.

Officers: T. J. O'Donnel, pres.; T. W. Graham, v. p.; G. N. Bachman, sec.-treas., with Chas. Small and A. H. Warner (manager), directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 treasury shares; 100,000 issued.

Property: the Doctor group, 4 claims and fraction.

DOUGHBOY DIVIDE MINING CO. **NEVADA**

Inc .1919, in Nevada.

Owns a group of 5 claims adjoining Treadwell on S. and 1½ miles E. of Gold mountain.

DOUGLASS DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: N. K. Cooper, pres.; F. B. Caldwell, sec.-treas.

Property: 3 Keystone claims, adjoining Mohawk, Northwest, and North properties. A prospect.

DOUGLASS MINING CO. **NEVADA**

Property: 15 patented (1908) claims, 227 acres, in Silver Star district, Mineral county, 7 miles S. W. of Mina, includes Hardluck, Mary, New Party, Orphan Boy and Snowball; also ½ interest in the Gold Sovereign, 20 acres, and water rights of 80 acres. Claims show quartz-adularia gold-bearing fissure veins in conglomerates, opened by shaft, tunnel and glory holes about 100′ deep.

Location originally acquired by company with Mrs. John L. Watson of Portsmouth, Va., apparently in control. Idle since about 1916. Property was disposed of at sheriff's sales to satisfy a mortgage judgment of $19,509 in favor of the Esmeralda County Realty Co., on Jan. 5, 1922. Reported that company may be reorganized.

DOYLE MINING CO. **NEVADA**

Dissolved June 26, 1917. Was controlled by Atkins Kroll Co. See Vol. XIII.

DROMEDARY HUMP CONS. MINES CO. **NEVADA**

Mine at Fairview, Churchill county. Edward W. Stratton, in charge.

Formerly the Dromedary Hump Mng. Co., name changed about 1917, when holdings (one claim) of Fairview Golden Boulder Mng. Co. were absorbed and capital was increased to 2,000,000 shares. The latter received 1,225,000 shares.

Was apparently coming to life mid-summer of 1921, after some years of quiescence.

DUNLAP COPPER MINE **NEVADA**

E. S. Chafey, lessee, Mina, Nev. Property at Mina, Mineral county, owned by **Nevada Copper Co.**, which see.

DUPLEX DIVIDE MINING CO. **NEVADA**

Office: Room 1, Journal Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; W. T. McNeil, v. p.; A. LeCuyer, sec.; C. H. Duborg, treas.; with Gray Mashburn and H. H. Donogh, directors.

Property: 3 claims, 1⅛ miles N. of Ben Hur, and the 4 Silver State claims. An undeveloped prospect.

DUPLEX MINING CO. **NEVADA**

Idle. **Office:** 501 P. E. Bldg., Los Angeles, Cal. **Mine office:** Searchlight, Clark county, Nev.

Officers: Geo. L. Craig, Long Beach, Cal., pres.; C. W. Ennis, v. p.; Geo. R. Colton, sec., with G. F. Colton, directors at last accounts.

Inc. May 7, 1915, in Nevada. **Cap.** $500,000; shares $1 par. All stock issued is assessable.

Property: 7 patented claims, 101 acres, is a well-known gold mine, with veins in quartz monzonite, carrying gold-silver ores, changing to copper, lead and zinc at depth. Orebodies from 2.5 to 5′ in width.

Development: by 600′ vertical shaft, a 45° incline shaft 400′ deep, and a 74° incline shaft 300′ deep, with about 2,500′ of underground workings. Assay results from carload lots are 0.9 oz. gold, and 4.9 oz. silver, 8.6% lead, 2.3% copper, 1.3% zinc. Company claims that on the lowest levels the amount of lead is diminishing and copper increasing. The first copper ore mined in commercial quantities in the Searchlight district was shipped from this mine.

During 1920, lessees were shipping selected ores, assaying $100 to $200 per ton.

DUPONT COPPER MINES CO. **NEVADA**

Office: N. H. Wheeler, gen. mgr., 10 E. 43rd St., New York City. **Mine address:** Dupont, P. O. Searchlight, Nev.

Officers: S. J. Kistler, pres.; Wm. D. Miller, v. p.; Chas. M. W. Keek, sec.-treas., with C. S. Clark, directors. G. B. Hartley, J. V. Priest, and W. W. Wishon, mining and consulting engineers.

Inc. Feb., 1916, in Arizona. **Cap.** $2,500,000: $1 par; 1,500,000 issued.

Security Transfer & Registrar Co., N. Y., transfer office. Metropolitan Trust Co., N. Y., registrar.

Property: the Sazarac group, formerly owned by the Gold Coin Mining Co., defunct 1907, and the Bornite group. These holdings comprise 23 claims, 8 patented, 410 acres, at Camp Dupont, 18 miles from Searchlight, Clark county.

Company also owns a stock interest in the **Queen Calumet Copper Extension Mining Co.** of Bisbee, Ariz.; also options on 30 mining claims, about 600 acres near the Dupont mines, a 51% stock interest in the Assets Realizing Mines Corp'n, California, which see. The entire mill equipment of the **Hartley M. M. & Reduction Co.**, at Mazuma, Nev., a defunct English concern, and "the prospect of obtaining" 44 patented lode claims, developed by 5,000' of tunnel, crosscutting and carrying more than 100 fissure veins yielding 10 to 7,000 oz. silver per ton, and estimated to contain more than two hundred millions of tons of profitable silver-lead ores.

Geology: the Sazarac or Dupont mines show mineralized dikes or veins cutting a quartz-monzonite porphyry, intrusive in a pre-Cambrian granitoid complex, overlain by Tertiary volcanics. A basic granite is cut by great tongues of aplite and pegmatite dikes paralleling the N.-S. vein system.

Ore is a silicfied quartz-porphyry with specular and spathic iron and carries copper and gold values. In the N.-S. Sazarac vein, 5' wide, the ore is specular hematite in a silicified quartz-porphyry, the vein being 15' wide on the 200' level. The Bornite is an E. W. vein 5' wide, claimed to average $15 to $20 per ton for a length of 100' and depth of 60' Four per cent. Hill is a stockwerk of veinlets, making a possible disseminated or porphyry orebody. Ore said to assay 10.4 oz. silver, 20.34% copper, and $6 to $300 gold per ton.

Development: by a 225' main shaft on the Sazarac, 92 and 111' shafts on the Bornite, and 100' shaft on the Queen claims.

Reported on by Carl Anderson, Walter M. Brown, and by W. W. Wishon in 1916.

In a recent circular, company claims to own, control, or was negotiating for, 4,800 acres in various districts and claimed that ore valued at about $14,000,000 was ready for milling; also that the future mine possibilities have a valuation in excess of $58,000,000, and mine and mill equipment is worth $600,000. This circular claims that when these properties are in full operation the company will produce $500,000 per month for many years, which is interesting if true.

The Hartley mill was apparently in operation for part of 1920.

DYKE DIVIDE MINING CO. **NEVADA**

Incorporated to raise funds to prospect on group of claims situated 3 miles N. E. of Gold mountain. A raw prospect.

EAST DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; P. H. O'Neil, v. p.; J. E. Adams, sec.-treas.; Allen Rives, asst. sec.-treas., with R. F. Brown, directors.

Inc. March 22, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 9 claims, south of Allied Divide and north of Big Divide.

EAST DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: Joseph Mayer, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas.; with C. S. Sprague and C. A. Leager, directors.

Inc. March 30, 1918, in Nevada. **Cap.** $150,000; 10c par; 1,400,000 outstanding. Transfers at company's office. Listed on San Francisco Stock Exchange. 3c high, 1c low, in 1921.

Property: 10 claims, 160 acres N. W. corner of tract 1,000' from the Tonopah Divide. Examined by Dr. Elftman and J. K. Turner. Property under same management as Alto Divide.

Development: by 400' shaft, which entered lower breccia zone at 290'

At 80′ from shaft, the E. cross-cut on the 400′ level cut a vein 23′ wide, assaying $5.60 per ton. At last report, crosscutting was being continued to reach a rhyolite dike. Total workings, 1,800′

Equipment: suitable for depth of 1,000′.

EASTERN COPPER CO. **NEVADA**

Idle. Mail returned from former offices, 805 H. W. Hellman Bldg., Los Angeles, Cal., and 32 Broadway, New York City. **Mine address:** St. Thomas, Nev.

Officers: L. H. Lathrop, pres.; J. K. Turner, v. p.-cons. engr.; C. P. Campbell, sec.-treas.; C. R. Topping, supt., with W. F. Vidal, directors.

Inc. 1917, in Arizona. **Cap.** $1,500,000; $1 par; 734,100 shares issued. Stricken from New York Curb, June, 1918. Security Transfer & Registrar Co., New York, and Registration Surety Co., S. F., transfer and registry agents, respectively.

Property: 12 claims, 240 acres, in Gold Butte mining district, Clark county, about 15 miles east of St. Thomas ,the nearest railway point. Ore occurs in a fracture zone in limestone and carries copper in the form of chalcocite and malachite.

Report by L. J. Lathrop recommends sinking a shaft. Lessees have shipped surface ore only in past, some of it reported to have carried 29% copper.

Is a prospect which needs deep development.

EASTERN PRINCE GOLD & SILVER MINING CO. **NEVADA**

Address: H. F. Earle, sec., Newhouse Bldg., Salt Lake City.

Cap. $100,000 shares 10c par. Listed on Salt Lake City Exchange, and offered at a cent a share in June, 1919.

Property: 8 claims in Ely district, Pioche, Lincoln county, believed to have extensions of the adjoining Prince Consolidated low-grade, iron-manganese deposits, carrying a little silver, lead, zinc and gold.

EASTERN STAR MINING CO. **NEVADA**

Office: Winnemucca, Humboldt county, Nev.

Officers: E. Reinhart, pres.; Chas. F. Spilman, v. p.; L. G. Campbell, sec.-treas.; with Daniel Craig and R. S. Bolam, directors.

Inc. 1911, in Nevada.. **Cap.** $1,500,000; shares $1 par; outstanding, 1,340,000.

Property: 5 claims, 70 acres, in Gold Circle mining district, Elko county, with a 4½′ gold quartz vein, in andesite.

Development: by 280′ incline shaft with levels at 75′, 160′ and 240′.

Equipment: includes two 25 h. p. engines.

Examination and report by a mining engineer estimated 5,000 tons of ore in sight averaging $20 a ton. Idle.

E. & F. MINING CO. **NEVADA**

Idle. Address: care Walker Bros. Bank, Salt Lake City, Utah. **Mine office:** Pioche, Lincoln county, Nev.

Officers: A. C. Ellis, Sr., pres.; A. Levy, sec.; Walker Bros. Bank, treas. Arthur Murphy, mgr.

Inc. March 17, 1902, in Utah. **Cap.** $100,000; shares 50 cts par; assessable.

Property: 12 claims, 11 patented, 240 acres, in the Bristol and Jackrabbit district, 1½ miles from a railroad. Mine has a 450′ incline shaft and 2 tunnels, one of 350′, with total workings of 5,000′.

Equipment: includes a 25-h. p. gasoline hoist and necessary mine buildings. Mine produced a little copper ore, with excess of iron, but was shut down 1907. Development work in lower tunnel resumed in 1914. Property operated under lease by Arthur Murphy in 1918, who shipped 7 tons of high-grade ore daily in September, 1919, and opened a new orebody 200′ below the tunnel level. **Production:** up to January, 1921, said to be $250,000 from ore averaging 21% copper, 18½ oz. silver, some lead and gold.

Reported early in 1921 that R. J. Evans, W. A. Clark, Jr., and others,

had purchased property from the Ellis estate; Mr. Evans is said to be a large stockholder in the Bristol mines which adjoin.

ELDORADO DIVIDE MINING CO. **NEVADA**

Office: R. Nenzel, agt. Lovelocks, Nev.

Officers: Rudolph Nenzel, pres.; A. B. Harlan, v. p.; C. H. Jones, sec.-treas.; W. E. Sirbeck, V. P. Twigg, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 treasury shares.

Property: 4 claims adjoining Frisco Divide and near Ajax Divide, 3 miles S. E. of Gold mountain. Is an undeveloped prospect.

ELDORADO ENTERPRISE GOLD MINING CO. **NEVADA**

E. P. Jeans, pres., Las Vegas, Nev. Company reported to have made a discovery of platinum ore on their property, 1916. No recent returns.

ELDORADO-FLAGSTAFF MNG. & MLG. CO. **NEVADA**

Address: Nelson, Nev.

Officers: C. R. Welch, pres.; Alex Mead, v. p.; G. A. Duncan, sec.-mgr.; I. W. Bennett, treas.; with Peter Anderson, Clark Moore and Duane Miner, directors.

Inc. Sept., 1917, in Nevada. **Cap.** $500,000; $1 par; 161,000 outstanding.

Property: 11 patented claims, 173 acres, in Eldorado canyon district, Clark county, carries gold-silver ore in a mineralized dike of monzonite-porphyry said to average 70 oz. silver.

Production: about 16,000 tons reported to have averaged $14 per ton. Was producing in 1918 and apparently active in 1919-20.

EL DORADO GOLD STAR MINING CO. **NEVADA**

Operating claim in Nob Hill section El Dorado mining district. Company offered 40,672 shares for sale, August, 1917, proceeds to pay off $15,000 due on purchase, and to pay for development. No later returns.

ELECTRIC GOLD MINES CO. **NEVADA**

Address: McLean, via Tonopah, Nev. Sol. Camp, supt. Property controlled through purchase by Frank E. Horton, representing other San Francisco men.

Property: the Weepah group, 6 claims, on S. W. slope of Lone Mts., Esmeralda county, 10 miles S. of McLean. Two vein systems cutting schists and limestone ,carrying gold and a little silver, have been traced for 1,500'. Ore is reported to be free-milling with a value of $12 to $20 for a 70' width.

Development: by 4 shafts; the deepest, 170', is reported to have uncovered a rich ore shoot, Sept, 1, 1921. Equipped with 15 h. p. hoist.

ELGIN-BELLEHELEN DIVIDE MINING CO. **NEVADA**

Name changed from **Silverfields Ajax Mines Co.**

Office: F. A. Burnham, Tonopah, Nev.

Inc. March, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: a gold-silver mine at Bellehelen, 30 miles due E. of Tonopah, in which an 18" streak of rich silver ore was found at depth of 120' early in 1919. Second-class ore sent to the West End mill at Tonopah assayed $84.34 per ton. At Divide, company has 3 claims and 3 fractions.

ELKO MINING CO. **NEVADA**

H. L. Hollis, cons. engr., 1025 People's Gas Bldg., Chicago, Ill.

Property: Alpha mine at Jarbidge, Elko county, contains veins of gold-silver ore in Tertiary volcanic rocks. See Bull, 497, U. S. Geol. Survey, 1912, by F. C. Schrader, for geology, etc. Property under lease with option to purchase, June, 1919.

Development: crosscut tunnel, several hundred feet long.

Equipment: 5-stamp mill.

ELKO PRINCE LEASING CO. **NEVADA**

Out of business. Operated property of the **Elko Prince Mining Co.** (which see), and when indebtedness to J. N. V. Dorr was paid off, the mine reverted to original owners.

ELKO PRINCE MINING CO. NEVADA

Main office: 501 Fifth Ave., New York City. **Mine office:** Gold Circle, Nev.

Officers: L. L. Savage, pres.; R. P. Jackson, v. p.; Henry E. Hawa, sec.-treas., with J. V. N. Dorr and F. F. Sharpless, directors. L. D. Dougan, supt.

Cap. $1,150,000; $1 par; 1,108,566 shares issued.

Annual report to January 1, 1920, shows: total assets, $1,155,116, including cash, $28,523 and supplies, $41,154; total liabilities, $1,282,434; accounts payable, $4,214 and depletion reserve, $169,656; general deficit, $127,320. Income was $183,515, of which bullion was $181,177; disbursements were $171,275, leaving operating profit of $12,240 and a net deficit of $112,388 after deducting for depreciation and depletion.

Dividends: begun October, 1917, total about 30c per share, the last of 3½ cents, being paid in Oct. 1919.

Property: 9 patented claims at Midas, Gold Circle district, Elko county, 50 miles N. E. of Golconda on the S. P. R. R. and 33 miles from Red House on the W. P. R. R. During 1915-18, the Elko Prince was equipped and operated by the The Dorr Co., acting as the Elko Prince Leasing Co., and mine is still operated by the Dorrs.

Geology: the prevailing and oldest rock of the Gold Circle district is rhyolite cut by andesite. Deposits occur as fissure or replacement veins and as sheeted zones in rhyolite. The vein filling is mainly quartz and the values are in gold and silver, the gold occurring native or associated with pyrite, and the silver free or as argentite in streaks. The veins run northwesterly with a dip of from about 65° to vertical. The Prince vein developed by drifts and crosscuts is 14-15″ wide, with a N. W.-S. E. strike, and dip from vertical to 85° N. E. Values occur as native silver and free gold. The June Bell, a parallel vein to the Elko Prince, is 30″ wide and 100′ long.

Development: by tunnels, shafts and winzes to depth of 950′ During 1918 the drifts on the 300, 600 north and south, 750 and 900′ were extended with disappointing results on the lower levels, but opening up promising oreshoots on the 300 and 600′ South which were followed downward. During 1920-21, the ore shoot opened on the 600′ level was being followed in the N. drift of the 750′ level, for a length of less than 100′. The north shoot is 1,500′ from the shaft, and an air locomotive is to be used for hauling cars. In July, 1920, a sudden flow of water prevented access to 750′ level for some months, involved $40,000 expense, and curtailed mill operations.

Ore reserves: (Jan. 1, 1921) broken ore, 850 tons; developed ore, 9,956 tons and probable ore, 370 tons; with a total estimated gross value of $253,324.

Equipment: includes complete mining plant and mill, employing 4′ Marcy mill, 5 by 14′ tube-mill, Dorr classifier and thickener, Oliver filter, 185-h. p. oil engine, 10,000′ water pipe-line, etc., the whole valued at $214,922, with daily capacity of 55 tons. Transportation from rail is by a Best tractor. Forty men are employed.

Production: in 1920, 12,514 ton of ore milled, yielding $14.40 bullion per ton. Since Nov., 1915, total output is $1,570,000 from 82,000 tons of ore.

An excellent description of mine and mill is given in "Trans. Am. Inst Mng. & Met. Eng.," Vol. 60, p. 78, 1919.

ELKORO MINES CO. NEVADA

Subsidiary of **Yukon Gold Co.**, which see.

Office: 120 Broadway, New York; 582 Market St., San Francisco, Calif. **Mine office:** Donald Steel, mgr., Jabidge, Nev.

Officers: William Loeb, Jr., pres.; W. E. Bennett, v. p. and sec.; O. B. Perry, gen. mgr.; Charles Earl, R. W. Straus, E. L. Newhouse, E. E. McCarthy, F. R. Foraker and Louis Sloss, directors; Leopold Frederick, treas.

Inc. Sept., 1916, in Delaware. **Cap.** $1,000,000; $5 par; all issued, and of which Yukon Gold owns 60%.. D. A. Crockett, 149 Broadway, New York,

transfer agent; Guaranty Trust Co., of N. Y., registrar. Annual meeting, third Tuesday of January.

Property: 75 lode claims, including the Starlight, the Long Hike and O. K. groups in Jarbidge district, Elko county. In each of these groups strong fault fissures in porphyritic rhyolite show alteration, leaching and replacement in the brecciated vein material and walls. Ore consists of sugary and solid quartz, adularia and silicious rhyolite, carrying free gold, with a little silver.

Development: by 5 adit tunnels, aggregating 5,000′, giving a depth of 800′ in the Long Hike, 4 adit tunnels, aggregate length 4,000′, to depth of 700′ in the Starlight, and 2 adit tunnels, 3,000′, to depth of 400′ in the O. K. mine.

In 1920, no work was done on the O. K. group; 3,723′ of extensions were made on the Long Hike; cost of mining and milling was $5.52 per ton. Ore reserves are estimated to yield a net profit of $500,000 and including probable ore, $1,000,000.

Equipment: electric hoist, 2 compressors, pumps, 2 aerial trams; also 100-ton mill employing counter-current decantation system of cyanidation in continuous operation since March, 1918.

Production: in 1919, averaged 112 tons of ore per day; in 1920, output was 41,248 tons of ore averaging $9.69 per ton with a recovery of 88.04%, and was the largest producer of gold ores in the State for that year. Operating at full capacity during 1921.

ELKTON DIVIDE MINING CO. **NEVADA**

Officers: C. H. Church, pres., Tonopah; E. R. Yerington, v. p.; S. C. Jameson, sec.-treas., with F. T. and C. F. Krebs, Will Brougher, and W. E. Casson, directors.

Property: 2 claims at N. end of Divide district, and 3-year lease on a silver-lead claim 2 miles from Reservation, Mountain View district, Mineral county.

ELY AMALGAMATED COPPER CO. **NEVADA**

Company controlled by O. Raymond Knight, pres., Provo, Utah, who owns 51% interest .

Inc. 1907, in Utah. **Cap.** $100,000; shares 10c par.

Property: 6 claims, and a townsite, about 1 mile from the Steptoe smelter, of the Nevada Consolidated Copper Co., at McGill, White Pine county, carries silver-lead ores. Several carloads of ore shipped in 1917. No recent work reported.

ELY BELL MINING CO. **NEVADA**

Company dead. Stock worthless. Fully described Vol. XI, Copper Handbook.

ELY-CALUMET COPPER CO. **NEVADA**

A company of same name was officially reported defunct in August, 1917. Either its corporate existence did not cease at that time, or another company with this title has been formed.

Address: A. D. Meyers Ely, Nev., who with J. M. Hayden and others apparently hold a lease on the property

Property: 32 claims, 600 acres, at extreme eastern end of the known copper belt, in White Pine county, one mile N. of Ely, covering a hill of limestone, traversed by E.-W. fault veins of ferruginous quartz, much brecciated, with replacement bodies of ironstone carrying copper.

Development: by a 450′ two-compartment shaft and 500′ of tunnels, with 1,300′ total workings. Zinc-lead-copper ores were being developed summer of 1921.

ELY CONSOLIDATED COPPER CO. **NEVADA**

Company inactive. **Office:** 414 Judge Bldg., Salt Lake City, Utah. **Mines:** Ruth, via Ely, Nev.

Officers: at last accounts, S. M. Levy, pres.; D. B. Shields, v. p.; Gideon Snyder, sec.; John Pingree, treas.; with Grant Snyder, directors. C. W. Geddes, cons. engr. and mgr.

Inc. October 2, 1906, in Utah. **Cap.** $1,500,000; $1 par; changed January, 1917, from $1,000,000, shares $10 par, assessable, of which 300,000 shares were donated to treasury by incorporators; 887,765 shares listed on Boston Curb. Striken from New York Curb June, 1918. Registrar and transfer agent, United States Corporation Co., 65 Cedar St., New York.

Property: 3 groups, 20 claims, 370 acres, in the Ely district, White Pine county.

The Ely property, 15 claims, about 300 acres is on the south side of the mineral belt, near the Ruth and Jupiter groups of the Nevada Consolidated. Developed by 3 vertical shafts. The 625′ Brilliant shaft has silver-lead ore on the 400′ level, and near the bottom is said to show a 100′ bed of disseminated copper ore, below commercial grade. The American shaft is 500′ deep. No work done in recent years, but property held in tact.

ELY COPPER CO. **NEVADA**

Office: 815 Ernest & Cranmer Bldg., Denver, Colo. No representative at Ely, Nev. Idle since 1907. Fully described Vol. XI, Copper Handbook. Unfavorably regarded.

ELY GIROUX COPPER CO. **NEVADA**

Office: 111 Broadway, New York. **Mine address:** Kimberly, Nev.

Officers: Robert L. De Groff, pres.; Wm. S. Woodhull, v. p.; Rosell S. Nichols, sec.-treas.; with Elmer E. Wigg, J. Irwin Mutch and Wm. J. Hoey, directors.

Inc. Dec. 2, 1909, in Nevada. **Cap.** $1,000,000; $1 par; $611,000 outstanding.

Property: 7 patented claims in Robinson district, White Pine county. Attempts made to raise funds for development, but no work has been done. Idle.

ELY-MIZPAH COPPER CO. **NEVADA**

Property: the Modoc group, near Ely, Nev. Assessment work neglected and property probably forfeited. See Vol. XI, Copper Handbook.

Principal promoter was A. M. Kearns, 1st Natl. Bank Bldg., Denver, Colo.

ELY NORTHERN COPPER CO. **NEVADA**

Merged in 1919 into the **Boston & Ely Consolidated Mining Co., which** see.

ELY REVENUE COPPER CO. **NEVADA**

Office: 830 Equitable Bldg., Denver, Colo.

Officers: F. C. Goudy, pres.; L. F. Twitchell, v. p.; J. P. M. Humphrey, sec.-treas.; above, with R. E. Sloan and A. E. Reynolds, directors.

Inc. 1907, in Colorado. **Cap.** $1,000,000; shares $1 par. International Trust Co., Denver, registrar. Annual meeting first Tuesday in March.

Property: 132 acres, known as the Revenue group, at Ely, White Pine county, near the Chainman and Altman mines. Idle for several years but reported under bond and lease to S. Herbert Williams, August, 1921.

ELY VALLEY MINING & MILLING CO. **NEVADA**

Dead. Fully described in Vol. XIII. Property now owned by the **Silgoled Mining Co.** of Nevada, which see.

ELY VERDI COPPER CO. **NEVADA**

Address: Geo. Wingfield, pres., Goldfield, Nev. Mine near Ruth, via Ely.

Directors: S. R. Robert John Berry, of Ely; A. P. Sawyer, and Leslie L. Savage, of Goldfield; M. R. Brown and H. S. Anderson, of Pierre, S. D.

Inc. May, 1912, in South Dakota. **Cap.** $5,000,000; shares $5 par. Is a reorganization of company of same name that was listed on New York Curb in 1909.

Property: a large group of claims south of the Copper Flat steam-shovel pit of the Nevada Consolidated, in White Pine county. Only assessment work being done

ELY WITCH COPPER CO. **NEVADA**

Officers: J. E. Bamberger, pres., 163 So. Main St., Salt Lake City, Utah;

D. M. Hyman, v. p.-treas; H. Cohen, sec.; Ernest Bamberger, gen. mgr.; preceding with H. G. McMillan and W. W. Armstrong, directors, at last accounts.

Inc. November 22, 1906, in Maine. **Cap.** $5,000,000; shares $5 par. Stock listed on Boston Curb, but inactive at last accounts.

Property: 7 claims, 1 fractional, 54 acres, patented, bought for $275,000, lying in the porphyry zone between the Ruth and Cumberland-Ely mines of the Nevada Consolidated, White Pine county, shows large blowouts of iron-stained porphyry.

Development: by 300′ shaft, with levels at 100′ intervals, and by tunnels of 1,200′, 600′ and 1,050′, with 3,500′ of workings. Development was disappointing, for, while claims cover the main monzonite belt of the district, the underground work on 300′ level showed values too low to work. Company was a speculative promotion at time Nevada Consolidated was floated, and proving lean on development, has been idle since.

EMANCIPATOR DIVIDE MINING CO. **NEVADA**

Address: Wm. Forman, res. agt. Tonopah, Nev.

Operated by controlling interests of the Webster Mines Corporation.

Officers: W. J. Webster, of Wilmington, Del., pres.; W. C. Rannels, v. p. and gen. mgr.; L. P. Carpenter, sec.-treas. and cons. engr.

Inc. March, 1919, in Nevada. **Cap.** $150,000; par 10c.; 750,000 treas.-ury shares.

Property: 4 claims, ¾ mile E. of Gold mountain, is reported to show two strong dikes or veins, showing values at surface.

Equipment: complete for shaft sinking, etc. Inactive, 1919-20.

EMPIRE-NEVADA COPPER MINING & SMELTING CO. **NEVADA**

Address: Yerington, Nev. Wm. Gelder, pres.; E. P. Minter, sec.; J. E. Gelder mgr.

Inc. in Arizona. **Cap.** $5,000,000; shares $5 par. Property taken over by Walker River Copper Co., under a lease which provides that when the royalties paid amount to $500,000, the title will pass to the leasing company. The General Development Co. (Lewisohns) is a small stockholder in the Empire Nevada company.

Property: about 500 acres on Copper Flat in 2 groups; 1 about 1 mile W., the other 2½ miles N. W. of Yerington, Lyon county. Ore occurs in bunches and disseminated throughout a body of monzonite-porphyry, said to be opened for 3,000′ in length and 1,000′ wide, carrying copper in the form of silicates, carbonates and oxides, a considerable part of it averaging 2.65% copper.

Development: by 5 shafts from 80 to 160′ in depth, several tunnels and open cuts, and also by diamond drilling. Mine is said to have produced about $500,000 from surface workings. Shipped 6,000 tons of 6% ore to Mason Valley smelter, 1912, and 2,900 tons in 1914. Property has small smelting plant, assay office, hoist, boarding house, etc. The leasing company was producing in 1919 and doing development work at last report.

ESMERALDA COPPER & SILVER CO. **NEVADA**

Successor to Esmeralda Copper Co.

Address: Luning, Nev., or 6 Montrose Ave., Verona, N. J.

Officers: Mayor D. H. Slayback, pres.-treas.; Jas Calvert, v. p.-mgr.; J. W. Parker, sec., with J. W. Van Schoick, directors. L. B. Spencer, cons. engr.

Inc. 1907, in Nevada. **Cap.** $1,200,000; par $1.

Property: 9 claims, 180 acres, at Luning, Mineral county, in Santa Fe district, developed by shafts and crosscuts, to depth of 300′. Assays reported to average 9% copper and 4 to 5 oz. silver. Stock was offered or sale (1919) below par and on a "liberal payment plan" to furnish funds for further development.

Inactive 1919-20.

EUREKA-CLIMAX MINING CO. **NEVADA**

Office: Eureka, Nev.

Officers: Tasker L. Oddie, pres.; M. D. Fairchild, v. p. (Box 802, Reno, Nev.); John E. Josey, sec.-treas.; with Ed. Malley, and Al. Revert, directors. L. A. Harris, supt.

Inc. 1919, in Nevada. **Cap.** $150,000; 15c. par; 500,000 treasury shares. Transfers at company office: Registration Surety Co., San Francisco, transfer agt. Stock listed on San Francisco Stock Exchange.

Property: 3 claims, 70 acres, which have produced $100,000 worth of rich ore, on Prospect Mtn., said to be the high-grade section of the Eureka district, Eureka county. The Deadbroke mine opened by a long tunnel from which some rich ore was produced in the 70's, has been reopened.

In the "Nevada Mining Press" of November 25, 1919, it was advertised that "while the Eureka-Croesus Mining Co. as such owns no interest in the Eureka-Climax Mining Co., those who own the controlling interest in the Eureka-Croesus are largely interested in the Eureka-Climax, and all of its mining operations will be conducted by the technical staff of the Eureka-Croesus. The secretary and treasurer of the Eureka-Climax Mining Co. is assistant secretary and treasurer of the Eureka-Croesus, under whose supervision the accounts and books of the company will be kept, in the office of the Eureka-Croesus Mining Co. at Eureka."

Eugene Davis, formerly of the Eureka-Croesus Mining Co., has taken a large interest in the Eureka-Climax.

EUREKA-CROESUS MINING CO. **NEVADA**

Offices: 103 Park Ave., New York City, and Eureka, Nevada.

Officers: Frank L. Torres, pres.; S. Russell Smith, v. p.; Geo. P. Hyde, sec.-treas., with A. P. Entenza of Detroit, directors. John E. Josey, asst. sec.-treas.; G. O. Bradley, cons. metallurgist. **Operating** staff: L. A. Harris, mgr.; C. A. Berryman, supt.

Inc. March, 1917, in Delaware. **Cap.** $3,000,000; increased Sept. 21, 1920, from $1,500,000; $1 par; increase, under the law, to be sold at par only; issued, June, 1921, 1,700,000 shares. On its organization, company issued its entire capital stock, $1,500,000, in payment for mining claims and $91,000 cash.

U. S. Corporation Co., New York, registrar and transfer agents. Stock listed on New York Curb and San Francisco Stock Exchange; traded in on Boston Curb. Share range: ⅞-2½ in 1918; 1-2¾ in 1919; ½-2 in 1920; $2 high and 24c. low in 1921.

Statement for Aug. 31, 1920, shows cash and bills receivable of $21,188; bills payable were $112,588, of which $100,000 is for advances made by Eugene Davis and Pres. Torres. Development and exploration costs for year were $93,904; other operating expenses were $85,194. Up to June 1, 1920, shipments had shown a gross smelter value of $311,806.

Property: 13 patented and 8 unpatented claims, total 135 acres, near Eureka, Eureka county, Nev. Claims include 3 old mines worked 1879-1889, one, the Dunderberg, producing 51,268 tons of ore netting $1,882,933. Prior to 1891, this mine was worked to a depth of 891' below the outcrop, with extensive workings at 550 and 700' in depth. Also the Connolly mine opened by tunnel and an inclined blind shaft 400' deep; this mine produced 4,657 tons of ore netting $166,794 prior to 1897.

Development: new work by present company includes the 425' vertical Catlin shaft with 7,000' of level work, all above elevation of the deeper levels of old Dunderberg mine. An incline 300' deep extends below the 400' level on a small orebody in Connolly ground. In 1921 company started sinking the Torres shaft from a point on the 400' level, not far from the old Atlas shaft of the Dunderberg. This will, it is said, be extended to get beneath all the old Dunderberg workings.

Detailed examination of all accessible workings, made in mid-1921 by several engineers, showed that various orebodies occur as replacements of limestone along dominant fault fractures, where they are cut by cross fissures. The orebodies now mined are small compared to those formerly

worked and being oxidized to the deepest levels known, only shipping ore can be mined. This ore is accompanied by more or less lowgrade material which cannot be profitably mined under existing conditions, and it is possible that the total amount of such lowgrade ore exposed in old and new workings may be as much as 200,000 tons.

From a detailed study of geological conditions, by various engineers, it is apparent that the orebodies were formed by ascending metal bearing waters of igneous origin; the ore has been oxidized in places by descending surface waters, with very slight local concentration of silver-lead ores; water level has not as yet been reached by any of the Croesus workings, and probably lies much lower than the deepest present levels; oxidized ore will extend to water level and sulphide ores may be expected below water level; workable ore occurs in masses along fissures which form a reliable guide in mine exploration and a comparison of the grade of ore and size of ore-bodies in the uppermost and lowest workings show no appreciable lessening of either value or size. The above conditions indicate that new and deeper work beneath the old stopes may open up a considerable tonnage of commercial ore.

The stock market manipulations of the company's shares have been notorious and many statements issued by brokerage houses concerning the property and company earnings, are unwarranted by the facts. Late in 1921 a reorganization was effected. Company is overcapitalized and mine needs heavy expenditures for exploration. Current shipment cannot meet current expenses for any considerable period and despite the fact that shipments prior to June 1, 1920, totaled 4,800 tons of $64,47 ore (gross value), the net sum realized was very disappointing to stockholders.

EUREKA DIVIDE MINING CO. **NEVADA**

Office: William Forman, agent, Tonopah, Nev.

Officers: J. H. Miller, pres.; F. M. Manson, v. p.; J. E. Adams, sec.-treas.; F. B. Baker, G. F. Sloan, directors.

Inc. March 6, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 7 claims, between the Calumet and Airedale, in southeastern part of district, developed by 200′ shaft, equipped with hoist and other machinery. Is a prospect which has produced some ore from old shaft, and which shows good vein.

EUREKA-HAMILTON MINES CO. **NEVADA**

Address: Hamilton, Nev.

Officers: R. G. Ward, pres.; Chas. D. Olney, v. p.; Thos. J. Lynch, sec.-treas.; with J. M. Lynch and H. Z. Peters, mgr., directors.

Inc. in Nevada, 1920. **Cap.** $1,500,000; $1 par; 443,484 shares sold and issued. Registration Surety Co., San Francisco, registrar; transfers made. 265 Russ Bldg., San Francisco. Listed on San Francisco Stock Exchange. The California Corporation Commission permitted (Sept., 1920) the sale of treasury stock at 30c per share.

Property: 17 claims, 230 acres, in part patented, on Treasure hill, Hamilton district, White Pine county, adjoining the Eberhardt mine, and 40 miles S. E. of Eureka. Ore occurs as replacements in folded limestone in contact with shale.

Development: by 3 shafts, deepest 240′, and the Pocatello 550′ tunnel. An orebody, 18′ wide and 40′ long, is reported to average $30 per ton. Work during 1921 was confined largely to opening ore above and below the Pocatello tunnel, and in September it was reported that $270,000 worth had been developed. A 3-drill air compressor and air hoist were purchased. Also reported that a number of plans for refinancing were being considered, one being the purchase of property by the Tonopah Mng. Co.

In spring of 1921, Eureka Hamilton did much advertising with the slogan, " if it's about Hamilton it is so". Property is thought to have merit.

EUREKA-HOLLY MINING CO. **NEVADA**

Successor to **Holly Mining Co.**

Office: 576 Mills Bldg., San Francisco, Calif.

Officers: B. F. Shepherd, Jr., pres.; W. A. Barnes, v. p.-gen. mgr.; E. W. Choynski, sec.; J. B. Cottle, treas.; with E. S. McCurdy, directors. L. Brooke, supt.

Inc. June 26, 1917, in Nevada. **Cap.** $500,000; $1 par; issued $426,000. Transfer agt. and registrar, Security Transfer & Registrar Co., New York, or company's office. Stock listed on New York Curb and San Francisco Stock Exchange. Annual meeting, 2nd Monday in September. For fiscal year to June 30, 1920, current assets were $71,978 and liabilities, $45,097. Total revenue was $61,021 and net operating profit, $6,035.

Property: 12 claims, 206 acres, on Mineral Point, Eureka district, contains deposits of lead-silver ore in limestone. There are also 320 acres of ranch and water-rights. Property was the old Idaho mine, acquired in 1917, and reputed to have yielded $150,000 from surface workings.

Development: by 600′ shaft with levels at each 100′; total workings 6,500′. Two orebodies—the east and west—are being developed, consisting of low grade (5 oz. silver, 10% lead) with frequent shoots of high grade ore averaging 20 oz. silver and 40% lead. Latest reports announce the uncovering of new orebodies on 400′, 500′ and 600′ levels. On June 30, 1920, ore reserves were: 60,000 tons milling grade and 3,000 tons shipping grade. Reserves of former increased to between 70,000 and 100,000 tons, January, 1922.

Equipment: 2 semi-Diesel 75 h. p. engines, hoists, air compressor, 50′ head-frame, etc. A 25-ton pilot mill put in operation spring of 1921, to be followed by 100-ton reduction plant.

Production: high grade only amounted to a gross smelter value of $60,959 for year ending June 30, 1920, or an average of $62.50 for 975 tons; for year 1920-21, shipments yielded $77,641. Mine costs were $8.80; transportation, $13.81; treatment, $4.78; total $27.39 per ton.

Is a fairly promising property sponsored by reputable people. Same management is responsible for operations of Bullwhacker Consolidated, the workings of which are to be tapped through the Holly shaft.

EUREKA KING MINING CO. **NEVADA**

Controlled by Eugene Davis, Room 1111, Canadian Pacific Bldg., Madison Ave. & 44th St., New York City.

Property: comprises a group of claims under the higher part of Prospect Mtn., near Eureka, Nevada, opened by the Eureka tunnel.

Development: is extensive, including winzes, drifts and crosscuts below the tunnel level and stopes, etc., above the tunnel. The orebodies are apparently disconnected replacements of limestone, of irregular shape and size, and are thus far not comparable in extent with those formerly worked in the big mines of the district. As the water level is not yet reached, there is a possibility of finding further orebodies below existing workings, but prospecting will be costly owing to length of tram and working conditions.

Mine regarded as a prospect of doubtful merit.

EUREKA-NEVADA MINING CO. **NEVADA**

Office: 226 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Nevada.

Officers: W. J. Robinson, pres.-mgr.; Wm. Story, Jr., v. p.; A. G. Burritt, sec.-cons. engr., with A. W. Hyre and Alonzo Billings, directors. G. A. Fletcher, supt.

Inc. July 17, 1917. **Cap.** $10,000; shares 1c. par; 800,000 issued. Stock assessable when treasury is exhausted. A $30,000 8% convertible bond issue, carrying a stock bonus, was authorized Dec. 12, 1921. Stock was donated for this purpose. Annual meeting, second Monday in July.

Property: 6 claims (4 patented) and fraction, 100 acres, on Prospect mountain, Eureka district, Eureka county. Ore occurs in fissure veins and

as a chamber deposit in limestone. Ores are silver-lead, both galena and carbonate; shipping ore said to average $50 per ton and up.

Development: by 2 tunnels, 1,400′ and 1,200′, the upper with 450′ back and 120′ above the lower. Lower tunnel equipped with small compressor. Upper tunnel is in the hands of lessees. Operating 1919-1921.

EUREKA-PRAIRIE MINING CO. **NEVADA**

Address: Hugh Leonard, gen. mgr., Eureka, Nev.

Property: a number of mines, including the Marguerita, on Adams hill, Eureka district and county.

Reported, December, 1921, that funds were available for development and equipment.

EUREKA-PRINCE MINING CO. **NEVADA**

Office: Eureka, Nev. Controlled by Eugene Davis, 1111 Canadian Pacific Bldg., Madison Ave., at 45th. St., New York City. **Officers:** M. H. Briggs, pres.; T. C. LeFevre, v. p.; J D. Peckner, sec.-treas

Inc. in Nevada, 1920. **Cap.** $1,000.000; $1 par; 333,000 treasury shares. Transfers made at company office. Stock listed on San Francisco Stock Exchange.

Property: the old Silver Lick mine, 13 claims (5 patented), on Adams hill, Eureka district, Eureka county. Lead carbonate ores occur as replacements along fractures in flat dipping beds of limestone; low grade ore averages $17.83 with silver at $1 per oz.; high grade shipments have returned up to 1.5 oz. gold and 79 oz. silver. Deepest workings, 140′, at which level, the ore shoot is reported 3 to 4′ wide. Said to have produced $250,000 prior to 1896.

Company is controlled by Eugene Davis, formerly of the Eureka Croesus company, who will, it is reported, sink the shaft to 500′ level in order to prove the downward extension of the ore.

EUREKA SILVER LICK EXTENSION MINES CO. **NEVADA**

In reply to an inquiry, we are informed that those in control of this company and of Broken Hills are the same, and it is disquieting to find that the Fidelity Finance & Funding Co. (a George Graham Rice promotion) has been assisting in its stock selling campaign.

Cap. 1,500,000 shares; 325.000 in treasury, May 9, 1921.

Property: in Eureka and Churchill counties,-the latter comprises the Westover group of 3 claims, 55 acres, adjoining the Broken Hills, on the W. According to "the very highest geological opinion" this property may prove to contain "the western extension of the Broken Hills vein system," etc.

EUREKA UNCLE SAM CONS. MINING CO. **NEVADA**

Office: 321 Monadnock Bldg., San Francisco, Calif. **Mine address:** D. States, supt., Eureka, Nev.

Officers: I. Salinger, pres.; F. T. Torpey, v. p.-mgr.; H. D. Edwards, sec.-treas., with Edwin Shaw and P. B. Ellis, directors. L. E. Rosenshine, cons. engr.

Inc. May, 1920. **Cap.** $100,000; 10c. par. Stock listed on San Francisco Stock Exchange. California Corporation Commissioner has permitted stock sales.

Property: 5 claims (2 patented) on Prospect Mtn., Eureka district Eureka county, including the Hamburg and Southern Pacific, purchased in 1921. The old Hamburg mine is said to have produced $3,000.000 above the 425′ level. An option is held on 4 other Hamburg claims. Property said to show extension of Eureka-Croesus ore zone.

Development: by tunnel to cut old workings of Hamburg mine at a depth of 400′, reported to be 900′ long, Jan. 1, 1922, with 450′ to go to reach the 800′ Hamburg shaft. The latter has levels at 250, 450, 600 and 800′. Several cross channels, one 7′ wide, have been discovered, carrying $20 milling ore with lenses of high-grade.

Equipment: 4-drill compressor; a 200-ton mill is contemplated.

EXCELSIOR MOUNTAIN COPPER CO. NEVADA

Mail returned from former office: Hawthorne, Mineral county, Nev.

Officers: at last accounts, Frank D. Qualey, pres.-gen. mgr.; J. H. Suits, sec.-treas., Lick Bldg., San Francisco; George Brodigan, W. R. Jackman and W. B. Tait, directors. Wm. Winkelman, supt.

Inc. Aug., 1907, in Arizona. **Cap.** $1,000,000; shares $1 par. Annual meeting, June 7.

Property: Qualey mine, 13 claims, 260 acres, 16 miles S. E o.f Hawthorne, in Whiskey Flat district, Mineral county, said to have surface showings of copper along a contact between granite and limestone. Has 4 shallow shafts and one 1,500′ tunnel, said to show 4% copper ore. Total workings about 3,000′ to a depth of 600′.

Equipment: includes 50-h. p. gasoline engine and 6-drill compressor. Property closed down since 1914.

EXCHEQUER GOLD & SILVER MINING CO. NEVADA

Office: 265 Russ Bldg., San Francisco, Calif. **Mine address:** Alex Wise, mgr., Virginia City, Nev.

Officers: H. Zadig, pres.; Alex Wise, v. p.; Chas. D. Olney, sec.-treas., with J. W. Davey and R. A. Hardy, directors.

Inc. November, 1904 in California. **Cap.** $100,000; par $1; all outstanding; assessable. Transfers made at company's office; Registration Surety Co., registrar.

Property: covers 400′ of the Comstock Lode, Virginia City, Storey county, adjoining the Bullion on the south. Company is a non-producer. Holdings consolidated with those of other Comstock Lode companies to form Middle **Mines Association.** which see.

EXCHEQUER LEASING & MINING CORPORATION NEVADA

Address: C. S. Witmer, sec., 511 12th St., New York City, or J. W. Walker, Cherry Creek Mines, via Cobre, Nevada.

The Exchequer mine, owned by this company was bonded 1918-19 to Exploration Syndicate, but returned to company in 1921. Mine reported late in 1921 to be under lease to A. Z. Smith, et al. A 3 to 4′ orebody opened on the 200′ level is said to yield silver ore netting $30 per ton.

EXPLORATION SYNDICATE No. 2 NEVADA

Office: Room 1927, 25 Broadway, New York. John D. Clarke, treasurer.

In 1919, the syndicate was operating the Mary Ann mine under lease from the **Cherry Creek Silver Mng. Co.** and was reported to have purchased property of the Exchequer L. & M. Corp. The treasurer now (March, 1921) states that both properties have reverted to owners.

FAGAN CONSOLIDATED SILVER MINES CO. NEVADA

Address: P. A. Simon, Mina, Nevada.

Officers: P. A. Simon, pres.; E. S. Chafey, v. p.; B. W. Zachau, sec.-treas., with E. S. Mulford and F. M. Manson, directors. E. W. King, supt.

Inc. November, 20, 1919, in Nevada. **Cap.** 3,000,000 shares; 10c par. 1,500,000 in treasury. Company is a merger of the Norman Silver Mining Co. and Simon Fagan Mines Co. Some of the officers are also directors of the Simon Silver-Lead Mines Co.

Property: the Norman and Fagan groups, 12 claims, 200 acres, in Bell district, Mineral county, 5 miles S. W. of Simon Silver-Lead Mines Co.

Geology: the Norman group has a contact deposit enclosed between limestone, rhyolite and andesite, containing gold-silver-lead ore, said to average $50 per ton. The Fagan group is on a lime-granodiorite contact like that of the Simon silver-lead mine. The contact is exposed by opencuts and pits for over 1,000′ and shows commercial ore at many places; the ore is mainly limonite with 5 to 10% lead in form of carbonate, with 1 oz. of silver per unit of lead.

Development: the Norman has an 80′ and 35′ shaft, equipped with hoist, etc. Work to be concentrated on the Fagan group and a shaft was sunk

during 1920 to 260′ and a new orebody is reported to have been discovered. In 1919, mine produced oxidized lead ore of shipping grade.

FAGAN EXTENSION MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: H. B. Lind, pres.; I. L. Pierce, sec.

Inc. August 22, 1919, in Nevada. **Cap.** $15,000; shares 1c par; 750,000 in treasury; 750,000 to be used for promotion stock.

Property: about 22 acres, adjoins north end and east sideline of Fagan and Fagan No. 2 claims, in Bell (Simon) district, Mineral county, only slightly developed.

FAGAN JUNIOR MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: Dr. A. S. Abdun-Nur, pres.; J. E. Greenan, v. p.; B. W. Zachau, sec.-treas., with E. S. Mulford, Frank Dunn, F. J. Guirhovien and E. N. Marks, directors.

Inc. December 6, 1919, in Nevada.

Property: 2 claims, in Bell district, Mineral county, adjoining the Fagan on the southeast. The Fagan ore zone is expected to extend into the Fagan Junior.

FAIRVIEW EXTENSION MINING CO. **NEVADA**

Office: 1011 Flrst Natl. Bank Bldg., San Francisco.

Officers: L. D. Gordon, pres.-gen. mgr.; E. B. Cushman, v. p.; H. G. Mayer, sec.-treas.; with J. R. Davis and H. R. Cooke, directors. Gibson Berry gen. supt.

Inc. July, 1919. **Cap.** $1,000,000; 50c par; 515,000 treasury shares; 500,000 shares owned by **Round Mountain Mng. Co.** taken in exchange for lode rights.

Property: the lode rights of the Shot, Blue Jacket and Alta groups, 14 claims and 2 fractions, 182 acres, contiguous to the Round Mountain and Fairview Round Mountain properties, Round Mtn. district, Nye county. Three claims are patented; patents for others have been applied for. The Blue Jacket group was obtained from the **Round Mountain Blue Jacket Mng. Co.**, the others from the Round Mountain Mng. Co.

The ore occurs in stringers in an E.-W. zone of sheeted and highly silicified rhyolite, with maximum width of 1,000′. On the easterly margin of property, rhyolite contacts with granite, trending N. and S. One stringer has shown values of $25 to $50 gold per ton. Blue Jacket group produced $80,000 prior to 1919. Developed by 100′ shaft.

Equipment: 25 h. p. electric hoist and 50 h. p. compressor.

For first 6 months, up to Dec. 31, 1919, operating costs were $9,558 with a net deficit of $8,026. The management is the same as that of Fairview Round Mountain and Round Mountain companies

FAIRVIEW RED ROCK CONSOLIDATED MINES **NEVADA**

Office: J. A. Wright, financial agent, Exchange Bldg., Denver, Colo. H. A. Riedel, pres.

Inc. in Arizona. **Cap.** $2,500,000; $1 par. Stock offered at 5c per share cash, or 5½c. per share in 10 equal monthly payments, March, 1917.

Property: the Red Rock group, 15 claims, 230 acres, near Fairview P. O., in the Fairview district about 42 miles E. of Fallon, Churchill county, the nearest railroad point. The mine shows 2 parallel contact veins, about 400′ apart, between limestone footwall and porphyry hanging wall, said to be from 2-8′ wide at surface for about 1,500′ and to carry ore averaging $30 per ton in gold-silver-copper. The veins have an E.-W. strike, dipping at about 65°.

Mine without equipment and property as yet a prospect.

FAIRVIEW ROUND MOUNTAIN MINES CO. **NEVADA**

Main office: 1011 First Natl. Bank Bldg., San Francisco, Cal. **Mine office:** Round Mountain, Nev. **Corporate office:** Tonopah, Nev.

Officers: L. D. Gordon, pres.-mgr.; C. J. Berry, v. p.; H. G. Mayer,

sec.-treas., with Fletcher Hamilton, H. R. Cooke and J. R. Davis, directors; E. M. Erb, pur. agt., San Francisco; Gibson Berry, gen. supt.; R. J. Ledwich, mine supt.; E. A. Michal, mill supt.

Inc. June 25, 1906, in Nevada. **Cap.** $1,000,000; $1 par; 952,471 shares issued; 200,000 held by Round Mountain M. Co. Transfers made at company's office; Anglo-California Trust Co., registrar. Annual meeting, 3rd Monday in Feb., at Tonopah. Stock listed on San Francisco Stock Exchange. Sales 12c high; 10c low, in 1921.

Annual report for year ending Dec. 31, 1919 shows; assets, $1,152,854, including mining properties, etc. $990,178 bonds, stock and bills receivable, $114,977; plant, $24,075; and cash, $20,790. Bills payable were $12,500; and depletion reserve, $93,267. Income from bullion, $296,466; total operating costs, $119,811 with net operating profit of $131,168 after deducting for depletion and depreciation. Per ton costs were; mining, $3.48; developing, $4.54; milling, $2.53; marketing and general, $3,23; total, $13.78.

Dividends: 2c in 1918; 14c in 1919; 3c in 1920; total, $182,289.

Property: 12 claims and fractions, 170 acres, 39 patented, in Round Mountain district, Nye county, includes the Fairview and the adjoining Daisy group, purchased in 1917 from the Round Mountain Mng. Co., for 200,000 shares of Fairview treasury stock.

Ore: occurs in sheeted zones and fissures in rhyolite, the milling ore during 1919 having an average gross value of $35.86 in gold per ton.

Development: by 500′ tunnel to depth of 250′, and 270′ shaft; total workings over 6,000′. In 1919, work was confined to Fairview claim, which, including shaft, amounted to 3,252′. **Ore reserves:** Jan. 1, 1920 were 4,000 tons.

Equipment: includes 25-h. p. gasoline hoist, compressor, electrical driven 6-stamp amalgamating mill of 50 tons daily capacity, taken over with the Daisy mine.

Production: 1906 to 1916 under former management, was $85,000; in 1917 (part of year) 1,214 tons, yielding $20,595; in 1918, 8,807 tons, yielding $178,801; in 1919, 8,693 tons, yielding $296,466 in bullion, and representing an extraction of 95.1%. For first 8 months of 1920, a gross bullion production of $99,500 is reported, with a net profit of $34,000.

Management is same as that of the Round Mountain and Fairview Extension companies; reported that 400,000 shares of latter have been acquired by Fairview Round Mountain.

FARETTA CINNABAR MINE **NEVADA**

See **Quicksilver Mines Co.**

FARRELL-DIVIDE MINING CO. **NEVADA**

Office: 205 Reno National Bank Bldg., Reno, Nev.

Officers: R. C. Harrison, pres.; B. J. Henley, v. p.; F. G. Hobbs, sec.-treas., with B. Sealy and J. R. Farrell, directors.

Inc. in Nevada. **Cap.** $100,000; shares, 10c par.

Property: 3 claims adjoining the Rosetta, about 1½ miles south of Gold mountain.

FAY EXPLORATION CO. **NEVADA**

Address: F. A. Hazard, or J. C. Charles, Fay, via Pioche, Lincoln county, Nev.

Property: an old mine at Fay 25 miles N. E. of Pioche, near the Utah-Nevada line, that yielded $228,000 in gold. Idle for past 10 years; plant has been dismantled.

FEDERAL DIVIDE MINING CO. **NEVADA**

Organized in Nevada to finance the development of 2 claims west of Lookout Divide and 2¾ miles N. E. of Gold mountain.

FEDERAL ELY COPPER CO. **NEVADA**

Idle. **Office:** 26 Mining Exchange Bldg., Salt Lake City, Utah. **Mine office:** Ely, Nev.

Officers: J. A. Cunningham, pres., at last accounts.

Inc. 1914, in Utah. **Cap.** $150,000; 15c par; reduced 1916 from $5,000,000; shares $5 par; assessable; 12 assessments levied to March, 1915.

Property: 21 claims, 3 fractional, 400 acres, partly patented, also the Huesser ranch of 600 acres, 15 miles north of Ely, in the Steptoe Valley, White Pine county, bought 1906, and a millsite. Mining lands are the Panama claim, bought 1909, for $10,000, lying about one-half mile north of the Star Pointer shaft of the Nevada Consolidated; 8 claims north of the Nevada Consolidated; 3 claims between the Cumberland-Ely and Turner-Ely, and the Queen of the West group, in Robinson Canyon. Company is said to have paid $225,000 for its lands.

Geology: property shows limestone beds dipping to the east said to be underlaid by cupriferous monzonite, and to carry 3 parallel shear zones, each about 400′ in width, 600′ apart, showing a little copper and lead ore. The limestone capping on the Savage claim is said to carry lead ore. Churn-drill borings are said to have given a satisfactory showing of ore, and there also was some test-pitting and surface trenching.

Development: by tunnels aggregating about 1,600′ and 4 shallow shafts, 3 said to show copper sulphides at depth of 100′, the main shaft said to be near the contact of 3 ore zones, which seems peculiar, if the ore zones are parallel, as claimed.

The Queen of the West shaft shows, at depth of 110′, a sulphide ore-body of considerable size averaging 3% copper, 1 to 2 oz. silver and 40 to 50 cts. gold per ton. The Kessler shaft, about 100′ deep, near the tunnel, shows lead carbonates of fair tenor. Mine has a small steam plant.

Company has done little save levy assessments for several years, doing barely enough work on the claims to meet annual assessment requirements. Operated by lessees at last accounts.

FIFTY-SIX COPPER MINE — **NEVADA**

See **Wyoming-Nevada Copper Co.**

FIVE-TO-ONE MINING CO. — **NEVADA**

Address: C. R. Mann, Tonopah & Goldfield R. R., Goldfield, Nev.

Company organized by the above, A. B. Drake, A. A. Redmond and Geo. Spangle, to operate claims 1 mile S. of Goldfield, Esmeralda county. A 550′ tunnel reported to have cut a 10′ vein, September, 1920.

FLORENCE DIVIDE MINING CO. — **NEVADA**

Office: Goldfield, Nev.

Officers: J. H. Miller, pres.; F. M. Manson, v. p.; J. E. Adams, sec.-treas., with Zeb. Kendall and B. F. Baker, directors. E. A. Byler, eng.

Inc. February, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable, 750,000 outstanding. Listed on San Francisco Stock Exchange. Transfers made at company office.

Property: 4 full claims and a fraction between the Sutherland on N. and Smuggler on S. Outcrops on rhyolite mountain E. of road said to have yielded $5 to $8 assays. Sinking was started and machinery erected, June, 1919.

The Florence Divide company in May, 1919, purchased the Witt-Brandon-Taylor-Mechling lease on part of the Red King claim of the Florence Goldfield property at Goldfield. A bonanza was discovered and up to Dec. 31, 1919, lease produced 3,140 tons of $85.60 ore, yielding a net smelter return of $217,142, of which 25% was paid to Florence Goldfield as royalty. Lease was renewed on Jan. 1, 1920, but shortly after relinquished.

Early in 1920, the company optioned the Carmen mine in Mexico, formerly held by the Carmen Syndicate of the Proprietary Mines Co. of America.

Mexican property: 136 acres, includes the Carmen, Chonita, Carmen Anexas and Los Angeles mines. Arizpe district, Sonora, 75 miles from Cananea and 15 miles from Nacozari. Seven veins cross property; six are mineralized shear zones in rhyolite: the main vein, 3 to 30′ wide, is a contact

between andesite and rhyolite. Silver 20 oz. and better per ton, occurs as argentite accompanied by a little gold in silicified rhyolite.

Development: by 2 shafts, one 150′ deep, and several hundred feet of workings. Equipped with steam power hoist, etc.

Examined by N. H. Burley, H. V. Wallace, F. W. Royer and Sill & Sill.

FLORENCE GOLDFIELD MINING CO. **NEVADA**

Offices: 25 Broad St., New York City, and Goldfield, Nev.

Officers: L. E. Whicher, pres.; F. Sommer Schmidt, v. p.-gen. mgr.; C. C. Burger, treas.; C. Brown, sec., with R. M. Atwater, Jr., W. W. Cohen, Albert Farjeon, H. C. Quackenbush and S. L. Sherman, directors. E. A. Byler, engr.; R. C. McCarthy, supt.

Inc. April 28, 1905, in South Dakota. **Cap.** $1,250,000; $1 par; outstanding 1,150,000. New York Trust Co., New York transfer agents.

This company paid large dividends during the years 1908,1909, 1910 and 1911. Operations, excepting those by lessees, were suspended at that time.

In June, 1919, the control of the company was bought by L. E. Whicher and associates—the **Florence Goldfield Syndicate.**

During 1920-21, company continued its policy of leasing parts of the mine; an average of 14 working faces were operated, on a 25% royalty, in an area of 10 acres. Among the lessees are several companies with financial backing, but the success of the Florence Divide lease, which in 1919 produced 3,140 tons of $85.60 ore, yielding $217,142 net from smelter has not been repeated. Other lessees include the Reorg. Cracker Jack Mng. Co., Sunbeam Divide and Donald & Giles.

An interim report (Nov. 12, 1920) showed receipts from Jan. 1, 1920, $50,508, of which royalties were $18,958; cash, $28,342; loan from syndicate, $3,000. Development and administration disbursements were $47,823. Total royalties since new management took possession, July 1, 1919, to date of report, $61,964.

Property: the property consists of 67.7 acres at Goldfield, Esmeralda county, adjoining the Goldfield Consolidated Company.

Development: the main shaft has been sunk to a depth of 1,200 feet and there are several miles of drifts, levels and crosscuts. There is still a large unexplored territory which is being developed by the company; more recently on the 358′ level by a S. E. crosscut to locate a fault zone which is believed to have displaced extension of Goldfield Cons. orebodies. In 1920, company work aggregated 2,655′, at cost of $10.90 per foot.

In fall of 1920, the company offered its stock-holders pro rata right to purchase 100,000 treasury stock, at 12½¢ per share; an underwriting syndicate was formed to assit in the sale of this offering.

FORD DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H. A. Stewart, agt.

Officers: M. J. Sullivan, pres.; H. A. Stewart, sec.; A. G. Raycraft, treas., with G. J. Murphy, directors.

Inc. in Nevada. **Cap.** $150,000; shares, 10c par.

Property: 4 claims adjoining Treadwell Divide and Rand Divide. A prospect. Idle.

FORT SCHELLBOURNE MINING & MILLING CO. **NEVADA**

Office: 521 Felt Bldg., Salt Lake City, Utah. **Mine address:** Schellbourne, Nev.

Officers: F. W. Snyder, pres.; Hugh H. Tarbet, v. p.; E. H. Snyder, sec.-treas.; with Howard Phelps and J. E. Hepworth, directors, at last accounts.

Inc. Sept. 27, 1916, in Nevada. **Cap.** $100,000; 10c par; 650,000 shares issued; assessable. No income, save stock sales.

Property: McMahon mines, 7 claims, 140 acres, in Schellbourne district, White Pine county, 8 miles from Nevada Northern R. R. (Cherry Creek Station). Lands show a fissure vein in a limestone shale contact.

with 15-20′ orebody. Ore in streaks carries $1 gold and 12 oz. silver per ton, in quartz-calcite gangue.

Development: by 500′ tunnel with 280′ back, and 1,000′ of work. Company plans tunnel to cut ore at greater depth.

No production since 1875.

FORTUNA DIVIDE MINING CO. **NEVADA**

Address: A. J. Moore, Reno, Nev.

Officers: A. J. Moore, pres.; Frank A. Anderson, v. p.; B. James, sec.-treas., with E. W. Mower, Wayne J. Wilson, directors. Frank Anderson, supt.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c; 1,100,000 treasury shares.

Property: 25 acres N. W. of Sutherland Divide and 4 miles N. W. of Gold Mountain. Work commenced in July, 1919.

Also owns 5 claims in Churchill county on which 1,000′ of development work disclosed pay ore.

FORTUNA GRUBSTAKE MINING CO. **NEVADA**

Inc. 1917, in Nevada. **Cap.** $500,000; $1 par; 125,000 shares issued; stock offered at 25c, April ,1917.

Property: in Churchill county, said to show 12″ vein carrying lead-silver values. Developed by 350′ tunnel. Presumably idle.

FRAVEL-PAYMASTER MINING CO. **NEVADA**

Office: c/o Rumball & Co., fiscal agts., 50 Congress St., Boston, Mass. **Mine office:** 234 No. Center St., Reno, Nev.

Officers: Jos. G. Ray, pres.; David O. Campbell, v. p.; Chas. F. Daniels, treas., with Geo. H. Allen, Jos. P. Baptiste and John F Linder, directors. E. S. Johnson, res. agt-mgr.; John Reinmiller, supt.

Inc. 1916 (?) in Maine. **Cap.** $2,000,000; $1 par; 1,300,000 shares issued.

Property: 12 claims in Peavine district, Washoe county, adjoining **Standard Metals** and **Peavine Silver Corp.**, 5 miles N. W. of Reno. Country rock is schist cut by quartz monzonite dikes, near which quartz veins, carrying gold, silver and copper, occur.

Development: by 330′ shaft (Oct. 1, 1921), to be sunk to 400′. Reported that an orebody, 2′ to 4′ wide, had been uncovered for 285′ in length on the 200′ level; one assay giving value of $27 per ton.

Equipment: includes 75 h. p. hoist, air compressor, etc.

District is an old one, mines having been first opened in 1867; because of lack of facilities, oxidized zone only was exploited.

PRESNO DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Property: a tract of undeveloped ground one mile N. E. of Gold mountain. Is a prospect.

FRISCO DIVIDE MINING CO. **NEVADA**

Office: H. R. Cooke, agent, Tonopah, Nev.

Officers: R. L. Johns, pres.; M. B. Aston, v. p.; B. A. Rives, sec.-treas.; with Zeb Kendall, and J. E. McCreery, directors. Charles Maher, mgr.

Inc. April 24, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 treasury shares; 147,000 issued. Listed on San Francisco Stock Exchange.

Property: 6 claims, lying N. of the Chariot and Jupiter and 2¾ miles S. E. of Gold Mountain. A. H. Elftman says surface indications are favorable.

GEM DIVIDE MINING CO. **NEVADA**

Address: E. P. Esser, res. agt., Tonopah, Nev.

Officers: E. T. Krebs, pres.; O. F. Krebs, v. p.; E. P. Esser, sec.

Inc. May, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury.

Property: 5 claims W. of Portland Divide.

GEM FIVE MINES CO **NEVADA**

Address: J. B. Ratliff and G. A. Goldsworthy, lessees, Lovelocks, Nev.

Property: in the Sunshine district, 20 miles S. of Winnemucca, Pershing county, said to carry a vein of high grade gold-silver ore. Hoist, compressor, etc. installed, shaft sunk 100′, and ore shipped in 1919.

GENERAL GRANT MINE **NEVADA**

See **Big Chief Cons. Mines Co.**

GENERAL MINES CO. OF NEVADA **NEVADA**

Addess: P. O. Box 835, Reno, Nev.

Officers: W. G. Humphrey, pres.; J. H. Clemons, v. p.; C. T. Stevenson, sec.-treas.-mgr.; with J. W. Davey and W. H. Moffatt, directors.

Inc. Nov. 1, 1916, in Nevada. **Cap.** $3,000,000; par $1; 1,400,000 outstanding. Company owns all the stock of the **Rochester Octopus Mines Co.** Operating expenses for 1918 totaled $183,951.

The Octopus mine in the Rochester district, Pershing county, is described separately. The bond on the adjoining property of the Rochester Buck & Charley Mng. Co. (q. v.) was relinquished in August, and that on the Silversides mine, near Luning, Mineral county, in October, 1919. A 200′ shaft was sunk on the latter during the option. Company not operating at present.

GENERAL WASHINGTON DEVELOPMENT CO. **NEVADA**

Office: Goldfield, Nev.

Officers: E. P. Junor, pres.; O. L. Becker; v. p.; H. G. McMahon, sec.-treas.-mgr.

Inc. March 3, 1917, in Nevada. **Cap.** $200,000; 10c par; assessable; 720,000 issued.

Property: 20 acres, patented. Company reports a 10′ quartz vein in andesite with gold, silver and copper values. Course N. 20° E., dip 30°.

Development: 320′ shaft. Arrangements have been made to operate the mine through the workings of the Reorganized Cracker Jack Mng. Co., and for the use of the latter company's equipment.

The G. W. Development Co. is a re-organization of the George Washington Mining Co., old stock being exchanged for new upon payment of 1 cent a share. Not operating during 1920.

GIANT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. G. Crumley, pres.; C. E. Oyster, A. E. Kane, v. p's.; C. C. Boak, sec.-treas., with F. K. Pittman, directors. R. A. Hardy, cons. eng.

Inc. March 26, 1919. **Cap.** $1,500,000; $1 par. Listed on San Francisco Stock Exchange.

Property: 3 claims and 4 fractions, 100 acres, patented, 1¼ miles S. of Gold Mountain, adjoining the Silver and Divide Syndicate on N. W. and S. E.

Development: by shaft to 450′, and crosscuts to E. and W.; in latter, at distance of 250′, a 25′ ledge has been cut. Values thus far found are low, but ledge is believed to be same as on Gold Reef.

Equipment: complete with 30 h. p. electric hoist, 8″x10″ compressor, drills, and camp.

Inactive 1919-20; development resumed in 1921.

GIBRALTAR SILVER HILL MINING CO. **NEVADA**

Address: Room 724, 25 Broad St., New York City.

Officers: Col. T. J. D. Salter, pres.; C. E. Robins, v. p.; Geo. B. Hutchings, sec.-treas.

Inc. February, 1920, in Nevada. **Cap.** $200,000; par 10c; 900,000 shares in treasury.

Property: the Shea-Putnam group, 8 claims, 140 acres, north of the Gibraltar Silver Mines Co. tract and traversed by the same big vein for 4,500′ and by two lesser veins. Principal orebody, 30′ wide on surface, said to average $31.40 (Feb., 1920) in silver and lead. Reported by Chas. D. Wilkinson, Frazier and other engineers, to have very promising vein outcrops; and was considered an attractive prospect.

In spring of 1920, brokers were offering "a limited block" of stock at 25¢ per share. Reports of Dec., 1921, indicate that actual operations were never begun.

GIBRALTAR SILVER MINES CO. **NEVADA**

Address: 80 Maiden Lane, New York City.

Officers: Wm. J. Loring, pres.-managing dir.; R. R. Sherwood, v. p.-treas.; with W. W. Waddell, E. B. Cadwell, E. A. Clark, N. J. Hyman, and H. C. Stimler, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par; 500,000 shares in treasury. Corporation Trust Co., New York, transfer agent. Property paid for and company reports a large cash balance in the treasury.

Property: 7 claims in Jett canyon, in the Toyabe mountains, 7 miles due W. of Round Mountain, Nye county, and 45 miles N. of Millers. The outcrop is a precipitous mass 250′ high. The main ore showing is where a basal fault along the east side of the range cuts an andesite dike or stock. The vein shows a length of about 1,500′ and a width of 60′ or more. It consists of highly silicified andesite carrying silver, lead and zinc. The high-grade ore is reported to assay above 30% lead, with a content of 3 oz. silver to each percent of base metal.

Development: by crosscut tunnels and surface open-cuts.

Equipment: compressor, machine drills and camp buildings.

Reported upon by Wm. J. Loring and Chas. D. Wilkinson, who state that the surface values are very good, the vein of large size, very strong and well defined and the geological conditions favorable for making large orebodies.

In mid-1920, the Gibraltar and Toggery Divide companies were supposedly merged to form the **Mines Selection Co.**, stockholders of each company being permitted to exchange their stock for that of new company, share for share, plus fee of 3¢. The Mines Selection Co. relinquished its option on the Gibraltar property in 1920 and took away its equipment. Work was resumed on Gibraltar in 1921, presumably by associates of Col. Salter, who apparently still controls the Gibraltar Silver Mines Co.

GIROUX CONSOLIDATED MINES CO. **NEVADA & MEXICO**

General office: suite 3300, 120 Broadway, New York City. **Mine offices:** Kimberly, Nevada, and Carbo, Sonora, Mexico.

Officers: Albert C. Hubbell, pres.; Henry B. Paull, 1st v. p.; Ernest R. Grouchaus, 2nd v. p.; Joseph B. Cotton, general counsel; Frederic R. Kennedy, sec.; Thomas B. Adams, treas.; foregoing with Samuel Brenner, Albert E. Humphreys, Jr., John D. Clarke, directors. H. T. Munroe, gen. mgr. and Nevada agent. Samuel L. Heslet, Mexican mine agent.

Inc. April 14, 1903, in Delaware.. **Cap.** $7,500,000; $5 par; issued $7,207,-100. American Trust Co., Boston, registrar, Boston Safe Deposit & Trust Co., transfer agents.

The Giroux is now controlled absolutely by the Consolidated Coppermines Co., through exchange of Giroux stock for that of the Coppermines company. The latter company now owns over 99% of the total Giroux stock outstanding. For description of properties and operations see **Consolidated Coppermines Co.**, and Vol. XI of this Handbook.

GLASGOW & WESTERN EXPLORATION CO., LTD. **NEVADA**

Liquidated. Fully described in Vols. XI, XII, XIII. The Copper Basin and Copper Canyon mines in Nevada were sold to the **Copper Canyon Mng. Co.**, the Adelaide in Humboldt county to Mr. Kierman, Tonopah, and the Montreal property in Beaver county, Utah, to the **Milford Copper Co.**

GLENDALE MINING, MILLING & POWER CO. **NEVADA**

Mail returned from Glendale, Calif. Had a lease on the Piermont mine near Cherry Creek, Nev.

A jitney auto man, named Hart, of Glendale, Calif., ran property, and the result of inexperience was the usual one. J. H. Leishman, Templeton, Calif., was formerly president, acting merely in an advisory capacity in the early days of the corporation. Company practically out of business, with no assets, but a number of unpaid accounts.

GOLCONDA GOLD LEDGE MINING CO. NEVADA

Presumably dead. **Address:** 909 Sharp Bldg., Kansas City, Mo.

Officers: M. A. Fyke, pres.; W. H. Otto, v. p.; A. C. Sweet, sec.; C. V. Fyke, treas., with F. M. Planck, directors at last account.s

Cap. 1,000,000 shares; $1 par.

Property: 8 claims, 2 miles S. of Golconda, Humboldt county, known as Kramer Hill, under lease to Golconda Nevada Mng. Co., at last accounts.

GOLCONDA NEVADA MINING CO. NEVADA

Address: Golconda, Humboldt county, Nev. J. B. Tomlinson, mgr.; had 3-year lease from September, 1915, on the Kramer Hill mine of Golconda Gold Ledge Mining Co.

Equipment: 20-stamp mill for sampling and testing. No recent returns.

GOLD BANK DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Ninnis, v. p.; B. E. Garnett, sec.-treas., with A. B. Garnett and F. C. Beedle, directors.

Inc. 1919 in Nevada. **Cap** $150,000; shares, 10c par.

Property: 2 claims and 3 fractions, 80 acres, adjoining the Rosetta, 2 miles south of Gold Mountain.

GOLD BAR DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Minnis, v. p.; B. E. Garnett, sec.-treas.; with A. B. Garnett and T. F. Potthoff, directors.

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 5 claims and a fraction E. of Sutherland and 1½ miles slightly E. of N. of Gold Mountain. Is a prospect only.

GOLD CANYON DREDGING CO. NEVADA

A subsidiary of **Metals Exploration Co.**, California.

Office: 1213 Hobart Bldg. San Francisco. **Mine office:** Dayton, Nev.

Officers: Bulkeley Wells, pres.; Roy H. Elliott, v. p.; and A. D. Snodgrass, sec.-treas., directors. Gerald H. Hutton, mgr.; W. J. Harvey, supt.

Inc. June 11, 1919, in Nevada. **Cap.** $250,000; $1 par, all issued.

Property: 297 acres of patented placer ground, and 720 acres leased from J. H. Rae on Gold Canyon Creek, between Dayton and Silver City, Lyon county. Also, water rights on Carson river. Gold was discovered in 1859, and ground worked in a small way for years by Rae and King, with total production of $25,000. Bedrock is at depth of 15′ to 40′; 200 acres have been tested. Gravel carries gold and silver; present (1921) estimates give 6,000,000 cu yd. Values said to be 40¢ to 90¢ per yd.

Equipment: includes one 9 cu. ft. electrically driven dredge of 500 h. p. with capacity of 5,000 cu. yd. per 24 hrs; 4,500′ of 8″ wood pipe and 3,800′ of ditch. A spur from the Southern Pacific brings the railroad to within one mile of the dredge.

Production: for 1920 was 225,000 cu. yd. with dredge starting operations Sept. 5th.; cost was 15¢ per cu. yd. Total cost, including boat, to Oct. 30, 1920, was $255,738.

Reported, December, 1921, that litigation over title of leased ground had begun.

GOLD CIRCLE BUICK MINING CO. NEVADA

Address: Louis Reymond, Midas, Nev.

Inc. July, 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: 3 claims in the Gold Circle district of Elko county.

GOLD CIRCLE COALITION CO. NEVADA

Address: Midas, Nev.

Officers: M. J. Paisley, pres.; J. W. Cody, v. p.; J. I. Peterson, sec.-treas., with J. A. Langworth, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: Golden Fissure group of 3 claims adjoining the Bamberger

property, Gold Circle district, Elko county. Free milling ore occurs in a 3' vein; values are spotty. Developed by shaft and tunnel.

Mine reported sold December, 1920.

GOLD CIRCLE CROWN MINING CO. **NEVADA**

Address: Wm. Rae, Midas, Nevada. Said to be controlled by Ellis & Snyder of Salt Lake City and Chas. A. Stoneham of New York.

Property: including the Banner claim, in Gold Circle district of Elko county, shows a 3' ore shoot in the Missing Link vein, said to be 150' long. Milling ore yields $15.75 and highgrade $50 to $100. Workings are shallow.

Mine leased to Rae and Hargrove, 1920 and 1921.

GOLD CIRCLE QUEEN MINING CO. **NEVADA**

Address: Midas, Nev.

Officers: J. E. Pelton, pres.; R. S. Bolam, v. p.-gen. mgr.; L. G. Campbell, sec.-treas.; with G. S. Pelton, directors.

Cap. $1,000,000, increased to $1,500,000 in December, 1919; $1 par; 840,000 outstanding.

Property: 5 claims in Gold Circle district, Elko county. Ore occurs in lodes in shattered rhyolite up to 20' wide; two principal veins developed show values in gold and silver, the latter greatly predominating. Production prior to present ownership said to have been $45,000.

Development: by 315' shaft and 2 tunnels; total workings about 1,200'. Equipped with small gasoline hoist.

Was operating 1919-20.

GOLD CRATER CONS. MINING CO. **NEVADA**

Property: in Gold Crater district, Nye county, 30 miles S. E. of Goldfield, was leased in 1914 to Gold Prince Mining & Leasing Co., which see. Thomas D. Murphy of Goldfield was the lessor.

GOLD DEPOSIT MINING CO. **NEVADA**

Address: Logan, Utah. **Mine office:** Battle Mountain, Nev.

Officers: Robt. Murdock, pres.-treas.-mgr.; John A. Crockett, v. p.; A. S. Cole, sec., with E. S. Larsen and Robt. Murdock, Jr., directors. F. W. Swindlehurst, supt.

Inc. May 27, 1916. **Cap.** $100,000; 10c par; 600,000 shares outstanding. Annual meeting May 27. Income from ore sales in 1918, $1,500; operating expenses, $1,200.

Property: 9½ claims, 10 miles from Battle Mountain, Lander county, shows rhyolite cut by a quartz vein 3-5' wide, said to average $10 per ton in gold. Developed by 250' tunnel to depth of 150'. Shipment of $60 ore made in 1918.

GOLDEN CHARIOT MINING CO. **NEVADA**

Address: Jamestown, Nye county, Nev. Carl Feutsch, pres.

Property: a group of copper claims, situated about 30 miles from Goldfield. Idle at last report.

GOLDEN PEN CONSOLIDATED MINING CO. **NEVADA**

Holdings sold to **Gold Pen Mines Co.**, which see.

Company was formed in 1915 by Jesse Knight, of Provo, Utah, to purchase the Golden Pen mine at Rand, Mineral county, Nev., for $150,000.

A peculiar feature of the purchase permitted former owners to retain a pay-shoot 38' long in center of mine. Past record shows rich shipments. See Vol. XII.

GOLDEN STATE DIVIDE MINING CO. **NEVADA**

Property was an old mine worked by Harry McNamara, who later formed company. In June, 1920, leased under option by Knox Divide Mng. Co., which see. Knox is the operating company, and in August, 1921, obtained stock control, but Golden State still keeps its entity and appears on the listing of the New York Curb.

GOLDFIELD BLUE BELL MINING CO. **NEVADA**

Address: Austin, Nev.

Officers: D. S. Johnson, pres.; B. W. Ward, treas.; J. M. Hiskey, sec.

Annual statement for 1918 shows: Receipts, $4,875; expenditures, $4,922

Property: 3 fractional claims at Goldfield, under lease to Spearhead Gold Mining Co., Reorganized.; Cotter mines (10 claims) at Golden Arrow, 50 miles E. of Tonopah; Berlin mine (16 patented claims), Berlin; Richmond mine (3 patented claims) 1 mile S. of Berlin; Shamrock mine (10 patented claims), 6 miles N. of Berlin; Downeyville and Sullivan mines (6 patented claims), 5 miles S. of Lodi. The latter were leased to F. H. Lerchen, late 1921.

Development: Cotter 450′ deep; Berlin (gold), 364′; Downeyville (silver-lead), 250′; Richmond (gold, silver, copper), 75′; Shamrock (gold, silver), 350′; Sullivan (gold), 100′. The Goldfield (950′) is the only mine worked.

Equipment: Berlin has 2 steam hoists, 2 compressors, assay-office, store, machine-shop, complete 30-stamp mill, etc.

A group of mines like these ought to develop something.

GOLDFIELD BULL DOG MINING CO. **NEVADA**

Office: 351 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Goldfield, Nev.

Officers: N. S. Keith, pres.; A. W. Ott, sec.

Inc. in Wyoming. **Cap.** $1,500,000; shares $1 par.

Property: 4 claims, in Diamondfield district, Goldfield, Esmeralda county, adjoins, holdings of the Vernal Mining Co. and is controlled by same interests. Developed by company and lessees. Small shipments made

GOLDFIELD COMBINATION FRACTION MINING CO. **NEVADA**

Mail returned from Reno, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zobel, v. p.

Inc. June 10, 1905, in South Dakota. **Cap.** $1,000,000; shares $1 par; 936,617 issued. Listed on San Francisco Exchange; removed from listing on N. Y. Curb, Dec. 2, 1920.

Property: at Goldfield, Esmeralda county.

Beginning with early 1919, property was under 5 years lease to Goldfield Cons., but later in the year was subleased to the Goldfield Development Co. Reported that lease was relinquished.

GOLDFIELD COMBINATION MNG. CO. **NEVADA**

A Washington corporation which forfeited its charter; its mineral holdings (1 claim), in the Goldfield district, were sold to Goldfield Deep Mines Co., in 1920.

GOLDFIELD CONSOLIDATED EXPLORATION CO. **NEVADA**

Office: Crocker Bldg., San Francisco, Calif. E. A. Julian, gen. mgr. Is a subsidiary of Goldfield Cons. Mines Co., formed in 1916 to examine and develop properties submitted for sale. All of capital stock is owned by the parent company.

The balance sheet of the Goldfield Cons. for year ending December 31, 1919, shows its equity in the Exploration Co., to be $150,000.

Property: claims of **Ash Peak Mines Co.** (q. v.), in Arizona, and the Surcease mine, Plumas county, Calif. During 1918, many properties submitted company were given consideration, but it has since been apparently inactive.

See **Goldfield Consolidated Mines Co.**

GOLDFIELD CONSOLIDATED MINES CO. **NEVADA**

Office: Reno National Bank Bldg., Reno, Nev.

Officers: Geo. Wingfield, pres.; Benj. J. Henley, v. p. W. E. Zoebel, sec.-treas.; E. A. Julian, gen. mgr., with J. H. Carstairs, Wm. Woodburn and S. C Mitchell, directors. A. H. Lawry, cons. eng.

Inc. November 13, 1906, in Wyoming. **Cap.** $50,000,000; $10 par; issued 3,559,148 shares. Stock listed on San Francisco and Salt Lake Exchanges and New York and Boston Curbs. John S. Cook & Co., Goldfield, Nev., registrar. Company office, Reno, transfer agt. Annual meeting, third Monday in March.

Company is a merger of Goldfield-Mohawk, Red Top, Jumbo, Laguna Goldfield, Goldfield and Combination mining companies. In 1911, company

acquired Vinegerone Fraction and the Bull Dog and Jumbo Fractions. Company owns entire stock of the Goldfield Cons. Milling and Transportation Co. and the Goldfield Cons. Expl'n Co .(q. v.); an 87% stock interest in the **Aurora Cons. Mines Co.**, Mineral county, Nev., and an interest by mortgage in the **Dolly Varden Mines Co.**, B. C. All of these companies are described under their own titles.

Company's 483,835 share interest in C. O. D. Cons. Mines Co., 1,499,727 share interest in Goldfield Merger Mines Co., and title to 5 isolated claims, were exchanged in 1920 for 3,559,148 shares of **Goldfield Deep Mines Co.** stock, on payment of a 1c assessment per share. On Sept. 15, 1920 company distributed Deep Mines stock among its stockholders.

Annual report for 1920 shows: total earnings, $33,455, of which $20,411 was rentals and royalty. Expenses and losses were $248,331, including $18,897 disbursements and $211,082 depreciation of plant. Assets include: property; $28,535,856; plant, $997,934; depletion reserves, $6,023,248, and current, $663,409, of which cash was $292,452. Accounts payable were $1-171. Surplus was $627,796. Property assets include Dolly Varden Mines Co., $181,447 (mortgage); **Ash Peak Mines Co.**, $90,000 (stock); and equity in **Surcease** mine, $75,000. See Goldfield Cons. Expl. Co. and also Ash Peak, separately described.

Dividends: total $29,176,788 or $8.20 per share, 1907 to 1919.

Aurora Cons. Mines Co. liquidated its indebtedness to Goldfield Cons. to the extent of $110,237 by transferring all of its assets, of which $56,704 was current. The plant will be sold.

Property: 26 patented claims, and 1 unpatented claim, 390 acres, at Goldfield with 6 working shafts, Combination, Mohawk, Red Top, Jumbo-Clermont, Jumbo No. 2 and Laguna. Output was from several mines working fissure veins whose stoping width varies from a few feet to as much as 20 or even 30'. In 1916, company adopted a system of leasing outlying parts of its property, and finally in February, 1919, gave Goldfield Development Co. a 5 years' lease on the entire holdings, on a 15% royalty basis. But, operations proving unprofitable, Goldfield Dev. Co. relinquished lease at close of 1920, when Goldfield Cons. adopted policy of leasing small blocks (300x300') to individuals, on royalties of 10 to 20%, depending on ore grade. Among other lessees, the **Silver Pick Cons.** is operating under a 5 years' lease on a portion of Red Top ground.

For complete description of Goldfield Consolidated, at one time, one of the world's greatest gold mines, see Volume XIV.

GOLDFIELD DEEP MINES CO. OF NEVADA — NEVADA

Office: Goldfield, Nev.

Officers: A. I. D'Arcy, pres.-mgr.; Corrin Barnes, v. p.; H. G. McMahon, sec.-treas.; with Benj. J. Henley and Ed. Lembcke, directors. Elmer Burt, supt.

Inc. May 26, 1920, in Nevada. **Cap.** $900,000; par 5¢; assessable; about $825,000 outstanding. Transfers made at company's office; registrar, John S. Cook & Co., Goldfield, Nev. Annual meeting, third Monday in June. Three 1¢ assessments have been levied up to September, 1921.

Total revenue, including 2 assessments, up to Sept. 1, 1921, was $226,734. Expenditures were $179,739, of which operation cost $130,054; equipment, $27,482 and properties, $22,202. By Dec. 1, additional cash receipts were $70,000, principally from assessment No. 3.

Property: 36 patented claims, 600 acres, Goldfield district, Esmeralda county, adjoining Goldfield Cons. on N. W.; consists of a consolidation of following properties: Reorganized Atlanta Mines Co., Goldfield Merger Mines Co., Reorganized Blue Bull Mng. Co., C. O. D. Consolidated Mines Co., Goldfield Combination Mng. Co., Milltown Mng. Co., 5 claims of the Goldfield Consolidated Mines Co. and other small parcels of ground in the district.

Shareholders of the Atlanta and Blue Bull had privilege of exchanging share for share without cost to them, as treasuries of these companies

had funds to meet bonus of 1¢ per share; in case of Goldfield Merger and C. O. D. Cons. individual shareholders were liable for the bonus exchange. The Milltown and Goldfield Combination properties were purchased for cash, and Goldfield Cons. transferred its stockholdings in the C. O. D. Cons. and Goldfield Merger, 483,835 and 1,499,727 shares, respectively, gave deed for 5 claims, and paid $35,591.48, in exchange for 3,559,148 Goldfield Deep shares.

The consolidation was effected to secure funds for deep mining and sufficient ground to cover "vein system on its dip and strike". Properties may be described in brief, as below:

Atlanta group; 74 acres, includes Atlanta Black Bear, Union Jack claims, and a fraction, adjoining the Florence on E. and the Goldfield Cons. on S. Developed by 1,750′ Merger Mines shaft, and 150′ deeper by winze. Vein 40′ to 100′ wide; some medium grade shipping ore, and a shoot, 5′ to 15′ wide, of $20 ore; but, as a whole, ore is of low grade concentrating tenor. Production, about 1,500 tons.

Blue Bull group: 8 claims, 148 acres, S. of Lone Star Cons. and Merger Mines. There is a 700′ shaft, with workings on 500′ and 700′ levels; commercial ore has been found on the former. Ore is gold, silver and copper.

C. O. D. group: forms compact group of 90 acres adjoining the Atlanta on S. Developed by 500′ shaft and several thousand feet of workings. In 1918, lessees claim to have uncovered a 35′ vein, with free milling gold value of $7 to $15. Said to have produced $75,000.

Goldfield Combination: 1 claim, centrally located in the Deep Mines consolidated territory.

Goldfield Consolidated: this group of 5 claims, including Goldstone and Wonder, lies between the C. O. D. and Milltown properties.

Goldfield Merger Mines: 7 claims, including St. Ives and Sunflower; covers northerly side of consolidation and adjoins Jumbo Extension on S. Its shaft is 1,750′ deep; a winze, 150′ deeper, opened veins with shoots of copper-gold-silver ore; 2% copper ore was developed on 1,350′ level.

Milltown group: 3 claims, adjoining the Goldstone and Wonder claims, referred to above, on S. and the Yellow Tiger property on W. Developed by shafts, deepest 300′. A big vein is exposed on surface, said to carry values up to $50.

The more important of these properties are more fully described in Vol. XIV.

Development: additional to old workings noted above, a 3 compartment shaft to be 2,400′ deep is being sunk on S. end of Combination claim, and had reached the 1,100′ point in Dec. 1921. The management is convinced "that the orebodies of Goldfield will persist to great depth", despite the fact that orebodies of commercial value were not discovered on the 1,750′ and 1,900′ levels of the Atlanta and Merger Mines. At depth of 1,000′, the shaft reached the C. O. D. vein.

Equipment: includes 250 h. p. hoist from the Merger Mines.

Beginning Dec. 1, 1921, company planned to strengthen its cash reserve by sale of surrendered stock at 12½ to 20¢ per share. A newspaper campaign was to be initiated.

GOLDFIELD DEVELOPMENT CO. NEVADA

Address: P. O. Drawer 119, Goldfield, Nev.

Officers: Corrin Barnes, pres.; A. I. D'Arcy, v. p.; H. G. McMahon, sec.-treas., with Ed. Lembcke and Benj. J. Henley, directors. Elmer Burt, mine supt.

Inc. February 13, 1919, in Nevada. **Cap.** $200,000, increased from $125,000 in December, 1919; shares 5c. par; assessable; 1,750,000 shares in treasury. John S. Cook & Co., registrar. Annual meeting, third Monday in February. Cash on hand, March 1, 1921, $18,000.

The Development Company was organized to operate the holdings of the Goldfield Cons. Mines Co., including the mining property, 1,000-ton mill and railroad in the Goldfield district, Esmeralda county. Part of the ground

was purchased and the balance taken under lease for a period of five years from February 1, 1919, with the privilege of sub-leasing any part or all of the ground. (See Vol. XIV for details); lease however was cancelled at end of 1920.

During time lease was in force, over 30 sub-lessees were at work. From Feb. 1, 1919 to March, 1920, 4,450 tons of ore were shipped having $75,000 gross value; in June, mill began operations and 4,800 tons were treated, with estimated net profit of $12,000. Assessments No. 1 and 2, of 3¢ and 2¢, were levied in 1920 (the last on Aug. 7), because of inability to readily sell treasury stock. Between Feb. 1, 1919 and March 2, 1920, disbursements were $276,901, and receipts, $278,515; of the latter, $107,500 was from sale of stock; $36,000 loans; and $58,700, sale of supplies. Mill repairs cost $43,500 and mining operations were $71,800.

Mill was closed down some months before lease was relinquished. Failure of this first stage in the life of the Goldfield Development Co. is charged to high costs and low grade of the ore.

In October, 1920, it was announced that the Goldfield Development, Co. had purchased the Gold Hill mine for cash, and assessments 3 and 4, of 1c. each, were levied June and Dec., 1921.

Property: 8 claims, 160 acres, in Lida district, 26 miles S. W. of Goldfield, Esmeralda county. A nearly vertical fault fissure vein, 14′ to 70′ wide, can be followed on surface for 2,000′. Value is in gold, ranging from $4 to $10. Ore is porous quartz and iron oxides; country rock, limestone and shale. The Sandstorm-Kendall Cons. Mng. Co., which has an option on adjoining Bonanza group, has taken a lease on 10 acres of G. D. ground.

Development: 2 tunnels, 500′ and 700′ with backs of 170 and 270′, respectively; also an 80′ shaft. A new 200′ shaft has been sunk, one-half of the expense being chargeable to the S.-K. company. Two ore shoots, 140 and 160′ in length, exposed in tunnels, are reported to average about $10 per ton.

Efforts to find the ore shoots on the 200′ level were at first unavailing, because of a fault plane, but report of Dec. 11, 1921, states that W. segment of vein, 23′ wide, has been found.

Equipment: includes 15 h. p. gas hoist, small compressor.

GOLDFIELD DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. D. Budelman, pres.; Clarence Waldner, v. p.; W. V. Richardson, sec.-treas., with J. R. Blair and H. H. Atkinson, directors.

Inc. April 28, 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: 6 claims in the N. E. part of the district adjoining the Mizpah.

GOLDFIELD GREAT BEND MINING CO. **NEVADA**

Office: 302 News Bldg., Goldfield, Nev.

Officers: C. S. Sprague, pres.; J. K. Turner, v. p. and gen. supt.; Ben Gill, sec.-treas., with L. L. Dellinger and B. W. Ward, directors.

Inc. May 8, 1915, in Nevada. **Cap.** $1,500,000; shares $1 par; assessable; all outstanding. Assessment No. 10, of 1c. was levied March 14, 1922. Stock listed on San Francisco Exchange.

Financial statement for period, Feb. 1, 1916 to March 31, 1918, shows: total receipts, $90,214, including stock sales, $1,502; assessments 2 and 3, $29,073; ore sales, $59,346. Expenditures for same period, $84,875, showing an operating loss of $25,529. Interim reports, March 31, 1918 to Nov. 30, 1920, give total receipts, $74,103, of which assessments 4, 5, 6 and 7 provided $56,621 and ore sales $4,396; there was a debit balance of $341. For nine months to Sept. 1, 1921, receipts were $14,727 and disbursements, $14,656.

Property: 7 patented claims, 112 acres, in Diamonfield section of Goldfield, Esmeralda county. Claims show a quartz vein in andesite, with 28° dip and E.-W. course. Oxide and sulphide ores occur in shoots said to average $60 per ton.

Development: by 2 shafts, about 400′ deep each. The old mine was un-

watered in 1915, and ore shoots on 160′ and 236′ levels produced $100,000 gross. Work during past 2 years confined to locating these shoots on the 375′ intermediate and lower levels. Prior to April, 1918, 4,630′ of new work was reported; since that time about 1,000′ additional has been done.

Equipment: 75-h. p. hoist, compressor, pump and an old mill.

Production: from 1916 (4 mos.) to 1918 inclusive 2,621 tons yielded $62,638 net; in 1919, $1,103 net; none since to Sept. 1, 1921.

GOLDFIELD MERGER MINES CO. **NEVADA**

Described in Vol. XIV.

In early summer of 1920, company became a part of the newly organized Goldfield Deep Mines Co. (q. v.). Outstanding shares of Merger were exchanged, share for share, for stock of new company, plus 1¢ assessment

GOLDFIELD MINING & ORE REDUCTION CO. **NEVADA**

Address: Marvin Arnold, mgr., Goldfield.

Property: 7 claims surrounded by the Trilby, Divide Gold Dyke, Gold Wedge, Calumet, and Argonne.

Development on the Gold Seam group, 7 claims in S. E. part of district. A 200′ shaft sunk several years ago showed seams of high-grade ore.

Equipment: 25-h. p. hoist, 4-drill compressor, etc.

From last acounts (Feb., 1921) active operations were to be resumed.

GOLDFIELD ORO MINING CO. **NEVADA**

Idle several years. Controlled by New York Oro Corporation, which see.

Address: Goldfield, Esmeralda county, Nev. Ben Gill, sec.

Inc. 1912 in Arizona. **Cap.** 3,000,000 shares; $1 par; 2,500,000 outstanding.

Property: 33 acres at Goldfield, developed to 800′ depth, where $40 assays were reported. Company also developed Vulture mine in Wonder district.

GOLDFIELD QUARTZ MOUNTAIN MINING CO. **NEVADA**

Address: J. F. Hooper, mgr., Goldfield, Nev.

Property: Bell group of 8 claims on Quartz mtn., Nye county, 12 miles E. of Goldfield. A vein, 100′ wide, is exposed on surface for 1,400′; 20′ of width is iron stained quartz carrying flake gold, with values of $5 to $17.

Development: by 2 tunnels. Equipped with 25 h. p. engine and compressor.

Company was financed by Los Angeles men. Corrin Barnes, is consulting engineer.

GOLDFIELD SHALE MINING CO. **NEVADA**

Out of business. Property worked by **Spearhead Gold Mining Co.**, which see.

GOLDFIELD SUNRISE GOLD MNG. CO. **NEVADA**

Holdings purchased 1918 by **Grandma Cons. Mines Co.**, which see.

GOLDFIELD-TULE CANYON PLACER CO. **NEVADA**

Directors: F. M. Field, A. B. Harms, Harry B. Ruhl and F. J. Harms.

Inc. April, 1919. **Cap.** $150,000; shares 10c par; 750,000 in treasury.

Property: 5 placer claims in Tule canyon, Esmeralda county, 30 miles S. W. of Goldfield. During 1919, $5,000 was spent in development and water supply.

GOLD MOUNTAIN MINING & MILLING CO. **NEVADA**

N. P. Theo, pres., Goldfield, Nev. Is a close corporation.

Properties: about 13 miles from Bonnie Claire and 6 miles from Hornsilver, Esmeralda county, operated under lease by J. W. Crane, at last accounts. Veins contain silver-gold ore carrying copper. Developed by two 240′ shafts and connected by a 200′ drift. An outcropping oreshoot 20″ wide said to have yielded ore assaying from $100 to $500 per ton. No recent information.

GOLD PEN MINES CO. **NEVADA**

Purchased in June, 1919, holdings of the Golden Pen Consolidated Mining Co.

Offices: 205 Nixon Bldg., Reno, Nev., and 611 Security Bldg., Los Angeles.

Officers: W. M. Wantland, pres.-mgr.; T. L. Lipsett, v. p.; Geo. N. Turner, sec.-treas., with Harry Amman and Edw. F. Wantland, directors. J. Carlton Bray, supt.

Inc. 1919, in Nevada. **Cap.** $1,500,000; $1 par; 250,000 shares outstanding.

Property: 14 claims, 200 acres in Rand district, Mineral county, 17 miles from railroad at Nolan, shows a quartz vein in rhyolite and andesite, with N.-E. course and dip of 70° E. Ore is sulphide, contains gold and silver, shipping grade said to average $366 and milling grade $20 per ton. **Development:** by 258′ vertical shaft, with about 2,000′ of workings.

Equipment: 20-ton amalgamating mill and electric hoist; mill first operated April, 1920.

The mine is credited with $200,000 past production. Small lots of high grade ore shipped in 1919. In Dec., 1919, management reported reserves of 40,000 tons of $20, and 4,000 tons of $500 ore. Suits to enforce payment for machinery were brought vs. company in fall of 1920.

GOLD PEN-RAND MINES CO. **NEVADA**

Address: Jas. L. Boyd, pres., Reno, Nev.

Officers: Jas L. Boyd, pres.; D. H. Updike, v. p.; Geo. Lewis, sec.-treas.; with A. J. Bovard, gen. mgr., W. H. Thomas and J. Carlton Bray, directors.

Property: in Rand district, Mineral county adjoining Gold Pen mine on S. E., 17 miles from Nolan on railroad shows 12′ vein of low grade sulphide ore, with a 10″ pay streak. Developed by 300′ shaft.

GOLD PRINCE MINING & LEASING CO. **NEVADA**

Idle or dead. E. L. Luker, sec.-treas., Grand Island, Neb.

Officers: Dr. A. H. Farnsworth, pres.; Jos. Kotik, St. Paul, Neb., v. p.; Chas. O. Orr, gen. mgr.; with E. L. and E. S. Luker, directors, at last accounts.

Inc. in 1914. **Cap.** $500,000; shares $1 par.

Had lease and bond on the Gold Crater mine, formerly owned by the Gold Crater Cons. Mng. Co., about 30 miles S. E. of Goldfield, Esmeralda county.

Ore: gold, milling grade, said to run about $15 per ton.

Development: by 265′ shaft and crosscuts. **Equipment:** a 12-h. p. hoist and small mill.

GOLD REEF DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. L. Ord, pres.; R. G. Williams, v. p. and mgr.; A. H. May, treas.; E. B. Harrington, sec., with F. A. Lindlof and L. M. Messner, directors.

Inc. June, 1908, in Nevada. **Cap.** $1,500,000; $1 par; 1,300,000 issued. Listed on San Francisco Stock Exchange.

Property: 5 claims, south of the Gold Zone and 1,500′ S. of the Tonopah Divide's eastern end, of the inside properties, originally located 12 years ago. Examined by J. B. Higgins.

Development: by tunnel and 2 shafts. A shaft sunk several years ago opened seams of sulphide ore. A new shaft, started in April, 1919, is 225′ deep. This shaft, located on the strike of the Tonopah Divide vein, is in hard rhyolite containing intrusions of breccia slightly mineralized. Indications are considered to be favorable for cutting the Tonopah Divide ledge.

Equipment: electric hoist, compressor, drills, pumps, etc.

Not operating 1919-20.

GOLD RIDGE DIVIDE MINING CO. **NEVADA**

Organized, 1919, to Finance development of 3 claims and a fraction in Klondike district on outskirts of the Divide district and about 3½ miles W. of Gold Mountain.

GOLDSMITH DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. F. K. Pittman, res. agt.

Officers: Herman Albert, pres.; J. M. Fenwick, v. p.; Julius Goldsmith, sec.-treas.; A. I. D'Arcy, cons. engr.; Ivan Arnold, asst. sec.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury.

Property: the Gypsy claims, located in 1916, about 3¾ miles S. E. of Gold Mountain. Ore of high value is said to exist at surface, from which small shipments were made from tunnel workings. Developed by 2 shafts.

Equipment: 54-h. p. hoist moved from the North Star at Tonopah.

GOLD SPRINGS MINING CO. **NEVADA**

Address: W. C. McMullen, mgr., Nyala, Nev.

Controlled by Salt Lake City people.

Property: in the Willow Creek section of Nye county. Was operated throughout much of 1921 and produced some concentrate valued at $100 per ton.

GOLD TOP MINING CO. **NEVADA**

Address: 519 H. W. Hellman Bldg., Los Angeles, Calif.

Officers: D. L. Keyes, pres.-treas.; John J. Graf, v. p.-mgr.; Walter F. Kean, sec., with W. H. Sexsmith and M. C. Keyes, directors. W. R. Cozart, supt.

Inc. in Nevada. **Cap.** $500,000; $1 par; 50,000 shares outstanding.

Property: the Pedro group, 6 claims, 120 acres, in Copper Basin, Lander county, 9 miles from Battle Mountain, developed by 585′ tunnel and 135′ vertical shaft. Ore occurs in a fissure vein, said to contain gold, silver, and copper.

Equipment: includes steam power, hoist, compressor, drills, pump, and Gibson crushing mill.

GOLD TRAIL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with A. G. Raycraft and H. R. Cooke, directors.

Inc. April 10, 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: 8 claims, 130 acres, adjoining south Divide, over 3 miles S. of Gold Mountain. A prospect.

GOLD WEDGE DIVIDE MINING CO. **NEVADA**

Office: 301 Nixon Bldg., Reno, Nev.

Officers: Wm. Forman, pres.; E. H. Mead, v. p.; P. C. Fisler, sec.-treas.; with F. H. Norcross, directors. W. G. Hellier, supt.

Inc. March 30, 1918, in Nevada. **Cap.** $150,000; 10c par; 850,000 issued. Listed on San Francisco Stock Exchange.

Property: 4 claims, about 2¾ miles slightly S. E. of Gold Mountain, covering a big fault fissure. A 12′ vein, giving fair assays, has been opened on surface.

Development: by shaft with a crosscut at 250′ level.

Equipment: includes 35-h. p. hoist, compressor, drills, etc.

Idle 1919-'20.

GOLD WEDGE HOMESTAKE MINING CO. **NEVADA**

Controlled by Tonopah Mining Co. of Nevada.

Office: care C. W. Taylor, pres.; Tonopah, Nev.

Inc. 1918, in Nevada. **Cap.** $150,000; 10c par; 750,000 outstanding.

Property: 5 claims, in S. E. part of district, between the Gold Wedge and Rosetta. Located during 1902.

Development: a 110′ shaft, sunk in 1902 on a gold vein, and 7 shafts, from 35 to 60′ deep sunk by lessees.

GOLD ZONE DIVIDE MINING CO. **NEVADA**

Principal office: 416 State Bank Bldg., Tonopah, Nev. **New York office:** 25 Broad St.

Officers: Wm. Forman, pres.; Geo. B. Hutchings, v. p.; F. A. Burnham, sec.-treas.; with A. M. Page and H. T. Gillman, directors. H. R. Bradley, supt.

Inc. Feb. 21, 1918, in Nevada. **Cap.** $150,000; 10c par; 1,490,500 issued.

assessable. Annual meeting, first Tuesday in March. Transfers made at New York office; registrar, U. S. Corporation Co., New York. Ten assessments levied to Sept. 15, 1921; total 15¢ per share.

Is a reorganization of the Tonopah Gold Zone Mining Co., whose shares were exchanged, share for share into stock of Gold Zone Divide Mining Co.

Property: 9 claims, 160 acres in Divide district, Esmeralda county, adjoins Tonopah Divide on south. First worked in 1901.

Development: by 900′ shaft, with crosscuts to the vein on the 300, 500, 700, 800 and 900′ levels. Though the vein as exposed is up to 49′ wide and strong, but little commercial ore was found until September, 1921, when work was resumed on the 500′ level and above, and uncovered an ore shoot 216′ long, 4-7′ wide, assaying between $18 and $55. Raises and intermediate drifts have been completed to block out ore for shipment. Total workings about 7,500′. Connection with Tonopah Divide has been made on 500′ level. Shaft to be continued to 1,000′. Production 1,200 tons of $20 ore, to midsummer, 1921.

Equipment: 50 h. p. electric hoist, compressor, etc.

Assessment notices carry brief progress reports, but financial statements are absent.

GOODSPRINGS ANCHOR CO. — **NEVADA**

Office: 1202 Hollingsworth Bldg., Los Angeles, Calif. Mine at Jean, Clark county, Nev.

Officers: Frank A. Keith, pres.; Philip Wiseman, v. p.; R. I. Rogers, treas.; I. Mattern, sec.; with Seeley W. Mudd, directors. Roy W. Moore, mgr.

Inc. Dec. 20, 1913, in Nevada. **Cap.** $1,000,000; $1 par; 550,000 issued. Annual meeting, second Monday in May.

Gross earnings in 1916, $111,350; in 1917, $105,589; in 1918, $71,073. Total dividends to January 1, 1919, $180,258.

Property: 7 patented and 1 unpatented claims at Jean, said to show lead zinc ore occurring as replacement deposits in limestone, strike N.-S., dip 50°. Developed by 212′ winze from a 110′ tunnel; greatest depth of workings 400′; total workings, 2,500′ of drifts.

Equipment: 15-h. p. oil hoist, 3-drill compressor, 2,000′ gravity tram, 50-ton dry mill.

Production: of zinc ore, lead ore and concentrate, on a small scale, was made 1917-18.

Inactive since April, 1918.

GOULD & CURRY MINING CO. — **NEVADA**

Office: Goodsprings, Nev.

Company formed in 1910 by Jesse Knight and associates to operate the Milford & Addison group, Yellow Pine district, Clark county. Reported April, 1921, that Knight interests no longer control property. Has been a steady small producer for 10 years. See Vol. XIV.

GOULD & CURRY MINING CO. — **NEVADA**

Office: 265 Russ Bldg., San Francisco, Calif.

Officers: H. L. Slosson, Jr., pres.; Herman Zadig, v. p.; Chas. D. Olney, sec.; Wells Fargo Nev. Natl. Bank, San Francisco, treas.

Inc. November, 1904, in California. **Cap.** $216,000; $1 par; assessable. Registration Surety Co., San Francisco, registrar. Stock listed on San Francisco Stock Exchange.

Property: a famous group of claims covering 613′ of the Comstock Lode properties, with a production record of $15,525,000. Now controlled by Slosson and associates.

Property with others on the Comstock Lode is to form the **Middle Mines Association**, which see.

GOWGANDA COPPER CO. — **NEVADA**

Probably dead, as letters sent company's officers are returned from Goldfield, Nev.

Officers: C. A. Braconier, pres.; Herman Krieger, sec.; S. H. Thompson, Reese Wampler, and W. H. Brock, directors, at last accounts.

Inc. July, 1913, in Nevada. **Cap.** $100,000; 10c par.

Property: 9 claims, near Round mountain, Nye county, said to show a deposit of low-grade copper ore. Workings are shallow.

GRANDMA CONSOLIDATED MINES CO. NEVADA

Address: Goldfield, Nev.

Officers: C. S. Sprague, pres.; J. K. Turner, v. p.-gen. supt; Ben Gill, sec.-treas., with B. W. Ward and L. L. Dellinger, directors

Inc. 1905, in Arizona. **Cap.** $2,500,000; $1 par; 1,262,493 issued. From Feb., 1917 to July, 1921, nine assessments of 1¢ per share have been levied. Listed on San Francisco Stock Exchange.

Statement of accounts, May 31, 1918 to Jan. 31, 1921 shows: total receipts, $61,446, of which assessments (5) were $51,456, and treasury stock sales, $3,617. Disbursements include; mine development, $47,751, and administration expense, $6,621. For last 5 months of this period, the figures are: receipts, $11,276, including assessment No. 7 $10,816; development and administration expenses, $10,362 and $1,350, respectively.

Organized to acquire and develop the Grandma claim of the Grandma Mining Co. In 1916 company acquired stock control of the adjoining Goldfield Sunrise Gold Mining Co., and in 1918 final payment was made on the Sunrise property.

Property: at Goldfield, Esmeralda county, shows a quartz lode in dacite with 60° dip and N. W.-S. E. course. Sulphide ore contains gold, silver, and copper. In fall of 1920, a lease on portion of ground of Reorg. Kewanas G. M. Co., touching Grandma on W., was taken.

Development: by shaft 1,018′ deep in July, 1921; total advance of workings to this date for 33 months, about 1,800′. Work on 800′ level discovered ore running $17 to $40, but not continuous. Sinking of shaft was to be resumed to locate E. dipping shale latite contact. Reported that work was suspended, Aug. 1, 1921, because assessment No. 9 had not supplied sufficient funds.

The 3-claim group of the Silver Coin Mng. Co., in the Railroad Sps section of Lida district, Esmeralda county, was acquired in November.

Equipment: includes newly-installed compressor pump.

Future of the company depends on results in the contact area.

GRANDMA MINING CO. NEVADA

Shareholders could exchange their stock for equal amount in the Grandma Cons. Mines Co. which now owns practically all the stock of the original Grandma company.

GRANITE HILL COPPER MINE NEVADA

Property: 14 miles N. W. of Reno, Nev., now owned by **Nixon-Nevada Mining Co.**, which see.

GRAY EAGLE MINING CO. NEVADA

See **Jersey Valley Mines Co.**

GREAT DANE MINING CO. NEVADA

Address: H. C. Stimler, agt., Mizpah Hotel, Tonopah, Nev.

Officers: C. L. Putnam, pres.; L. S. McConnell, v. p.; A. C. Kearns, sec.-treas., with H. W. Albert, H. C. Stimler, and L. W. Horton, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 shares treasury stock.

Property: 2 claims and fraction, 55 acres, south of the Reno, adjoining the Toggery on W. and 4,000′ S. of the Tonopah Divide. Has 3 distinct veins, with 3 prospect shafts. The vein system of Toggery goes through the tract.

GREAT DIVIDE MINING CO. NEVADA

Is a development proposition organized to finance a promising tract S. of Jim's Divide and a mile S. of the Tonopah Divide.

GREAT WESTERN CONSOLIDATED MINING CO. NEVADA

In 1915, an interest in this company was acquired by the Greenwater Copper Mines & Smelter Co., which see.

Address: Emery W. Elliot, 542 Mills Bldg., San Francisco, Calif. John McGee, supt., Box X, Tonopah, Nev.

Annual statement to Dec. 31, 1920; cash on hand, $1,372; received from assessments, $12,947. Mine and general expenses were, $9,535, as compared with $21,563 for previous 12 months. Eleven assessments had been levied up to Sept., 1919. Listed on San Francisco Stock Exchange.

Property: 11 unpatented claims, about 300 acres, at Tonopah, Nye county.

Development: by 2-compartment shaft, 1,150′ deep, which enters one of the ore-bearing formations at about 1,000′. Considerable exploration work was done on the 860′ level, but it is said to have been all in cap rock and commercial ore was not found. Water hindered exploration during the early part of 1917. Management intends to explore the ground thoroughly by crosscutting and drifts. In June, 1918, work was resumed on the 1,100′ level and 12′ vein intersected about 130′ north of the shaft. A new 4-compartment shaft had reached 600′ in Aug., 1919, since when no progress report received.

GREAT WESTERN DIVIDE MINING CO. NEVADA

Inc., 1919, in Nevada. One of the many companies organized during the wild days of the Divide boom.

No information as to holdings, etc., obtainable.

GREEN MONSTER MINE NEVADA

Office: Phoebe A. Hearst Estate, 410 Hearst Bldg., San Francisco. Operated by lessees at last accounts.

Property: in Yellow Pine district, Clark county, 16 miles N. W. of Goodsprings. Ore is mainly zinc carbonate with a little lead, copper, and silver. Regular shipments were made 1917-19, but no production figures are available.

Development: by 250′ single-compartment shaft with manway, 2 incline shafts, 100 and 255′ deep, and 200′ winze.

GREENWATER COPPER MINES & SMELTER CO. NEVADA

Principal office: Room 515-E., 30 Church St., New York, c/o W. G. Benham, sec.-treas.

Officers: Chas. R. Miller, pres.; M. R. Ward, v. p.; preceding, with Max E. Bernheimer, Chas. Gold, W. G. Denham, Clyde Milne, Oscar A. Daube, F. I. Mallory, B. H. Campbell and W. H. Drayton, 3rd, directors, at last accounts.

Inc. Dec. 12, 1906, in Delaware. **Cap.** $25,000,000; shares $5 par. Was a securities holding company only, and owned stock in a number of Greenwater promotions, all dead, described Vol. VIII, Copper Handbook. Company, on December 31, 1910, had $144,727 invested in choice bonds, after losing about $170,000 through the failure of Chas. Minzesheimer & Co., New York brokers, who failed October 15, 1910.

Reorganized October, 1914, and capitalization reduced to $500,000; shares 10c. par; 3,000,000 issued. Stock listed on the N. Y. Curb. Annual report December 31, 1916, showed cash assets of $52,630, less expenses and loss of $4,960, leaving $47,670 net. Corporation Trust Co., Jersey City, N. J., transfer agents. Annual meeting, second Friday in February.

Property: in August, 1911, company took over the O. K. and Supply groups, gold mine at Dale, Calif. Considerable work was done on the Supply mine. In 1915 a crosscut on the 700′ level cut the Armenian and Jeane veins, carrying practically no metal. Two winzes were sunk and drifts extended on the 800-1,100′ levels of the Supply vein with negative results.

The value decreased with depth, and on the 1,200′ level no pay-ore was found. all development and prospect work gave unsatisfactory results and the property was abandoned in October, 1915.

In November, 1915, the company acquired stock interest in the Tonopah Bonanza Mining Co. and Great Western Cons. Mining Co., at Tonopah, Nev. The cost of shares and assessments in first-named company to end of 1916 was $31,867, and in latter company $14,910. For the Ruby claims, also at Tonopah, 125,000 treasury shares at par 10c. each was paid. Due to excessive water encountered and insufficient funds to carry on development, all operations at Tonopah were suspended in 1918.

Holdings described under their respective titles.

GRIMES DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: J. L. Joseph, pres.; J. G. Crumley, v. p.; E. J. Erickson, sec.-treas.; with C. C. Boak, Gust Hanson, James Grimes and H. C. Brougher, directors.

Inc. March 20, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable. All issued. Listed on San Francisco Stock Exchange. Transfers at company office. Had $56,278 cash in treasury July 1, 1919.

Property: 5 claims, 100 acres, adjoining the Tonopah Divide on southwest side. Originally located 16 years ago and produced some shipping ore.

Development: a 350′ tunnel was driven prior to sinking new shaft in 1919. **Equipment:** complete includes electric hoist, etc.

Patent was applied for in 1920, but no mining operations carried on in 1919-20. Is a promising prospect.

GROOM MINE NEVADA

Address: Indian Springs, via Las Vegas, Clark Co., Nev. Owners are T. J. Osborne, G. Poncin and Patrick Sheahan, mgr.

Property: in Groom district, Lincoln county, some 60 miles N. of Indian Springs, the nearest R. R. point. Ores are lead sulphide, carrying silver, in limestones and shales; shipping ores assay 35 to 60% lead, and 11 to 22 oz. silver.

Development: by 2 shafts, 170′ and 200′, and over 500′ of drifts.

Production: during 1916, was 1,500,000 lb. of lead and 25,000 oz. silver. Shipments are of record for years 1915, 1917 and 1918. Total production to 1919 said to have been $250,000.

During 1916, and part of 1917, mine was under lease to Tom McCormac. Was operated 1919-20.

GROOM SOUTH END MINING CO. NEVADA

Address: Indian Springs, via Las Vegas, Clark Co., Nev.

Officers: Wm. Armstrong, pres.; Chas. Osborne, v. p.; T. J. Osborne, sec.-treas.

Property: 1 claim, 20 acres, adjoining Groom mine, in Groom district, Lincoln county, 60 miles N. of Indian Springs. A 50′ shaft was reopened in fall of 1916 on 8′ vein. No later information.

GYPSY QUEEN MINING CO. NEVADA

Offices: 265 Russ Bldg., San Francisco, Calif., and Tonopah, Nev.

Officers: C. F. Wittenberg, pres.; Chas. D. Olney, sec.

Inc. in Nevada. **Cap.** $1,500,000; 18 assessments have been levied. Listed on San Francisco Stock Exchange.

Property: 53 acres in Tonopah mining district, Nye county, said to show silver ore. Vein is from 1 to 5′ wide. Formation is rhyolite, quartz and trachyte.

Development: by 1,370′ shaft. On the 1,350′ level a crosscut was run S. E. for several hundred feet. In spring of 1921, company reported to have taken a lease on Montana-Tonopah Mng. Co., adjoining on the west.

HALE & NORCROSS MINING CO. NEVADA

Address: Virginia City, Nev., or 26 Russ Bldg., San Francisco, Calif.

Officers: H. B. Bulmer, pres.-mgr.; E. L. Lowe, v. p.-sec.; with P. H. Hohnewald, Wm. Turney and R. L. Thurston, directors. Wells Fargo Bank, San Francisco, treas.

Inc. in California. **Cap.** $112,000; $1 par; 100,000 issued; assessable Annual meeting 3rd Monday in December.

Property: 1 claim, 400′ on the Comstock Lode, at Virginia City, Storey county, developed by 3,200′ shaft, and reputed to have produced $11,486,000 when first operated.

Idle during 1919, but mine was again under development in 1920, and in 1921 was merged with other lode properties to form the **Middle Mines Assoc.**, which see.

HALIFAX TONOPAH MINING CO. **NEVADA**

Offices: 1008 Kearns Bldg., Salt Lake City, and Tonopah, Nev.

Officers: F. M. Smith, pres.; Thos. Kearns, v. p.; Geo. C. Ellis, sec.; C. B. Zabriskie, treas.; preceding, directors. B. F. Edwards, gen. mgr., Syndicate Bldg., Oakland, Cal. J. W. Sherwin, supt.

Inc. Sept. 27, 1902, in Utah. **Cap.** $2,000,000; outstanding, $1,895,000; shares $1 par. Stock transferred at company's office. Registrar & Transfer Co., 19 Nassau St., New York, registrar. Annual meeting, second Tuesday in October. Listed on New York Curb and San Francisco Exchange.

Annual statements show: for 1919, receipts, $68,785 and disbursements, $73,446; for 1920, the figures are, $77,841 and $78,194.

Property: 4 patented claims, 81 acres, adjoining the central portion of the Belmont property on the east. Company also has a lease on the Mizpah Extension property, which is being worked through the Halifax shaft.

Ore: gold-silver, occurring in trachyte. For geology of Tonopah district, see U. S. G. S. Prof. Paper, 42, or Jim Butler company herein.

Development: by vertical shaft, 1,734′ deep, with the deeper levels at 1,000′, 1,200′, 1,400′ and 1,700′. The 1,000′ crosscut picked up the easterly extension of the Belmont vein and ore shipments were made. After considerable work the vein was lost through faulting. Owing to an excessive flow of water work was stopped until July, 1919, when the water was reported under control and work resumed. During spring and summer of 1920 fairly regular shipments were made to the West End mill from 1,100′ and 1,160′ levels. Reported, February, 1921, that company operations had creased; lessees working on 1,000′ level.

The West End Cons. Mng. Co. has been in control of operations for several years; a number of the officers are identical.

HAMBURG MINES CO. **NEVADA**

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. Mine at Pioche, Lincoln county, Nevada.

Officers: M. C. Godbe, pres.-mgr.; J. R. Cook, v. p.; J. T. Osborne, sec., John Pingree, treas.; above with A. H. Godbe, W. H. Pitts and Murray Shepherd, directors. M. M. Johnson, cons. engr.

Inc. June 1916, in Nevada. **Cap.** $200,00; 20c par; all issued; 200,000 shares sold during 1920. Listed on Salt Lake Stock & Mng. Exchange.

Dividends: first dividend of 1c paid March 2, 1917, third paid May 21, 1917, making $24,000 to date.

Property: 4 claims (1 patented), 40 acres, in Pioche district, shows quartzose replacement veins in flat bedded limestones, carrying gold, silver and lead; veins vary from several inches to 5′ wide, and are cut by N. S. faults.

Development: by 800′ tunnel with 75′ winze, drifts and crosscuts. Early operators worked through 130′ shaft.

Production: reported to have been $100,000 in the '80s, and by present management another $100,000, the ore averaging 14 oz. silver, $3 gold and 20% lead. Mine was closed down in 1918 when faulting of orebody was encountered; reopened in 1920. Development is to be pushed in current year and old workings leased. A compressor has been installed.

HAMILTON POWER, MINING & TRANSP. CO. **NEVADA**

Property: the Grand Prize group, 5 claims and power rights on Illipah

creek in Rocco canyon, near Hamilton, White Pine county. Probably dead. See Vol. XIII.

HAMMOND EXPLORATION CO. NEVADA

Address: Gold Creek, Nev.

Property: in Island Mtn. district, Elko county. Made a small production in 1919.

HANNAPAH DIVIDE EXTENSION MINES CO. NEVADA

Offices: 310 First National Bank Bldg., San Jose, Calif. and 126 Main St., Tonopah, Nev., (care J. C. Kind).

Officers: W. R. Porter, pres.; Louis O'Neal, v. p.; M. J. Rankin, sec.-treas.; with F. E. Chapin and D. A. Beattie, directors.

Inc. in Nevada; 300,000 treasury shares offered at $1 each in Dec., 1919.

Property: 9 claims, 176 acres, in the Silverzone district.

Idle.

HANNAPAH MINE NEVADA

Former address: Care Fred'k E. Brown, owner, Hannapah, via Tonopah, Nevada.

Property: in Silverzone (Hannapah) district, Nye county, 18 miles E. of Tonopah; located in 1902 and developed by 2 shafts, 250' and 300' deep; reported that 8½' of ore carrying 35 oz. silver was exposed on 250' level.

HARMILL DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: G. B. Hartley, pres.-gen. mgr.; Floyd Cable, v. p.; M. B. Hartley, sec.-treas., with W. D. Miller and Thos. Keane, directors.

Inc. April 1, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable: 810,000 shares issued. Transfers made at company's office; registrars, Tonopah Banking Corp., Tonopah, Nev. Listed on San Francisco Stock Exchange and traded in on New York Curb.

Property: Chimney and Nieta claims, 14 acres, the south end adjoining east end of Tonopah Divide, in the Divide district, and the Monitor group of 8 claims (acquired in 1920), in Montezuma district, Esmeralda county. The former exposes the familiar Divide formation. The latter covers seven parallel veins and one cross vein, reputed to have produced $75,000 from 150' shoot to a depth of 80', as replacements in limestone; ore is lead-silver.

Development: 50' shaft on Divide claims; 100' shaft and tunnels on Monitor group, opening an ore shoot, 57' long and 3 to 5' wide. Shaft was being enlarged and sunk in 1921.

The Divide property is apparently idle (1921), and all efforts reported to be concentrated on Monitor group. In May, 1920, certain brokers were accused of "rigging" the market in connection with Harmill Divide.

HARMONY MINES CO. NEVADA

Address: Geo. B. Williams, mgr., Winnemucca, Nev.

Property: in Humboldt county, 3 miles E. of Winnemucca, shows a 4 to 6' vein carrying gold, silver and copper with some antimony. Developed by 200' incline with drifts at 110'. Equipped with gas hoist and 5-drill compressor.

Active late in 1921.

HARNEY GROUP NEVADA

Address: Stindl & Donohue, lessees, Pioche, Nev.

The mine is 1 mile east of Pioche, Lincoln county, and in April, 1919, an orebody 9' wide was cut that consisted of galena averaging $80 to $100 per ton. Shipments were made in 1919, but no record is obtainable.

HARTLEY MNG., MLG. & REDUCTION CO. NEVADA

Dead. Plant at Mazuma, Nev., purchased by Dupont Copper Mines Co.

HASBROUCK COMSTOCK DIVIDE MINING CO. NEVADA

Organized 1919, to finance development of a group of 8 claims, 160 acres, lying west of the Hasbrouck Extension and north of Hasbrouck Divide.

HASBROUCK DIVIDE ANNEX MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Busey, pres.; A. H. Butler, Jr., v. p.; A. A. Codd, sec.-treas; with D. E. Kernick and H. H. Blair, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable; 750,000 treasury shares; 815,000 shares issued.

Property: Nonpareil 3 and 4 claims, adjoining Tonopah Hasbrouck and Western Divide. Mine is to be developed through shaft on Kernick Divide, 900' deep, April, 1921.

HASBROUCK DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: J. W. Dunfee, pres.; J. E. Ewing, v. p.; E. Marks, treas.; Clyde Cannan, sec. T. Connolly, mgr.; A. H. Elftman, cons. eng.

Inc. March, 1919, in Nevada. **Cap.** $200,000; par 10c; 1,000,000 in treasury; 150,000 issued.

Property: 8 claims, 1 mile due W. of the Tonopah Divide, and adjoining the Tonopah Hasbrouck, developed by 100' shaft with crosscuts and drifts on Hasbrouck vein.

Equipment: complete for 500' depth with electric hoist, compressor, etc.

HASBROUCK EXTENSION MINING CO. **NEVADA**

Company, as yet, incomplete, but owns a group of 4 claims adjoining the Tonopah Hasbrouck and Hasbrouck Divide on the south.

HASBROUCK MINE **NEVADA**

Formerly owned by the Hasbrouck Mining Co., but abandoned after doing considerable work and bought at Sheriff's sale by Geo. Kernick, of Tonopah, who organized **Tonopah Hasbrouck Mining Co.**, which see.

HAYSTACK MINES CO., INC. **NEVADA**

Address: Winnemucca, Nev.

Officers: Pete Egoscue, pres.; F. L. Reber, v. p.; C. T. Smith, sec.; B. J. Loinaz, treas.; with Y. Arrascade, and Jose Ugariza, directors.

Inc. June, 1914, **Cap.** $1,000,000; none issed. Annual meeting first Tuesday in January.

Property: 5 claims, 35 miles W. of Winnemucca and 7 miles S. of Jungo, Humboldt county, on the Western Pacific R. R. Ore carries free-milling gold in fissure veins in granite and quartzite, said to average $22 per ton.

Development: by 3 shafts, deepest 100'. Machinery installed in 1919.

HECLA DIVIDE MINING CO. **NEVADA**

Address: H. C. Pratt, sec., 85 Devonshire St., Boston, Mass. Company's present operations are confined to its New Mexico holdings and the Nevada property, at Divide, near Tonopah, is idle. The company is described in the New Mexico section of this volume.

HELEN FRACTION DIVIDE MINING CO. **NEVADA**

Owns a group of claims situated about 1¼ miles S. of Gold Mountain.

HENNESSY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: W. A. Bradley, pres.; E. R. Bennett, v. p.; L. L. Mushett, mgr.; A. G. Raycraft, sec.-treas., with F. H. Bruce and Agnes Cordingly, directors.

Inc. Feb. 25, 1919, in Nevada. **Cap.** 1,000,000 shares; 10c par; increased to 1,500,000 in June; 400,000 in treasury. Listed on San Francisco Stock Exchange.

Property: 3 claims E. of the Alto and Harmill, and 800' E. of the Tonopah Divide, developed by 250' shaft, which cut 4' of $18 ore, also a 4" streak high in silver.

Equipment: 15-h. p. electric hoist, 3-drill compressor, drills, etc.

In July, 1921, a suit to recover ½ interest in the property was decided in favor of company.

HERCULES DIVIDE MINING CO. **NEVADA**

Office: E. J. Erickson, res. agt., Tonopah, Nev. J. W. Hutchinson, manager.

Officers: J. G. Crumley, pres.; A. E. Kane, v. p.; E. J. Erickson, sec.-treas., with George Wingfield and H. C. Brougher, directors.

Inc. April 10, 1919, in Nevada. **Cap.** $150,000; shares 10c par; 750,000 in treasury. Listed on San Francisco Stock Exchange.

Property: 4 claims, 60 acres, between the Anchor and Argonne, and S. of the Rosetta. Patent was applied for in 1921.

Development: shaft down 280′ in December, 1919, and silicified breccia worth $20 per ton reported cut. Has 30 h. p. hoist, compressor, and other machinery.

HIDER NEVADA MINING CO. **NEVADA**

Address: Fred Redmond, Elks Club, Salt Lake City.

Officers: Fred Redmond, pres.; J. J. Morris, sec.-treas., with Mrs. A. F. Pitt, E. O. Lee and T. E. Fitzgerald, directors.

Cap. 1,000,000 shares; 347,980 issued.

Property: about 23 miles south of Battle Mountain, Lander county, said to show several veins carrying copper ore.

Development: by two 125′ inclines and a tunnel.

Management shipped some ore from the dumps in 1917.

HIGH DIVIDE ANNEX MINING CO. **NEVADA**

Fully described in Volume XIV. Property taken over, Spring of 1919, by Chas. E. Knox and name of company changed to **Knox Divide Mng. Co.** (q. v.)

HIGH DIVIDE EXTENSION CO. **NEVADA**

Address: 1131 Hearst Bldg., San Francisco, Calif., or Tonopah, Nev.

Officers: W. C. Pitt, pres.; Grant Y. Alexander, v. p.; J. R. Whitmire, sec.-treas., with George Woodland and F. T. Martens, directors.

Inc. March 10, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable; 800,000 issued. Listed on San Francisco Stock Exchange.

Property: 6 claims, N. of the High Divide.

Development: by 150′ shaft sunk in early days. Fully equipped.

HIGH DIVIDE MINING CO. **NEVADA**

Address: E. J. Erickson, res. agt., Tonopah, Nev.

Officers: H. C. Brougher, pres.; Wm. F. Watters and W. J. Douglass, v. ps.; E. J. Erickson, sec.-treas., with Roger Dougherty, directors.

Inc. April 13, 1918, in Nevada. **Cap.** $150,000; 10 par; 1,250,007 outstanding. Listed on San Francisco Stock Exchange. Annual meeting, first Monday in May. $50,406 in treasury July 1, 1919.

Property: over 200 acres, 1,300′ N. E. of the Tonopah Divide.

Development: by shaft, 230′ deep at last accounts.

Equipment: electric hoist and 2-drill compressor.

HILLTOP GROUP **NEVADA**

Formerly operated by Kimberly Cons. Mines Co., of record as having milled and shipped a small tonnage of gold-silver-copper ore, 1915-19.

Property: 18 claims, patented, 360 acres, at Hilltop Lander county, shows gold, silver, copper and lead ore in quartz veins. The vein runs N.-S., dips W., and is said to have been proven for 5,000′ in length. A crosscut driven on the 350′ level reported to have cut a 12′ vein assaying $9.48 per ton. Developed by 5,000′ tunnel and several shafts.

Equipment: included compressor, ½ mile tram and 25-h. p. gasoline engine, 50-ton mill and cyanide plant.

Property sold at sheriff's sale, March 15, 1920.

HILLTOP MILLING & REDUCTION CO. **NEVADA**

Hilltop, Lander county, Nev. **Officers and directors:** Frank LeBar, pres.; Chas. E. Beach, v. p.; E. Ross Carver, sec.-treas. and mgr.

Inc. in Nevada. **Cap.** $50,000; shares $10 par; all outstanding. An-

nual meeting in January. Company operated a 75-ton 10-stamp cyanide plant at last accounts.

HOBART DIVIDE MINING CO. **NEVADA**

Inc. under laws of Nevada, 1919.

Property: 4 claims adjoining Rex Divide, nearly 2½ miles E. of Gold Mountain.

HOLDEN MINING & MILLING CO. **NEVADA**

Described in Vol. XIV. Name changed to **Stewart-Tuscarora Mng. Co.**, which see.

HOLLY MINING CO. **NEVADA**

See **Eureka-Holly Mng. Co.**

HOME RUN COPPER CO. **NEVADA**

Idle. **Office:** 1118 Newhouse Bldg., Salt Lake City, Utah. Mine in Bristol mining district near Pioche, Nev.

Officers: M. C. Godbe, pres.; E. S. Woodward, v. p.; H. F. Earle, sec.-treas., with A. H. Godbe and Henry Sadler, directors W. H. Pitts, supt.

Inc. 1912. **Cap.** $100,000; 10c par. Listed on Salt Lake Exchange.

Property: 8 claims, 3 fractions, 180 acres, 9 miles from railroad, in Lincoln county, adjoins the Gypsy mine and is said to carry same fissures. Claims show fissures in limestone expanding into replacement deposits and caves carrying rich copper ores with gold and silver.

Development: by 225′ shaft with levels at 65′, 90′ and 150′. **Equipment:** includes gasoline engine, hoist, compressor, building, etc.

HOMESTAKE CONS. PLACER MINES CO. **NEVADA**

Office: Reno, Nev. George B. Cole, Wm. Forman, Ed. Malley and Geo. B. Thatcher are principal stockholders. Chas. LaKamp, supt.

Cap. $175,000; increased April 12, 1920, from $150,000; par 25c.; assessable; 4c assessment became delinquent Feb. 7, 1921.

Property: placer ground in Copper Canyon, Lander county, held at one time as lode claims, by Glasgow & Western Expl. Co., now liquidated Title was under litigation for a number of years. Gravel is found in an old channel, 18′ wide, with gold values for a depth of 6′. Production for 1921 season said to be $60,000.

Development: began May, 1920. The channel has been opened by two 50′ shafts and drifts. Water for sluicing is obtained by pumps from an old shaft.

HOMESTAKE DIVIDE MINING CO. **NEVADA**

Office: J. C. McKay, res. agt., Tonopah, Nev.

Officers: J. C. McKay, pres.; Nick Ableman, v .p.; Ben D. Luce, sec.-treas., with Ed. C. Smith, G. W. Quigley and B. D. Price, directors. Homer O'Connell, supt.

Inc. March 24, 1919, in Nevada. **Cap.** $100,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 3 claims, S. of the Sutherland and 1 mile N. of Tonopah Divide, opened by 200′ shaft and adequate machinery erected.

HOMESTAKE MINING CO. **NEVADA**

Address: c/o J. F. Musselman, Tristate, Nev., via Kingman, Ariz.

Property: 6 claims on the Colorado river, Clark county, immediately across from the Katherine gold camp, Union Pass section, San Francisco district, Mohave county, Ariz.

HONEST ENDEAVOR MINING CO. **NEVADA**

Was unfavorably regarded and fully described Vol. XIII. Company succeeded 1917 by **Nevada Union Copper Mines Co.**, which see. Stock exchanged share for share.

HOPE CONSOLIDATED MINING CO. **NEVADA**

Address: Eureka, Nev. J. H. Rogers, pres.-mgr.

Inc. 1918. **Cap.** $500,000; shares $1 par.

Property: on Ruby hill, Eureka, Eureka county, developed by tunnel. Prospecting in 1921.

HORNSILVER AMERICAN CO. NEVADA

Address: Harry De Votie, Goldfield, Nev., or E. G. Reinert, Opera House Bldg., Denver Colo. **Mine address:** Hornsilver, Nev. Controlled by the above with J. F. Erisman and G. T. Hoffman, both of Denver.

Property: 8 claims in the Hornsilver district, Esmeralda county, 30 miles S. W. of Goldfield, and 1½ miles S. E. of the Orleans mine, shows high grade silver ore. Developed by 2 shafts, 200 and 140' deep. Is well equipped. Said to have produced carload shipments averaging $70 per ton.

HORNSILVER APEX MINING CO. NEVADA

Mine address: Hornsilver, Nev.

Inc. summer of 1921, by E. O. McGrath and H. W. Young, of San Jose, Calif., and M. A. Diskin, Reno, Nev.

Property: 6 claims in Hornsilver district, Esmeralda county, 1½ miles from the Orleans mine and same distance from Hornsilver.

HORNSILVER MAY CO. NEVADA

Mine address: Hornsilver, Nev.

Organized in 1921 by W. E. Sirbeck, Ben Gill and J. K. Turner, all of Goldfield, Nev.

Property: the May and May Fraction claims, 27 acres, in the Hornsilver district, Esmeralda county, shows 2 well defined, persistent veins. One traced for 1,000', is opened by 2 shafts, 50 and 70' deep and is 5 to 6' wide. The ore at surface assays $4.28 in gold and silver.

HORNSILVER NEW ORLEANS MINING CO. NEVADA

Mine address: Hornsilver, Nev.

Incorporated late in 1921, by Peter J. Somers and Dr. McCarthy (of Goldfield) to operate an "inside" property in the Hornsilver district, Esmeralda county.

HORNSILVER RED TOP MINING CO. NEVADA

Mine address: Hornsilver, Nev.

Organized in October, 1921, by Sol Camp, Harry Ruhl, L. L. Patrick and Del Hammond.

Property: the Jacks group, and options on other claims, in the Hornsilver district, Esmeralda county, 3 miles from the Orleans mine. A 75' shaft and crosscut have uncovered a 4' vein said to carry high grade ore.

HORSESHOE DIVIDE MINING CO. NEVADA

Address: Fr. K. Pittman, res. agt., Tonopah, Nev.

Officers: Forest B. Caldwell, pres.; Zeb. Kendall, v. p.; F. A. Burnham, sec.-treas., with T. D. Cummins and Frank Pittman, directors. Frank Helm, mine supt.

Inc. April 7, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 5 claims, 53 acres, adjoining the Hennessy on north. Two N. W.-S. E. and two cross veins said to run through ground. Machinery erected 1919.

HUDSON DIVIDE MINING CO. NEVADA

Address: Frank T. Dunn, res. agt., Tonopah, Nev.

Officers: Ben Luce, pres.; Roger Dougherty, v. p.; P. Mooney, sec.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 shares issued.

Property: 4 claims, one fractional, adjoining Circle and Ben Hur Ex. properties.

HUDSON LEASING CO. NEVADA

Operated the Best Chance claim of the Hudson M. & M. Co., in 1919, producing lead shipping and gold-silver milling ore.

HUDSON MINING & MILLING CO. NEVADA

Address: Walker Bros., Main & 2 S. St., Salt Lake City, Utah.

Officers: J. R. Walker, pres.; W. H. Royston, v. p.-gen. mgr.; A. H. Jones, treas., with R. J. Kelly and Jos. Wilson, directors.

Inc. April, 1921, in Nevada. **Cap.** $100,000; par 10c; 500,000 treasury shares.

Property: 17 claims, including the Golden Eagle and Best Chance, at the new camp of Royston, San Antone district, Nye county, 28 miles N. of Tonopah, shows veins carrying high grade silver ore with some lead. One 30" vein said to assay $92 per ton for a length of 40'. Production prior to 1921, reported to be $40,000.

A conflict relative to claim titles prevented development for a number of years until interests were consolidated in spring of 1921.

Development: by several shafts, a 300' incline being the deepest, with 600' of laterals.

Company plans to continue shaft and open claims at depth, but in meantime is leasing small tracts. Thirteen lessees were at work in November, including the Hudson Leasing Co. (q. v.) and Betts lease on the Golden Eagle claim.

HULL CITY DIVIDE MINING CO. **NEVADA**

Idle. **Office:** W. J. Gomm, res. agt., Tonopah, Nev.

Officers: L. R. Robins, pres.-mgr.; Herman Dauth, v. p.; W. J. Gomm, sec.-treas., with A. G. Raycraft, Gust Hanson, and T. J. Lynch, directors.

Inc. March 8, 1919, in Nevada. **Cap.** $100,000; 10c par; 500,000 issued. Listed on San Francisco Stock Exchange.

Property: 9 claims, 2 fractional, S. W. of Reno-Divide, equipped with electric hoist, etc.

HUMBOLDT CONSOLIDATED MINES CO. **NEVADA**

Offices: 108 So. La Salle St., Chicago, Ill., and Oreana, Nev.

Officers and directors: C. F. Champion, pres. and treas.; C. J. Hayden, v. p.; L. R. Miser, sec. A. E. Taylor, asst. sec.; J. B. Newman, mgr.

Inc. in Arizona. **Cap.** $1,500,000; shares $1 par. Owns entire capital stock of La Toska Mining Co.

Property: La Toska mine, about 360 acres, at head of Wright Canyon, 5 miles from Ryepatch and the same distance from Oreana, both on the S. P. R'y, Pershing county. Claims reported to show gold-silver ore occurring in 2 well defined veins. The main vein 6' wide has limestone hanging wall and rhyolite foot, and carries free gold, as well as silver minerals (bromide).

Development: by 3,000' tunnel. The main vein was cut in 1917, at depth of 1,345' as a result of six years' work and mining on it was begun in 1918, when the management reported that there was an ore shoot 130' long, and was considering erection of a mill. In extending this tunnel, two veins were cut, one at 600' and the other at 1,000'. Development work on the first vein showed 15' of gold-silver ore running $8 per ton. The other vein is 4' thick including an 18" band carrying $10 gold and 25 oz. silver. $73,626 was spent on mine up to 1918, of which $64,825 was for development work.

No recent returns.

HUMBOLDT COUNTY TUNGSTEN MINES & MILLS CO. NEVADA

Address: care H. M. Byllesby, 208 S. La Salle St., Chicago, Ill. L. A. Savage, mgr.

Property: 5 claims in Mill City district, also a lease on the Ragged Top Tungsten mine near Lovelocks, which was abandoned. Operated a custom mill of 125 tons daily capacity at Toulon, Pershing county. All operations discontinued Dec. 31, 1920.

HUMBOLDT TRINITY GOLD MINING & MILLING CO. NEVADA

Office: Lovelocks, Pershing county, Nev. E. L. Connell, mgr. Not incorporated.

Property: 10 claims, 200 acres, 12 miles N of Lovelocks, said to show gold-silver ore in quartz vein 18" to 24" wide. The ore above water-level at 100' depth is said to assay $18 to $25 per ton, with higher value below.

Development: 108' Humboldt incline with drifts on 90' and 55' levels. **Equipment:** included an 11-ton mill, and a 15-h. p. gasoline engine.

No report since 1917.

HUNTER MINE NEVADA

Owned by Vulcan M., S. & R. Co., which see.

HYBLA MINING CO. OF NEVADA NEVADA

Address: Pioche, Nev.

Reported, February, 1920, to have leased the Ronnow claim of the Stella Mng. Co. (q. v.), in Comet district, Lincoln county.

IDEAL COPPER CO. NEVADA

Office: 634 Bridge St., Grand Rapids, Mich. **Mine office:** Luning, Nev.

Officers: S. J. Hufford, pres.; H. D. Keefer, v. p.; Henry Riechel, sec.-treas., with Henry Smith and J. I. Keller, directors.

Inc. Jan. 12, 1915, in Nevada. **Cap.** $600,000; $1 par; 4,000 shares issued Annual meeting, 2nd Tuesday in January.

Property: 16 claims, in 2 groups, 360 acres, about 4 miles from Luning, Mineral county, formerly owned by the Wagner Azurite C. Co. and described in Vol. XI. The Atwood group, which is the principal property, shows a contact zone of about 600′ width, traceable 2,000′, between an altered granite footwall and limestone hanging, with N. W.-S. E. strike and dip of 50° N. The outcrop carries silver and gold-copper ores with a quartz gangue. The Nevada-Wisconsin group shows several dikes of 50 to 100′ width, one said to show 2 to 11% copper sulphide ore.

Development: by 2 tunnels, 1,700′ and 350′ long, with a total of 2,185′ of workings. In 1916, 400′ of shaft work was done, also 350′ of crosscutting, the work costing $6,000. No recent operations reported.

Equipment: includes 40-h. p. steam plant with 15-h. p. hoist, 3-drill compressor, 100-ton leaching plant and 10-stamp mill. Owing to excess of lime in the ore, the leaching plant proved a failure.

INDEPENDENT SCHEELITE CO. NEVADA

Property: tungsten claim in the Snake Range district, 26 miles from Ely, White Pine county. A 30-ton mill, erected at a cost of $35,000, made one run, but product was too low-grade and operations ceased.

INDIAN SPRINGS MINING CO. NEVADA

Address: 223 Mohawk Block, Spokane, Wash. Mine at Lida, Esmeralda county, Nev.

Officers: A. B. Railton, pres.; H. T. DeMerritt, v. p.; Fred N. Davis, sec.; Thos. R. L. Harris, treas.; Ross C. Craddock, supt., at last accounts.

Inc. Feb., 1911, in Washington. **Cap.** $1,500,000; shares $1 par; assessments, 3 mills to April, 1913. Company is a reorganization of the Indian Springs Copper Mining Co.

Property: 8 claims, 100 acres mineral land in Lida valley, or Tule Canyon district, 30 miles S. W. of Goldfield, Nev. Ground shows veins and replacements in massive gray limestone. Vein runs E.-W. has vertical dip and is said to be 70′ wide, traceable for 1,000′.

Development: by 100′ shaft and 200′ tunnel. Presumably idle.

INDUSTRIAL DIVIDE MINING CO. NEVADA

Mail returned from J. G. Thompson, res. agt., Tonopah, Nev.

Officers: W. C. McFarland, pres.; Fred Nielson, v. p.; Albert Erickson, sec.-treas., with L. C. and J. G. Thompson, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 issued.

Property: the Calico group of 5 claims, 100 acres, adjoining the Rainbow on E. and S. Surface prospects considered good.

INGALLS MINE NEVADA

See Vol. XIV. Under option to the **Silver Hills Nevada Mines Co.** (q. v.) for 2 years, beginning March 12, 1920.

INGOMAR MINE NEVADA

Address: 303 Dooley Bldg., Salt Lake City, Utah, and Gobdsprings, Nev. Owned by Samuel A. Arentz and W. A. Perkins.

Property: 3 claims 10 miles S. of Goodsprings, Clark county, has a

chamber deposit in limestone, dipping 35° S. E. and pitching N. 20° E., with high-grade zinc carbonate and lead sulphide ore.

Development: by incline shafts to 50′ depth, and tunnels 200 and 300′ long. **Equipment:** includes 2-single-span wire tramways, 1,200 and 1,600′ in length, with 2 buckets.

Gross yield for 1918 was $20,000 from shipments of zinc carbonate ore assaying from 42 to 46% zinc, and free from lead and other impurities. Both lead and zinc ore were shipped in small amounts in 1919. Presumably operated in 1920-21.

INTERNATIONAL DIVIDE MINING CO. **NEVADA**

Address: H. J. McSherry, res. agt.-gen. mgr. Tonopah, Nev.

Property: is 3 miles from Tonopah on Silver Bow road and near the Cornucopia Divide. R. E. France is president; no other information available.

INTERNAT'L & INTERCONTINENTAL MNG. & REF. CO. NEVADA

Dead. Was a paper corporation organized 1916 by Raoul Madero, et. al. of Mexico City, to make a market for their holdings. Reported to have had no connection with the companies appearing on the balance sheet of March 24, 1916, as debtors (see Vol. XIII) and was evidently a rank promotion that nobody wants to father.

Stock was stricken from New York Curb, June, 1918; 200 shares were sold at auction in New York City, July 26, 1919 at $1 for the lot.

INTERNATIONAL PROPERTIES SYNDICATE **NEVADA**

Reported operating manganese claims adjoining the holdings of the Manganese Association, Inc., near Las Vegas, Clark county.

INTERSTATE CONSOLIDATED MINES CO. **NEVADA**

Address: Franklin Harding, Camp Harding, Goldfield, Nev.

Officers: Franklin Harding, pres.-gen. mgr., J. L. Simmons, v. p.; R. W. Force, sec.-treas., with A. M. Schull and A. C. Frary, directors.

Inc. Sept. 4, 1909, in Arizona. **Cap.** $2,500,000; $1 par.

Property: 41 claims at Camp Harding, Esmeralda county, 12 miles from railroad at Klondyke Sta.

Geology: the Harding group shows copper-silver-gold ore in lime-shale for a considerable distance. The copper-content varies greatly, but hand sorting gives about 10% grade. A carload of ore from near the surface returned 7.1%. The veins dip 45° N. E. and have a strike of S. 68° W. Other claims show copper, lead, and silver ore.

Development: by 127′ shaft and tunnels, two being 327′ long each. Total workings approximate 5,300′. Developing.

IRISH MOUNTAIN SILVER MINES **NEVADA**

Successor to Peerless Mng. Co.

Address: Caliente, Nev.

E. Muir Southers, of Salt Lake City, pres.; Reginald P. Jones, supt.

Property: 23 claims, 360 acres, near Hiko, Lincoln county, said to show a 2½ vein, carrying ore containing silver, lead, and copper. Development is but slight and property a prospect.

IRON CROWN DIVIDE MINES CO. **NEVADA**

Mail returned from address: Tonopah, Nev.

Officers: "Diamonfield Jack" Davis, pres.; "Happy" John Barrier, v. p.; Robt. W. Craghill, sec.-treas., with W. J. Douglass, Rice Maupin and J. G. Thompson, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 issued.

Property: a group S. W. of Goldsmith Divide, about 3½ miles S. E. of Gold Mountain. Ore was extracted from shallow workings in 1909, but it was too low-grade to ship on account of the low price of silver.

IRONDIKE MINING CO. **NEVADA**

Address: care W. R. Smith, Mina, Nev.

Property: 10 claims in Gold Range mining district, Mineral county, about 5 miles W. of Mina, shows fissure veins in limestone porphyry con-

tact. Outcrops said to contain bunches of 1 to 8% copper ore. Developed by 1,100′ tunnel with a 400′ back. A prospect.

IRON GATE MINE NEVADA

Address: E. C. Watson, owner, Luning, Nev.

Property: 6 claims (3 patented), 110 acres, in Santa Fe district, Mineral county, between Congress Copper and Pilot Copper properties. Orebodies, carrying silver and copper, occur in bedding planes in limestone near contact with quartz monzonite. A gossan, 10′ to 50′ wide, is exposed for 2,000′, averaging 0.5% and 1 oz. silver.

Development: by 250′ incline and 350′ tunnel

IRONSIDES MINING CO. NEVADA

Officers: W. H. Gable, pres.; J. C. McCreary, v. p., both of Scotts Bluff, Neb.; A. J. Shumway, sec.

Property: near Goodsprings, Clark county, developed by 150′ shaft with drifts and stopes from which shipping ore was mined. One shipment to Utah smelters is said to have assayed 15% copper and $9 gold per ton.

IROQUOIS COPPER CO. NEVADA

Address: Mina, Nev.

Officers: H. B. Lind, pres.; M. A. Lind, v. p.; J. L. Fenwick, sec.-treas.

Inc. in Nevada. **Cap.** $12,000; par $1; 8,000 shares issued and owned by the Nevada & Boston Copper Co.

Property: 9 claims adjacent to the Wall Street mine, Santa Fe district, Mineral county, near Luning, covering a contact-metamorphic zone 3,000′ long and 50′ to 300′ wide, of garnetized limestone with porphyry intrusions, but no definite contact; course of zone, N. E.-S. W. This material carries ore in fractures and cross fissures, the garnet material being reported to carry a large body of 1½ to 2% copper ore.

Development: by 1,300′ of workings, including the 125′ Mary and 325′ Mastadon shafts on an 18 to 48″ strong vein of oxidized ore.

During 1916-1918, property was worked by lessees who shipped ore that averaged 7% copper, 2 oz. silver and gave a return of $50,000.

JACKET-CROWN POINT-BELCHER MINES CO. NEVADA

Merged in 1920 into the **United Comstock Mines Co.**, which see.

JACKSON MINE NEVADA

Address: Lucin, Utah. Mine under bond and lease to S. F. Hunt of Salt Lake City.

Property: 6 claims in Elko county, 10 miles N. of Tecoma and near the Nevada-Utah line. Ore is lead-silver, which with its high iron content is desired by smelters for its fluxing quality. Up to Aug. 1, 1920, had shipped 2,500 tons of $20 ore from above the 100′ level.

JARBIDGE-BUHL MINING CO. NEVADA

Address: J. C. Finch, sec., Buhl, Idaho.

Officers: B. R. Tillery, pres.; V. R. Laird, v. p.; J. C. Finch, sec.-treas.; Jesse Deemer, gen. mgr.; with V. R. Laird, R. W. Allred, Geo. C. Beach and H. Coleman, directors. W. H. Hudson, res. agt., Jarbidge, Nev.

Property: 12 claims, including Altitude group, in Jarbidge district, Elko county, between "craters" 1 and 2, at 8,700′ elevation. Five veins are reported, one 17′ wide; ore is quartz and adularia, carrying gold and a little silver, in fissures in rhyolite. Values, $14 to $29, of which gold is 90%.

Development: by shaft, 600′ deep, Feb. 1, 1922, with 1,000′ of laterals, opening 2 veins converging with depth.

JARBIDGE CENTRAL MINES CO. NEVADA

Closed down.

Officers: J. P. Duncan, pres.; Angus McDonald, v. p.; W. W. Fisk, sec.; with John MacRae, Ira Brackitt and H. O. Milner, directors.

Inc. Oct. 5, 1911, in Nevada. **Cap.** $1,500,000; $1 par; 1,250,000 issued.

Property: 9 unpatented claims in Jarbidge district, Elko county, said

to show a quartz vein in rhyolite, dipping 85° S. W. and pitching S. 32° E. Average gold assay is $15 to $20 per ton.

Development: by vertical shaft to 65′ and by 2 tunnels 175′ and 225′ long. Work in 1916 cost $5,000, done on an option. A prospect.

JEFFERSON GOLD & SILVER MINING CO. NEVADA

Closed down.

Address: C. J. Kanrohat, mgr., Round Mountain, Nev.

Property: the old Kanrohat mine in Jefferson canyon, 8 miles from Round Mountain, Nye county, developed by 4 tunnels to depth of 750′. An orebody 8′ wide reported exposed on the bottom level. Ore carries gold and silver.

Reported (March, 1921) that assured and probable ore amounts to 30,000 tons, with average value, 12 oz. silver and 60c gold; 5,000 tons lower grade on dumps.

Equipment: includes 50-ton cyanide mill.

JERSEY CONS. COPPER & GOLD MINING CO. NEVADA

Office: 272 Grant St., Salem, N. J. **Mine office:** East Ely, Nev.

Officers: R. T. Seagrave, pres.; H. M. Loveland, v. p.; F. Eldridge, sec.; W. L. Bassett, treas., at last accounts.

Inc. Jan. 15, 1917, in Delaware. **Cap.** $100,000; shares $1 par; non-assessable; 4,950 issued. Annual meeting 1st Thursday of March.

Property: 15 claims, 300 acres, in the Mizpah district, 5 miles E. of Mizpah, on Nevada Northern railroad, White Pine county,. Claims show several fissure veins in granite and contact deposits between granite and rhyolite, one of which is estimated to be 200′ wide, carrying mainly bornite and chalcopyrite ore.

Company re-located above property, formerly owned by Mizpah Cons. Copper & Gold Mining Co., when latter failed to do its annual assessment work for 1915.

Development: by 70′ two-compartment shaft, showing a 3′ orebody, said to give maximum assays of about 15% copper, 8 oz. silver and $18 gold per ton, which are not to be considered as average ore values.

JERSEY VALLEY MINES CO. NEVADA

Address: Worcester, Mass. W. Prince Catlin, mgr., Battle Mountain, Lander county, Nev.

Property: in Hill Top district, 23 miles from Battle Mountain, comprises the Jersey Valley group, and the Gray Eagle claims, acquired September, 1913, from the Gray Eagle Mining Co. No recent report.

JIM BUTLER TONOPAH MINING CO. NEVADA

Office: 500 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Tonopah, Nev.

Officers: Clyde A. Heller, pres.; Wm. M. Potts, v. p.; J. K. Kitto, sec.-treas.; R. G. Wilson, asst. sec.-treas.; C. B. Taylor, gen. counsel; C. Ducheneau, auditor; Fred'k Bradshaw, gen. supt.; L. R. Robins, mgr. eng.

Directors: Clyde A. Heller, Wm. M. Potts, Geo. F. Tyler, H. C. Brougher, C. B. Taylor, S. D. Sinkler, T. W. Synnott, M. B. Cutter and Henry C. Gibson.

Inc. Nov. 13, 1903, in Delaware. **Cap.** $2,000,000; $1 par; all issued; 281,979 in hands of Trustee for company. Traded in on New York and Boston Curb. Listed on San Francisco Exchange. Transfer agent; company's office; registrar: Fourth St. National Bank, Philadelphia. Annual meeting, last Tuesday in April.

Dividends initial of 10% was paid August 2, 1915. Total distributions to August 1, 1918 were $1,151,074.

Treasurer's statement for year ending Dec. 31, 1920, shows: receipts, $184,447, of which, $123,342 was ore sales. Disbursements were operations, $102,300; to Belmont Shawmut Mng. Co., $31,921; to Belmont Wagner Mng. Co., $49,307. Cash on hand was $918, and $6,266 was due from ore shipped. Net profit for 1920 was $16,865, as compared with $28,563 for 1919, after tax deductions.

Report for year ending Dec. 31, 1921, shows; receipts, $118,157, of which $69,955 was from ore shipments by lessees. Expenditures were, operations, $62,104; Belmont Shawmut M. Co., $16,203; Belmont Wagner M. Co., $18,609 cash on hand, $4,997. Net profit for 1921 was $15,384.

Property: 16 patented, 2 unpatented claims, 241 acres, at Tonopah, Nev., and the Ophir King group, 91 acres; also owns a one-quarter interest in an option on the Eagle Shawmut mine, California, and Belmont Wagner property, both held by the Tonopah Belmont Dev. Co. and separately described. The Jim Butler has $495,632 invested in these holdings.

Geology: of Tonopah is complex; a series of volcanic rocks, partly lava flows, partly intrusive sheets and masses of quickly varying thickness overlie one another irregularly. The productive veins are in the Mizpah "trachyte," overlaid by the Midway andesite and intruded by the West End rhyolite. The veins are cut through by the Miday andesite and do not commonly outcrop, but terminate against the Midway andesite at depths up to 1,200'. They are fissure veins which for some distance lie on or in planes of contact between eruptive rocks. Values are in gold and silver. See U. S. G. S. Prof. Paper, No. 42. The company holdings are identical in character to those of its neighbors, the Tonopah Mining and Belmont companies.

Development for 1920 was 1,249', largely in the Wandering Boy mine, to be continued below the 900' level. Operations on the Desert Queen practically abandoned, and exploitation from Wandering Boy ceased in September, except by lessees of which there are 12, including West End Cons. Mng. Co. and New California Tonopah Mng. Co., the latter's lease becoming effective in 1921.

Recent production and costs per ton:

Year	Ore Tons	Value per Ton	Mng. (A)	Mng. Dev.	Trans.	Trmt. Chge.	Gen. Exp.	Total Oper.	Oper. Profits
1920(b)	3,172	$24.08	.....	.....	.....	.....	.....	.....	.....
1919...	5,711	23.48	$1.88	$9.33	$0.63	$3.64	$1.48	$15.08	$6.52
1918...	27,688	26.15	2.14	8.21	0.53	3.98	0.89	13.61	10.40
1917...	40,297	26.12	1.79	5.17	0.71	5.33	0.73	11.94	12.39
1916...	46,489	19.78	1.56	4.80	0.83	4.79	0.38	10.80	7.73
1915...	48,533	19.25	1.74	4.29	1.08	5.02	0.28	10.40	7.11
1914...	34,722	21.45	2.14	5.36	1.07	5.58	0.32	12.18	7.13

(A) Deductions by ore purchasers. (b) Complete figures for 1920 not available.

The ore is sold to the Tonopah Belmont Dev. Co. and treated in its mill. In addition to company production, in 1920, the West End company produced 5,896 tons with net value of $42,051, 50% of which was paid as royalty to Jim Butler; other lessees produced 3,548 tons with a return to company of $10,135.

Company operations ceased April, 1921, and no production made. West End produced 3,916 tons and other lessees 4,602 tons of $18.38 ore during 1921, which netted the company $25,600.

The apex suit of the Jim Butler against the West End Co. for trespass and ore extracted was decided July, 1916, in favor of the West End Co. by the State Supreme Court, and the judgment confirmed June, 1918, by the U. S. Supreme Court. Pending the suit the West End continued to mine ore, but the revenue was impounded, the total amount being $373,614, from 62,758 dry tons of ore.

Ore reserves are practically exhausted; development by company, or by lessees, has not shown important results; investment in Belmont-Shawmut and Belmont-Wagner was unproductive in 1920, and the outlook is not encouraging.

NEVADA

JIM'S DIVIDE MINING CO.

Offices: Tonopah, Nev., and Mills Bldg., San Francisco, Calif.

Officers: Jas. Grimes, pres.; Chas. Ducheneau, v. p.; Emery W. Elliott, sec.-mgr.; F. B. Mechling, treas., with S. D. Allen, directors. C. N. Chatfield, supt. (address, Pike, Calif.).

Inc. April 10, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury. Listed on San Francisco Stock Exchange.

Property: 3 claims, between the Cresson, Reno, and Keane, 2,200′ S. of the Tonopah Divide.

Development: ore was shipped years ago from shallow workings. A new shaft 100′ deep is sunk in breccia on a well mineralized N.-S. vein showing values, but "search for a bonanza" has been unrewarded.

Equipment: head-frame, electric hoist, etc.

In spring of 1921, company purchased, for $15,000, the Mount Alta gravel mine, 33 acres, in Indian Hill district, Sierra county, near Pike, upon recommendation of Frank L. Sizer. A 3,100′ tunnel undercuts the bed rock at a maximum depth of 23′ and is "well located with reference to the gravel channel." Channel is wide and fairly regular; gravel is free of cementation and carries a gold value from $1.50 to $5.00 per 20 cu. ft. Less than ½ of channel length has been prospected.

JOHNNIE MINE — **NEVADA**

Address: A. P. Johnson, 207 O .T. Johnson Bldg., Los Angeles, Cal. **Mine address:** Johnnie, Nev.

Property: 20 claims, 12 patented, 400 acres, at Johnnie, Nye county, carries a gold quartz vein with 45° dip, running N.-S. through, quartzite and limestone.

Development: by incline shaft 1,100′ deep, and 10,000′ of workings.

Equipment: distillate engines, 40-h. p. hoist, 10-drill compressor, and 16-stamp mill, of 80-ton capacity, employing amalgamation.

Was operated part of 1919.

JOLLY JANE LEASING CO. — **NEVADA**

Dead. Described in Vol. XIV.

JOSE-DAVIS MINING & MILLING CO. — **NEVADA**

Addresses: John Etchebarren, Reno, Nev., or Henry Ward, supt., Lovelocks, Pershing Co., Nev.

Property: the Jose-Davis lease of the Sheepherder's Dream claim which produced rich gold ore in 1915, and 2 claims adjoining.

Development: by two 40′ shafts, and several drifts, reported to have opened 200 tons of rich ore.

A 30-ton Gibson mill was erected at Kodak, on the Southern Pacific, 6 miles from the mine.

The lease was to have expired Feb. 15, 1921, but no recent information is available.

JOYCE MINING CO. — **NEVADA**

Officers and directors: J. C. Jensen, pres.; A. J. Weber, v. p.; Judge Bldg., Salt Lake City, Utah; J. A. Stallings, sec.-treas., with J. H. Stallings and D. Bianco.

Inc. 1917, in Utah. **Cap.** $100,000; shares 10c par.

Property: 4 claims, in Galena camp, 12 miles S. W. of Battle Mountain, Lander county, developed by 1,000′ of tunnels and drifts, said to show lead-silver ore of shipping grade. Reported (Dec., 1920) that company was to be liquidated.

JULIA CONS. MINING CO. — **NEVADA**

Address: 315 Bush St., San Francisco, Calif.

Cap. $550,000; shares $5 par. Listed on New York Curb, but lifeless.

Property: on the Comstock Lode, Storey county, is practically unworked. Assessments made at intervals. Idle.

JUMBO COPPER MOUNTAIN MINING CO. — **NEVADA**

See Volume XIV. Was a subsidiary of Jumbo Extension Mng. Co., which see. Forfeited its equity in property in 1919.

JUMBO EXTENSION MINING CO. NEVADA

Office: Goldfield, Nev. Corporate office: Phoenix, Ariz.

Officers: Chas. S. Sprague, pres.; J. K. Turner, v. p-cons. engr.; Ben Gill, sec.-treas.

Inc. April, 1904, in Arizona. **Cap.** $1,500,000; par $1; all issued. Security Transfer & Registrar Co., New York and Registration Surety Co., San Francisco, registrars and transfer agents. Annual meeting, July 18. Listed on New York Curb and San Francisco Stock Exchange.

Dividends: to June, 1916, totaled $685,008; none since.

Company's Goldfield property, described in great detail in Vol. XIII, having proved disappointing, an exploration department was organized in 1916, and a year later the Copper Mountain mine was taken over under option and development begun; and in November, 1917, a subsidiary, Jumbo Copper Mountain Mng. Co. was incorporated, after a reported expenditure of $130,000.

Late in 1921, it was planned to reorganize the parent company, increase the capital to $2,550,000, and acquire new properties.

JUMBO JUNIOR MINING CO. NEVADA

Address: Goldfield, Nev.

Officers: J. L. McCarthy, pres.; A. I. D'Arcy, v. p.; Floyd Cable, sec.-treas., with Joseph Bruder and H. E. Clark, directors.

Cap. $1,500,000; $1 par. Listed on San Francisco Exchange.

Property: the Spearhead Fraction claim, 6 acres, located between the Jumbo, Kewanas and Spearhead properties at Goldfield, Esmeralda county, purchased of the the Spearhead Fraction Mining Co.

Development: was centered on ground below the 880′ level and ore was opened a few inches to 24″ in width, from which better than $100 per ton of gold-silver-copper ore was shipped in 1917 and 1918.

JUNE BUG DEVELOPMENT CO., INC. NEVADA

Office: Ogden, Utah. **Mine office:** Las Vegas, Clark county, Nev.

Directors: Lester S. Scoville, pres.; Milton J. West, v. p.-mgr.; Frank L. Scoville, sec.-treas., with John Hochett and Walter B. Scoville.

Inc. Jan., 1916. **Cap.** $100,000; shares 10c par; 825,000 issued. Annual meeting, January 4.

Property: 9 claims, 18 miles N. W. of Las Vegas, in the Goodsprings district, said to show gold, silver and zinc ore. Pay ore occurs in shoots 30′ long, 6-10′ wide and from 14″ to 5′ thick, reported to assay 40% zinc, $1.50 gold and $4 silver per ton. The ore is a zinc silicate. Veins are in limestone formation.

Development: by shallow shafts, and about 1,200′ of workings. Shipments of 650 tons for 4 months ending June, 1916, returned $35,000. Three cars of ore shipped in 1917, returned $2,811. No shipments since.

JUPITER DIVIDE MINING CO. NEVADA

Address: R. L. Johns, care P. D. Kahn, 308 Bush St., San Francisco, Calif.

Officers: R. L. Johnson, pres.; M. B. Aston, v. p.; B. A. Rives, sec.-treas., with J. E. McCreary, C. J. Blumenthal, directors. Chas. Maher, supt.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 issued.

Property: 130 acres, adjoining Chariot Divide on S. E., and about 2¼ miles from Gold Mountain

JUSTICE GOLD & SILVER MINING CO. NEVADA

of the Comstock lode. A new shaft is down 350′; crosscutting to locate orebody found at 200′.

Address: 265 Russ Bldg., San Francisco, Calif.

Officers: Franklin Leonard, Jr., pres., 25 Broad St., New York City; Jas. Leonard, v. p.; Chas. D. Olney, sec.

Inc. 1904, in California. **Cap** $105,000; $1 par, reduced from $5 assessable; last assessment levied Jan. 31, 1921.

Property: a group in the Gold Hill district, Storey county, at south end

JUSTICE GOLD MINING CO. **NEVADA**

Address: Goldfield, Nev.

Officers: O. M. Justice, pres.; John La Foe, v. p.; Mrs. A. B. Hays, sec.-treas.; C. W. Hays, gen. mgr., with J. R. West, directors, at last accounts.

Inc. 1914, in Nevada. **Cap.** $1,000,000; shares, $1 par. Stock listed on San Francisco Stock Exchange.

Property: the Gold Coin Extension claim in the Diamondfield section of the Goldfield district. Company also had a lease on the adjoining property of the Diamondfield Daisy Gold Mining Co., which carried a 2½′ vein of gold-copper ore running from $18-$39 per ton.

Development: by 265′ Daisy shaft, crosscuts, drifts and stopes. Several carload shipments in 1915 from stope above the 265′ level reported to have yielded $70 per ton. No recent returns.

KANSAS CITY-NEVADA CONS. MINES CO. **NEVADA**

Office: 510 Commerce Bldg., Kansas City, Mo. **Mine office:** Bruner, Nevada.

Officers: Walter P. Neff, pres.; Geo. A. Metcalf, v. p.; B. H. McGarvey, treas.; R. E. Bruner, sec.; H. W. Bruner, gen. mgr., with R. W. Waddell, E. C. Sooy, Henry Crawford, E. E. Nordquist and Jas. W. Orr, directors. Wm. H. Kinnon, engr.

Inc. 1915, in Nevada. **Cap.** $6,000,000; $1 par; all issued. Company gave 100,000 shares for the property of the Big Henry Gold Mng. Co.; 2,000,000 shares to redeem the outstanding stock of the Phonolite Paymaster Mng. Co.. 800,000 shares to redeem the outstanding stock of thePhonolite Silent Friend Mng. Co., and 1,600,000 shares for the Duluth Gold Mng. Co. holdings.

Property: 25 patented claims, 487 acres, in the Bruner district, Nye county. Ore occurs in fissure vein in andesite and rhyolite, said to carry gold and silver averaging $20 per ton. A. E. Swain reports that one ore-shoot on the 125′ level is over 340′ long. Over $300,000 has been expended on the property to date.

Development: the Paymaster property has about ½ mile of workings. The 2-compartment shaft is 300′ deep.

Equipment: a 50-ton mill was constructed at Bruner (Phonolite) in 1919, and remodeled in 1921. Water will come across Ione valley, a distance of 8 miles.

Company in mid-summer, 1921, contracted with Broken Hills Silver Corp. to treat 50 tons of B. H. ore per day, heads to be maintained at $25 per ton. Ore is hauled by auto-truck for 12 miles. Net profits to be divided equally between mine and mill. The Broken Hills mine is to be managed by the Kansas company.

KANSAS NEVADA MINING CO. **NEVADA**

Mail returned from Goodsprings, Clark county, Nev.

Officers: Frank Williams, pres.; Jonah Jones, v. p.; A. M. Horter, sec.-treas., with John Williams and Jos. Walter, directors.

Inc. July 16, 1917, in Nevada. **Cap.** $1,000,000; shares $1 par; 706.895 outstanding.

Property: 3 claims, about 53 acres, 9 miles W. of Goodpsrings, show zinc, lead and silver ore in a 4′ vein in limestone formation. The vein runs E. W. and dips N. Developed by 500′ tunnel to depth of 130′ Small shipments of lead-zinc ore netted $941 in 1916; $1,832 in 1917; $64 in 1918. Inactive 1919-'20.

KATTENHORN MINE **NEVADA**

Address: Albert Kattenhorn, Maysville, via Hilltop, Nev.

Property: at Hilltop, S. E. of Battle Mountain, Lander county. Ore occurs in fissure vein in quartzite and is highly siliceous.

Shipments during part of 1918 amounted to 100 tons per month, running

up to 35 oz. in silver. In 1919 and 1920, lessees were reported making small shipments.

KEANE DIVIDE MINING CO. NEVADA

Office: M. E. Allier, res. agt., Goldfield, Nev.

Officers: Tom Keane, pres.; Chas. T. Allier, v. p.; Floyd Cable, sec.; E. Marks, treas.

Inc. May, 1919, in Nevada. **Cap.** $150,000; par 10c.; 750,000 issued.

Property: 4 acres west of Jim's Divide and 2,200′ S. W. of Tonopah.

KENDALL DIVIDE MINING CO. NEVADA

Address: care J. B. Kendall, res. agt., Goldfield, Nev.

Officers: J. B. Kendall, pres.; Del Hammond, v. p.; M. A. Kendall, sec.-treas., with C. A. Hammond, and N. P. and J. Theo, directors.

Inc. April, 1911, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 6 claims, 1,500′ S. E. of Hasbrouck Divide and 4,200′ S. W. of Tonopah Divide.

KENNEDY CONSOLIDATED MINING CO. NEVADA

Mail returned from Yerington, Nev. Mine at Buckskin, Douglas county, Nev.

Utah people, headed by J. F. Cowan, took over property in June, 1917, from the previous owners, the Kennedy Cons. Gold M. & M. Co., of which W. C. Pitt was president.

Property: 7 claims, 110 acres, patented, in Buckskin district, Douglas county, developed by 3 shafts, 90′, 147′ and 250′ deep and by one 240′ tunnel, said to expose some large bodies of ore, mostly sulphides with gold, silver and copper. Water forced a suspension of work below the 250′ level, where drifting was under way at last accounts. Mine is 4 miles from Nevada Copper Belt railroad and has power line within 1 mile.

Equipment: includes air-compressor and electric hoist.

KENNETH DIVIDE MINING CO. NEVADA

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Codd, pres.; H. F. Bruce, v. p. and cons. engr.; W. H. G. Buck, sec.-treas., with R. H. Bates, and A. A. Busey, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 110 acres N. of Mizpah Divide, and 9,000′ N. E. of Gold Mountain. Idle; presumably a prospect.

KENTUCK MINING CO. OF NEVADA NEVADA

See Vol. XIV. In 1920 became a part of the **United Comstock Mines Co.**

KERNICK DIVIDE MINING CO. NEVADA

Office: care A. A. Codd, Reno, Nev.

Officers: A. A. Busey, pres.-gen. mgr.; H. C. Brougher, v. p.; A. A. Codd, sec.-treas.; H. E. Bruce, supt., with George Wingfield, directors.

Inc. April 5, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable; 1,150,000 issued. Listed on San Francisco Stock Exchange.

Company had expended $38,000 up to spring of 1920; treasury then reported to be well supplied.

Property: Little Zoe group, 3 claims, 40 acres, adjoining Western Divide on N. Revert Divide on S., in Gold Mountain district, Esmeralda county; patent application has been filed. Also has a 3-year lease, beginning June 25, 1920, on 55 acres of the Revert Divide.

Development: shaft down 900′, April, 1921, with 2 crosscuts at this level, 475′ to N. and 485′ to S. W. Reported that veins were cut by shaft at 500′ and 750′. Because of water, work at 900′ was suspended in September, and crosscutting begun on 500′ level.

Equipment: electric hoist of Revert Divide installed, etc.

In addition to Revert lease, it is reported that deep development now under way, will be used to explore the properties of Hasbrouck Divide Annex, Tonopah Hasbrouck and Western Divide companies, of which Mr. Busey is also president.

KEWANAS EXTENSION MINING CO. **NEVADA**

Inc. 1915, in Goldfield, Nev. **Cap.** $1,000,000. Is a small, well located property, 18 acres, adjoining Kewanas on the north and in direct line with its ore zone, as developed on its north drift. It adjoins the Booth mine at Goldfield. Is controlled by the Sprague interests and other California men who have underwritten the stock at 5c. a share. Gave the Reorganized Booth company 25,000 shares of stock for a sideline agreement, thus avoiding litigation.

KEWANAS MINING CO. **NEVADA**

See **Reorganized Kewanas Gold Mining Co.**

KEYSTONE CHROME MNG. CO. **NEVADA**

Mail returned from Mina, Nev.

Inc. June 24, 1919, in Nevada, by J. M. O'Brien, B. E. Bonner, C. H. Goodnight, and Zeb Bonner. **Cap.** $100,000; 10c par.

KEYSTONE DIVIDE MINING CO. **NEVADA**

Office Tonopah, Nev.

Officers: R. J. Kelly, pres.; George Schmidt, v. p.; Dr. T. A. Musante, sec.-treas.; Wm. Forman, ass. sec., with Ed. Byrne and F. W. Taylor, directors. Jay A. Carpenter, cons. engr.

Inc. March 2, 1919, in Nevada. **Cap.** $150,000; 10c. par; assessable; 750,000 treasury. Listed on San Francisco Stock Exchange.

Property: 4 claims, S. of the Verdi, W. of the Reorg. Divide Junior, and 700' south of W. end of Tonopah Divide, and the Big Horn group, in Klondyke section, acquired in spring of 1921.

Development: by 625' shaft on Divide group and by 35' shaft on Big Horn; latter reported to show 5' ledge that carries a fair silver value.

The Ben Hur Divide is using the Keystone shaft to explore ground of Reorg. Divide Junior M. Co., held under lease.

Equipment: on Divide group; 30 h. p. electric hoist, 3-drill compressor, etc.

KICKAPAH DIVIDE MINES CO. **NEVADA**

Office. A. H. Hardy, res. agt., Tonopah, Nev.

Officers: C. A. Clinton, pres.; Owen Dougherty, v. p.; C. J. Young, sec.; A. G. Raycraft, treas.; Cliff Stewart, auditor.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 7 claims E. of Lone mountain, which is 4 miles N. W. of Gold Mountain. Three well defined orebodies are said to exist along the vein, assays from 5' of ore cut in shaft returning $36.10, $38.30, $46.15, and $46.90 per ton, mostly gold.

Development: 150' shaft ,said to show pay-ore. **Equipment:** complete. Idle 1921.

KIMBALL LEASING & DEVELOPMENT CO. **NEVADA**

Address: Mr. Kimball, mgr., Tonopah, Nev. A company formed locally by 20 men, and incorporated in spring of 1920.

In 1920, held a lease on part of Polo claim of the Revert Divide Mng. Co., expended $10,000 in sinking 160' shaft, etc., without developing commercial ore; lease was relinquished. Rumored that lease has been taken on the 6 claims of the **Klondyke Imperial Divide Mng. Co.** (q. v.).

KIMBERLY CONSOLIDATED MINES CO. **NEVADA**

Presumably dead. Fully described in Vol. XIV. Property sold at sheriff's sale, March 15, 1920; for description, see **Hilltop Group.**

KIMBERLY SHIPPER MINING CO. **NEVADA**

Office: 1337 Roosevelt Ave., Salt Lake City, Utah.

Officers: W. S. Gilsey, pres.; F. L. Sumpter, v. p.; C. W. Fleck, sec.; Salt Lake City, Utah; C. L. Shelley, treas. ,with G. H. Gould, directors.

Inc. in Utah. **Cap.** $50,000; shares 5c par.

Property: 60 acres at Hilltop, Lander county, 20 miles E. of Battle Mountain, shows gold-silver ore. Developed by 800' tunnel and drifts. A shipment in 1915 yielded $75 per ton. No recent returns.

KINSLEY DEVELOPMENT CO. NEVADA

Idle.

Officers: Wm. M. Bradley, pres., Felt Bldg., Salt Lake City; Wm. Pischel, v. p.; Newton A. Dunyon, sec.-treas.-mgr., with B. F. Bauer and Jos. Wirthlin, directors.

Cap. $10,000, 10¢ par; reduced from $1,000,000, $1 par.

Property: 28 miles from Currie, Elko county, on Nevada Northern railroad, shows limestone cut by parallel N.-S. fissures, which carry copper ore at the S. end of the property and lead ore 1½ miles N. Worked intermittently by lessees. Had 3 hoists, compressor and a concentrating mill erected 1909.

KIRCHEN MINES CORPORATION NEVADA

Property: St. Patrick group at Luning, Mineral county, sold at sheriff's auction, September, 1918, to satisfy a judgment for $2,168.

KIRK MINE NEVADA

Address: Chas. J. Wilson, owner, Hilltop, Nev.

Property: 2 claims, 40 acres, in Hilltop district, Lander county, developed by 140′ tunnel to depth of 70′. Ore is a sulphide, occurring as contact deposit in porphyry and gneiss, with shoots of ore reported to assay 38% antimony.

Gross returns from shipments in 1918 were $1,400, and expenditure $900.

KLAMATH MINING & MILLING CO. NEVADA

Q. M. Robertson, pres., Klamath Falls, Ore. Holdings in Jumbo district, near Virginia City, said to show 12′-20′ ledge developed by crosscut tunnel.

KLONDYKE DIVIDE MINING CO. NEVADA

Property: in Gold Mountain district, Esmeralda county, about 3½ miles S. from Tonopah Divide.

Reported (June, 1921) to have been taken over by J. C. Weir, 25 Broad St., New York, for Eastern interests.

KLONDYKE IMPERIAL DIVIDE MINING CO. NEVADA

Office: Care R. W. Tucker, res. agt., Tonopah, Nev.

Officers: Thomas Toner, pres.; Chas. Lee, v. p.; R. W. Tucker, sec.-treas.

Inc. April, 1919, in Nevada. **Cap.** $200,000; par 10c; 1,000,000 treasury shares.

Property: Tucker group, 6 claims, adjoins the Original Klondyke on W. and Golden State on S. A 180′ shaft is said to have opened 18″ vein, carrying 9 to 19 oz. silver. In spring of 1921, leased to **Kimball Leasing & Devel. Co.**, which see.

KLONDYKE-PORTLAND MINES CO. NEVADA

Goldfield, Nev. **Officers:** Peter Felis, pres.; M. F. Hill, v. p.; J. F. Henry, sec.-treas., with J. B. Witt and Mrs. Helen Rosenthal, directors.

Inc. 1915, in Nevada. **Cap.** $100,000.

Property: 9 claims in the Klondyke district, near Goldfield, Esmeralda county, developed by 3 shafts, showing gold-silver-lead ore.

Reports of March, 1921, were encouraging, but no news since.

KLONDYKE STANDARD DIVIDE MINING CO. NEVADA

Address: Tonopah, Nev.

Property: 2 claims in Klondyke section, 6 miles south of Divide mine.

KNOX DIVIDE MINING CO. NEVADA

Office: Hugh Henry Brown, res. agt., Tonopah, Nev. Geo. F. Badgett, supt., Tonopah.

Officers: Chas. E. Knox, pres.-gen. mgr.; P. Mooney, v. p.; Mrs Herman Albert, sec.-treas., with A. G. Raycraft, F. T. Dunn and E. Malley, directors.

Inc. March 20, 1919, in Nevada. **Cap.** $150,000; 10c par; 1,100,000 issued. Listed on San Francisco Stock Exchange. Transfer agent, Security Transfer & Registrar Co., New York. Reported $30,000 cash in treasury, July 1, 1919.

Property: the Knox group of 5 claims, formerly in control of High Divide Annex Mng. Co. (see Vol. XIV), adjoining High Divide on N. and

Sutherland on S., in the Divide district, and 4 claims of the Golden State Divide Mng. Co., adjoining original Klondyke on N. in the Klondyke section of the Divide district; all in Esmeralda county.

Bond and lease was taken on Golden State holdings in June, 1920, and it is understood that by August, 1921, Knox had purchased 667,825 of 917,825 outstanding Golden State shares. Thus Golden State still has a corporate existence in which title to property still rests, and trading in its stock continues on the N. Y. Curb. Reported that remainder of Golden State outstanding shares will be exchanged for the Knox group and that final name of company will be Golden State Mines Co., Knox stockholders making exhange of shares, and Knox shares being retired.

Development: on High Divide Annex, shallow shafts only. On Golden State group, an orebody 56′ x 9 x 20′, with average gross value of $25 per ton in silver and a little gold was opened at 60′ depth. By Sept., 1921, shaft was 130′ deep.

Equipment: includes by purchase of defunct Mutual Divide plant, 4-drill compressor, one mile of transmission line ,etc.

Production: reported that Golden State, under former regime, produced 75 cars of $20 ore; present management shipped about 1,000 tons to Tonopah mills up to April 1, 1921; shipments interrupted for 4 months by strikes, but since September production is reported to be 100 tons per week.

LADY WASHINGTON CONSOLIDATED CO. **NEVADA**

Idle. **Office:** 342 Mills Bldg., San Francisco.

Inc. 1878, in California. **Cap.** $100,000; shares $1 par.

Property: on Comstock Lode, at Goldhill, Storey county, is practically unworked. Assessments made at intervals.

LAFAYETTE MINING CO. OF NEVADA **NEVADA**

Address: Tonopah, Nev. Controlled by Ed. P. Kimball of Calgary, Canada, Fred Hawkins, and Mark G. Bradshaw.

Property: a silver mine in Esmeralda county, 24 miles S. of Goldfield, developed by 200′ shaft with drifts at 100′. Ore said to assay 28 to 52 oz. silver, with some gold. Closed down early in 1920.

LAHONTAN MINES CO. **NEVADA**

Address: Parker Liddell, Box 414, Reno, Nev.

Officers: B. P. Howell, pres.; M. Eddy, v. p.; Parker Liddell, sec.-treas.

Property: discovered in 1906, formerly that of the Ramsey Comstock Mining Co., in Ramsey district, Lyon county, 15 miles N. E. of Virginia City and 13 miles S. of Clark, on the So. Pacific. In 1918, a small output was made and in 1919 shaft was sunk from 330 to 440′. Three levels show from 3 to 8′ of gold-silver ore, which averaged $35 per ton in milling. A 30-ton mill produced $35,000 worth of bullion which, with shipping ore, gave a total of $80,000 gross receipts from operations.

After a 2 years' shutdown, mine was unwatered to 2nd level, April, 1921; later, a crosscut on 160′ level opened a new vein, 10′ wide, showing gold-bearing quartz assaying $11 per ton.

LAS VEGAS GOLD-SILVER MINING CO. **NEVADA**

Inc. June, 1919, in Nevada. **Cap.** $100,000; shares 10c par.

Property: 23 miles S. E. of Las Vegas, Clark county.

LA TOSKA MINING CO. **NEVADA**

See **Humboldt Cons. Mines Co.**

LEAD KING MINING & MILLING CO. **NEVADA**

Idle. **Office:** 145 So. State St., Salt Lake City, Utah.

Officers: A. P. Spitko, pres.-mgr.; J. J. Kellogg, sec.

Inc. 1899. **Cap.** 300,000 shares; 10c par; assessable; 254,000 shares issued. Stock listed on Salt Lake Exchange.

Property: 15 claims, 8 patented, 250 acres, in Duck Creek district, White Pine county, said to carry high-grade galena ore with small values in silver occurring in gray and blue limestone formation. Developed by 700′ tunnel.

Shipments: to date total 20 carloads, netting $23,000.

LEADVILLE DIVIDE MINING CO. NEVADA

Dead. Fully described in Vol. XIV. Owned property in Divide district, Esmeralda county and the Tohoqua mine in Leadville district, Washoe county; the latter now controlled by **Leadville Mines Co.** (q. v.).

LEADVILLE MINES CO. NEVADA

Office: Box 5021, Reno; and Gerlach, Nev.

Officers: A. A. Codd, pres.-gen. mgr.; F. M. Manson, v. p.; G. V. Ward, sec.-treas.; H. H. Blair, asst. sec.-treas., with T. J. Dunn, directors. Homer J. O'Connell, supt.

Inc. Jan. 3, 1920, in Nevada. **Cap.** $150,000; 10c par; 750,000 shares in treasury. Initial offering of 50,000 shares at 25c each made in Jan., increased to 100,000 in July, 1920.

Property: the old John Harnan mine, 3 claims, 60 acres, formerly owned by the Tohoqua Mng. Co., in Leadville district, Washoe county, 38 miles N. of Gerlach on the W. P. R. R. Claims show diorite-porphyry traversed by 3 quartz veins, carrying silver-lead ore, containing zinc and a little gold; main vein, 3′ average width, exposed for length of claims. Mill heads carry about 18 oz. silver with $25 total value. The Associated Mines Co. holds an interest in the property.

Development: old workings include two 300′ shafts, and 1,700′ Floyd tunnel, with 300′ back and 190′ winze. This work developed an ore-shoot 800′ long, from above tunnel to bottom of winze. Present management sunk winze to 300′ and has followed vein, 1 to 4′ wide, for 700′ to Jan. 1, 1922 and plans to deepen winze by 200′. Ore reserves as of July, 1920, estimated to be $250,000, or including probable ore, $1,000,000.

Equipment: includes 80 h. p. oil engine, 2 semi-Diesel engines (75 and 100 h. p.) 275′ compressor, electric locomotive, auto trucks, 7,500 water line and 30,000 gal. tank. The old 50-ton concentrating mill was remodeled and a flotation plant added. Present capacity is 35 tons per day, making 5 to 6 tons of concentrates, with 92% extraction.

Production: in early days, $205,000 both in shipping and milling ores. An average of 4 carloads of concentrate per month by present management, with a gross value of $200 to $240 per ton. A mine fire in December, 1920, caused delay, but total production in 1921, from July 1, was about $153,000 gross.

LEGITIMATE MINES CO. NEVADA

Address: Jarbidge, Nev.

Property: 6 surveyed claims in Jarbidge district, Elko county, one mile E. of Jarbidge. The country formation is rhyolite; ore is gold-bearing. Equipped with 5-stamp test mill, and made a small production in 1919. Reported to be developing, September, 1921.

LE ROY DIVIDE MINING CO. NEVADA

No record of officers or holdings obtainable.

LIBERTY BELLE DIVIDE MINING CO. NEVADA

Inc. 1919, in Nevada.

Property: 3 claims and fraction adjoining Gold Reef and Alto, about 2,100′ S. E. of the Tonopah Divide and Gold Zone mines.

LIBERTY DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: Chas. R. Evans, pres.; Milton Detch, v. p.; F. R. Hackley, sec.-treas.; Geo. W. Allen, res. agt., with W. S. Norris, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury Listed on San Francisco Stock Exchange.

Property: 3 claims and fraction, 55 acres, just N. of the Goldfield M. & O. group and E. of Rosetta.

Development: by shaft, down 80′ in March, 1921; to be continued to 300′ with crosscut to vein of Goldfield M. & O. R. Co.

Equipment: 40 h. p. hoist, etc., destroyed by fire; to be replaced.

Rumored that option has been taken on **Bonanza Divide Mng. Co.** (q. v.) in Klondyke section.

LIBERTY GOLD MINES CO. **NEVADA**

Address: Frank H. Bird, pres.-mgr., Tuscarora, Nev.

Property: 7 claims, 140 acres, in Deep Creek district, Elko county, developed by tunnels to depth of 625'. **Ore:** occurs in a porphyry intrusion. Values are in gold-copper-silver. Reported to have 5,000 tons of $50 ore available.

LIBERTY GROUP **NEVADA**

Address: Jas. G. Lindsay, owner, Commercial Trust Bldg., Philadelphia, Pa.

Property: a mine at Liberty, 20 miles from Tonopah, Nye county, which was worked in the 70 s, the old workings reaching a depth of 700'. Recent work said to have opened an orebody 10' wide at depth of 60', assaying 60 oz. silver and 6½% lead. Operated intermittently.

LINCOLN DIVIDE MINING CO. **NEVADA**

Address: W. V. Richardson, Tonopah, Nev.

Officers: W. V. Richardson, pres.; A. E. Kane, v. p.; G. A. Reading, sec.-treas., with D. T. Donovan and P. J. Donovan, directors.

Inc. May 19, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 in treasury.

Property: 50 acres, adjoining Florence Divide on N. and 6,000' north of Gold Mountain.

LINCOLN HILL MINING & MILLING CO. **NEVADA**

Office: Lower Rochester, Nev.

Officers: C. D. DeLorme, pres.-mgr.; F. L. Reber, v. p.; F. B. DeLorme, sec.-treas., with John M. Adams and Adam Patterson, directors

Inc. April 8, 1913, in Nevada. **Cap.** $1,750,000; $1 par; increased 1917 from $1.000.000.

Property: Lincoln Hill mine, 2 claims and a fraction, 45 acres, on Lincoln Hill, Rochester district, Pershing county.

Ore: occurs in well-defined fissure veins. Samples from a 40' vein under development in the east end of the tunnel assayed $62 in gold and silver.

Development: by 1,600' of tunnels, raises and winzes.

Equipment: includes electric power, compressor, power drills, hoist, 2-stamp mill of 12 tons daily capacity. Small tonnage is being treated; one 500 ton lot reported to have averaged better than $100. Operated 1919-'21.

LITTLE GIANT GOLD & SILVER MNG. CO. **NEVADA**

Successor to **Nevada Sheba Silver Mng. Co.**, as lessee, of holdings of **Sheba Gold & Silver M. Co.**, which see.

Office: Imlay, Pershing county, Nev.

Officers: S. H. Brady, pres.-treas.-mgr.; T. S. Chalmers, v. p.; C. H. McIntosh, 2nd v. p.; J. C. Trantor, (Reno), sec., with Frank Hibbard, W. H. Ferguson and A. Watson Armour, directors.

Inc. 1921, in Nevada. **Cap.** $250,000; par $1; 500,000 treasury shares. Had a 3-year lease and option; from the spring of 1921, on property of the Sheba G. & S. Mng. Co.; royalties paid on production were to be applied to purchase price, $125,000.

Reported, December, 1921, that owning company had declared the lease forfeited.

LODI MINES CO. **NEVADA**

Address: J. L. Joseph, 565 Mills Bldg., San Francisco. **Mine address:** Bruner, Nev. Homer Williams, mgr.

Property: the old Illinois mine, 29 claims, at Marble, in the Mammoth (Lodi Valley) district, Nye county, 45 miles N. E. of Luning, the nearest rail point. Lead ore, carrying silver, and some gold, ocurrs in a vein in limestone near its contact with granite. Opened first in 1858, the mine is reputed to have been a producer of high grade silver ore; was dormant 1910-1919; in latter year, lessees, including United Lodi Mines Co., made small ore shipments.

Development: by old workings to a depth of 1,000'

Equipment: includes 25 h. p. gas hoist and 25-ton concentrator and

cyanide unit. Also a lead smelter which, erected in 1908, did not prove successful. Water is brought in by a 5-mile pipe line.

Late in 1920, property was taken under lease by **Rural Mines, Inc.**, of Arizona, and a year later was producing shipping ore from 4th and 5th levels, and milling ore from the 7th.

LONE MOUNTAIN DIVIDE MINING CO. NEVADA

Mail returned from Tonopah, Nev.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 18 claims west of Apex Divide. Also Lucy mine in Paymaster Canyon, E. of Lone Mountain. No report since late 1919.

LONE MOUNTAIN MINING CO. NEVADA

Operated under bond the Rip Van Winkle mine of the **Alaska Improvement Co.**, which see.

LONE STAR CONS. MINING CO. NEVADA

Office: 10 E. 43rd St., New York. **Mine office:** Goldfield, Nev.

Officers and directors: N. H. Wheeler, pres.-gen. mgr.; G. B. Hartley, v. p.-supt.; W. D. Miller, sec.-treas., J. I. Wheeler, asst. sec. A. H. Elftman, cons. engr

Inc. April 17, 1912, in Nevada. **Cap.** $2,500,000; $1 par; assessable; all issued. Security Transfer & Registrar Co., New York, transfer agents and registrar. Stock listed on Salt Lake and San Francisco Exchanges. Stricken from New York Curb, October 1, 1918, after a stock-rigging scandal alleged to have been instigated by an officer of the company and a bankrupt brokerage concern. Four assessments, totaling 7¢ have been levied, the last one on March 3, 1920. Annual meeting last Wednesday in April. Reported $50,000 expended in 1919, no later report available. Shares ranged from 1 to 29¢ in 1918; 6 to 29¢ in 1919; 4 to 8¢ in 1920; 2 to 8¢ in 1921, to November.

Property: 24 claims, 17 patented, 450 acres, in Goldfield district, Esmeralda county, Nevada; and 7 unpatented claims in Indian district, Mono county, California.

Development: at Goldfield, by 252′ shaft and 850′ drifts and crosscuts on 150′ and 250′ levels; in California, by 200′ shaft. But little progress made from year to year and little commercial ore developed. In early days, property produced $20,000 to $30,000; in 1920, lessees mined small amounts of high grade. Not favorably regarded.

Reported on by Emory J. Arnold, A. H. Elftman and M. Duvall.

LONGFELLOW GOLD M. & M. CO. NEVADA

Address: Carman Heights, Gardnerville, Nev.

Officers: W. I. Boardman, pres.; H. H. Fisher, v. p.; E. W. Carman, sec.-treas.-mgr., with Dr. M. A. Albe, J. M. Albe, C. L. Hale and J. R. Miller, directors.

Inc. 1903, in Nevada. **Cap.** $1,500,000; $1 par; 1,325,000 issued.

Property: 8 claims, 150 acres, in Red Canyon district, Douglas county, said to show quartz veins in monzonite averaging $10 in copper, gold, silver and lead.

Development: by 265′ shaft and 845′ tunnel to depth of 415′.

Equipment: includes gasoline hoist, compressor, pump, 30-ton mill.

Idle.

LOOKOUT DIVIDE MINING CORPORATION NEVADA

Office: Tonopah, Nev.

Officers: A. T. Wilkinson, pres.; J. M. Fenwick, v. p.; M. J. Gray, sec.-treas., with Julius Goldsmith and P. D. McLeod, directors. J. W. Morris, cons. engineer.

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 5 claims, 2 fractions, 3¼ miles northeast of Gold mountain.

LORING NEVADA MINES CO. NEVADA

Address: Lovelocks, Pershing county, Nev.

Inc. Sept., 1919, by W. A. Huston, A. Bermedetti, and J. C. Foster. **Cap.** $150,000; 10c par.

Property: a group of claims in the Loring district.

No other information available.

LORING TREASURE HILL MINES CO. **NEVADA**

Dead. See Vol. XIV. Company never incorporated; deal, by which Wm. J. Loring and associates, were to take over the Treasure Hill claims of the Lovelock Willard Mng. Co., did not materialize.

LOUISIANA CONSOLIDATED MINING CO. **NEVADA**

Offices: 111 Broadway, New York and 305 Nat'l Bank Bldg., Tonopah, Nev. **Office** of president: 900 Broadway, New York.

Officers: Julius Siegbert, pres.; Herman Rawitser, v. p.; L. A. Dessar, sec.; R. S. Nichols, treas., with Jas. E. Osborn, Wm. V. Creighton and Fred Housman, directors.

Inc. May 17, 1912, in Nevada. **Cap.** $100,000; 10c par; increased to $2,500,000; $1 par; 699,476 shares in treasury, June, 1920. Bonds; $185,000—10s, and $65,000—6s, due 1923; $95,000—10s issued. Annual meeting June 1st. Registrar and transfer agt., Registrar & Transfer Co., New York.

Property: 43 claims, 808 acres; includes Tip-top mine at Mt. Montgomery, Buena Vista (Oneota) district, Mineral county; Southwestern mines in Reveille district, Nye county; and, beginning with 1917, a 20-year operating agreement on Tybo mine and 10-year lease on Diminick mine, in Tybo district, Nye county. Company owns also about 75% stock control of Nevada Sm. & Mng. Corp., which in turn owns about 90% stock control of Tybo Cons. Mng. Co., (Tybo mine); also entire issued capital stock of Southwestern Nevada Mines Co. (Southwestern mine). At Tybo, owners are to receive 30% of profits.

Stockholders in the Nevada Sm. Corp. were permitted to exchange their holdings on a basis of 10 shares of Nevada Sm. for 3 shares of Louisiana Cons.

Geology: the Tip-top group shows 2 contact veins between andesite and rhyolite; 2½′ and 6′ wide; values in gold and silver. At the Tybo, there is a fissure vein on a limetone-rhyolite contact; ore averages 19 oz. silver, 0.15 oz. gold and 11% lead. The Southwestern mine shows oxidized lead ore, containing silver and a little gold.

Development: at Tip-top, by tunnels; total workings 1,000′. At Tybo, by 400′ shaft and winze 100′ deeper; workings aggregate 3,200′.

Ore reserves: ore above 120′ level of Tip-top exhausted and mine has been shut-down for 3 years. At Tybo, the management estimated (Oct., 1919) $2,000,000 of ore blocked-out.

Equipment: at Tip-top, includes 10-stamp and cyanide mill, of 50 tons capacity. The Tybo mine is equipped with 125-ton concentrator with 3 flotation units, and 125-ton lead smelter with sintering plant.

Production: at Tip-top said to be $120,000 up to 1918; the Tybo and Southwestern, especially the latter have been small producers for a number of years.

Up to September, 1918, company had expended about $100,000 on the Tybo mine, and despite glowing press reports, had run into debt, in an unsuccessful attempt to put the property on a profitable basis. Operations were suspended until October, 1919, when new management started sinking to the 600′ level.

Mill and smelter began operations late spring of 1920, and in August a first shipment of 5 tons of base bullion was reported, with 20 tons in reserve. In November, plant was said to be too small to earn a profit, and later, after company had endeavored to carry its obligations, S. R. Moore, of Tonopah, was appointed receiver. Liabilities of $500,000 were reported.

Reported that bondholders had purchased the assets at receiver's sale for $400,000, Dec., 1921. Company is to be reorganized, former stockholders may receive 16 participation certificates for each 100 shares of old company, plus 20c per share assessments. Plant is valued at $300,000 and 24,000 tons of $20 ore is said to be available.

LOVELOCK WILLARD MINING CO. NEVADA

Address: Lovelocks, Nev.

Officers: W. H. Goodin, pres.; O. H. Olesen, 1st. v. p.; L. S. Young, 2nd v. p.-treas.; J. J. Garnier, 3rd v. p.; St. J. L. Thaw, sec.; J. H. Borland, mine mgr.

Inc. May, 1919, in Nevada

Property: the Treasure Hill group adjoining the Nevada Honey Bee mine, 6 claims, 10 miles from Lovelocks, Pershing county, reported to carry 3 well-defined veins, the main orebody, 18′ wide, giving assays of from $20 to $70 in silver per ton. Development is by tunnel. It is a prospect examined by Oscar A. Hershey.

Company has never operated, and will not do so until conditions are favorable. Lessees have made small shipments. Deal by which part of holdings were to be taken over by Wm. J. Loring, and associates, under name of Loring Treasure Hill Mines Co. (q. v.) was not consummated.

LOWNEY MANGANESE ASSOCIATION NEVADA

Address: J. M. Carter, supt., Las Vegas, Nev.

Property: adjoins the holdings of the Manganese Association, Inc., near Las Vegas, Clark county, developed by 60′ shaft and 50′ drift said to show a lens of ore from 4 to 8′ wide, averaging 38-48% Mn. No shipments reported.

LUCKY BOY CONSOLIDATED MINING CO. NEVADA

Address: care J. H. Miller, Hawthorne, Nev.

Officers: O. Raymond Knight, pres.; John H. Miller, v. p. and gen. mgr.; R. E. Allen, sec-treas.. Company controlled by the Knight Investment Co., of Utah. Total dividends paid, $125,000.

Inc. in Utah; 2,681,763 shares issued; assessable; assessment of 1c. levied in 1919.

Property: the Lucky Boy mine, under the town of Lucky Boy, about 5 miles from Hawthorne, Mineral county, shows silver-gold-lead-copper ore in a vein in limestone near granite. Ore contains galena and tetrahedrite with quartz and some calcite, in lenses and shoots, in a vein which runs N. 80°-85° E. and dips 65°-75° S. Geology fully described in U. S. G. S. Bull. 594, p. 153.

Development: by 1,000′, Hubbard shaft with drifts E. and W. at 100′ intervals and by a deeper drainage tunnel, 6,200′ long.

The big ore-shoot, which produced $800,000 in 8 months and half as much more in the next year, has been mined out except where narrow. No stoping ore was cut in the lower tunnel, but there is much unworked ground in the mine and much virgin territory in the property.

Equipment: includes air compressor, electric motors, machine drills and useless 10-stamp mill.

Lessees are reported to have mined ore worth $100,000 during the 12 months ended October, 1919. Their work has not revealed any new orebodies. The Mills property adjoining, and the townsite and water supply of Hawthorne was acquired, a total of 2,000 acres.

For 2 years from October, 1919, company has been reported as about to resume operations, and was preparing to erect a mill. Reports are apparently premature.

LUCKY BOY DIVIDE MINING CO. NEVADA

Address: F. T. Dunn, res. agt., Tonaph, Nev. Wm. Farrish, supt.

Officers: Harry MacNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.; A. G. Raycraft, treas., with L. R. Robins and Wm. Farris, directors.

Inc. March 31, 1919, in Nevada. **Cap.** 1,000,000 shares; 10c par; assessable. Last assessment, of 1c., became delinquent Nov. 17, 1921. Listed on San Francisco Stock Exchange.

Property: 2 fractional claims, about 1,500′ E. of Tonopah Divide, dividing property of the East Divide. Reported, Feb. 1921, company had acquired claims adjoining the Golden State group in Klondyke section and later that an option had been taken on a group at Hornsilver.

LUCKY BOY MINING CO. **NEVADA**

Address: Osceola, Nev.

Property: a silver-lead mine in the Osceola district, White Pine county, 46 miles S. E. of Ely, developed by shaft and 350′ tunnel. **Equipment:** includes hoist and compressor; a mill is contemplated.

LUCKY DEPOSIT MINING CO. **NEVADA**

Officers: L. G. Hardy, pres.-gen. mgr.; J. P. Cahoon, v. p.; C. W. Knudsen, sec.-treas.; with A. N. Olsen, directors, at last accounts.

Inc. March 1, 1914, in Utah.

Property: 9 unpatented claims at Aurum, White Pine county, said to show copper ore with some silver-gold values, running $45-$50 per ton.

Development: by 175′ crosscut tunnel along a porphyry dyke, said to measure 200′ across, eventually to reach depth of 300′. No recent returns.

LUCKY DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Officers: Fred Nielson, pres.; Albert Erickson, v. p.; L. C. Thompson, sec.-treas.; W. C. McFarland and J. G. Thompson directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 4 claims, 80 acres, N. E. of Mizpah Divide and 2½ miles N. E. of Gold Mountain. Veins show good values at surface. A prospect.

LUCKY PRINCE MINING CO. **NEVADA**

Address: J. J. McDonald, Searchlight, Nevada.

Property: 16 claims in Clark county, within one mile of the Colorado river, across from the Katherine gold camp in San Francisco district, Mohave county, Arizona.

LUNING CONSOLIDATED SILVER MINES CO. **NEVADA**

A merger, early in 1920, of the Luning Gold Mines Co. and R. B. Todd Mining Co. and controlled by L. A. Browne and associates of San Francisco and New York.

Addresses: 265 Russ Bldg., San Francisco, and A. E. Lowe, supt., Tonopah, Nev.

Officers: L. E. Browne, pres.; H. Zadik, v. p.; with A. S. Wollberg, J. N. Rodgers and A. E. Lowe, directors. Chas. D. Olney, sec.

Inc. in Nevada. **Cap.** $150,000; 10¢ par; 750,000 shares in treasury. Transfer agt., Registration Surety Co., San Francisco.

Property: the Todd mines, 23 claims, 460 acres, in the Luning district of Mineral county. Two principal veins; the Nogal shows lead-silver-gold ore in quartz monzonite, a few inches to 2′ wide; the other (Red) heavily iron stained quartz, carrying gold and silver, as a replacement in limestone, 3′ to 4′ wide.

Development: by 3 shafts, deepest 125′, and 5 tunnels, with total workings of 5,000′. Present work largely confined to replacement deposit, in which 7,000 tons of $25 ore is reported blocked out.

Equipment: steam power, hoist, aerial tram, orebins, dwellings.

Production: $30,000 during past 15 years, under management of R. B. Todd. Shipments made during 1921 to mill of the Tonopah Mng. Co.

The Red vein contains large pockets of powdered red oxide of iron, from which occasional shipments are made to the company's $60,000 paint plant at Richmond, Calif. This hematite ore is said to carry also $26 in gold, recovered by cyanidation.

LUNING DIVIDE MINES CO. **NEVADA**

Address: Luning, Nev.

Inc. May 26, 1919, in Nevada, by G. A. Raymer, W. E. Harris, and S. J. Dillbaugh. **Cap.** $150,000; 10c par.

LUNING GOLD MINES CO. **NEVADA**

Merged early in 1920 into the **Luning Consolidated Silver Mines Co.** of Nevada, which see.

LUNING-IDAHO MINING CO. **NEVADA**

Office: Reno, Nev. **Mine office:** Luning, Mineral county, Nev.

Officers: Robt. B. Todd, pres. and gen. mgr.; R. G. Withers, v. p.; G. M. Todd, sec.-treas., with M. W. O'Boyle and G. B. Brest, directors.

Inc. April 29, 1910, in Nevada. **Cap.** $1,500,000; $1 par; 1,116,533 issued. Operating expenses for 1916, $20,000; 1917, $24,505; 1918, $5,282.

Property: 13 claims, 260 acres, in the Pilot range in the Santa Fe mining district, shows several fissure veins in granite and quartzite, said to carry 2½% copper, 2 oz. silver and about 60c gold per ton.

Development: by shafts, open cuts and tunnels, with about 3,000' of workings to depth of 200'. Longest tunnel driven about 682' across the mineralized zone, is near the hanging wall granite.

Equipment: includes hoists, compressor and drills.

Last shipments made in 1917. Property reported on by M. H. Jacobs, J. C. Skuse, S. B Parish and Wm. G. Oliver. Operations during 1918-'19 were limited, owing to lack of working capital, but reported to have been resumed in early 1920.

LYNN BIG SIX MINING CO. **NEVADA**

Office: 701 McIntyre Bldg., Salt Lake City Utah. **Mine office:** Carlin, Nevada.

Officers: Henry Harker, pres.; R. M. Holt, v. p.-sec.-treas.-mgr.; with L. A. Marks, Swen Nelson and Frank Davis, directors. H. L. Parker, supt.; T. F. O'Brien, asst. supt.

Inc. 1912, in Nevada. **Cap.** $250,000; shares 25c par; assessable; 850,000 shares outstanding. Assessment 15, of 1c, levied Sept. 3, 1921.

Property: 12 claims (1 patented), 220 acres, in Lynn district, Eureka county, at Goldville, via Carlin. Ore occurs in shattered zones in flat dipping bedded rhyolite, intruded by andesite; the vein filling is an iron stained, silicified rhyolite carrying gold; assay value, $2 to $300 per ton.

Development: by inclines, deepest 300' vertically, and 800' tunnel. Reported that 5 mineralized zones, 6 to 35' wide, have been cut.

Equipment: a gasoline hoist and 50-ton amalgamating test mill, increased, 1921, to 100 tons.

Production: milled 1,000 tons; and 10 carload shipments to smelters in 1918 said to have averaged $80 per ton.

Word is received from the management that a number of precious metals have been discovered; "free gold averaging about $10 per ton, some platinum, selenium, vanadium, silver and considerable mercury and gallium. Also a brilliant metal which has the appearance of gold; it is heavier than gold and much more brilliant." Also, it seems that there is "enough ore to run at the rate of 100 tons per day for at least 50 years". Confirmation as to the characteristics of this "spirit ore" is given by the assistant superintendent in a letter to the M. & S. Press for April 3, 1921. With such a galaxy of precious things, and in such vast quantities, no further comment is needed.

MacFARLANE DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Officers: T. L. Oddie, pres.; M. M. Detch, v. p.; O. G. Wolther, sec.; W. V. Richardson, treas., with Joe Loeb, Hector Stewart, and A. E. Kane, directors. J. W. Hanson, supt.

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 4 claims N. E. of the Ajax and 2½ miles N. E. of Gold Mountain, near the Myra and Ben Hur.

MacNAMARA CRESCENT DEVELOPMENT CO. **NEVADA**

Inc. 1921 in Nevada, to take over assets and liabilities of MacNamara Crescent Mng. Co. **Cap.** $375,000; par 25¢; assessable. Stockholders of old company, who will receive new stock on a share for share basis, were called to take final action, Jan. 21, 1922.

MacNAMARA-CRESCENT MINING CO. **NEVADA**

Offices: 565 Mills Bldg., San Francisco, Calif., and Tonopah, Nev. Ivan C. Arnold, sec.; J. L. Joseph, mgr.

Cap. $300,000; shares 20c. par; all outstanding; 751,000 shares are held by the MacNamara M. & M. Co. Registrar and transfer agent, U. S. Corporation Co., New York.

Property: 9 claims, 144 acres, at Tonopah, adjoining the West End Cons.

Development: by 1,222' two-compartment shaft. By Jan. 1, 1922, a N. W. crosscut was driven 2,019', with 110' still to go, to cut the Ohio vein of West End Cons. If no ore is found, a 600' N. E. crosscut will be driven.

Equipment: includes 100 h. p. double drum hoist and 50 h. p. compressor. Total expense of development and improvements has been $129,195.

A special stockholders meeting was called for Jan. 21, 1922, to approve sale of all assets to the MacNamara Crescent Development Co., stock of which is assessable, shares to be exchanged on an equal basis. New company assumes liabilities of old company.

MacNAMARA MINING & MILLING CO. **NEVADA**

Offices: 565 Mills Bldg., San Francisco, Calif., and Tonopah, Nev.

Officers: J. L. Joseph, pres., Mark Wulfsohn, v. p.; E. W. Elliott, sec.-treas., with S. D. Allen, directors.

Inc. 1914, in California, as a reorganization of the MacNamara Mining Co. **Cap.** $1,500,000; shares $1 par; assessable; 435,000 shares in treasury. Transfer office and registrar: 565 Mills Bldg. Listed on San Francisco Exchange; traded in on New York Curb.

Annual statement for year ending December 31, 1920, shows; receipts, $575,715; disbursements, $587,134; cash on hand, $28,627.

The management got into bad repute with stockholders because no statements of operations were given out, and they were at a loss to know what had become of the money in treasury. To provide working capital the company was reorganized under its present title and the stock was put upon an assessable basis. Two assessments of 3c. and one of 2c. per share have been levied. The property of the NacNamara Mining Co. was sold to the new company for 1,340,076 shares of the latter, 275,076 shares of which have since been re-purchased. In 1919 company acquired stock control in the MacNamara-Crescent Mining Co., which see. Dividends: paid, $40,399.

Property: 2 patented claims, 16 acres, at Tonopah, said to have 3 flat dipping quartz veins, not including the Ohio of West End Cons., continuation of which underlies part of MacNamara claims; one vein is of contact type up to 80' in width.

Development: by 800' shaft.

From December, 1912 to 1917, the mill treated 54,000 tons of company ore, assaying from $7.04 to $11.08 per ton. The plant was shut-down in 1917, due to lack of development, shortage of money, and low price of silver. Property was not operated in 1915.

In February, 1916, arrangements were made with the West End Cons. Mining Co. by which the MacNamara Company could develop on its side of the property line a body of ore which the West End has exposed in its stoping operations near the line; work to be done through West End workings to avoid the necessity of MacNarmara driving a 500' crosscut. The joint exploration was continued during 1916 and 1917. Late in 1917 the mine and mill were reopened. Good developments on the Ohio vein in the West End mine adioining has led to exploration for this shoot.

In the MacNamara mine much of development and production is in hands of lessees; in 1921, specifically in MacNamara vein and on 725' level.

Equipment: includes 100-h. p. electric hoist, compressor, 10 stamps and cyanide plant.

Production: about 1,500 tons per month. Since closing of the Goldfield Consolidated mill, the MacNamara has contracted with the Tonopah Divide M. Co. to treat 60 tons of the latter's ore daily; also some from the Hasbrouck and Divide Extension In spring of 1921, mill was reported to be treating between 2,000 and 2,500 tons per month. According to a 1918 estimate of Wm. B. Fisher, it was then reasonably probable that 100,000 tons of 15 oz. silver ore could be mined.

In a stock selling campaign, in spring of 1920, New York brokers made extravagant claims as to the assets and probable earning powers of the MacNamara M. & M. Co.

MAJUBA FRESNO SILVER MINING CO. NEVADA

Address: Imlay, Nev.

Property: in Antelope district, Pershing county, 17 miles W. of Imlay, developed by an 830′ tunnel and 84′ shaft, both in ore. A few shipments of high grade ore were made in 1921.

MAJUBA SILVER, TIN & COPPER CO. NEVADA

Address: 315 Nixon Bldg., Reno, Nev. G. S. Brown, pres.; Jack Welch, mgr.

Inc. 1919, in Nevada. **Cap.** $200,000; shares 10c par.

Property: 79 claims, 1,580 acres, in Antelope district, Pershing county, 25 miles W. of Imlay. Estimated reserves in May, 1920, were: 50,000 tons of ore, assaying 3% copper and 2 oz. silver, and a small tonnage of higher grade. Some tin ore has been found.

Development: by tunnels, in upper leached zone; aggregate workings 4,400′.

The Majuba Hill group was under option, 1916-1919, to the Mason Valley Mines Co., which is responsible for existing development. Shipments amounted to about 2,000 tons, yielding 12% copper and 1.4 oz. silver; total expenditures to Jan. 1, 1919, were $142,509.

MAMMOTH DIVIDE MINING CO. NEVADA

Address: R. K. Brown, res. agt., Tonopah, Nev.

Officers: S. A. Holman, pres.; C. W. Geddes, v. p.; with Wm. A. Kerr, R. K. Brown (supt.), and P. B. Ellis, directors. A. R. Buchanan, sec.-treas.

Inc. April 18, 1919, in Delaware. **Cap.** $150,000; 10c par; 1,000,000 issued. Listed on San Francisco Stock Exchange and New York Curb. Annual meeting, last Thursday in October. Security Transfer & Registrar Co., New York, and Registration Surety Co., of San Francisco, transfer agents and registrars.

Property: 4 claims, 50 acres, 2,500′ S. E. of Tonopah Divide and adjoining the Gold Reef on S., considered to be well located.

Development: by 100′ shaft on Wonder claim, at a point in line with trend of main Tonopah Divide fault-fissure.

Equipment: 30-h. p. electric hoist, compressor, bunk-house, etc.

MAMMOTH GOLD MINING CO. NEVADA

Office: 127 Montgomery St., San Francisco, Cal.

Officers: J. W. Lowe, pres.; Wm. P. Wrixon, v. p.; Leon C. Osteejee, sec.; E. H. Norman, treas., with E. M. Robitscher, J. C. Romaine and I. H. Wyruck, directors.

Cap. $100,000 par $1; assessable; 17,500 shares outstanding. Assessment No. 4 of 2c levied November 1, 1917.

Property: 2 patented claims, 40 acres, in southern part of Manhattan mining district, Nye county, said to show gold-silver-copper ore. Development is by 250′ vertical shaft. Idle several years.

MANDALAY MINES CO. NEVADA

Address: J. F. Dwyer, gen. mgr., Jungo, Humboldt Co., Nev.

Property: in Mandalay district, Humboldt county, 3 miles S. of Antelope station on W. P. R. R. An 80′ shaft has opened a 4′ vein of quartz carrying silver sulphides, with assay value of $20 to $75 per ton. Mine has been equipped with hoist and compressor. Total expenditures to Sept., 1920, $14,000.

MANGANESE ASSOCIATION, INC. NEVADA

Control purchased for $100,000 in 1918, by Thos. Thorkildson, Trust & Sav. Bk. Bldg., Los Angeles, Calif.

Property: the Three Kids claim, 16 miles S. E. of Las Vegas, Clark county, said to carry the largest known sedimentary deposit of high-grade manganese ore, assays averaging 40% Mn. and 12% SiO_2.

Ore is composed mainly of wad, psilomelane and pyrolusite, occurring in a lenticular mass in lava and outcropping near the base of the foothills.

It is very soft and light and occurs in a stratified deposit, the beds striking N. 50° W., with dip of 15° N. E. The ore exposed in the face of an open-cut 200′ long averages 25′ in thickness, and the lateral extent of the deposit unknown.

Production: by lessees in 1917 was 6,500 tons. Said to have been 150 tons daily in early 1918. The slump in price and lack of demand resulted in the mine being shut-down in March, 1919.

MANHATTAN BIG FOUR MINING CO. **NEVADA**

Idle. Harry B. Ruhl, sec. Goldfield, Nev. L. K. Koontz, pres.; J. H. Thatcher, v. p.; C. Wilson, treas., with W. G. Saunders, directors.

Inc. 1906, in Nevada. **Cap.** $1,000,000; outstanding, $784,000; shares $1 par. Listed on San Francisco Stock Exchange.

Property: 60 patented claims at Manhattan, Nye county.

Development: to 500′ level by shafts. High-grade ore was extracted by early lessees and the ore remaining is exceedingly low-grade. About the only way to treat it profitably would be to mine the Big Four hill by steam shovels and even this method is uncertain. No news for several years.

MANHATTAN CONS. MINES DEVELOPMENT CO. **NEVADA**

Address: P. O. Box 921, Tonopah, Nev. **Mine office:** Manhattan, Nev.

Officers: O. J. Stewart, pres.; W. J. Douglass and J. A. Gibbons, v. ps. C. C. Boak, sec.-treas.; with C. F. Wittenberg, A. J. Twilegar and J. H. Miller, directors. M. N. Page, supt.

Inc. 1913, in Nevada. **Cap.** $1,500,000; $1 par; assessable; 420,472 treasury shares. Assessment No. 13 of ½c. levied Sept. 6, 1921. Listed on San Francisco Stock Exchange.

Cash on hand, Jan. 1, 1921, was $5,276; mine idle for 12 months preceeding Mar. 1, 1921, but expenses were $8,000.

Property: 5 patented claims, 82 acres, in Manhattan district, Nye county. Litigation with White Caps company was settled in 1917, after 5 years. **Geology:** ore occurs as shoots up to 42′ wide in contact and chamber deposits in lime-shale.

Development: by 555′ shaft and 3,500′ total workings. On 3rd level an 8′ orebody was opened, and management reports (1921) $1,000,000 worth of ore blocked out; assay value, $19 to $55. Ore said to be free-milling to this level, but carries arsenic below.

Equipment: 50-h. p. electric hoist, 6-drill compressor, and triplex pump.

Recent change of officers, reported to be due to dissatisfaction with previous management. Also reported late in 1921 that operations were to be resumed and a chlorination mill of 1,000 tons monthly capacity would be erected.

MANHATTAN COPPER MINING & MILLING CO. **NEVADA**

See Vol. XIV. Company succeeded the Manhattan Gold & Copper Mining Co. and is owned by the **Cons. Nevada-Utah Corporation**, which see in this book and in Vol. XII.

MANHATTAN DEXTER MINING CO. **NEVADA**

Address: Manhattan, Nev.

Officers: S. R. Moore, pres.; C. F. Wittenberg, v. p.; C. T. Lawrence, sec.-treas.

Inc. in South Dakota. **Cap.** $1,500,000; shares $1 par.

Property: 1 patented claim, at Manhattan, Nye county, has been operated intermittently by lessees.

MANHATTAN MORNING GLORY MINING CO. **NEVADA**

Property: adjoins holdings of the White Caps Mining Co., near Manhattan, Nye county. Apex suit brought against the latter company decided adversely for the claimants, May, 1918.

MANHATTAN MUSTANG MINING CO. **NEVADA**

Manhattan, Nye county. Property mostly held by Tram-Chase lessees, who reported mining rich ore, at last accounts.

MANHATTAN RED TOP MINING CO., REORGANIZED NEVADA

Office: 126 Russ Bldg., San Francisco, Cal.

Officers: H. Zadig, pres.; W. E. Colburn, v. p.; C. E. Hudson, sec.-treas.; also directors. N. K. Franklin, supt.

Inc Oct., 1912, in Nevada, as successor to the Manhattan Red Top. **Cap.** $1,500,000; shares, $1 par; 1,000,000 issued; assessable. Two assessments of ½c each levied December, 1917, and June, 1918.

Property: 60 acres in Manhattan district, Nye county.

Development: by 200′ shaft with crosscuts and drifts on the 110′ level.

Equipment: 40-h. p. hoist, compressor, electric power, drills, etc.

A prospect whose shares have been extensively traded in on the San Francisco Stock Exchange. Work was discontinued March, 1918, owing to a heavy flow of water and inadequate equipment.

MANHATTAN SUNRISE MINING CO. NEVADA

Address: Manhattan, Nev.

Inc. 1917. E. H. Mead, pres.; Wm. Forman, v. p.; John M. Gregory, treas.-sec., with E. C. Smith and Zeb Kendall, directors.

Property: lies east and northeast of the White Caps Extension holdings, near Manhattan, Nye county. No record of operations securable.

MANHATTAN UNION AMALGAMATED MINES SYN. NEVADA

Is a reorganization of the Union Amalgamated Mining Co., fully described Volume XIII.

Offices: 265 Russ Bldg., San Francisco and Tonopah, Nev.

Officers: C. F. Wittenberg, pres.-mgr.; Jas. H. Forman, v. p.; Chas. D. Olney, sec.; with Wm. Forman, H. H. Brown and J. M. Gregory, directors.

Inc. Nov., 1917. **Cap.** $200,000; 10c par; assessable; 1,385,344 outstanding. Four assessments levied to March; No. 5, of 1c., was delinquent July 18, 1921. Stockholders in the Union Amalgamated were given the privilledge of exchanging their stock, share for share, upon payment of a 2c per share assessment.

Property: 6 patented claims, 120 acres, on Litigation hill, Manhattan, Nye county, sadi to show gold-silver ore in fissure veins. Development is by 600′ shaft. **Equipment:** includes 20-ton cyanide mill.

Production: under former management was about 10,000 tons of ore. Mine has been closed down since 1918.

MARICOPA MINES CO. NEVADA

See **Austin Nevada Cons. Mines Co.**

MARIETTA GROUP NEVADA

Address: Marietta, Nev.

Property: at Marietta, Silver Star district, Mineral county, 9 miles W. of Belleville. A 3′ vein carries silver-lead-gold ore. Operated by lessees at last account.

MARINETTE MINING & MILLING CO. NEVADA

Address: P. O. Box 1258, Goldfield, Nev.

Officers: R. H. Tune, v. p.-gen. mgr.; A. J. Padgham, sec.-treas.; with E. E. Nott, Hunter Campbell and L. H. Dappreck, directors.

Inc. Nov. 12, 1918, in Nevada, as a reorganization of the Marinette Nevada Mining Co. **Cap.** $1,000,000; 10c par: assessable; about 190,000 issued. Annual meeting, first Tuesday in January.

Property: 9 claims, 8 patented, 180 acres, in Klondyke district, 14 miles N. of Goldfield, Esmeralda county. Ore contains silver chloride in quartz fissure vein, 1 to 4′ wide, with N. E.-S. W. course and dip of 30°. Assays said to average $12 to $18 in silver-lead.

Development: by 600′ incline to a vertical depth of 200′, with a total of 1,500′ of workings. Management plans development at depth. Shipments were made by former company.

MARINETTE NEVADA MINING CO. NEVADA

Succeeded, 1918, by **Marinette Mining & Milling Co.**, which see.

MARNE DIVIDE MINING CO. **NEVADA**

Office: care Hugh H. Brown, atty., Tonopah, Nev.

Officers: H. A. Johnson, pres.; R. Q. McDonald, v. p.; Emil Elkner, sec.-treas., with Wm. R. Bozarth and A. E. Carper, directors, mostly connected with the Tonopah Mining Co.

Inc. April 3, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 7 claims, N. of Champion, 1½ miles S. E. of Gold Mountain; adjoins the Big Divide and Morris on the N. Surface prospects encouraging. **Development:** by 50′ shaft at junction of 3 faults.

MASCOT SILVER MINING CO. **NEVADA**

Address: Pioche, Nev. Organized 1918 by John R. Cook, Judge Chas. Lee Horsey, H. W. Rand, and J. B. Thompson.

Cap. $1,000,000; $1 par; 400,000 shares held in treasury.

Property: Boston-Pioche group of 12 claims, formerly known as the Yuba East group at Pioche, Lincoln county, developed to depth of 800′. Returns from ore shipments said to have paid for development work during 1918.

MASON VALLEY-BLUESTONE EXTENSION MINES **NEVADA**

Address: 1014 Boston Bldg., Salt Lake City, Utah.

Officers: C. W. Reese, pres.; A. G. Gutheil, v. p.; G. M. Sullivan, sec.; H. C. Jex, treas., with O. P. Soule, W. E. Evans, and Henry Barney, directors.

Inc. in Utah. **Cap.** $100,000; shares, 10c par; 500,000 shares held by Trustee. Listed on Salt Lake Exchange. Is a reorganization of the Mason Valley Extension Mining Co.

Property: 48 acres, 20 patented, in Mason district, near Yerington, Lyon county.

Geology: claims cover contact metamorphic deposits of copper near porphyry, and grano-diorite, the ore occurring in crushed limestone.

Development: by 350′ shaft . Management hoped to find the same ore zone as in the Mason Valley and Bluestone mines, at last accounts.

MASON VALLEY EXTENSION MINING CO. **NEVADA**

Re-organized under name of **Mason Valley-Bluestone Extension Mines**, which see.

MASON VALLEY MINES CO. **NEVADA**

Successor to Mason Valley Copper Co.

Office: 14 Wall St., New York. **Mine office:** Thompson, Lyon county, Nevada.

Officers: Wilber Judson, pres.; Theo. Schulze and E. O. Holter, v. p's.; Henry E. Dodge, sec.-treas.; preceding with John F. Alvord, C. A. Corliss and C. F. Ayer, directors. Operating staff: A. J. Mc Nab, gen. mgr.; W. R. Cox, supt., of mines; Robert Nesbit, mine mgr.

Inc. Jan. 4, 1907, in Maine. **Cap.** $2,500,000; $5 par; increased March 14, 1910, from $1,000,000; $1 par; all issued. Former bonded indebtedness of company paid in full with interest, Mar. 30, 1920.

Guaranty Trust Co., New York, and United States Trust Co., Boston, **registrars.** Bankers Trust Co., New York, and Boston Safe Deposit & Trust Co., **transfer agents.** Shares listed on Boston Stock Exchange and New York Curb.

Annual report for year ending December 31, 1920 shows: Current assets, $777,798, and current liabilities, $6,133, compared with $1,310,116 and $23,549 in 1919. Deficit amounted to $60,065 in 1920 and $10,755 in 1919, compared with profit of $178,202 in 1918 and $358,277 in 1917. No dividends paid.

Nevada Property: 9 claims, patented, 170 acres, and a fractional claim of 10 acres, known as the Spragg mine, lying south of the Bluestone at Yerington, and about 1½ miles west of Mason. Company also owns a smelter

and 1,320-acre smelter site at Thompson, one mile from Wabuska and on the railway.

California Property: The Gray Eagle property, 14 patented claims, 256 acres, near Happy Camp, Siskiyou county, Cal., was acquired in September, 1916, for 144,250 fully-paid Mason Valley shares, said to be worth $271,250. The title to the property is in the name of the **Gray Eagle Copper Co.**, all of the stock of which is held by Mason Valley.

Company acquired a bond on the Blue King claims in Plumas county, Calif., 5 miles N. E. of the Walker Mng. Co. property near Genessee and 28 miles from Beckwith. The claims show 3 parallel veins that average 2% copper at the surface.

Option on the Majuba Hill group, Humboldt county, Nev., held since 1916, was relinquished early in 1920; up to Dec. 31, 1918, $142,509 had been expended in development, and some 2,000 tons of ore produced (see Majuba S., T. & C. Co.). An option on the property of the **Northern Light Copper Co.** (q. v.), Lyon county, Nev., was relinquished at the same time, after about 1 year's work.

At the Mason Valley mine, the Nevada property, an oxidized garnet deposit between limestone and andesite, is partly covered by rhyolitic tuffs. The latter rocks are comparatively soft and have been eroded into steep escarpments and sharp gulches. Ore is of contact metamorphic character, being an altered limestone of 30′ average width. Surface ore shows malachite with a little cuprite, succeeded, at about 100′ depth, by cupriferous pyrite, largely massive, with copper in the form of chalcopyrite. The mine is said to have some ore averaging 10% copper, but the average is about 3.5% copper. An average analysis shows 16 to 17% iron, 16 to 18% lime, 12% sulphur and 38% silica.

Development at the Mason Valley mine consists of crosscut tunnels driven to the ore-bearing zone with drifts run N. and S. following the general course of the orebodies. Crosscuts have been extended E. and W. from the main drifts. The workings reach a depth of about 550′. The mine has been worked by the shrinkage stope system. A very considerable tonnage of low-grade carbonate and sulphide ores, with a small quantity of high-grade ores has been developed. Actual development work begun March, 1907, and workings aggregated 32,202′ on Dec. 31, 1920.

At Gray Eagle, a 10′ to 80′ vein dips 45° in schist and shows an ore shoot 300′ long, carrying $1.50 in gold and 2½ to 18% copper; ore is pyrite and chalcopyrite. The Blue King claims cover 3 parallel veins, with an average copper content of 2% at surface and some gold and silver.

The Gray Eagle is developed by 8 or more tunnels, 50′ to 600′ long, and hundreds of feet of drifts. It is proposed to open the Blue King by tunnel and do further prospecting by drill. Development, old and new, totals 8,000′, with 7,500′ of drilling. As property is 80 miles from a railroad it must await transportation facilities before becoming a shipper.

Ore Reserves: in the Gray Eagle, the management reports the tonnage, as of Dec. 31, 1920, to be 1,045,000 tons of 3.23% and 500,000 tons of 1% copper ore; the former with 50c and the other with 20c in gold per ton. (See other estimates in Vol. XIV.)

Equipment: a 6,250′ tramway, with drop of 600′, of 100 tons hourly capacity, connects the mine with the Nevada Copper Belt railway, which line connects with the company's smelter, 16 miles distant.

The Wabuska Smelter.

The smelter built at a cost of approximately $900,000 is about 2½ miles from Wabuska, on the Southern Pacific railway, and about 16 miles from the mine. The plant consists of a sampling mill for custom ores; extensive storage bins, a blast-furnace building, with two blast furnaces of 1,800 tons daily capacity, a sintering plant, and two stands of 12′ converters

of the Great Falls type. Reverberatory furnaces are to replace the blast furnaces when the smelter resumes operations.

The smelter was blown in January 16, 1912, and one furnace was in continuous operation to October 20, 1914. Smelting operations were resumed February 13, 1917, and the second furnace put in operation in March. During 1917 the smelter treated 294,958 tons of ore and 13,390 tons of low-grade fluxes, of which 114,273 tons represented Mason Valley ore, amounted to 7,038 tons of blister copper containing 1,037 oz. gold, 46,257 oz. silver, and 13,914,764 lb. copper.

In 1918 the smelter treated 336,694 tons of ore and 11,689 tons of fluxes, 117,251 tons of which was company ore and 788 tons from properties under option, yielding 809 oz. gold; 91,824 oz. silver and 15,475,851 lb. copper.

Average price received for copper sold was 25.01c, compared with 28.09c in 1917. Income from ore sales in 1918 totaled $1,507,507 and operating costs $1,246,017.

Only one furnace was operated during the greater part of 1918 and the uncertain copper market caused a closing down of mine and smelter, February 28, 1919. Production for the 2 months of 1919, from 44,543 tons of ore (of which 15,894 came from its holdings), was 2,097,772 lb. copper, 238 oz. gold and 22,409 oz. of silver; the average price received for copper was 18.39¢. Property idle throughout 1921.

Company is in a position to become a steady dividend payer as it has a good plant, strategic location and owns a good mine. If this is done, the smelter will be enlarged by a reverberatory and custom work done. In January, 1920, it cost $10.50 per ton to ship concentrate from Paxton, Plumas county, California, to the smelter at Wabuska, a distance of 182 miles; but to Utah smelters, a distance of 680 miles, only $8.80 per ton. Late in 1921, the Interstate Commerce Commission ordered that a rate of $3.27 per ton on $100 ore of all classes be established from Western Pacific points to Wabuska, which ensures the resumption of operations at the smelter and may make it an important custom plant.

According to a well known mining engineer, "Mason Valley is both a custom smelting company and a mining corporation. The company boasts of about 1,000,000 tons of ore reserves averaging over 3% copper and 500,000 tons of about 1%. It has no bonded indebtedness, having retired the last of these in the past year out of funds piled up during the prosperity of 1916, 1917, 1918 and 1919. With the bonded indebtedness eliminated, and a strong financial position, having some $750,000 in the treasury, the common stock now appears in line for distribution of earnings, to say nothing of discounting the intrinsic value of the shares which, according to the ore reserves of the company, is about $5."

MASON-YERINGTON MINES CO. **NEVADA**

Reorganization of the Utah-Yerington Mines Co.

Office: 1014 Boston Bldg., Salt Lake City, Utah. **Mine office:** Mason, Nevada.

Officers: at last accounts, C. W. Reese, pres.; A. G. Gutheil, v. p.; G. M. Sullivan, sec.; H. C. Jex, treas., with S. McCroskey, C. J. Guild and Ross Thompson, directors.

Inc. in Utah. **Cap.** $1,000,000; 500,000 held by trustee.

Property: E. of the Mason Valley Mines Co., in Mason district, Lyon county, said to show 42" of silver, gold, lead, copper ore, in limestone.

No recent information.

MAYFLOWER BULLFROG CONSOLIDATED MINING CO. **NEV.**

Reorganized 1917, as **Cons. Mayflower Mines Co.**, which see.

McCONNELL MINES CO. **NEVADA**

Office: care O. H. Sonne, pres., Yerington, Lyon county, Nev. **Mine office:** Mason, Lyon county, Nev.; S. B. Elbert, sec. and mng. engr.; with Mrs. O. H. Sonne and Mrs. S. B. Elbert, directors.

Inc. Sept. 14, 1912. **Cap.** $500,000; $5 par; issued, 40,002 shares.

Property: 10 claims, 160 acres, patented, adjoining the Yerington Malachite mine on the west. Claims show limestone, shale and granite with argentiferous contact deposits in the contact zone near the grano-diorite. Property has 4 orebodies, 2 developed, averaging 25′ in width and carrying about 3.5% copper.

Development: by 400′ shaft and 3 tunnels. **Equipment:** includes a 25-h. p. hoist, 7-drill air compressor and 8 buildings.

Production: in 1918, shipments to Mason Valley smelter totaled 3,964 tons ore averaging 3.88% copper, producing 304,332 lb. copper.

Property regarded as good.

McCOY WEST DIVIDE SILVER MINES CO. NEVADA

Mail returned from Tonopah, Nev.

Officers: Al. McCoy, pres.; G. H. Cook, v. p.; B. E. Garnett, sec.-treas.

Property: 3 claims north of the West Divide Extension.

McDONALD-ELY COPPER CO. NEVADA

Office: Boston Bldg., Salt Lake City, Utah. **Mine address:** J. P. Turner, supt., Ely, White Pine county, Nev.

Officers: D. C. McDonald, pres. and gen. mgr.; Col. Enos A. Wall, v. p.; Geo. W. Parks, sec., Boston Bldg., Salt Lake City, Utah; Frank Knox, treas., with Frank J. Westcott, Geo W. Lamb and Hon. Thos Kearns, directors. E. P. Jennings, cons. engr. and mgr.

Inc. November, 1906, in Utah. **Cap.** $1,000,000; $5 par; issued, $790,000. Debentures, $100,000, at 6%, maturing November 15, 1915. Shares were listed on the Salt Lake Stock Exchange, but withdrawn.

Property: 28 claims, patented, 325 acres, 19 claims held under bond and lease. Property, on the lime belt, in the N. E. part of the Ely district, carries 4 contact deposits, between porphyry and limestone, showing prominent iron outcrops. Management estimated veins as 20′ wide carrying oxidized ores, assaying 1 to 40% copper, and about 80 cts. gold per ton.

Development: is by the 415′ Wall tunnel, showing 21′ of heavy iron. The mine as a whole has about 3,000′ of workings.

Equipment: includes a 25-h. p. gasoline hoist, 40-h. p. steam hoist, and a 6-drill compressor. A pumping plant and pipe line supply water from a spring at nearby ranch.

An old 50-ton mill, with rolls and cyanide plant, remains from a former ownership. The 100-ton concentrator has a gyratory crusher and 3 sets of rolls. Idle for several years.

M. & D. MINING CO. NEVADA

Office: 903 Boston Blk., Salt Lake City, Utah.

Officers: U. Terasawa, v. p.-mgr.; P. A. Clark , sec.; S. Samota, treas. H. A. Smith, A. T. Clark and H. A. Smith, Jr., directors.

Inc. Aug. 6, 1916, in Utah. **Cap.** $10,000; 10c par; assessable. Annual meeting, August 6th.

Property: 17 claims in Eldorado canyon, Clark county, said to carry gold-silver-copper ore. A prospect.

MECCA DIVIDE MINING CO. NEVADA

Address: Tim Connelly, agt., Goldfield, Nev.

Officers: J. W. Dunfee, pres.; J. E. Ewing, v. p.; Clyde Cannan, sec.; E. Marks, treas., with T. Donnelly, directors. A. H. Elftman, cons. eng.

Inc. March, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 32 acres, ¾ mile E. of the Tonopah Divide, adjoining Tonopah Hasbrouck on north.

Development: sank shaft and erected hoist, etc., in 1919.

MENDHA-NEVADA MINING CO. NEVADA

Mine office: Pioche, Lincoln county, Nev. T. J. Osborne, pres.; M. C. Godbe, sec., Newhouse Bldg., Salt Lake City, Utah.

Cap. $1,000,000; shares $1 par.

Property: in Pioche district, Lincoln county, is said to have produced $500,000 under its former ownership. Reported to have a vein 3 to 15′ thick,

averaging 6', practically vertical and showing silver and gold-bearing lead and copper ores on 700' level. Development is by a 900' incline shaft. Was a producer in 1919.

MERCURY MINING CO. **NEVADA**

Address: G. D. Abbott, sec., 1022 Crocker Bldg., San Francisco, Cal. **Mine** office: Ione, via Austin, Nye county, Nev.

Officers: C. A. Norris, pres.; F. W. Bradley, v. p.; G. D. Abbott, sec.-treas.; Clifford G. Dennis, mgr.

Inc. May 7, 1910, in Nevada. **Cap.** $1,000,000, all outstanding; shares $1 par. Annual meeting second Wednesday in January.

Balance sheet for 1920 shows assets: $1,102,000, of which property and plant is $1,056,660; supplies, $2,234; stock $6,660; consignment account, $8,760. Liabilities include operating accounts, $53,651; reserve, $48,355. Surplus account shows a deficit of $27,616.

Comparative Operating Statement:

	Gross Earnings	Operating Expenses	Operating Profits
1920.....	$16,990	$31,103	$14,113*
1919.....	32,028	31,089	1,039
1918.....	51,363	51,363	26,702
1917.....	9,704	11,949	2,245*
1916.....	31,099	33,042	1,943*
1915.....	44,127	26,299	17,828
1914.....	16,110	17,868	1,758*

*Deficit.

Property: 10 patented claims near Ione, which show cinnabar ore. Company has one 25-ton Scott furnace.

Production: in 1911-'12, 9,467 tons ore, 2,480 flasks mercury; in 1913, 7,715 tons ore, 1,013 flasks; in 1914, 2,100 tons ore, 384 flasks; in 1915, 5,375 tons ore, 417 flasks; in 1916, 7,314 tons ore, 399 flasks; in 1917, 94 flasks, in 1918, 10,147 tons ore, 775 flasks; in 1919, production was less than half of that for 1918; in 1920, 2,598 tons ore produced 250 flcsks.

During 1920, 1,383' of workings were completed and commercial ore was opened, a few inches to 6' wide, for 200'; 3,400 tons of ore in reserve, Dec 31, 1920. Furnace was operated for 3½ months only, closing down because of market conditions.

MERRILL SILVER-LEAD CO. **NEVADA**

Address: J. K. Turner, cons. eng., Goldfield, Nev.

Officers: A. H. Merrill, pres.--gen. mgr.; J. K. Turner, v. p.-cons. engr.; Gordon M. Bettles, sec.-treas.; with L. K. Dellinger and Owen Crawford, directors.

Property: 10 claims, 10 miles S. of Goldfield. A 6' vein crosses the ground for 1,800', and samples have yielded up to 7.44 oz. silver per ton, as well as lead and a little gold. Formation is crystalline limestone. **Development:** by 50' shaft.

Early in 1920 reported that C. E. Greenamyer & Co., New York, were financing this enterprise.

MEXICAN GOLD & SILVER MINING CO. **NEVADA**

Offices: 787 Mills Bldg., San Francisco, Calif, and Virginia City, Nev.

Officers: J. H. Goldman, v. p.; A. P. Swain, sec., with J. P. Fraser, Geo. E. Bennett and C. W. Conliss, directors.

Inc. 1874, in California. Operations under former managements described in Vol. XIII. **Cap.** $201,600; $1 par; assessable all issued. Assessments during 1918 amounted to $56,848. A 10c assessment levied May 25, 1921. Stock listed on New York Curb and San Francisco Exchange.

Property: 600' along the Comstock Lode, bounded on the N. by the Union Consolidated and on the S. by the Ophir Silver, which, with the Cons. Virginia mine are under the same management. For geology see Vol. XIII, and U. S. Geological Survey Monograph No. 3.

Exploration work on the 2,700 and 2,900' levels has been abandoned, and work confined to the 2,000' level and above. This new work has not yet progressed far enough to develop ore.

Production: in recent years amounted to about $1,500,000 from the 2,200 to the 2,500' levels, the ore averaging $33 per ton.

Equipment: includes 100-ton all-slime cyanide plant operated under the name of the Mexican Milling Co., which is used by the Cons. Virginia, Ophir Silver, Sierra Nevada, and Mexican G. & S. companies.

MEXICAN MILLING CO. NEVADA

Offices: 787 Mills Bldg., San Francisco, Cal., and Virginia City, Nev. Is an association of the companies using the mill of the Mexican G. & S. Mining Co.

MIDDLE MINES ASSOCIATION NEVADA

Address: H. L. Slosson, Jr., pres., Russ Bldg., San Francisco. Alexander Wise, mgr., Thos. F. McCormic, supt.

Is a consolidation of the Best & Belcher, Bullion G. & S., Chollar, Exchequer G. & S. Gould & Curry, Hale & Norcross, Potosi and Savage companies, operating jointly to develop the central section of the Comstock lode The associated companies are separately described.

In mid summer of 1921, Alex. Wise is reported to have taken under option the mineral rights of the entire group and to have interested Philadelphia capital. Albert Burch was retained to investigate the project and is said to have reported favorably after 4 months work, but option was relinquished. In January, 1922, it was announced that D. M. R. Ward, pres. of Tonopah Ext., and associates, were preparing to expend $150,000 in sampling and examining the mines under guidance of Rogers, Mayer & Ball.

MIDLAND DIVIDE MINING CO. NEVADA

Address: W. V. Richardson, Tonopah, Nev.

Officers: T. L. Oddie, pres.; A. E. Kane, v. p.; W. V. Richardson, sec.-treas., with D. T. Donovan and P. J. Donovan, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; par 10c.

Property: 40 acres adjoining California Divide, between the Operator and Portland groups, 9,000' S. of Gold Mountain.

MIDWAY DIVIDE MINING CO. NEVADA

Office: 206 Nixon Bldg., Reno, Nev.

Officers: Dr. J. L. McCarthy, pres.; R. W. Cattermole, v. p.; J. F. Kunz, sec.-treas., with R. G. Myrtle and R. P. Burris, directors.

Inc. May, 1912, in Nevada. **Cap.** $1,500,000; $1 par; assessable; 468,800 treasury shares issued out of total of 650,000.

Property: 4 claims, 50 acres, adjoining the Dividend and Divide Consolidated.

MILL CITY TUNGSTEN CO. NEVADA

Address: W. J. Loring, Crocker Bldg., San Francisco, Cal. Thos. Sutton, mgr., Mill City, Nev.

Inc. 1918, in Nevada. **Cap.** $500,000; $1 par. A 75% stock interest is owned by the **Pacific Tungsten Co.** (q. v.).

Property: a tungsten-bearing group near Mill City, Pershing county, developed by 400' of tunnels and drifts. Ore occurs in a vein said to average 4' in width with good value. Shipments began in 1917 and during part of 1918 were at rate of 30 tons of scheelite per day. Ore was treated in the Pacific mill after October, 1918.

Operations ceased in February, 1919, due to the collapse of the tungsten market. A large sum of money was spent on property to meet war demands; in this connection the Minerals Relief Commission's auditor, in his report on the Pacific company's claims, allowed $125,000 as valuation of its interest in, and $6,909 for development of the Mill City company. For other figures see **Pacific Tungsten Co.**

Presumably idle.

MILLTOWN EXTENSION GOLD MINING CO. **NEVADA**

Address: Goldfield, Nev.

Inc. 1915 in Nevada. **Cap.** $1,500,000; $1 par; 800,000 shares in treasury at last accounts.

Company was organized to secure title to the Louis Fraction and Milltown Extension claims at Goldfield, which were explored on the 700' level by a crosscut run from the Yellow Tiger Co.'s shaft to the property of the Red Lion Cons. Mng. Co., which lies on the opposite side of Milltown Ext.

The Milltown Extension and the Jerry Johnson Mng Co. each owned a half interest in the Cripple Creek Deep Leasing Co., operating a lease on the Jerry Johnson mine at Cripple Creek, Colo. During the war it was impossible to operate the lease at a profit and it was forfeited after the expenditure of all treasury funds. Property holdings of the company are not favorably regarded.

MILLTOWN MINING CO. **NEVADA**

Property: 3 claims in Goldfield district, Esmeralda county, taken over in merger formed in 1920, by **Goldfield Deep Mines Co.**, which see.

MINA COPPER SILVER MNG. CO. **NEVADA**

Address: Mina, Nev.

Officers: A. E. Bettles, pres.; Wm. Bouchard, v. p., and Geo. W. Meyers, sec.-treas.; also directors.

Inc. July 24, 1919, in Nevada. **Cap.** $150,000, 10c par.

MINA GOLD MINES CO. **NEVADA**

Address: Tonopah, Nev.

Officers: P. H. O'Neil, pres.; J. H. Miller, v. p.; J. E. Adams, sec.-treas.; Allen Rives, asst. sec.-asst. treas., and Wm. Watters, directors.

Inc. May, 1919, as a reorganization of the Mineral County Gold Mines & Milling Co. **Cap. $150,000;** 10c par.

Property: 2 miles W. of Simon mine, in Bell district, Mineral county, shows a 2 to 4' vein at contact of andesite and lava. Ore is calcite or quartz carrying $7.50 in gold.

Development: by 200' tunnel and 100' incline shaft. Produced $4,400 when first opened in 1912, using a crude cyanide plant. Reported in 1921 that mine was to be again operated.

MINA GOLD MINING EXTENSION CO. **NEVADA**

Same office and directorate as Mina Gold Mines Co. whose property it adjoins.

MINA MERCURY CO. **NEVADA**

Address: Mina, Nevada.

Property: a quicksilver mine, 15 miles E. of Mina, in Pilot Mtns., Mineral county. Cinnabar ore is said to run about 10% mercury. Four "D" type retorts were installed in 1921, having a capacity of 6,000 tons of ore to produce 4 flasks of quicksilver per day.

MINA REWARD GOLD & SILVER MNG. CO. **NEVADA**

Address: 223 N. Virginia St., Reno, Nev.

Inc. June 5, 1919, in Nevada, by T. R. Hofer, L. T. Booth, J. J. Rossiter, V. S. Andrus, and A. B. Gudmendsen.

Cap. $150,000; 10c par.

MINERAL BELL MINING CO. **NEVADA**

Office: 318 Clay Peters Bldg., Reno and Mina, Nev.

Officers: L. Little, pres.; with W. G. Adams, Albert A. Baroni and Tom Sharpe, directors. A. N. Salisbury, sec.-treas.; F. B. House, mgr.

Inc. May 3, 1919, in Nevada. **Cap.** $150,000; 10c par; 110,000 shares issued. Annual meeting, first Monday in May.

Property: 11 claims, 200 acres, in Simon (or Bell) mining district, near Mina, Mineral county. **Ore:** occurs as a contact deposit in lime and rhyolite, said to average $16-$18 in lead, silver, gold.

Equipment: burned in 1919, has been replaced, but development work was suspended April, 1920.

MINERAL HILL CONSOLIDATED MINES CO. **NEVADA**

Mail returned from Mineral Hill, Nev. President's address: Montgomery, Ala.

Officers: Frank Stollenwerck, pres.; S. F. Stollenwerck, v. p.; Daniel Pratt, sec.; J. S. Wilcox, treas, at last accounts.

Inc. 1906, in Arizona. **Cap.** $1,000,000; $1 par; 713,000 issued; $100,000 6% bonds authorized; issued, $2,500.

Property: 11 claims, 3 patented 135 acres, in Mineral Hill district, Eureka county, Mine discovered 1869 was worked from 1871 to 1887, when it was closed because of the drop in silver; re-opened in 1906. Production of early days estimated to have been $6,000,000, practically all silver.

Geology: ore occurs in fracture zones, along strike faults in blue dolomitic limestone and carbonaceous shale. Ore carries silver, which occurs as argentite, with some gray copper, galena and gold. There is about 2,000' of underground development. Samples of over 4,000 tons varied from 3.8 to 177 oz. silver and 0.5% to 0.7% lead, averaging 53.5 oz. silver and 0.04 oz. gold.

Was producing in 1919; 6 additional claims were to be patented in 1921

MINERAL ZONE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: R. M. Hampton, pres.; Bert Allen, v. p.; V. M. Place, sec.-treas., with Henry Hanson, T. F. Bannigan, and H. H. Hill, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 6 claims, 1¼ miles S. of Goldsmith Divide and over 4 miles S. E. of Gold Mountain.

MINERVA TUNGSTEN CORPORATION **NEVADA**

Office: 330 Investment Bldg., Los Angeles, Cal., and Pioche, Nev.

Officers: Bryant Mathews, pres.; J. B. Van Winkle, v. p.; O. Werner, sec.-treas., with K. G. Gillette, A. M. Chase, and O. A. Knox, mgr., directors

Inc. 1918, in Nevada. **Cap.** $350,000; par $1; 250,000 issued.

Property: 17 claims, 340 acres, in Minerva district, White Pine county, 55 miles S. E. of Ely and 77 miles N. of Pioche.

Examined by F. L. Hess, F. B. Weeks, E. R. Pembroke, J. B. Winwood, J. Nelson Nevius, S. R. Porter, O. A. Knox and M. van Sicklin.

Geology: scheelite ore occurs in a quartz vein in limestone, dipping 55°, with E. W. course and 9 to 50' wide. Shoots are up to 750' long. Ore carries 1 to 4% tungstic acid.

Development: by 100' shaft and tunnels 200 to 350' long. Greatest depth is 150'. Workings amount to 3,000'.

Ore blocked out is estimated at 25,000 tons, with 100,000 tons probable.

Equipment: gas engines, compressor, drills, 3½-mile pipe-line for water, 150-ton gravity concentrating mill, camp for 50 men, auto-trucks, etc.

Not operating 1919-20.

MINES DEVELOPMENT CO. OF NEVADA **NEVADA**

Idle for several years past.

Address: Lovelocks, Humboldt county, Nev.

Officers: John T. Reid, pres., treas, and gen. mgr.; Paul G. Reid, v. p., sec. and supt., with R. C. Moore, J. Theis, Peter Anker and W. H. Rawlis, directors.

Inc Sept. 1, 1904, in Arizona. **Cap.** $750,000; $1 par; issued, $454,000.

Property: 5 claims, 100 acres, in the Juniper Mountain district, said to show various fissure veins along side of quartz porphyry dikes, intrusive in monzonite. Veins run N. 20° W. and are nearly vertical. The vein developed averages 5' wide, is traceable for 2,000' and proven to 170' depth. Small seams of ore found at or near surface show chalcocite, bornite and tetrahedrite, giving average assays of 2% copper, 5 oz. silver and $1 gold per ton.

Development: by a 500' tunnel.

Company also has some claims under option in the Table Mountain district, Churchill county. Two cars of sorted ore are said to have returned

22 and 26% copper. Mine is remote from rail and only assessment work wes done.

Company owns 60,000 shares of the **Buffalo Valley Mines Co.**, which see.

MINES SELECTION CO. NEVADA-MEXICO

Office: Room 724, 25 Broad St., New York.

Directors: C. L. Despard, W. J. Loring, Fredrick G. Corning and Geo. B. Hutchings, sec.-treas.

Cap. $300,000; 10c. par.

According to a circular letter, June 15, 1920, sent by Weir Bros. & Co., New York brokers, to stockholders of **Toggery Divide Mng Co.** and **Gibraltar Silver Mines Co.**, the M. S. Co., is solely a holding and development company organized to take over outstanding shares of the two Nevada companies, 1,300,000 and 1,200,000, respectively, on a share for share exchange basis, plus fee of 3c. per share. The same offer was made on July 7, 1920, to stockholders of the **Nevada Honey Bee Mines Co.**

The letter of June 15, announces also that option on 2/3 control of La Perla Mng. Co. "is to be taken over", but in July, 1921, reported that negotiations are being held in abeyance pending stabilization of the Mexican situation. La Perla mine is advertised as offering a fair chance to recoup losses sustained in Toggery and Gibraltar.

Company will ultimately take over also the Orizaba Mng. & Dev. Co., now under the control of the Diamondfield Black Butte Reorg. Mng. Co.

See all of these properties under individual titles.

MINNESOTA-NEVADA COPPER MINES CO. NEVADA

Formerly the Wabuska Copper Mines Co.

Address: Otto Taubert, Yerington, Nev.

Inc. in Nevada. **Cap.** $3,000,000; $1 par.

Property: 600 acres in Douglas county and 160 acres in Lyon county, near Wabuska. The Minnesota group is said to show a contact deposit between limestone and granite of about 20' average width, carrying sulphide ore.

Development: by 2 shafts, 1 of about 500' depth, showing ore said to average better than 3% in copper tenor. Reported that company is developing a large iron-ore deposit. Surveys completed for driving a half-mile drainage and transporation tunnel.

MINNESOTA NEVADA INVESTMENT CO. NEVADA

Address: Fairview, via Fallon, Churchill Co., Nev.

Officers: Alf. Patterson, pres.; O. S. Deringer, sec.; M. P. Ryan, treas.; A. A. Day, gen. mgr.; Chas. A. Peet, mgr. engr.

Inc. Aug. 6, 1906, in Oklahoma. **Cap.** $1,000,000; $1 par; issued 690,000. Annual meeting, Aug. 6.

Property: 28 claims and 160 acres placer ground, total about 700 acres, on Chalk mountain. 3½ miles N. of Fairview. Claims said to show several orebodies, of which 3 are 6' average width and proven to depth of 126', showing 2% copper, 32% lead, 26 oz. silver and $8 to $20 gold per ton.

Development: by 3 shafts, deepest 126'. Company succeeded to the property of the Corinthian Mining Co. and Chalk Mountain Copper Co. Idle several years.

MIZPAH DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; F. M. Manson, v. p.; J. E. Adams, sec.-treas., with J. G. Kirchen, P. H. O'Neill, and Allen Rives, directors

Inc. March, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable.

Property: 9 claims, 4,500' N. E. of Gold mountain. Has breccia exposures and rhyolite dikes, with N. E. fissures that are to be opened on Boston & Mizpah claims. **Development:** by shaft, machinery erected August, 1919.

MIZPAH EXTENSION CO. OF TONOPAH NEVADA

Offices: 1513 Walnut St., Philadelphia, Pa., and Tonopah, Nev.

Officers: C. E. Knox, pres.; Lambert Ott, v. p.; C. F. Griffith, sec.; W. P. M. Braun, treas., with J. F. Braun, H. W. Davis, and M. B. Cutter, directors.

Inc. in Delaware. **Cap.** 2,000,000 shares; 1,702,092 issued. Listed on San Franciso and Salt Lake City Exchanges; traded in on New York Curb. Expenses for 1920 were $2,170 and cash balance Dec. 31, $1,223.

Property: 24 claims at Tonopah, adjoining the Tonopah Mining and Tonopah Belmont properties on the N. E. Mine under lease to Halifax-Tonopah Mining Co. (q. v.) **Ore:** silver. For geology see U. S. G. S. Prof. Paper 42, Geology of the Tonopah Mining District, by J. E. Spurr.

Development: 1,000′ shaft, with a winze from the 1,000′ to the 1,340′ level. The West End Cons. Mng. Co., which see, controls operations in the Halifax and thus is also the operating company for Mizpah Ext.

MOGUL MINING CO. **NEVADA**

Dead. See same title under North Carolina. **Inc.** Oct. 11, 1916, in Delaware. **Cap.** $1,000,000; $1 par; 932,500 shares issued. Was listed on New York Curb as a prospect in 1917, and the shares skyrocketed by rank manipulation.

Property: in the Rawhide camp, was sold by the sheriff for debt in 1918, and bid in by former president, Alexander S. Proskey, who organized the **Seminole-Regent Mining Co.**, which see.

MOHAWK DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; William Watters, v. p.; J. E. Adams, sec.-treas., with A. G. Raycraft and B. F. Baker, directors.

Inc. March, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable; 750,000 outstanding. Listed on San Francisco Stock Exchange. Transfer office, Tonopah, Nev.

Property: the Stewart group of 4 claims and 2 fractions, 100 acres, N. E. of Divide Consolidated and 3,000′ N. of Tonopah Divide. Promising veins outcrop on property.

Equipment: 40-h. p. electric hoist, etc.

Idle.

MONARCH DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: a group of claims (Sunbeam and others) 2½ miles north of the Tonopah Divide.

MONARCH PITTSBURG MINING CO. **NEVADA**

Address: P. O. Box 11, Tonopah, Nev.

Officers: H. C. Brougher, pres.-gen. mgr., 6150 Harwood St., Oakland, Calif.; W. J. Douglass and C. C. Boak, v. p's.; E. J. Erickson, sec.-treas.-res. agt.; with E. W. Blair, directors. S. C. Mitchell, asst. sec.-astt.-treas.; John R. Jones, supt.

Inc. in Nevada. **Cap.** $1,500,000; $1 par; fully paid; assessable; assessment No. 16 of 1c per share levied Sept. 21, 1921; total assessments to this date, 16c. Stock transfers made at company's office Tonopah Banking Corp., registrar. Stock listed on San Francisco Stock Exchange. Annual meeting, Jan. 15, 1921.

Balance sheet for 1920 shows: assets, $1,699,152, of which property is $1,517,237; plant, $8,600; treas. stock, $90,159; and cash $31. Liabilities include assessments, $199,078. Surplus account shows a deficit of $82,163. Operating expenses for 1920 were $29,029, of which labor was $15,423.

Property: 3 patented claims at Tonopah, adjoining Tonopah Extension on south and west. Claims show veins with silver ore.

Development: by vertical shaft, 1,100′ deep. Geological conditions were so extremely favorable that it was decided to prospect in the extreme western ground; also north of the shaft. Highly silicified West End rhyolite was in the 1,003′ drift and soon a typical Extension breccia was cut. Work along the contact for 180′ disclosed a vein 43′ wide of low value. Work in

1919-20 was confined to the 600′ level in an endeavor to find the rhyolite-trachyte contact with the possibility of uncovering the extension of the Ohic vein; total advance, 1.053′ in 1919, and 1,291′ in 1920. Developments have apparently not been encouraging.

MONITOR-BELMONT MINING CO. **NEVADA**

Mail returned from Belmont, Nev.

Officers: G. A. Nelson, pres.; Hugh W. Nelson, sec.-treas.

Property: 33 claims in Belmont district, 51 miles from Tonopah. District first opened in 1864 and yielded over $15,000,000 of silver to 1885. Mines were then closed until 1906, but it took 8 years to secure title to the present holdings. A mill was erected in 1915 and started treating old dumps in 1916, but closed down in 1917.

Geology: quartz veins and lenses occur in slate and limestone, near their contact with intrusive silicious granite. Intruded rocks have been altered to mica schists and jasperoid, the minerals occurring in the quartz as bunches. Ore is chiefly an argentiferous, antimonial copper ore, with lead and silver chloride, etc.

Development: by three 500′ shafts, drifts and crosscuts.

Equipment: hoist, compressor and 120-ton mill, including ten 1,600-lb. stamp with flotation plant.

The mine was under one year lease from August 1, 1918, to the Nevada Wonder Mng. Co., which see. To March 1, 1919, $85,644 had been expended and further work was done until September, when the lease was relinquished. From reliable information received, we understand that this old mine is not worth further investigation.

MONTANA-TONOPAH MINING CO. **NEVADA**

Tonopah, Nev.

Officers: Chas. E. Knox, pres., 300 First Nat'l Bank Bldg., San Francisco; Henry D. Moore, v. p.; M. E. Albert, sec.-treas., with Hugh H. Brown, E. A. Keenan, J. H. Evans, J. M. Wynn and Thos. J. Lynch, directors.

Inc. in Utah, in 1912, re-incorporated Jan. 31, 1912, in Delaware. **Cap.** $1,000,000; $1 par; outstanding, 998,942. Listed on San Francisco Exchange. Annual report for year ending December 31, 1920, shows: receipts, $121,307; disbursements, $142,108; cash $15,824.

Dividends: paid to April, 1914, total $530,000; none since.

Property: 15 claims, about 190 acres, traversed by the Mizpah fault and showing silver ore. In 1916, the greater part of claims were deeded to the **After-All Mines Co.**

Development: 865′ shaft and over 15 miles of workings. Mine was closed down and the 40-stamp mill ceased operating in 1914, due to exhaustion of ore reserves and low price of silver. Since then a number of lessees have been working in the mine, apparently with success. During 1918 a vein 4 to 7′ wide was opened up on the Petrovich lease, running from $250 to $1,000 per ton, shipments averaging $400 per ton; production continued through 1919.

Company is one of the oldest in the Tonopah district, and has had a checkered career. In spring of 1921, the property was reported leased to the Gypsy Queen Mng. Co., adjoining on the east.

MONTANA YERINGTON COPPER CO. **NEVADA**

Yerington, Lyon county, Nev.

Property: a group of claims said to show orebodies in porphyry with 4-7% copper, unlike other Yerington deposits.

Development: by 420′ shaft showing chalcopyrite ore at bottom. The 160′ level east was run 500′ to daylight, making a main working tunnel. Crosscut on 400′ level said to encounter ledge 6-7′ thick, showing shipping ore in face. Under option to Geo. Wingfield, in 1913, and Mason Valley Mines Co., in 1914, but was relinquished. Messrs. Archer, Ehrman and Kremmel controlled the company at last accounts.

Output in 1916 was 2,050 tons of 6% ore. Operated by lessees in 1917-18.

MONTE CRISTO MINES CO. NEVADA

Inc. 1919, to take over holdings of Chas. Butters Co., Ltd., London.

Property: 700 acres and a millsite in Storey county, near Virginia City.

MONTEZUMA SILVER MINES CORPORATION NEVADA

Office: Goldfield, Nevada.

Officers: H. B. Nedham, pres.; J. G. Thompson, v. p.-res. agt.; Joseph Hover, sec.; Robert Dixon, treas.; Duncan Cameron, asst. treas.; E. S. Giles, mine mgr.

Inc. Oct. 5, 1917, in Nevada. **Cap.** $1,000,000; par $1; about 150,000 in treasury.

Property: 9 patented claims, 178 acres, in the Montezuma district, Esmeralda county, about 16 miles S. W. of Goldfield (nearest rail point), and 30 miles S. W. of Tonopah. Properties were operated as individual mines and produced heavily 40 years ago, the ore being hauled by mule teams 200 miles to Austin for smelter treatment.

Of these old mines, the present company is opening the Arizona, Caracas and Bullion. The claims are traversed by 10 veins, 1′ to 10′ wide, in limestone or at contact of quartz-monzonite porphyry and limestone; the ores, from $10 a ton up carry silver, lead, copper and gold; value is largely in silver.

Development: prior to resumption of operations by the present company in 1917, 9,000′ of development had been performed, the 300′ Bullion shaft being the deepest; dumps are said to contain many thousands of tons of milling ore. A new shaft sunk on the Arizona to depth of 400′ (July, 1920), is to be continued to 800′, and a 200′ shaft on the Caracas is being reopened. A small amount of high grade ore was shipped from the Arizona in 1919 and 1920.

MONTGOMERY-SHOSHONE CONS. MINING CO. NEVADA

Address: W. G. Benham, asst. sec., 30 Church St., New York City.

A holding company with subsidiaries at one time operating in Bullfrog district, Nye county, all activities suspended March, 1911. Annual statement showed cash on hand. Dec. 31, 1920, of $180.

MORNING GLORY DIVIDE MINING CO. NEVADA

Mail returned from only known address: no information available except that company was incorporated.

MORRILL SILVER MINING CO. NEVADA

See Silver Cons. Mines Co.

MORRIS SYNDICATE MINES NEVADA

Address: W. C. Losey, Paulsen Bldg., Spokane, Wash.

Property: 6 claims, 23 miles N. E. of Mina, Mineral county, and near the Olympic Mines Co.'s property, a producer.

Geology: shoots 2 to 20′ wide reported to occur in contact vein in rhyolite and andesite. Ore said to assay $30 gold per ton. Developed by 60′ shaft.

MT. VERNON M. & M. CO. NEVADA

Address: G. A. Bice, pres., Box 166, Sparks, Nev. T. K. Byers, v. p.; S. O. Trescott, sec.-treas., Box 121, Reno, Nev.

Property: 6 claims at Tokop, an old camp with a production record. 30 miles S. of Goldfield, 8 miles E. of Hornsilver, Esmeralda county, and 9 miles from the T. & T. railroad. An 8′ quartz vein, carrying at the surface $30 in gold and 3 oz. silver, has been reopened.

In 1920, company acquired 3 claims in Peavine district, Washoe county. N. of Black Panther Mng. Co. and 4 miles from Reno.

MUNCY CREEK MINING CO. NEVADA

Offices: Judge Bldg., Salt Lake City, Utah, and Aurum, Nev.

Officers: C. D. Ray, pres.; S. A. Greenwood, sec., with Jos. Crosby, directors. H. L. Parker, gen. mgr.

Property: 23 claims, a millsite and the Muncy Creek ranch at Aurum, White Pine county.

Ore: in the Grand Deposit mine the main vein shows carbonate zinc ore on the footwall and lead-silver ore on the hanging, with an intervening lens of copper sulphide. Ten known oreshots are claimed to have sampled 6% copper, 8 oz. silver, and 10-60% lead.

Development: by 240′ Grand Deposit incline shaft. **Equipment:** includes 25-ton mill, calcining plant, hoist, office and other buildings.

In 1920, company brought suit against claim jumpers, to quiet title, and was successful. Reported that ore reserves amount to 43,000 tons, assaying 5% copper, 10% lead and 4 oz. silver, also 50,000 tons of zinc carbonates; exploitation of latter is comtemplated.

MUTUAL DIVIDE MINING CO. **NEVADA**

Presumably defunct. Equipment sold to Knox Divide in 1921.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par. Security Transfer & Registrar Co., New York, transfer agt.

Property: a group of 5 claims 2½ miles S. of the Tonopah Divide. Was equipped with hoist, etc.

The reputation of this company depends more upon its unenviable record on the Curb rather than its "priceless holdings" in the Divide district. Early in 1920, company was reorganized and became the "Mutual Divide of Massachusetts, Trustees", with alleged holdings of valuable Texas and Indiana oil lands. Gushers were reported and stock was so manipulated that shares of 10c par were selling at $1-$2. Geo. L. Ware & Co., a Boston brokerage firm, was the evil genius in this case; the head of the firm was arrested and indicted by the Federal grand jury in October on the charge of misusing the mails in a scheme to defraud, among other things, defaulting on the payment of promised dividends; he was convicted in February 1921.

MYRA DIVIDE MINING CO. **NEVADA**

Addresses: 265 Russ Bldg., San Francisco, and c/o A. E. Lowe, res. agt., Tonopah, Nev.

Officers: L. E. Browne, pres.-mgr.; Hermann Zadig, v. p.; Chas. D. Olney, sec., with Edw. S. Van Dyck, E. P. Baker and A. E. Lowe, directors.

Inc. May 3, 1919, in Nevada. **Cap.** $150.000; 10c par; 750,000 treasury shares. Listed on San Francisco Stock Exchange.

Property: the Shoveler group, 4 claims, 70 acres, purchased in June, 1919, over 3 miles slightly S. E. of Gold Mountain.

In spring of 1920, acquired Good Luck group, 4 claims, adjoining the Silver Reef, in Unionville district, Pershing county. Said to show 1,500′ of the Stewart vein (exploited in earlier days) with 3 ore shoots, carrying 20 oz. silver ore; vein width, 2′-10′. Reported to have been transferred to company by the directors without cost to it.

Development: at Divide, by shaft down 200′ in 1919. Cut bunches of ore at 16′, but is bottomed in andesite. Crosscutting on the 200′ level said to show good mineralization. Equipped with hoist.

Old workings on Good Luck total 1,000′, largely tunnels; extension of old tunnels to give a 400′ back is now in progress. A small amount of ore has been shipped to nearby mill of the Arizona Silver Mines.

NATIONAL DIVIDE MINING CO. **NEVADA**

Office: 312 Clay Peters Bldg., Reno, Nev.

Officers: L. H. Bartholomew, pres.: A. G. Miller, v. p.; A. A. Smith, sec.-treas., with S. Mozingo and H. D. Danforth, directors.

Inc. in Nevada. **Cap.** $150.000; shares 10c par.

Property: 5 claims, nearly 3¾ miles S. E. of Gold Mountain, said to show a strong outcrop. Examined by P. R. Whytock.

NATIONAL LEASING CO. **NEVADA**

A George Graham Rice promotion which went the way of all things human.

Inc. 1917, in Delaware. **Cap.** $2,000,000; $1 par.

Company had a 5-year lease on property of the Charleston Hill Gold Mining Co., at National, Nev. It was claimed that the gold-bearing vein of the National Mines Co. continued through the National Leasing claims for at least 700', and that a 3,000' tunnel already driven was near the vein. George Graham Rice underwrote 1,000,000 treasury shares and guaranteed to provide $5,000 per month for development, accepting stock therefore at 15c. per share, less 5%. This money was considered sufficient to do 10,000' of work in 2 years. Only about $40,000 was actually expended on the property by Rice.

In February, 1918, the Leasing company was unable to meet payments and the lease was forfeited. An attempt was made to reorganize and an option obtained on Las Palmas silver-lead mine at Sonora, Mexico, near the Lampazos Silver property, another promotion under the same management that is now defunct.

Apropos of the stock flotation by another "National Leasing Co." alleged to hold Texas oil and gas leases, the **New York Curb**, under date of Oct. 23, 1920, refers to the defunct Rice project in the following words: "Though the memory of most investors is not very long, the painful memories connected with the fleecing of the public with this original National Leasing Co. will be long enough to keep it clear of any and all new enterprises bearing the same title."

NATIONAL MINES CO. NEVADA

Office: 1025 Peoples Gas Bldg., Chicago, Ill. **Mine office:** National, Humboldt county, Nev.

Officers: F. G. Fabian, pres.; L. G. Campbell, v. p.; C. W. Buckley, sec.; E. A. Bern, treas.; H. L. Hollis, cons. engr.

Inc. in Wyoming. **Cap.** $1,000,000; $1 par; 923,558 shares outstanding.

Property: 6 patented claims and a fraction at National, Humboldt county, shows gold-silver ore in quartz fissure veins, traversing a rhyolite-andesite formation. Orebody runs N.-S. and dips 45-70° W. Geology and vein system fully described in U. S. G. S. Bull. 601.

Development: by 10 adits from 150' to 2,500' in length and 3 shafts, 450', 350' and 800' deep. Underground workings total about 7 miles.

Equipment: includes 2 electric hoists, aerial tram, 100-ton mill for amalgamation and concentration of ore. Mill treated 4,463 tons of ore in 1912; 47 tons in 1913; 2,763 tons in 1914; 18,622 tons in 1915; a total production of 36,000 tons, or $6,000,000, mainly from the National gold shoot, intercepted at depth of 40' below the surface and which averaged $20-$30 to the pound.

In June 1917 a lease on company's plant was given the National Leasing Co. to enable it to explore the ground through the National Mines. Payments were not met, and the company recovered its holdings with the aid of a sheriff in February, 1918. Since then operations have been continued by several sets of lessees in a small way, and small shipments of rich ore reported being made.

NATIONAL NEVADA MINING CO. NEVADA

Address: T. J. Defenbaugh, supt., National, Nev.

Property: lies north of the National mines, Humbodt county, developed by tunnel 800' long in August, 1921.

NATIONAL TREASURE MINES CO. NEVADA

Office: Boston Bldg., Salt Lake City, Utah. **Mine office:** National, Nev.

Officers: J. G. McAllister, pres.; Judge H. H. Henderson, v. p.; Dr. L. G. Wheeler, sec.; Robt. Noyes, treas., with John Pingree and Daniel Alexander, directors.

Property: 4 claims to the south of the National mine at National, Humboldt county, developed by 800' tunnel, said to show gold and silver ore in andesite.

NELSON GROUP **NEVADA**

Address: Mountain City, Nev.

Property: in Centennial district, Elko county, 1¾ miles from Mountain City, shows fissure veins, including the Standard, 1 to 3′ wide, in granodiorite and limestone. The ore is quartz with sulphides of lead, zinc and copper, carrying good values in silver and gold. Developed by 2 adit levels, 100′ apart vertically, with 4,000′ total workings. Equipped with 9-stamp mill. Apparently active, 1919-'20.

NENZEL CROWN POINT MINING CO. **NEVADA**

Office: 704 Market St., San Francisco, Calif.

Described in Vol. XIII. Contemplated merger with Rochester Nevada Silver Mines Co. (q. v.) did not become effective. Became bankrupt, November, 1920, and was sold out to satisfy bonded indebtedness. Rochester Silver Corp. (successor to Nevada Silver Mines Co.) owns 1,222,980 shares of 1,720,800 outstanding.

NENZEL DIVIDE MINING CO. **NEVADA**

Address: S. O. Trescott, Box 121, Reno, Nev.

Officers: J. F. Nenzel, pres.; Abraham Wise, v. p.; S. O. Trescott, sec.-treas., with J. J. Murphy and S. N. Snyder, directors. J. C. Huntington, cons. eng.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: Tom Boy 1 and 2, Eldorado 1 and 2, and Cresson 1, 2, 3, and 4 claims, S. E. of the Tonopah Divide and S. of the Rosetta. Surface prospects considered good. Company also owns some claims over 3 miles N. E. of Gold Mountain.

NEVADA & BOSTON COPPER CO. **NEVADA**

Address: care H. B. Lind, Mina, Nev.

Owns all the outstanding stock of the **Iroquois Copper Co.** (q. v.), which has title to a copper property in Santa Fe district, Mineral county.

Inc. in Wyoming. **Cap.** $2,500,000; par $1: 1,000,000 shares issued and held intact by three stockholders; 10,000 sold; 1,490,000 in treasury.

NEVADA AUSTIN MINES CO. **NEVADA**

Defunct. **Address:** W. C. Pitt, Lovelocks, Nev.

Property: a 100-ton cyanide plant at New Pass, 27 miles W. of Austin, Lander county, sold February, 1919, to satisfy a $30,000 mortgage held by the president, W. C. Pitt.

NEVADA BELLEVUE COPPER CO. **NEVADA**

Address: Contact, Nev.

Property: in the Contact district, Elko county. Oxidized copper-gold-silver ore was shipped in 1918-1919. Apparently active in 1920-'21 also.

NEVADA BIRCH CREEK MINING CO. **NEVADA**

Office: Austin, Nev.

Officers: J. F. Bowler, pres. and G. L. Belanger, sec-treas.

Inc. Oct., 1919, in Nevada. **Cap.** 1,500,000 shares.

Property: 8 claims in Birch Creek district, Lander county, 12 miles S. of Austin. The surface shows a wide contact vein between granodiorite and limestone; the ores assay $3-$10 in gold. The ground is being developed by 2 tunnels, 210′ and 605′ (April, 1921), with intention of erecting mill when sufficient ore is blocked out.

NEVADA BLACK HAWK SILVER MINING CO. **NEVADA**

Office: 232 North Virginia St., Reno, Nevada.

Officers: C. E. Flagg, pres.; Chas. G. Sadlier, v. p.; A. D. Bird, sec.-treas.; O. W. Whiting, E. M. and H. M. Hamlin, directors.

Inc. July, 1919, in Nevada. **Cap.** $75,000; par 5c; 750,000 shares of promotion stock outstanding.

Property: consists of 6 claims, viz: Black Hawk, Gray Hound, Glance, Glance No. 1, Hamlin No. 1 and 2 with all claims joining. The Black Hawk claim was worked in the 70's and early 80's, and has produced over $250,000 in silver, lead, and gold. All of these claims have large outcrops,

and samples run as high as $250 to $300 per ton. The property is in Silver Star district, Mineral county, adjoining the Endowment mine on the S. and the Silver Gulch Mining Co. on the S. E., 2 miles north of Marietta and 17 miles S. W. of Mina.

Development: by 200′ of shaft and tunnel work; 500′ of tunnel will crosscut the Black Hawk vein, and Hamlin vein at a depth of 300′.

Assessment work only performed in 1920.

NEVADA BONANZA COPPER CO. **NEVADA**

Main office: 159 S. Main St., Salt Lake City, Utah. Mine at Morning-Star City, Lyon county, Nev.

Officers: Freeman Morningstar, pres. and gen. mgr.; Sereno B. Tuttle, v. p.; Walter C. Tuttle, asst. sec.-asst. treas., with Robt. J. Deighton, H. P. Clark, W. D. Mathis, Thos. J. N. Nippur, M .S. Woolley and P. L. Williams, directors.

Inc. 1906. **Cap.** $2,100,000; $1 par; 1,448,000 issued.

Property: 12 claims, 7 patented, 250 acres, adjoining the Nevada Douglas, about a third of a mile from Ludwig, on Nevada Copper Belt railroad, in the Yerington district. Three fissure veins are said to cross the property; the Green Dutchman vein being about 5′ wide and assaying well in gold and copper. The vein on the Copper King claim has been developed by a 3-compartment, 115′ shaft, said to show copper ore its entire depth. No record of recent operations obtainable.

NEVADA-BULLION MINES CO. **NEVADA**

Mine near Bullion, Elko county, Nev. Company often called the Bullion-Nevada Mines Co., owns a group of claims adjoining the Nevada-Bunker Hill Mining Co. holdings on the N., and a half interest in the Kerr & Peterson lease on that company's ground.

Development: by a 1,980′ tunnel, which will be extended 200′ further to cut the vein opened in old mine workings. Lessees were shipping ore, 1916, but property is now tied up in litigation.

NEVADA BUNKER HILL MINING CO. **NEVADA**

Address: Box 477, Elko, Nev. Mines at Bullion, Nev.

Officers: J. A. McBride, pres.; W. W. Booher, v. p.; Frederick Davis sec.-mgr.; John Henderson, treas., with O. T. Williams, S. E. Davis, and G. S. Brown, directors. S. E. Davis, supt.

Inc. April 28, 1905, in Nevada. **Cap.** $2,000,000; $1 par; 800,911 shares in treasury, December, 1920. Annual meeting, first Wednesday in May.

Receipts from all sources for 1920 were $3,965, all expended during year; total outlay has been $90,000. Including $600,000 for developed ore, the assets, Jan. 1, 1920, were $2,095,000; liabilities show $25,000 accounts payable.

Property: 22 claims, 6 patented, including the Bullion, 320 acres, in Railroad district, Elko county, 28 miles S. W. of Elko. Claims said to show copper-silver ore in porphyry contacts, silicious copper ore in porphyry intrusions, and silver-lead ore in limestone. Property has been reported on by Chas. E. Van Barneveld, H. L. Huston, and by Chas. H. White of Harvard University.

Company has also a bond and lease on the patented Standing Elk, Hoffman and Cleveland mines.

Development: by numerous tunnels and shafts and a deep tunnel 3,410′ long, to tap veins at a depth of 500 to 800′ below deepest workings, 150′ further work expected to bring it to the Tripoli and 600 to 800′ further to the Standing Elk fissure. Workings total about 3 miles.

Production: by lessees from workings 800′ above main tunnel; prior to 1914, 3,657 tons of ore; 1914 to end of 1919, 8,349 tons of a gross value of $286,469.

In order to provide funds for further development work, stockholders were asked to return a portion of their holdings into the company treasury or pay 10c. a share assessment before October 1, 1919, but, according to the

1920 annual report, a contract has been made for sale of 200,000 treasury shares for this purpose.

NEVADA-BUTTE MINING CO. **NEVADA**

Probably dead. Martin Benson, pres., at last accounts.

Inc. 1913. **Cap.** $1,000,000; shares 25c par.

Property: 15 claims in Dolly Varden and Mizpah districts, Elko county, 75 miles from Ely, said to be on the northern end of a great belt of mineralized porphyry and to carry fissure and contact deposits.

Development: by several shallow shafts, shows mineralization, but property still in prospect stage. Drilling on neighboring areas reported to have shown commercially mineralized porphyry.

NEVADA-CALUMET COPPER CO. **NEVADA**

W. H. Bray, mgr.; F. D. Nowell, pres.; J. A. Beck, v. p.-sec., at last accounts.

Inc. 1913.

Property: the Boyd-Martin group, 30 claims, in heart of the monzonite-porphyry belt of Battle mountain, Lander county, shows copper-stained patches thought to represent the outcrop of a big disseminated glance deposit.

NEVADA-CALUMET COPPER MINING CO. **NEVADA**

Out of business. See **Nevada Calumet Mine.**

NEVADA-CALUMET MINE **NEVADA**

Address: John L. Washing, 868 Park Ave., Bridgeport, Conn.

Property: 17 claims, patented, 340 acres, 4 miles N. E. of Buckskin and 8 miles N. W. of Yerington, formerly owned by Nevada-Calumet Copper Mng. Co. Property shows diorite porphyry and silicious limestone, and has 3 contact deposits, 3-4′ wide, showing cuprite, malachite, azurite, chalcocite, and chalcopyrite, giving assays of 2-4% copper. Reported on by T. M. Hammond and Arthur Prell.

Development: by 2 main shafts, 1,200′ apart, No. 2 on the Yellow Metal claims, 60′ deep, shows 9′ of 2.75% ore. About 300′ of work on 400′ level, and 225′ of laterals on the 500′ level, show small bunches and stringers of ore, in a leached zone, with fair indications of workable values at greater depth.

Equipment: includes two 25-h. p. gasoline hoists.

Idle since 1917.

NEVADA CENTRAL COPPER CO. **NEVADA**

Went out of business, January, 1916. Property near Cedar Eureka county, deeded to Mrs G. W. Leighton, who has leased it to local people. For description see Vol. XII.

NEVADA CENTRAL MINES CO. **NEVADA**

Address: Tonopah, Nev. W. H. Knowles, agt.

Inc. in Nevada by a syndicate of San Francisco men.

Property: 9 claims in Hannapah district, Nye county, 20 miles E. of Tonopah, being developed by tunnel to give a 200′ back.

NEVADA CHAMPION COPPER CO. **NEVADA**

Inc. 1907, in Arizona. **Cap.** $1,500,000; $5 par. Succeeded 1917 by the **Pilot Copper Co.**, which see.

NEVADA CONSOLIDATED COPPER CO. **NEVADA**

Controlled by Utah Copper Co. through ownership of 1,000,500 Nevada shares.

Office: 25 Broad St., New York. **Operating office:** McGill, White Pine county, Nev. Mine near Ruth, White Pine county, Nev.

Officers: Daniel C. Jackling, pres.; Chas. Hayden, v. p.; W. E. Bennett, v. p.; C. V. Jenkins, sec.-treas., with Stephen Birch, E. A. Guggenheim, Wm. Pierson Hamilton, H. O. Havemeyer, Murray Guggenhein, C. V. Jenkins, J. K. MacGowan, Chas. M. MacNeill, W. Hinkle Smith, R. C. Semmell and C. B. Lakenan, directors. Arthur J. Ronaghan, asst. sec.

Operating officials: C. B. Lakenan, gen. mgr.; W. S. Larsh, underground supt.; F. E. Grant, shovel-pit supt.; Geo. C. Riser, mill supt.; D. D Moffatt, cons eng for mills; J. C. Kinnear, smelter supt.

Inc. November 7, 1904, in Maine, as a merger of the Boston & Nevada Copper Co. and White Pine Copper Co. **Cap.** $10,000,000; $5 par; $9,997,285 issued; original cap., $5,000,000 increased February 5, 1908, to $8,000,000 and again increased November, 1909, to present figure. A former issue of $3,000,000 first-mortgage 6% convertible gold bonds, due April, 1918, has been retired. Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, registrars; Boston Safe Deposit & Trust Co., Boston, and D. A. Crockett, 149 Broadway, New York, transfer agents. Shares listed on the New York and Boston stock exchanges. Annual meeting, third Friday in April.

Sales on N. Y. Stock Exchange during 1920 totaled 211,500. The range was 17½ in January and 8 in November. In 1921, the range was 15⅝ to 9 for sales totaling 199,900.

Comparative General Balance Sheet: Nevada Cons. Copper Co. and Nevada Northern Ry. Co.—

Assets:

	Net Property and Equip.	Def'd Chgs. to Oper's	Metals on Hand	Other Current	Total
1920.....	$ 9,171,872	$5,655,536	$7,017,302	$ 3,830,033	$25,673,743
1919.....	9,776,212	5,400,686	8,129,986	4,826,162	28,133,046
1918.....	10,566,087	5,450,974	6,809,668	8,802,466	31,629,195
1917.....	10,986,337	5,454,520	6,533,188	11,044,595	34,018,640
1916.....	11,634,365	4,935,838	9,265,014	6,473,648	32,308,865
1915.....	12,198,977	4,136,970	4,998,829	2,512,439	23,847,215
1914.....	13,361,672	3,739,988	3,114,863	1,229,737	21,446,260

Liabilities:

		——Surplus——			
Year	Capital	Current	Stock and Secur. Sold	Earned	Total
1920.....	$9,997,285	$1,429,347	$7,071,850	$ 7,175,261	$25,673,743
1919.....	9,997,285	2,221,797	7,071,850	8,842,114	28,133,046
1918.....	9,997,285	3,569,630	7,071,850	10,990,429	31,629,195
1917.....	9,997,285	3,074,677	7,071,850	13,874,828	34,018,640
1916.....	9,997,285	2,300,219	7,071,850	12,939,511	32,308,865
1915.....	9,997,285	1,576,544	7,071,850	5,201,536	23,847,215
1914.....	9,997,285	1,756,982	7,071,850	2,620,143	21,446,260

Comparative Income Account: Nevada Cons. Copper Co.

Year	Operating Revenue	Operating Expenses	Net Op't'g Profit	Total Income	Total Deduct's	Balance* Dec. 31
1920..	$9,067,025	$9,261,443	$194,418**	$ 235,904	$1,851,835	$6,538,612
1919..	8,535,728	8,199,704	336,024	1,225 357	2,999,185	8,140,533
1918..	16,787,657	14,437,281	2,350,376	3,402,071	6,648,235	9,934 361
1917..	20 279,723	11.635.375	8.644,347	9.937.599	9.110.716	13,180 5.6
1916..	24.366.292	9.996.023	14.370.269	15.435.359	7,931,272	12,353 643
1915..	11.685,276	6.544.593	5.140.683	5 905.602	3.346.672	4,849,556
1914..	7,052,499	6,335,522	716,977	1.763.021	2.542.037	2,290,626

*Includes balance from previous year. **Deficit.

An operating loss of $135,029 is reported for first 6 months of 1921, or a total net deficit of $285.492, after including shutdown expense and making allowance for outside income.

Dividends: Begun October, 1909, rate 37½c. per share quarterly; paid $1.50 in 1910 and 1911; $2 in 1912; $1.50 in 1913; $1.12½ in 1914; $1.50 in 1915; $6.75 in 1916; $4.15 in 1917; $3.25 in 1918; $1.50 in 1919; $0.75 in 1920; none in 1921; a grand total of $46.768.616.

Company absorbed the Cumberland-Ely Copper Co., paying $7,554,084 cash therefor, August 30, 1910. Shareholders of the Cumberland Ely were given the opportunity of exchanging stock on the basis of 3¼ shares for 1

share Nevada Consolidated. The Nevada Cons. Copper Co. owns all the stock of the Nevada Northern Railway Co., which is capitalized at $2,000,000. Also owns through purchase and absorption, the physical assets of the Steptoe Valley S. & M. Co., which was dissolved October, 1914.

In February, 1921 company took a 4.45% interest, $1,780,000 total amount, in the Copper Export Association's $40,000,000 8% notes.

Property: 106 claims patented, 27 unpatented, in Robinson (Ely) district, White Pine county. Distributed as follows: Copper Flat Group—33 patented claims, covering about 355 acres; 23 unpatented. Ruth Group—57 patented, 705 acres; and 4 unpatented. Veteran Group—14 patented; and 2 outlying patents; also 40 acres for water supply and railroad siding, and 182 acres for dumping overburden. The above does not include acreage occupied by concentrator and smelter, discribed farther on.

Geology: The geologic features of the property are somewhat similar to those of Morenci, Arizona, and Bingham, Utah. An area of Paleozoic limestones and shales is intruded by a great mass of monzonite porphyry, tilting and breaking the sedimentaries and forcing its way into them in dykes and sills. Alteration of both sedimentaries and monzonite is extensive, and inclusions of great masses of country rock in the intrusive are common.

The main orebodies are found in monzonite porphyry; all of the porphyry area however is not ore bearing. Small bodies of high-grade copper ore are encountered in the sedimentaries near the contact, and occasional occurrences of silver-lead ore are met at some distance from it. These latter are of small importance. In the porphyry, commercial ore occurs at depths varying from 20 to 700′ below the surface, and up to 450′ thick. Copper occurs as chalcocite, chalcocite coating pyrite, and some chalcopyrite, in seams and disseminated through the mass of porphyry. As the copper content fades out gradually in depth, the bottom limits of pay ore are determined largely by commercial factors. The capping of leached porphyry, is for the most part barren, though there are occasional occurrences of copper carbonates, silicates, oxides, etc., in it. Sufficient carbonate ore was found in the capping of the Copper Flat orebody to supply the smelter with flux. A considerable part of the property is covered with rhyolite, the remains of an extensive lava flow occurring long after the monzonite intrusions. To date, no orebodies have been found in the rhyolite. To the end of 1920, a total of 31,141,633 yards of capping had been removed, leaving 35,842,840 yards in place.

Development: has so far proved the existence of three main orebodies namely: the Copper Flat, Ruth, and Veteran, and several of lesser importance—the Kimbley, Ingersoll, Wedge, and Jupiter.

The Copper Flat, or Eureka orebody the largest and most important, was disclosed in three places known as the Eureka, Liberty, and Hecla pits, and is mined by steam-shovels. These three pits have been consolidated into one. The big pit has roughly the shape of a dumbbell, with the former Eureka and Liberty pits on the east and west end respectively, and the Hecla in the middle. Its longest dimension E.-W. is 4,100′ and N.-S. 2,500′. It covers an area of 124 acres and is at its deepest point 250′ below the surrounding country. Entrance for trains is had in the northerly part of the Eureka and Liberty ends. These entrances are made from an assembly yard, where ore trains are made up for the Nevada Northern railway which handles them from this point to the smelter, 26 miles distant.

In mining, benches are maintained at about 50′ intervals. To loosen up the material ahead of the shovels, 6″ holes, placed at proper intervals in the benches, are put down by churn-drills. Nine drills of the No. 5 Keystone type are kept on this work; 1½ in ore, 3½ in waste, and 4 as extras are kept in the pit to minimize the amount of moving Holes are spaced about 35′ apart, 10 or 12′ back from the edge of the bank and average 50 to 55′

in depth. They are sprung or chambered by light charges before they receive the blasting charge.

After blasting, the material, ore or waste as the case may be, is loaded into railroad cars by steam-shovels. In this work nine 95-ton Bucyrus shovels, having Vanderhoef 4-cu. yd. dippers, are used. A good general average is 1,200 cu. yd. per steam shovel shift of 10 hours.

Transportation of ore from the pits to the assembly yard, and of waste to the various dumps, is done by 17 saddle-back locomotives, 2 of 85 tons, 2 of 81 tons, 5 of 65 tons, 7 of 45 tons, and one of 35 tons weight. In addition one 56-ton, 6 wheel yard or switch engine is employed in general service. Cars for the transportation of ore from the mines to the mill are furnished by the Nevada Northern railway and are of 55 ton all steel Ingolsby type. There are about 400 of these in service. Overburden is handled with 70 wood and steel dump cars of 18 and 20 yard capacity. Normally, over 10,000 tons of ore and 14,000 yards of overburden are handled daily.

Other pit equipment consists of one 30-ton locomotive type crane, one employes' car used to transport men to and from work; a repair car equipped with tools, compressor, and boiler; ten coaling cars of special design for the shovels; 4 flat cars for transporting drills, casing, etc.; and two powder cars, one a refrigerator used to preserve explosives at the right temperature. Adequate machine, blacksmith, carpenter, engine and car shops with full equipment are maintained.

The Ruth orebody lies about 1¼ miles east of the Copper Flat deposit. Here the capping is too deep, from 110 to 540′ thick to mine it economically by steam-shovels, hence it is mined by underground methods. The ore zone, roughly oval-shaped, is 1,200 x 1,600′ in area, 40 to 310′ deep, with an average of 120′.

The Ruth mine is served by two shafts, the Star Pointer—the main working shaft, a 4-compartment vertical, 25′-6″x5′-6″ inside dimensions; and the Ingersoll, an incline, 5′x8′-6″ inside dimensions. The two shafts are about 2,500′ apart, 700′ and 550′ deep, repectively, and connected on the 500 and 600′ levels. To date about 14¼ miles of underground workings have been driven, also several thousand feet of churn-drilling.

Ore is mined by the branch-raise caving system, which consists in driving raise series at 25′ intervals at right angles to motor haulage-ways. From the branch-raises, finger-raises are put up to open the orebody at 12½′ intervals, both parallel and normal to the direction of the haulage ways. The orebody is undercut at the tops of the finger-raises, caved, and ore drawn off through the fingers and branches to the haulage ways. This method was described by W. S. Larsh in a paper read before the A. I. M. E. of New York, in February, 1918. The advantage of all caving systems is primarily one of cost, but not always of complete extraction of orebodies. In the Ruth mine, where ore-blocks have been completly mined, actual production was 3,747,249 tons of 1.95% copper tenor as against an expected yield of 3,580,757 tons of 2.15% grade.

Late in 1920, an enriched portion of the Ruth orebody, averaging 7% copper, was opened on the 700′ level, 50x150x60′; development to define its limits were continued throughout 1921.

Material is moved underground by twelve 10-ton electric mine locomotives of 60 h. p. and 90 h. p., of 250 volt d. c. trolley type. Fifty 88 cu. ft. saddle-back steel cars, holding about 4 tons each are used.

In the Star Pointer shaft, ore is hoisted by a 400 h. p. 550 volt a. c. Nord-

berg hoist in 6 ton self-dumping skips running in balance. The shaft is also equipped with a 200 h. p. geared hoist handling a double deck cage capable of holding 30 men. From the tipple ore is distributed in a 3,000 ton bin by means of chutes, and loaded from the bin into 55-ton railroad cars. A heavy duty hoist and 3,200 cu. ft. compressor were added in 1917. The Ruth mine produced 591,545 tons of 2,195% copper ore in 1916; 991,164 tons of 2.013% in 1917; 1,316,144 tons of 1.87% in 1918; 714,312 tons of 2.04% in 1919; 784,757 tons of 1.76% in 1920. The mine can produce a daily output of 5,000 tons, and the new hoist can handle 6,000 tons from a depth of 600'.

The Ruth is further equipped with two, P. R. E.-2, 3,000 cu. ft. air compressors direct connected to 550 h. p. synchronous motors, 3 phase, 600 cycle, 600 volts. About 80 air drills are in use. Direct current at 250 volts for the underground trolley system is furnished by three 150 h. p. motor-generator sets of the Bullock type. A saw-mill, equipped with timber framing machinery, and handling about a half-million foot, board measure, of timber per month; a blacksmith shop and a small machine-shop are maintained.

Nearly all of the waste, and some of the material for mining is handled through the Ingersoll shaft in a 2-ton capacity skip. Equipment here consists of a 112 h. p., 550 volt a. c. electric hoist.

The **Veteran** mine, taken over from the Cumberland-Ely, west of and adjoining the Consolidated Coppermines Giroux holdings, is not producing, operations at this property having been discontinued indefinitely.

The **Kimbley** orebody has been developed only by churn-drill and the Wedge and Jupitor by underground workings; the latter two are small. No mining is being done at any of these at present.

Ore reserves: extensive churn-drill borings on the Ruth and Eureka have proven a tonnage estimated January 1, 1919, as 68,549,644 tons of ore, averaging 1.57% copper and representing an ore supply of about 17 years, of which about 1/5 is in the Ruth mine. No revision of reserves has been made since.

Comparative Table of Recoverable Developed Ore:

Year ended	Tons	Copper, %	Year ended	Tons	Copper, %
Sept. 30, 1907...	14,432,962	1.97	Dec. 31, 1914...	41,020,296	1.68
Sept. 30, 1908...	20,000,000	1.94	Dec. 31, 1915...	50,525,289	1.65
Sept. 30, 1909...	29,000,000	1.94	Dec. 31, 1916...	67,993,117	1.59
Sept. 30, 1910...	40,360,823	1.70	Dec. 30, 1917...	70,025,322	1.58
Dec. 31, 1911...	40,853,371	1.66	Dec. 30, 1918...	68,549,644	1.57
Dec. 31, 1912...	38,853,551	1.67	Dec. 31, 1919...	66,414,219	1.56
Dec. 31, 1913...	39,108,590	1.65	Dec. 31, 1920...	63,845,631	1.58

The above figures do not include carbonate ores nor the reserves of the Kimbley, Veteran and Wedge groups, aggregating 800,000 tons assaying 2.4% copper.

Churn-drill prospecting from the beginning of operations to end of 1920 totaled 575 holes averaging 366'. In the Ruth the cost of drilling was $2.213 per foot in 1919.

Electric power is used throughout, current being brought from the Steptoe smelter, at 40,000 volts, and stepped down to 600 volts by seven 200-k. w. transformers in a concrete station at the Ruth mine.

Ore is shipped to the Steptoe smelter, at McGill, separately described below over a 27-mile standard-gauge railway, forming a part of the Nevada Northern railway which has a line 165 miles in length running from the mines and Ely to a junction with the Southern Pacific railway at Cet- tation.

It does a general business in addition to handling the traffic of the Nevada Consolidated. In 1920, it carried 2,924,905 tons of ore from all mines in the district, 343,334 tons of commercial freight, and 222,840 passengers.

On Sept. 1, 1920, a trackage right agreement was made with the railway company, whereby Nevada Cons takes over a large part of the equipment and operates its own ore transportation over that part of the railway system, known as the Ore Line.

Mining costs:

Year	Moving overburden, cents per yard	Steam-shovel mining, cents per ton *	Ruth mine, per ton
1920	40.47	32.22	$1.320
1919	38.65	31.59	1.350
1918	41.20	22.27	1.330
1917	34.43	31.32	1.0251
1916	30.09	23.70	1.2021
1915	28.85	15.24	.....

*Excluding 40c. per ton for prepaid stripping cost.

Reduction works: The concentrating mill and smelter owned by the company are at McGill. The property, which covers 8 square miles, with water rights, is on the eastern side of Steptoe valley, on the slope at the foot of the Schell Creek range, 14 miles N. E. of Ely and 22 miles from the mines, on the Nevada Northern railway. The smelter site proper comprises 320 acres, 1 mile long and ½ mile wide on a hillside with 10% grade, permitting the works to be terraced, and handling material by gravity throughout. Lands carry water-rights to Duck creek, and to the McGill ranch, estimated as capable, jointly, of furnishing water for a 15,000-ton plant.

The mill, about one mile from the smelter, is one of the largest and best in existence. Late in 1917 its capacity was increased from 12,000 to 14,000 tons daily. All main buildings are of steel frame and the plant is built on the unit system. It is nearly a mile from the smelter, and treats the moderately hard silicified, altered porphyry ore, containing tiny specks of chalcocite, pyrite, and some chalcopyrite, averaging 1.5% copper.

The coarse ore bins are of timber, 15′ deep, 20′ wide and 288′ long with a capacity of 5,000 tons. They are built about the center line of the mill and 400′ behind the center line of the fine ore bins. The ore is dumped on grizzlies of railroad iron with openings of 13.5″.

From the coarse ore bins the ore goes through chutes at the bottom, to twenty-four 60″ steel apron-feeders driven at a speed of 2.2′ per minute. The full capacity of each feeder is 75 tons per hour. The two feeders in each unit adjoining the center line of the plant can be run at 9′ per minute, delivering 700 tons per hour. The feeders, with the exception of these two, deliver to two 60″ steel pan conveyors, each 118′ long, traveling at a speed of 28′ per minute, and with a total capacity for the two 1,700 tons per hour. The high-speed feeders and pan conveyors deliver to two 60″ traveling grizzlies of 3.5″ openings and having a speed of 40′ per minute. The oversize from the grizzlies is delivered to two No. 8 McCully crushers. The discharge from the McCully crushers and the undersize from grizzlies is elevated by two 42″ belt conveyors to two screens 6′x14′ of ⅜″ wire, 1″x1½ mesh, inclined at an angle of 36 to 48°. The oversize of these screens is re-ground by two Garfield rolls, 72″x20″, set

for a 7/8" opening. Four ball-mills were added to the re-grinding plant during 1918. Discharge from the rolls and undersize from the screens is elevated to two horizontal conveyors which distribute to the fine ore-bins by means of two trippers. The new coarse crushing plant was put into commission about mid-1917.

In order to minimize sliming, the flow-sheet is arranged for step grinding. From the fine bins the ore passes by belt feeders over automatic scales to a set of 36"x15" rolls set for an opening of 5/8" and run at 85 r. p. m. with water introduced beneath washing to a pair of bucket elevators. The buckets on these elevators are 8"x8"x18" and the elevators deliver to two trommels, 42" diam, by 8' long, having one section of 3/16" and one of 5/16" perforations. The oversize goes to another set of rolls 36"x14" set for a 5/16" opening and driven at 105 r. p. m. The undersize of 5/16" goes to a set of rolls 30"x14", set for a 1/8" opening and run at 122 r. p. m. The undersize of 3/16" goes to eight 2 m. m. trommels 36" diam, by 8' long. The oversize of the 2 m. m. screens goes to a fourth set of rolls 36"x15" with an opening of 1/16" and driven at 160 r. p. m. All of the above rolls deliver to the same elevators so that everything must finally pass 2 m. m.

The undersize of 2 m. m. passes to 10 double deck Wilfleys making final concentrates, and middlings to five Wilfleys. The five Wilfleys make final concentrates and send tailings to the regrinding system. The tailings from ten double deck tables pass to four Steptoe classifiers, having four spigots and an overflow. The overflow is sent to a 50' Dorr thickener, delivering underflow to the slime department and overflow to the reclaimed water system. The first spigot product goes to the regrinding system after being dewatered. The second spigot delivers to four Wilfleys which make final concentrates and send tailings to the regrinding system. The third spigot delivers to eight Wilfleys, making final concentrates, middlings to the regrinding system and tails to waste after being dewatered in Steptoe tanks. The fourth spigot delivers to Callow tanks, delivering underflow to four Wilfleys and overflow to slime departments. These four Wilfleys produce final concentrates and send tailings to Callow tanks delivering underflow to Johnson vanners.

Each unit is equipped with two Hardinge mills 8'x30" direct driven through herringbone gears. The feed to these is delivered at 65 to 75% solid by means of a shovel wheel. The product is delivered by two bucket elevators to four Steptoe classifiers making four spigot products and an overflow. The overflow goes to two 17' Dorrs delivering underflow to the slime department and overflow to 75' Dorr thickeners. The first spigot delivers to two Wilfleys, making final concentrates and sending tailings to the regrinding system. The second spigot delivers to seven Wilfleys making tailings to waste and sending middlings to six more Wilfleys, making tailings to waste. The third spigot delivers to seven Wilfleys, making tailings to waste an sending middlings to the above mentioned six Wilfleys. The fourth spigot delivers to Callow tanks whose overflow goes to the slime department and underflow to ten Wilfleys, delivering tailings to Callow tanks which in turn deliver underflow to 26 Johnson vanners and overflow to the slime department.

All concentrates except those of the real slime department are delivered to 16 steel tanks of 225 ton capacity, having filter bottoms for suction drying. These tanks are unloaded by a Blaisdell disc excavator into cars below.

All overflows of Callow tanks, Steptoe tanks, and Blaisdell concentrates tanks are delivered to a series of settling ponds from which the underflow is delivered to the slime department (flotation process) and the overflow is pumped to the mill to be re-used. During 1920, substantial improvements in handling of slimes were made, one unit of concentrates with 2,000 ton capacity being so altered as to show a 75% extraction. When completed mill is expected to have a daily capacity of 15,000 tons.

In September, 1919, Minerals Separation brought suit against Nevada Consolidated alleging infringement of its flotation patents; the suit was settled by compromise early in 1922

Water is secured from Duck creek, which has an average flow of 8,000 gal. per minute, water being collected in the hills in reservoirs and brought by gravity for 9 miles through a 32" iron-banded wooden pipe line and delivered at the highest point of the works under a pressure of 10 to 20 lbs. per sq. in. An electrically-driven pumping plant in Steptoe valley, immediately below the works, has a capacity of about 5,000 gal. per minute. By means of a system of settling tanks, ponds and pumps, approximately 8,000 gal. of water per minute is recovered from mill tailings for re-use. Approximately 4½ tons of fresh water to 1 of ore are used in the process. A supplemental triple expansion pumping engine with 5,000 gal. capacity vs. 480' head was added in 1919.

The smelter is connected with the concentrator by a standard-gauge railway line. The works have about 12 miles of railway track, equipped with 9 small locomotives, a switch engine and 100 cars, and 2 loco cranes. It includes separate buildings for calcining, reverberatory smelting, blast-furnace smelting and conversion, all of steel frame, with corrugated iron sheathing. Each department has independent flues and chimneys.

The roaster building, 328' in length, has 4 floors, with twenty-four modified McDougal roasters, set in 2 rows. Coal is now used for fuel in place of oil. Concentrates are delivered to the calcining building in 10-ton standard-gauge cars entering over a trestle on a level with the feed floor. All the roasters have air-cooled rabbling arms, and center columns supplied with air under a pressure of about 3" of water by a fan of about 120,000 cu. ft. capacity. The roasters are driven by 10 h. p. electric motors. Hot calcines, carrying 6.5 to 9% sulphur, are discharged into hoppers beneath the roasters and trammed directly to the reverberatories, or to nine 150-ton calcine storage bins, built of brick and steel, which serve as a balance-wheel between the roasting and smelting departments. Each roaster discharges gases through a 54" elbow to a brick flue running between the 2 rows. This flue discharges fumes itno the main flue, which is in 2 parts, each of 312' square cross-section, permitting either to be cut out for cleaning. The flue is 1,070' long, including the dust chamber, which is 150x50x30', and leads to a brick stack 250' high and of 18' internal diameter at the top. Dust from the flue in the roaster building is piped to the ground floor, for loading into cars, and for about 500' the flue has tracks underneath, permitting the collection of dust from steel hoppers in cars, which are hauled by small locomotives. The copper-bearing feed per roaster-day in 1919 was 64 tons, against 67.2 tons in 1918.

The reverberatory building has five 600-ton furnaces, each 19' wide by 111' to 130' long. The use of oil as fuel was superseded in May, 1918, by pulverized coal. The plant has a capacity of 600 tons of slack coal daily, ground to pass 200-mesh, has lowered costs and given complete satisfaction. In 1920, Bunsen type burners were in use to permit of a closer mixture of fuel and air. A full description of this plant by R. E. H. Pomeroy, was published in Bull. 158 (Feb., 1920) of the A. I. M. & M. E.

The reverberatory furnaces are charged with calcines mixed with limestone dumped through slide-gates, from hoppers, suspended from the charge-floor. Each furnace has 2 tap-holes on one side, from one of which matte is drawn off into matte cars of about 30-ton capacity. These cars are tilted and contents poured into the converters by an electrically-driven mechanism mounted on the car frame. Slag is skimmed twice every shift, the skimmings going to a cast-iron box leading to a lined launder, in which a jet of water granulates the slag and washes it to the dump. Slags carry 30 to 45% silica 6 to 12% calcium oxide, 25 to 35% iron oxide and 8 to 14% alumina. The reverberatory building has a dust chamber of 1,000' square section, 155' long, leading to a 300' brick chimney, 15' in diameter at top.

The converter building is about 600' from the reverberatory furnaces, and receives molten matte from cars, behind and above the converters, the contents being poured into a launder, while the shells remain in position for blast. The building has two 5-motor Shaw electric cranes, each with a capacity of

60 tons besides 2 auxiliaries of 25 tons each. There are 2 of the old stalls with 96x150" shells of the barrel type built for acid linings, but now used with magnesite brick linings. There are also 2 Peirce-Smith barrel-type converters, both originally 25' 10" long by 10' diameter shell. One of these was lengthened to 33' 11". They originally had 30 tuyeres eacn but these have been increased to 35 and 46, respectively. The blast pressure used is nominally 10 lb. gauge at an altitude of 6,327'. The Peirce-Smith converters produce about 50 and 60 tons of copper per day on 40% matte.

Blister copper is poured into ladles and transferred into a brick-lined steel cylindrical receiver. This is mounted on rollers and rotated on its poured axis by an electrical motor, so that the molten blister copper is poured through a tilting pouring spoon into moulds on a horizontal straight-line chain and sprocket conveyor. These moulds discharge on a submerged apron conveyor which after traveling in water horizontally for a few feet turns on an incline and raises the copper ingots out of the water and lands them on the loading platform. They contain 99.5% copper, weigh about 400 lbs., and, after trimming and being weighed, are shipped in box cars.

The converters slag is taken back to the reverberatory furnaces in 10-ton side-tilting pots operated by compressed air. Flux for the converters consists of concentrator slimes and silcious carbonate ore from the Copper Flat pit, mixed and dried in 2 oil-fired rotary driers at the converter building and handled and charged by boats. The hoods from the converters lead to a balloon flue running along over the charge floor for the extent of the converter building covered by stalls. It is then connected by a circular flue 10' diam. to a brick dust chamber which in turn connects to a brick stack 100' from the ground 10' diameter at top.

The power plant has 4 batteries of two 400-h. p. water-tube boilers each and one battery of two 600-h. p. Stirling water-tube boilers. Two batteries have Foster and 3 others have internal super-heaters, and there is a separate Foster super-heater for the steam supplied by the reverberatory waste-heat boiler plant of ten 400-h. p. boilers. Steam is generated at 160-h. p. pressure, and can be super-heated 100° F. All boilers are fired by Green chain-grate stokers, coal being fed from overhead bins by chutes direct to the stoker hoppers. These are to be replaced by powdered fuel stokers. Each double battery of boilers has a 9x40' steel stack with induced draught, furnished by 5 Sturtevant fans, each connected with a 30-h. p. Sturtevant slide-valve engine, running at 150 to 175 r. p. m. Each battery of boilers is equipped with fuel economizers of about 3,360 sq. ft. heating surface, set between the boilers and the induced draught fan; they are dampered so that they can be cut out for cleaning while the boilers are in service. A 3,000-gal. capacity Kennicott water purifier supplies make-up water for all boilers.

The engine-room, main floor, contains the generating engines, blowers, 3 exciters, and a switchboard, and the basement contains condensers, air pumps and oil filters. The electrical equipment consists of two 1,100-h. p. 22x48x48" Corliss cross-compound engines, with 800 k. w. Bullock a. c. generators mounted on the shafts; two 2,000-h. p. 31x66x48" Corliss cross-compound engines with 1,500-k. w. Bullock a. c. generators mounted on the shafts, and one 2,500-k. w. steam-driven turbo generator. Current is generated at 600 volts and carried to a concrete transformer station, equipped with seven 200-k. w. Bullock water-cooled transformers, stepping the current up to 40,000 volts for transmission to the mine; four 750-k.w. water cooled transformers and four 1,000-k. w. water-cooled transformers stepping current up to 13,200 volts for transmission to the mills; 13,000 and 40,000-volt choke coils and lightening arresters. A 3,000 k. w. turbo- generator was added during 1917, to take care of increased power consumption at the mill.

The smelter blowing plant, in the engine-house, includes a 350-h. p. 14x28x36" tandem-compound engine direct-connected to a No. 10 Connersville blower with capacity of 300 cu. ft. of air per revolution, making 120 r. p. m. This is for the blast furnace. For the converters air is supplied at 10-lb. gauge

pressure by one blowing engine, 16" and 24" diam. steam 34" and 34" diam. air by 48" stroke of 6,000 cu. ft. capacity; one 25" and 54" diam. steam 52" and 52" diam. air by 48" stroke of 12,000 cu. ft. capacity and one 26" and 56" diam. steam, 54" and 54" diam. air by 48" stroke of 18,000 cu. ft. capacity. These are all of the cross-compound steam, tandem, air and steam type. A 20,000 cu. ft. steam driven turbo-blower was added in 1916 to supplement the blowing engine in supplying air for converters, and another in 1920.

A cross-compound air-compressor with steam cylinders 11" and 21" diam. and air 21" and 12" diam. and 18" stroke of 1,080 cu. ft. displacement, compresses air to 100-lb. This was originally for tamping converter linings, but is now used for pneumatic tools of various kinds at the shops and the mill. A 2,000 cu. ft. 2-stage, steam-driven compressor was added in 1916.

In connection with the works are a number of thoroughly appointed shops, including a boiler, machine and carpenter shop, foundry, warehouse and round-house.

The Steptoe works were started in April and the first finished copper shipped in August, 1908. Nearly 1,500 men are normally employed at the plant.

Production:

Year	Tons Milled	Cu. %	% Rec.	Ratio Conc.	% Cu. in Concts.	Net Prod. lb.Cu.	Cost per lb. Cts.	Sell Price Cts.
1921 (4 mo's.)	.....	....	.....	.....	....	9,362,325	.....	.....
1920.....	2,568,588	1.45	70.20	8.24:1	8.38	48,311,985	17.28	17.77
1919.....	2,135,425	1.60	70.49	8.22:1	9.26	43,971,892	16.14	18.67
1918.....	3,999,526	1.51	67.28	8.33:1	8.33	.....	16.60	21.049
1917.....	4,064,095	1.46	73.08	7.-8:1	7.67	.....	11.68	23.750
1916.....	3,922,634	1.63	73.87	7.45:1	8.98	90,735,287	8.13	25.83
1915.....	3,081,520	1.54	70.18	7.18:1	7.77	62,726,651	8.23	17.65
1914.....	2,640,294	1.48	68.48	6.05:1	6.14	49,244,056	9.82	13.39

Gold and silver extracted during 1920 was sold for $483,668, compared with $327,680 in 1919; $664,429 in 1918; $767,760 in 1917, and $801,818 in 1916.

Copper is marketed through the new selling agency of Guggenheim Bros. The property has been splendidly developed, and is being managed with ability and success. Operations during 1919 and 1920 were reduced to 50% of capacity, and in April, 1921, mines and plants were closed down, except for development work at Ruth, for an indefinite period.

NEVADA CONSOLIDATED MINES & SELLING CO. **NEVADA**

Idle and probably dead.

Officers: Alex. Brown, pres.; Chas. L. Newton, v. p.; C. C. Matthews, sec.; F. G. Carey, treas., at last accounts.

Property: about 1,000 acres, including a gold property formerly owned by the Huntoon Valley Mining Co., 45 miles south of Hawthorne, Mineral county, and copper claims 10 to 20 miles S. W. of Hawthorne, formerly owned by the Walker Lake Expl. Co. The copper property, developed by 3 crosscut tunnels to 440' below the outcrop, was claimed by the company to have a vein carrying disseminated pyrite and chalcopyrite, averaging 2½% copper and $4 gold. This vein has apparently been lost in the lowest tunnel. Country rock is granodiorite. The mine has 1,500' of workings.

NEVADA CO-OPERATIVE MINING CO. **NEVADA**

Address: Goldfield, Nev.

Officers: Chas. S. Sprague, pres.; J. K. Turner, v. p. and cons. engr.; P. J. Somers, sec.

Inc. 1913. **Cap.** $2,000,000; $1 par; assessable; 1,500,000 shares in treasury. Company is a reorganization of Goldfield Mines Operating Co.

Property: 11 claims, 150 acres, including the Empress, in Gold Mountain mining district, Esmeralda county, 37 miles S. E. of Goldfield, shows 3 well-defined quartz veins from 1-6' wide with numerous quartz-stringers, running N. E. The formation is Cambrian sedimentary rocks, quartz-monzonite porphyry, granite, rhyolite, and basalt.

Development: total work to June, 1915, was about 3,000', of which 2,000 is on the Central or Liberty vein. A crosscut tunnel driven 800', exposed ore averaging $8.17 across a width of 1½'. Drifts run from a raise on the hanging-wall from the 800' level, encountered a quartz vein, assaying $26.40 gold and 54c. silver per ton.

Equipment: includes several buildings and an old 10-stamp mill. Mine was inactive pending favorable opportunity for refinancing, but resumption reported in September, 1919. Not operating, 1921.

NEVADA COPPER CO. **NEVADA**

Company inactive since 1910. **Office:** 572 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Mina, Mineral county, Nev.

Officers: J. H. Whiteman, pres.; P. S. Bickmore, sec.-treas. Company is controlled by the Tonopah Mng. Co.

Property: Dunlap copper mine, 10 claims, 200 acres and millsite in Silver Star district, 10 miles W. of Mina, operated under lease in 1919 by E. S. Chaffee. Claims show quartzite and quartzite-breccia with mineralized zone 700' wide and 2,000' long, carrying ore-bearing reefs with oxides, carbonates and native copper.

Development: by tunnel, etc., mostly in ore. **Equipment:** includes compressor, etc.

NEVADA COPPER HILLS MINING CO. **NEVADA**

Idle, and probably dead.

Mail returned both from Philadelphia and Nevada addresses.

Officers: at last accounts, A. H. McCullough, pres.; F. W. Lenhart, v. p.; T. J. Foster, sec.; Chas. Ritter, treas.; Rowland Lea, gen. mgr.

Inc. Oct. 24, 1907, in Nevada. **Cap.** $1,500,000; $1 par; issued 745,000. Farmers Savings & Trust Co., Mansfield, Ohio, registrars. Annual meeting, first Monday in December.

Lands: 10 claims, 200 acres, in Mineral county, 9 miles north of Luning. The property is reported, by Mr. Lea, to have replacement ore-bodies in limestone over a width of about 600', with a N.-S. strike, and a dip of 6°.

Ore: oxidized, with occasional native copper and some bornite with chalcopyrite in the bottom workings. Orebodies average 2' thick and 28 of them are opened up for a length of 400' and a depth of 100' according to the company's secretary. Ore is stated to assay 1 to 70% copper, from a trace to 8 oz. silver and from a trace to $3 gold per ton.

Development: by 225' shaft and a 330' tunnel.

Equipment: includes a 25-h. p. hoist, and 6 buildings. Presumably pursuing a "watchful waiting" course and ignores all requests for information.

NEVADA COPPER MINING, MILLING & POWER CO. **NEVADA**

Office: Tacoma, Wash. Mine at Contact, Elko county, Nev.

Officers: E. F. Messinger, pres., Tacoma, Wash.; Henry Smith, v. p. and gen. mgr., Contact, Nev.; E. S. Price, sec.-treas.; with M. K. Price and C. Smith, all of Tacoma, directors.

Inc. May 5, 1905, in Arizona. **Cap.** $1,500,000; $1 par; all issued.

Property: 52 claims, patented, in Contact district, shows Paleozoic sediments cut by granite with ore-bodies along the contact. In 1915 a 100-ton flotation plant was erected, following extensive diamond-drill explorations. Property and geology fully described Bull. 497, U. S. Geol. Survey.

NEVADA CROESUS SILVER MINES CO. **NEVADA**

Address: Richardson & Foster, Tonopah, Nev.

First offering of 200,000 shares at 10 cents, November, 1919 to February, 1920.

Property: 7 claims in the West Divide district, 15 miles from Klondyke station on the T. & G. Railroad. Examined by Ross Woodward, who said that encouraging values had been found, particularly on the Mammoth silver lode. From 250' of development, 11 samples ranged from $8 to $546 per ton in silver.

NEVADA DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: John Holst, pres.; Joseph de Forrest, v. p.; P. J. Daube, sec.-treas., also directors.

Inc. April, 1917, in Nevada. **Cap.** $100,000; 10c par.

Listed on San Francisco Stock Exchange.

Property: 6 claims N. W. of Sutherland, about 3 miles N. W. of Gold Mountain. Joint shaft with the Anaconda Divide, in breccia, gave assays of $1.80 per ton at 65' depth.

NEVADA-DOUGLAS CONSOLIDATED COPPER CO. NEVADA

Office: A. J. Orem & Co., 79 Milk St., Boston, Mass. **General office:** 222 S. W. Temple St., Salt Lake City, Utah. **Mine office:** Ludwig, Lyon county, Nevada.

Officers: H. I. Moore, pres.; James G. Berryhill, v. p.; L. H. Curtis, v. p.; F. M. Orem, sec.-treas.; W. C. Orem, gen. mgr.; with J. J. Corum, A. J. Orem, J. B. Lord, H. Goodacre, F. J. Curtis and J. G. Berryhill, Jr., directors.

Officials: Henry I. Moore, asst. mgr.; G. E. Mainhart, gen. supt.

Inc. March 13, 1915, in Utah. **Cap.** $5,000,000; $5 par; assessable; 979,643 issued. Bonds, $2,000,000; matured May 1, 1919; $215,100 outstanding. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, first Tuesday in May.

The company is a reorganization of the Nevada Douglas Copper Co. at the time of its consolidation with the Moore Mng. Co. The new company assumed liabilities of the old companies. $535,956 of Nevada Douglas and $57,000 of Moore Co.; Nevada Douglas indebtedness includes also $18,100 of 6% bonds which matured in 1913. Nevada Douglas stockholders received share for share in stock of new company and the Moore Co. received 10,000 shares of stock. To date, 10 assessments of 10c. a share have been levied, the last one in September, 1919. The old Nevada Douglas Copper Co. paid a dividend of $125,000 in 1913.

From the many financial statements issued by A. J. Orem of Boston, it would appear that during 1918, the operating revenue was $362,466 and expenditures $432,070, making a loss of $60,604. In 1919, there was a net deficit of $181,000. The balance sheet of January 31, 1919, showed current assets, $478,987, of which $387,108 was copper in transit; liabilities totaled $551,910, of which $151,554 was A. S. & R. Co.'s advances on metal, $182,818 for Mason Valley company's smelting charges, and $124,923 for accounts and wages unpaid.

Another analysis said to be by a stockholder, gives a net indebtedness of $343,669.

The company also owns 88% of the capital of the Nevada Copper Belt R. R. Co., which made a net profit of $87,417 during 1918, and $11,102 in the first four months of 1919. The line is 41 miles long.

Property: about 950 acres, with 2 millsites, 80 acres, and miscellaneous lands, including water-rights, giving total holdings of about 1,070 acres on the western slope of the Mason mountains, in the Yerington district, Lyon county. Lands include former holdings of the Ludwig Copper Mng. Co., the Douglas C. Mng. Co., which succeeded the Douglas M. & S. Co., the Nevada Douglas C. Co. and the Moore Mng. Co. Holdings of the Nevada Douglas C. Co. consisted of 4 separate and distinct mines, the old Douglas mine, the Amalgamated group and the Casting Copper mine, being the original holdings of the company, and the Ludwig mine. Country rock consists of limestone intruded by grano-diorite with large contact orebodies and fissure veins. There is also one claim at Buckskin, 7 miles distant, which carries fluxing ore.

The Moore Mng. Co. owned the Moore group of claims, a prospect with about 450' of development work and "considerable oxidized ore blocked out in a way that it cannot be measured." Property of the old Western Nevada Copper Co. (described in Vol. X), which had been under option to the Moore company, was paid for in full by the Nevada-Douglas Cons.

Ludwig mine: is about a mile N. W. of the Douglas. The property comprises 2 mining claims and a 40-acre tract in Smith Valley, on which there is a well and pumping station. The Ludwig was opened 1865, and was a shipper for some years of small quantities of high-grade ore, production including some very handsome malachite and azurite, a portion of which was sold to lapidaries, and considerable bluestone was mined for the old mills of the Comstock that used the Washoe process.

Geology: the ore occurs in a fissure vein with a white limestone footwall and a silicious limestone hanging wall, which changes to a garnetiferous limestone, heavily impregnated with sulphides in places. Where crushing has permitted surface waters to work downward, large bodies of carbonates and copper glance ores are found as replacements in the footwall limestone. The vein proper has an average width of about 30′ and has been developed along its course for 1,300′ and to a depth of 800′ by levels, along hanging wall, every 100′. The orebody on the 700 level is 50′ wide and 300′ long and runs 6% copper. The shoots, or pipes, of high-grade secondary ore, running from 16 to 30% in copper, form chamber deposits in the limestone near the porphyry contact, proven down to 800′ level. Ore reserves were estimated at 200,000 tons of 2% copper ore.

In addition to copper ore, the Ludwig has a very large deposit estimated to contain 15,000,000 tons of gypsum, on the footwall, said to be 3,000′ long, 500′ wide and 400′ deep, which figures seem high. This deposit of gypsum is of commercial value, and some has been mined and shipped.

Douglas mine: this has a typical contact metamorphic deposit in which garnetized limestone carrying copper sulphides and their resultant oxidized ores occur in very irregular orebodies in limestone, which have a tendency towards a horizontal rather than a vertical extension. The mineralized area is about 700′ wide and 2,000′ long with numerous parallel fissures which seem to control the mineralization. This mine has been been developed by a main working tunnel and a deeper haulage tunnel with numerous crosscuts and drifts netting the property. The working tunnel, 4,290′, has an average depth of 120′ beneath the surface and the ore is in places continuous to the surface. Four 50′ winzes show the downward extension of the ore. Claimed to have 75,000 tons of ore blocked out.

The **Casting Copper mine** shows a large area of garnet-epidote limestone constituting low-grade carbonate ore, which will be extensively mined. This mine has a vertical 350′ shaft and a 500′ tunnel. Claimed to have 100,000 tons blocked out. When shipments were being made to the smelter the ore averaged 5% copper as compared with 3% in the Douglas mine.

At the Amalgamated mine little development work has been done but the surface exposures indicate the existence of similar large contact metamorphic deposits.

Ore reserves: in all properties are estimated at 550,000 tons blocked out, and 2,000,000 tons partly blocked. A report says that "Engineers estimated probable ore several times the latter amount." In May or June, 1919, A. J. Orem said: "I estimate the real values in sight in these properties are worth $2,000,000, over and above all indebtedness ——." In Dec., 1919 he gave the net value as $1,908,590, less $125,000 for the flotation plant contemplated. Present ore carries 3% copper, with a fair quantity of high-grade material.

Property as a whole has about 8 miles of workings.

Equipment: includes four 100-h. p. hoists, good for 1,000′ depth each, with a 52-drill air-compressor. Electric current is taken from the Truckee River General Electric Co. Water is secured from artesian wells in Smith valley, brought to the mine by a 17,000′ pipe-line.

Production: since present management took charge over 31,000,000 lb. of copper realizing about $5,285,000. Of this the Ludwig yielded 18,587,924 lb. in 7 years. During 1916, ore sent to Utah smelters amounted to 11,135 tons, carrying 7.5% copper. Freight charges were $8 per ton.

General: in Vol. XIII of "The Mines Handbook," we gave the following opinion: "A 250-ton leaching plant, begun in 1914, was in full operation by September, 1917. . . . This plant cost $475,000 and is expected to treat ore at cost of $1.25 to $1.50 per ton. . . . If the leaching plant is a success it will prove the salvation of the company. The policy of handling the property has not met with favor in the East, as a result, financing and development have been slow. Management is believed to be competent, and makevery effort to put property on a dividend basis. Estimated that $1,000,000 has been spent on the property since 1912, of which $475,000 went to the leaching plant, $193,000 to offices, shops, buildings, etc., the remainder in development, new property, etc. The year 1918 should show the property's merits."

Then in Vol. XIV, we reported that the plant had been a complete failure and that a change of management had become effective on June 1, 1918. The mines, save the Western Nevada, were then running low on shipping ore, so a development campaign was started at the Ludwig, Casting Copper, and Western Nevada. This resulted in sufficient 3½ to 4% ore being added to yield 250 tons daily for 18 months or more. Some of the largest orebodies ever opened in these mines were uncovered at 800' in the Ludwig and at 400 and 500' in the Western Nevada. Results in the Casting Copper are stated by the assistant general manager, H. I. Moore, to be promising. Late in January, 1919, operating costs were 19c. a pound. On December 1, 1918, metal on hand and in transit totaled 1,2000,000 lb., and in that month and January, the yield was between 300,000 and 400,000 lb. There were 160 men employed then. It was estimated in January, 1919, that current assets, etc., were almost sufficient to pay off the floating debt. An assessment of 10c. was urged, also that development and operation be continued. As a neighboring company, the Bluestone had erected and operated a 400-ton oil-flotation plant, it was suggested that Nevada-Douglas do likewise.

In October, 1919, a new scheme for financing Nevada-Douglas was proposed. It includes extending the railroad bonds for 3 years and have holders of the bonds release N.-D. from its guarantee. This would reduce obligations of N.-D. to $300,000. To take care of this indebtedness and furnish money for working capital, the plan proposed 5-year, 6% bonds amounting to $1,000,000, secured by N.-D. properties, and increase capital by 300,000 shares.

The plan covers also the formation of a leasing company, with a fully paid capitalization of $200,000, to operate the Western Nevada mine, under a 10-year lease, and to build a flotation plant, stock to be offered to Nevada-Douglas Cons. shareholders at par.

In February, 1920, the $1,000,000 bond issue and increase in capitalization was authorized, and leasing company formed; bonds (convertible into stock at par) are sold to Nevada Douglas Cons. stockholders at 90, and old bondholders allowed to exchange old bonds for new at same rate. By July, reported that new bond issue had been sold, and that leasing company contemplated treating Western Nevada ores in Bluestone mill, and erecting a reverberatory furnace to smelt the concentrates.

Nothing has been heard from this company for nearly 2 years. The general feeling towards the property, and apparently towards the management also, is one of doubt.

NEVADA EXTENSION MINING CO. NEVADA

Mail returned from only known address, Tonopah, Nev.

Property is near the Hecla, Airedale, and St. Patrick groups in the south east part of the Divide district.

NEVADA GOLD MINES CO. NEVADA

No recent returns. J. S. Madden, Austin, Lander county, Nev., mgr., at last accounts. **Inc.** 1915, in Nevada.

Property: 16 claims, including the Gold Park, La Crux, San Pedro,

May-Do-So and Cottonwood groups, at Austin, said to show gold-silver-copper ores in well-defined veins. Development was begun in 1915.

NEVADA GOLD MINES CO., LTD. **NEVADA**

Mail returned from Spokane office. **Mine office:** Luning, Nev.

Officers: W. C. Losey, pres.; S. S. Endslow, sec.-treas.

Property: 4 groups of claims, comprising 24 claims near Luning, Mineral county. The Carbonate group is developed by 1,800′ of workings to depth of 350′, and the Montreal group of 4,000′ by workings, said to have disclosed several orebodies containing gold, silver and copper values.

NEVADA GOLDEN DIVIDE MINING CO. **NEVADA**

Office: 313 Clay Peters Bldg., Reno, Nev.

Officers: Alex. McIntyre, pres.; Albert Fisher, v. p.; Joseph Johnstone, sec.; George Hall, treas., with George McKenzie, M. C. Kloskey and Charles O'Neill, directors.

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 188 acres at Golden, Nye county, and at Divide.

NEVADA HILLS MINING CO. **NEVADA**

See Vol. XII. Company reorganized on an assessable basis in 1921, as **the Nevada Hills Mng. Co., Reorganized.**, which see.

NEVADA HILLS MINING CO., REORGANIZED **NEVADA**

Is a reorganization of the Nevada Hills Mng. Co.

Office: 225 No. Center St., Reno, Nev.

Officers: E. C. Smith, pres.; Alex. McIntyre, v. p.; F. A. McCafferty, sec.-treas., with R. A. Crider and Jas. Gallagher, directors. Wood Elkins, supt.

Cap. $125,000; 10c. par; assessable; $18,400 in treasury. Stock of new company exchangeable, share for share, for old stock, plus a 1c. assessment levied June 25, 1921. Stock is listed on San Francisco Stock Exchange.

Property: the Fairview Eagle mine, about 107 acres, at Fairview, Churchill county. After a profitable career as a gold-silver producer the mine was closed early in 1917.

Former company's operations were quite successful, production for 6 years said to have been $2,265,000.

NEVADA HONEY BEE MINES CO. **NEVADA**

Dead. T. J. D. Salter, Winnemucca, Nev., was president.

Property: in the Loring (Willard) district, Pershing county, 10 miles from Lovelocks, adjoins the Lovelock Willard on the north.

Report, July, 1920, that $40,000 had been expended on development without finding commercial ore. Enterprise abandoned and stockholders given privilege by Weir Bros. & Co. to exchange their stock for stock in the Mines Selection Co. (q. v.), on a share for share basis, plus a fee of 3c.

NEVADA HUMBOLDT TUNGSTEN MINES CO. **NEVADA**

Address: Lovelocks, Nev., or Mill City, Nev. C. J. Jones, H. E. Loufek and P. J. Murrish, incorporators.

Cap. $1,000,000; $1 par.

Property: claims 7 miles N. W. of Mill City, Pershing county, show a 6′ bed of scheelite with quartz and calcite as a replacement in limestone near a granodiorite contact; can be traced for 2,500′. Main orebody has been developed for length of 700′, to depth of 650′. Ore averages 2% tungstic oxide, but carried 4% for length of 120′.

Equipment: a 150-ton mill was completed in 1918, and the first shipment of three carloads of concentrates was made February, 1919. Power and water supplied by the Mill City Development Co., a subsidiary, over a 34-mile power line; the water supply of 250 gallons per min. supplied through a 22,000′ pipe line of 6″ wire wound redwood pipe carrying water in 2 stages from a 24′ well. Two storage reservoirs of 100,000 and 50,000 gal. have been built. Mine worked 7 months in 1919; presumably idle since.

In September, 1919, the company was taken over by the Pacific Tungsten Co. interests.

NEVADA-KATHERINE MINES CO. **NEVADA**

Address: E. A. Shaw, Kingman, Arizona.

Officers: E. S. Chafey, pres.; Jas. Cashman, v. p.; E. A. Shaw, sec.-treas., with A. Adams and J. J. McDonald, directors.

Property: 4 claims on the Colorado river Clark county, Nev., across from the Katherine gold camp, San Francisco district, Mohave county, Arizona.

NEVADA KEYSTONE MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Property: a large group in Yellow Pine district, Clark county, 8 miles W. of Goodsprings, reputed to have produced $1,000,000 in gold prior to 1906. Idle 1906-'13 and after. The country formation is limestone cut by dikes and sills of quartz monzonite porphyry. The ore is an altered porphyry carrying free gold, with a little silver, and has a value of $18 to $25 per ton. Developed by glory holes, 3 tunnels, one over 450' long, and an incline from lower tunnel to depth of 1,100'. Equipped with cyanide mill which was treating tailings in 1919.

NEVADA LEAD MINING CO. **NEVADA**

Dead. Utah charter forfeited, and claims abandoned in 1918. See Vol. XIV.

NEVADA LINCOLN MINING CO. **NEVADA**

See Vol. XIII for details. About mid-1918 Frank Wilson, then president, sued company for services rendered and secured judgment by default, and the mine was sold to satisfy the judgment. Wilson bought it, and organized the Nevada Wilson Mining Co., to which the property was transferred. In September, 1919, the Lincoln company started suit against Wilson and his company to set aside the judgment and sale.

Report of May, 1921, announces settlement of suit out of court, and formation of still another company, controlled by Gilbert S. Johnson, Waggoner Bldg., Fort Worth, Texas. Stockholders of Nevada Lincoln will receive 500,000, and those of Nevada Wilson 525,000 shares of new company. Augustus Tilden of Reno, Nev., is attorney.

NEVADA LORING MINES CO. **NEVADA**

Address: T. J. D. Salter, Tom Ward, or J. C. Foster, Loring, via Lovelocks, Nev.

Property: the Mayday claims in the Loring (formerly Willard) district, Pershing county. In September, 1919, several veins had been uncovered, assaying high in gold and silver.

NEVADA NEW MINES CO. **NEVADA**

Office: 146 No. Virginia St., Reno. **Mine office:** Rawhide, Mineral county, Nev.

Officers: E. W. King, pres.-gen. mgr., Mina, Nev.; Alex. Boyle, gen. supt.

Inc. 1912, in Nevada. **Cap.** $1,200,000; par $1; 500,000 issued. Transfers made at company's office.

Company took over the property of George Graham Rice's old promotions, the Rawhide Coalition M. Co., Rawhide Queen M. Co. and the Black Eagle M. & M. Co.

Property: 260 acres in Rawhide, Regent district, said to carry free gold and ruby silver, in a 4" vein, opened on the 500' and 600' levels. Developed by 3 shafts and crosscuts to depth of 600'.

Equipment: includes 10-stamp amalgamation and concentration mill, 35-ton cyanide plant, compressor, and gasoline power.

After the wild boom of 1908 the mines were practically idle until 1912. Worked by lessees from 1912-1916, the production is reported to have been $800,000 worth of ore averaging $25 per ton. Company resumed operations in 1916, but operated at a loss and in September, 1917 leased the entire holdings to Salmon, Ross and Flynn, who sank the main shaft to depth

of 1,500'. Lessees have also granted sub-leases, the company receiving royalty on all ores shipped.

During 1918, lessees, or sub-lessees, shipped a small tonnage, and it is reported that lessee shipments in 1920 amounted to $49,820.

NEVADA OPHIR MINING CO. **NEVADA**

Office: 25 Broad St., New York City.

Officers: Walter E. Trent, pres.; C. A. Higgins, sec., with E. E. Rich and Frank V. Sullivan, directors. Supt. Harrington in charge at mine.

Inc. 1917, in Utah. **Cap.** $100,000; 10c par; 500,000 issued. Registrar & Transfer Co., N. Y. registrar and transfer agent.

Property: 8 claims in Ophir canyon, Nye county, formerly known as the Murphy mine and originally owned by the Twin River M. Co., which was succeeded 1869 by the Cambridge Silver M. Co.

Geology described by Clarence King in a volume of the U. S. G. S. published in 1870. Rich silver ore occurs in a well-defined fissure vein in andesite; a 4' vein averaging $15 per ton. Orebody ends against a fault.

Development: by 500' and 300' shafts with levels at 100' and 60' intervals, respectively; also by tunnel on 6th level, 700' long in December, 1921, to serve as main working adit and for drainage. Ore reserves are estimated to be $1,000,000, including 12,000 tons of 14 oz. silver ore on dumps.

Equipment: includes power plant, hoist and 20-stamp mill.

The mine is credited with a production of $700,000 up to 1868, when the old company went into bankruptcy and the property was sold. Several companies then operated the mine but apparently without success. The Nevada Ophir started work in 1918.

Is regarded as a very promising property.

NEVADA ORE & COPPER CO. **NEVADA**

Address: Hawthorne, Mineral county, Nev.

Officers: T. L. Kimmel, pres.; E. M. Freerks, v. p.; J. A. Wright, sec.-treas., with D. D. Ellerbrock and A. W. Beach, directors. H. J. Fick, supt.

Inc. 1907, in Nevada. **Cap.** $600,000; 30c par; 20,000 outstanding.

Property: 34 claims, 40 acres, near Mina, carrying copper-gold ore in fissure veins. Developed by 560' shaft and 6,000' of workings.

Equipment: includes gasoline hoist and 50-ton cyanide mill. Company has expended about $120,000 on property.

NEVADA PACIFIC MINES CO. **NEVADA**

Probably dead.. **Address:** L. P. Patrick, pres., Goldfield, Nev., at last accounts. **Mine office:** Mina, Mineral county, Nev.

Property: the Mayflower group in New York canyon, N. E. of Mina, shows copper ore 150' wide, exposed by surface work, from which 15 tons daily were shipped to the Wabuska smelter in 1913. No recent information received.

NEVADA PACKARD MINES CO. **NEVADA**

Office: Reno, Nev. Mine at Rochester, Pershing county, Nev.

Officers: Mark Walser, pres.; W. M. Gardiner, v. p.; Frank Margrave, sec.

Inc. 1913 in Nevada. **Cap.** $1,250,000; $1 par; 1,164,492 issued. Stock listed on San Francisco Exchange and Boston Curb. Transfer office: Reno, Nevada.

Dividends, first paid December 20, 1916, amounting to 5c per share; 2nd of 2½c. on September 30, 1918; 3rd of 2½c. on April 20, 1919.

Annual report to June 1, 1918, shows: current assets, $49,272; liabilities, $24,188; total earnings, $235,910; operating profit, $48,373.

Property: 7 claims, about 130 acres, in the Rochester mining district, said to show ore in silicified schist netted with quartz stringers. It is essentially highly altered sericitized rhyolite, varying from a soft and friable talcose or schistose product to an extremely tough silicified variety. Cerargyrite is the valuable constituent of the ore. Sulphides are not common. Ratio of gold to silver is about 1 to 300. Quartz veinlets are some times high in gold.

Development: by 400′ shaft and 5 tunnels, longest over 1,400′. Three ore-zones have been opened, and a fourth is indicated. A total of 2,659′ of work was done during the fiscal year ending June, 1919, at an average cost of $31 per foot.

Equipment: is complete including 125-ton mill, with rolls, tube-mills, agitation in cyanide, counter-current decantation, Oliver filters and Merrill precipitation system. Mill feed is about $9 per ton. Plant is of excellent design and cost $85,000. Capacity of mill increased to 225 tons, in fall of 1920.

Production: mill treated 32,605 tons in 1916-17, making an extraction of 86.8%, and in 1917-18, 31,390 tons, with an extraction of 88.5%. Output for fiscal year ending June 1, 1918, was 250,378 oz. silver and 357 oz. gold at a total cost of $5.003 per ton, compared with 339,062 oz. silver and 617 oz. gold and costs of $5.42 for previous year. Total production to January 1, 1919, was about $1,000,000. Reported producing 100 tons daily during 1919, to September, when a water shortage forced closing down the mill and curtailing operations. Again in summer of 1920, mill ceased operations for same reason and up to March, 1921, property was practically idle.

Company has had to face many difficulties and has been through much litigation, culminating in October, 1920, when Herman Davis, superintendent, was appointed receiver in a friendly suit involving an indebtedness of $55,000; Davis died in February, 1921. Frank Margrave, the secretary, succeeded Davis and announced that operations would be resumed.

NEVADA PROGRESSIVE GOLD MNG. CO., INC. NEVADA-CALIF.

Main office: 3204 N. Clark St., Chicago. **Mine office:** Sweetwater, Mineral Co., Nev.

Officers: A. G. Anderson, pres.; Chas. T. Scholz, v. p.; Paul Wohlbruck, sec.; Carl W. Lindeberg, treas.; Niels Buck, trustee, with Isabel Cameron and Nich. Evans, directors. E. F. Hall, supt.

Inc. Sept., 1914, in Nevada. **Cap.** $2,000,000; $1 par $708,167 in treasury. Bonds: $300,000-7s, maturing Nov. 1, 1925, authorized; $40,044 issued. Dec 31, 1920; each $100 bond carries bonus of 100 shares of treasury stock. Final payment on properties made in Nov., 1920, and trust deed filed in favor of trustee for bondholders. Assets for Dec. 31, 1920, were $2,234,133, including plant, $22,887, and $496 cash. Liabilities included; loans, $4,280 and $59,039, notes payable. Surplus was $838,927.

Property: 400 acres mineral and 600 acres miscellaneous land, Lyon county, Nev., near Wellington. Also by purchase in 1916 and 1920, the Silverado mine, 9 claims and mill site, of the Columbia Cons. Mines Co. and 13 claims (3 patented) of the Kentucky Cons. Mines Co., both in Patterson district, Mono county, Calif., 7 miles westerly from Sweetwater, Nev. On the California groups, which adjoin, the vein, 2′ to 5′ wide, is said to carry argentite with a little gold; average value $15 to $20; the country formation is andesite. Company also owns power plant on Green Creek.

Development: in California; by 3 tunnels, longest 800′ with back of 450′; in Nevada; by 2 shafts, 100′ and 300′ deep.

Equipment: in Calif.; 10-stamp mill and cyanide department, to be followed by 150-ton cyanide plant when sufficient funds are raised.

Production: in Calif.: $25,000 from Silverado and $600,000 from Kentucky, prior to 1916. Present company has shipped, including 1917 and up to Jan. 1, 1921, about $90,000. The Nevada holdings are inactive.

Examined by T. D. Benjovsky, E. F. Hall and Wm. Kramer.

NEVADA PROTECTIVE MNG. & INVESTMENT CO. NEVADA

Address: E. R. Argersinger, pres.-gen. mgr., or A. J. Canavan, supt., Carson City, Nev.

Property: 2 miles N. of Carson City, adjoins Southwest Comstock Ext. A shaft has been sunk 100′ on a granite-limestone contact; ore is said to carry gold, silver, copper and lead. In late 1921, operations were conducted through Southwest Comstock ground. Equipped with 30 h. p. hoist and compressor.

NEVADA QUEEN COPPER CO. **NEVADA**

Office: 404 Mining Exchange Bldg., Colorado Springs, Colo. Mine near Yerington, Lyon county, Nev.

Officers: Duncan Chisholm, pres.; John A. Chisholm, v. p.; R. G. Riddett, sec.-treas., with Geo. M. Irwin and D. P. Randall, directors.

Inc. Oct. 5, 1906, in Colorado. **Cap.** $75,000; par 5¢; decreased from $1,500,000, $1 par. Is operated as a close corporation. Annual meeting second Monday in October.

Property: 28 claims, patented, 467 acres, lying immediately north of the Nevada Douglas property. Developed by shafts of 186′ and 210′, showing copper ore said to assay 1.5 to 28%.

Idle for several years, and will remain so until copper market improves.

NEVADA QUINCY MINING CO. **NEVADA**

Address: 303 Judge Bldg., Salt Lake City, Utah.

Property: in Cherry Creek mining district, White Pine county. Company in process of dissolution.

NEVADA RAND MINES CO. **NEVADA**

Address: Box 152, or 11 Fordonia Bldg., Reno, Nev.

Officers: C. G. MacBride, pres.; Dr. C. F. Watkins, 1st v. p.; S. R. Satterthwaite, 2nd v. p.; Wm. V. Rudderow, sec.-treas.-mgr.; J. D. Walker, supt.

Inc. July 8, 1916. **Cap.** $150,000, increased Aug. 16, 1920, from $100,000; 10¢ par; 590,200 in treasury. No debts. Annual meeting, 2nd Monday in July.

Property: 7 claims, 110 acres, in Rand district, Mineral county, 17 miles N. E. of Nolan on S. P. R. R. Group shows fissure veins in a mineralized fracture zone, 100′ wide, in altered hornblende trachy-andesite; a 240′ shoot, from which high grade ore is being shipped, has been opened. Ores are highly silicious, largely oxidized to 250′ level, and carry hornsilver, gold and some manganese. Early in 1921, a 75′ shoot of primary ore was encountered on 200′ level, said to average $54 for width of 3′.

Development: by 450′ shaft, with total workings of 2,500′. Recent work on the 150 and 200′ levels, south of the old workings, disclosed a new orebody from which high grade milling ore has been mined and lesser grade developed. Management plan to explore for primary ore shoot extension. Reserves are estimated to be 30,000 tons of $15 ore and 1,400 tons $17 ore on dumps. Production to May 1, 1921, $50,000.

Equipment: includes 18-h. p. gas. hoisting engine and assay plant. In June, 1919, a 45-ton mill was purchased which it is proposed to move to mine; a cyanide plant is to be added; tests show 96% extraction.

Company appears to have a promising mine in a district that has produced very rich ore, and is following a conservative policy.

Examined by S. E. Montgomery and J. C. Jones of Mackay School of Mines.

Inc. June, 1915, in Utah. **Cap.** $1,000,000; shares 10c par.

Property: in Regent district, Mineral county, Nevada. No recent returns secured.

NEVADA SCHEELITE CO. **NEVADA**

Mail returned from Ely, Nev.

Property: S. E. of Ely, White Pine county, equipped with mill and reported producing tungsten ore during 1918. No production figures obtainable.

NEVADA SHEBA SILVER MINING CO. **NEVADA**

Presumably dead.

Held a lease and option on holdings of the Sheba Gold & Silver Mng. Co., shipped small amounts of ore and concentrate in 1919; became financially involved and forfeited lease about January, 1921. Succeeded as a lessee by **Little Giant Gold & Silver Mng. Co.**, (q. v.) organized by same people.

NEVADA SILVER CONSOLIDATED CO., INC. **NEVADA**

Former office: Wonder, Nev., successor to Vulture-Wonder Mines Co.

Officers: at last accounts, G. H. Manning, pres.; R. V. Ellis, v. p.; N. H. Manning, sec.-treas.; E. S. Cox, asst. sec.; S. H. Brady, mgr.; also directors.

Inc. in Delaware. **Cap.** $2,500,000; $1 par; 1,700,000 issued. The New York brokerage firm of Howard A. Riley & Co. was to make a "market" for the stock, but appears to have lost interest in the promotion.

Property: 9 quartz claims, 166 acres, 4 miles N. W. of Wonder, Churchill county. Nearest railroad point is Fallon.

Geology: ore deposition has followed a dike of dense and hard intrusive rhyolite, showing intense silicification. This dike is intruded along the dacite-rhyolite contact, except where quartz-porphyry intervenes between it and the dacite. The dike is itself classed as a vein, as it is silicified, and somewhat mineralized. The quartz of the hanging and foot walls carries the best values. Forty-six samples taken from various exposures on the property returned from 0.3 to 13.6 oz. silver per ton.

Development: in 1917 extensive openings were made by lessees, who shipped ore, one lot of 500 tons averaging $125 per ton. A shaft was down 216' in July, 1917. No recent returns.

NEVADA SILVER CONSOLIDATED MINING CO. **NEVADA**

Mail returned from only known address, Tonopah, Nev.

Property: 20 miles from Ione, Nye county, N. E. of Tonopah. Formation is said to be almost similar to that at Tonopah and Divide. Veins are fault-fissures, filled with mineralized breccia from which good surface assays are reported.

NEVADA SILVERFIELDS CO. **NEVADA**

Office: 7 Hanover St., New York. **Mine address:** Battle Mountain, Nev.

Officers: E. N. Breitung, pres.; H. B. Barling, v. p.; C. F. Breitung, sec.-treas.; with C. A. Breitung and H. W. Richter, directors.

Inc. June 27, 1918, in Nevada, and acquired rights to develop, operate and purchase holdings of Silverfields Mng. Co., Ltd., and acquired the Nicklas Mng. Co. by stock exchange, 1 share (par $5) of Nevada Silverfields for 5 shares (par $1) of Nicklas.

Cap. $2,000,000; par $5; $1,849,995 outstanding. Company has assumed balance of bonded debt, $75,000, of the Nicklas company which matured Nov. 1, 1921. Empire Trust Co., New York, transfer agt. Annual meeting, second Monday in March.

Property: Nicklas property, adjacent to that of Silverfields (described under own title), comprises Plumas and other mines, in Galena sub-district, 13 miles S. W. of Battle Mountain, Lander county; 4 claims (2 patented) and 2 mill-sites. The veins occur in sandstones, shales and conglomerates; the Plumas vein, 4' to 6' wide, shows iron stained crushed country rock and quartz, carrying gold, said to average $10 to $12 per ton. Other veins carry silver and but little gold.

Development: largely by tunnels, but one shaft is 750' deep; total workings, about 3,000', up to 1919. Proven ore of Silverfields and Nicklas combined amounts to 217,000 tons, of $12.35 gross value per ton.

Equipment: hoist, experimental mill, etc. A 100-ton mill is in contemplation.

A small production of sulphide ore came from the Nicklas in 1919.

NEVADA SILVER HORN MINING CO. **NEVADA**

Address: Geo. B. Hutchings, sec.-treas.; 25 Broad St., New York. **Mine office:** Pioche, Nev. Frank A. Crampton, mgr.; Thos. H. France, cons. engr.

Inc. in Nevada. **Cap.** $200,000; par 10¢; $145,000 in treasury.

Property: Horn Silver group of 5 patented claims and millsite, in new Silverhorn camp, near the Bristol district, Lincoln county, 23 miles N. W. of Pioche. The surface shows a massive quartz vein, reported to be 40' to 200' wide, in shales and limestone cut by porphyry dikes; the vein is said to outcrop 10' to 35' above the surface and to be traceable for 1 800'. Shear zones, occurring at frequent intervals, cover the richest portions of the out-

crop, showing milling ore averaging 15 to 30 oz. silver per ton. It is believed that ¼ of the entire body will yield profitable ore of this class. Development: is exploratory only. Assay returns from 500 samples show 0.24 to 134 oz. of silver per ton from width of 1½ to 52', gold value is small.

The discovery of this new silver camp dates back to the fall of 1920 and the Silver Horn boom was well under way early in 1921. The Nevada Silver Horn Mng. Co. is a Weir Bros. & Co. promotion. But little was heard from the new camp during the last 6 months of 1921.

Examined by J. Nelson Nevius, T. H. M. Crampton, and many other engineers.

NEVADA SILVER KLONDIKE MINING CO. **NEVADA**

Address: Pioche, Nev.

Controlled by Spaeth Mac-Knight & Co. of New York. Maurice J. Fink, gen.mgr.; John Carter Anderson, cons. engr.

Property: the Great Western mine in Stampede gap, Lincoln county, near Pioche, shows a big iron vein in contact with a porphyry dike, developed by a crosscut tunnel. Ore carries lead and silver, with some gold.

NEVADA SILVER MINING & DEVELOPMENT CO. **NEVADA**

This is a new company operating the Dog group of claims 3,000' S. of the V 7 company in the Reservation district near Schurz, Mineral county.

NEVADA SILVER SHIELD MINING CO. **NEVADA**

Address: Horse Canyon, via Round Mountain, Nye county, Nev.

Officers: J. L. McCarthy, pres.; C. W. Taylor, v. p.; G. W. Quigley, sec.-treas., with J. B. Witt and John W. Hanson, directors.

Inc. late in 1919. **Cap.** $150,000; 10c par.

Property: 8 claims, including the Silver Shield mine in Horse Canyon, opened by two 400' tunnels, one of which to a depth of 160' is said to have revealed 200,000 tons of $15 to $18 silver ore.

NEVADA SIMON MINES CO. **NEVADA**

Mail returned from Tonopah, Nev.

Officers: Lt. Gov. Maurice J. Sullivan, pres.; Al. McCoy, v. p.; A. Shannon, sec.-treas., with H. C. Heidtmann and W. J. Douglass, directors.

Inc. 1919, in Nevada. **Cap.** $1,500,000, par $1.

Property: 7 claims, 2,000' from the Simon mine and on same kind of contact, according to report. One of many new prospects at Mina.

NEVADA SMELTING & MINES CORP. **NEVADA**

Controlled by and practically merged with the **Louisiana Cons. M. Co.**

Address: Julius Siegbert, 900 Broadway, New York. Mines near Tybo, Nye county, Nev.

Officers: Max E. Bernheimer, pres.; L. A. Dessar, v. p.; Werner Mueller, sec.; A. W. Joseph, treas., with M. Eisenberg, Chas. Lee, L. E. Marsden, N. P. Payne, H. Rawitzer, and C. J. Roberts, directors.

Inc. May, 1906, in South Dakota. **Cap.** $5,000,000; shares, $5 par. Stock stricken from the New York Curb August, 1918. U. S. Corporation Co., New York, registrar and transfer agt. Balance on hand, March 31, 1918, was $121.

Company realized $4,090 on 80,000 shares of Greenwater Copper Mines & Smelter Co. stock in 1914, retaining 272,000 out of the 3,058,775 issued shares of the Greenwater Co.; also owns a controlling interest in the Tybo Cons. Mining Co., owning silver-lead-zinc properties at Tybo, Hot Creek district, Nev., operated by the Louisiana Cons. M. Co., which see.

Stockholders of the Nevada S. & M. were given the privilege of exchanging their stock on a basis of 10 shares of Nevada for 3 shares of Louisiana Con. This offer was withdrawn February 10, 1918, after more than 70% of the outstanding stock had been exchanged.

NEVADA STANDARD COPPER CO **NEVADA**

Officers: Wilbert E. Marsh, pres., P. O. Box 24, Mina, Nev.; C. E. Korthe, v. p.; L. H. Marsh, sec.-treas., with B. H. Wyant and Matthew W.

King, directors. Marsh sold his majority holdings in the company to G. A. Raessler of Luning in 1919.

Inc. 1912, in Nevada. **Cap.** $100,000; $1 par; 6,850 issued.

Property: the Green Mystery group of 11½ claims, the Tray Dollar group of 10 claims and a mill-site, near Luning in Santa Fe district, Mineral county, 8 miles N. E. of Mina, on the Goldfield branch of the S. P. R. R. The Green Mystery claims cover low rounded hills at about 6,000' elevation. The rocks are leached porphyries underlain at 20' depth by low-grade oxidized copper ores. Ore contains bornite, chalcocite and chalcopyrite. Assays reported from 1.1 to 25% copper with small gold and silver values.

Development: by 192' shaft on the Green Mystery claim, which at 45' cut a fault plane fissure that widened to 20' on the 104' level. Crosscutting in 1915 on the 192' level to the north opened up 11' of low-grade copper ore. Management considers it a typical porphyry, or disseminated, copper deposit. There is a bed of copper-bearing conglomerate between porphyry and lime, extending for 4,000' along the contact. An incline sunk to explore this conglomerate is 60' deep with drifts N. & S. for 160'. The Tray Dollar covers several lead-silver veins containing ore assaying from $16-$40; a copper-silver contact vein between lime and monzonite is said to assay $50-$134 per ton. Developed by 5 tunnels, 50-175' on fissure veins and 335' crosscut to contact vein with 175' further to go to reach the ore-shoots. Property examined by W. R. Brown, W. H. Wiley and C. W Clark.

Equipment: includes gasoline hoist, pump, blacksmith shop and buildings for men. There are 3 springs, 2½ to 5 miles distant. Report $25,078 expended on property to March 1, 1919. No salaries paid.

NEVADA SUPERIOR MINES CO. **NEVADA**

Probably dead as mail is returned from former office at 625 Dooly Bldg., Salt Lake City. **Mine office:** Jungo, Nev.

Officers: Otto Grantz, pres.; E. R. Reitsch, v. p.; John Geiger, sec., and gen. mgr.; Dr. Allen C. Eakin, treas.', with D. R. Peterson, directors, at last accounts.

Inc. 1905, in Utah. **Cap.** $300,000; $1 par; assessable; 155,000 shares outstanding.

Property: 21 claims, 420 acres, in Humboldt county, 23 miles from Jungo on the W. P. R. R., shows gold-silver-lead-zinc ore in fissure veins traversing schist and slate. The main orebody from 2-20' wide, strikes N. W. and is said to give average assays of 8.6 oz. silver, 11.2% lead, 1% copper, 8% zinc. Shipments of crude ore made by lessees in 1915 ran $15-$24 per ton. Developed by 2 tunnels, 1,000' and 2,500' long, and 330' vertical shaft.

Equipment: includes 75-ton concentrating mill, steam power, compressor, pump and hoist. Company has been inactive since 1913 owing to lack of funds.

NEVADA TRI-METALLIC CONS. MINING CO. **NEVADA**

Address: R. C. Miller, supt. Marietta, via Mina, Nev.; or W. M. Gardiner, sec., Reno, Nev.

Officers: J. J. Duffie, pres., 1108 Hearst Bldg., San Francisco, W. R. Berry, v. p.-treas.; W. M. Gardiner, sec., with W. D. Wright and J. N. Morris, directors.

Property: is a consolidation of 2 groups including the Shepherd mine, in the Silver Star district, Mineral county, 16 miles S. W. of Mina. Quartz veins occurring in quartzite and conglomerates are developed by tunnels. Lessees are working the claims and shipping small amounts of high grade ore.

NEVADA UNION COPPER MINES CO. (THE) **NEVADA**

Office: 611 Mining Exchange Bldg., Denver, Colo.

Officers: F. D. Goodale, pres.-treas. gen mgr.; M. H. Muller, sec.; Paul Esch, v. p., with Byron Tifft, Robt. Kettner, A. M. Goodale, and Henry Truelson, directors.

Inc. June 29, 1917, in Colorado. **Cap.** $600,000; 10c par; 2,000,000 shares in treasury, July, 1919. Company acquired holdings of the Honest Endeavor Mng. Co., fully described in Volume XIII. The stock of the latter company was exchanged on a share for share basis. In January, 1919, stockholders authorized an issue of $25,000 five-year 1st mortgage bonds, of which $5,000 have been placed among the stockholders with a stock bonus of an equal amount and $4,000 additional had been subscribed at last report.

Property: 12 claims, 200 acres, in Yerington district, 1½ miles from Ludwig, Lyon county.

Development: by several shafts, one 120' deep, and some lateral work. The Union Blue is the principal vein, being described as a porphyry intrusion between diorite walls. On surface between a streak of high-grade ore and one of white talc there is said to be 32' of mineralized diorite-porphyry. In 1919, drifts were run E. and W. on the 120' level with expectation of opening an orebody of commercial size.

Recent report state that property shows 1,000' of development, costing $60,000, on two principal veins, the Union Blue and Golden Sunset, each more than 30' wide; shipments of 12% copper ore are also reported. Information is in part derived from advertisements appearing February, 1921, offering a limited amount of stock at 5c per share. But reference should be made to what is said in Vol. XIII; 14 years have now passed since operations were first begun and there seems but little to show for them.

NEVADA UNITED MINES CO. **NEVADA**

Address: 441 Equitable Bld., Denver, Colo.

Officers: W. J. Chamberlain, pres.; H. F. Crocker, v. p.; R. J. Pitkin, sec.; E. S. Kassler, treas., with H. B. Northrop, F. N. Bancroft, W. G. Boyle, A. G. Bowen and A. G. Burton, directors.

Inc. February 6, 1906, in Arizona. **Cap.** $3,500,000; $1 par; 2,962,952 issued.

Property: 50 claims, 38 patented, about 600 acres, in the Ward district, White Pine county, 18 miles from Ely, includes the Ward mine, said to show chamber deposits of lead ore in limestone. Ore contains lead, silver and iron.

Development: by 2 adits, 1,500 and 2,400' long, to 350' depth. In 1919, 1,200' of drifting was done. An estimate of Oct. 1, 1920, gave ore reserves of 200,000 tons averaging 7% lead and 2 to 3 oz. silver. Mining is by caving system and output was about 2,800 tons monthly in 1917. Shipments continued during 1918-'19 and up to Sept. 1, 1920. Because of unfavorable economic conditions, exploratory work only was done in 1921.

Property is now worked by The Ward Leasing Co., successor to Nevada United Mines Leasing Co.

NEVADA UNITED MINES LEASING CO. **NEVADA**

Name changed, 1920-21, to The Ward Leasing Co., which see.

NEVADA UNITED MINING CO. **NEVADA**

Oliver G. Jennings, pres. and treas., 49 Wall St., New York. An inactive corporation. Fully described in Vol. XI Copper Handbook.

NEVADA-UTAH MINES & SMELTERS CORP. **NEVADA**

See **Consolidated Nevada-Utah Corporation.**

NEVADA VOLCANO MINES CO. **NEVADA**

Address: Thomas Harney, Pioche, Nev.

Property: Harney group, 1 mile east of Pioche, Lincoln county, said to show a 9' vein of silver-lead-gold ore, running $80 to $100 per ton. Production by company and lessees from 1915 to June, 1919, reported to be $75,000.

Suit was filed in June, 1919, by Lloyd Brothers of Pioche, who claim ownership of the mine by right of prior location.

No recent information.

NEVADA WILSON MINING CO. NEVADA

Address: A. L. Haight, Fallon, Nev. Company organized 1918 to operate the Wilson mine, and 2 additional adjoining claims, at Eastgate, Churchill county, 20 miles E. of Fairview. But in 1919, litigation over title began with former company, settlement was reached in 1921. See **Nevada Lincoln Mng. Co.** for details.

NEVADA WONDER MINING CO. NEVADA

Office: 572 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Wonder, Nev. **Officers:** Chas. R. Miller, pres.; J. H. Whiteman, v. p.-gen. counsel; with Samuel Bell, Jr., M. B. Cutter, Barton Hoopes, Jr., Jos. W. Murray and Wm. M. Potts, directors. P. S. Bickmore, sec.-treas.; H. C. Carlisle, gen. supt.

Inc. Sept. 19, 1906, in Delaware. **Cap.** $1,500,000; $1 par; $91,513 in treasury. Book value of abandoned property, $893,953, written off against capital stock, leaving balance of $606,047.

Dividends: paid at the rate of 10% annually. Last dividend paid May, 1919. Total is $1,549,002. Transfers made at company s office. Registrar, Fourth St. Natl. Bank, Philadelphia. Annual meeting, 3rd Wed. in March.

Balance sheet for year ending Dec. 31, 1920, shows assets: $636,457, of which $169,461 ($120,000 Peruvian C. & S. Co.) is for stock owned, $255,000 for demand loans, $31,086 for cash, and $56,241 for plant. Current liabilities total $30,410. Receipts were $587,774, including $15,340 for mill products. Income account shows a net loss of $30,785 due largely to examination and exploration of outside properties.

Property: includes by nearly complete stock control claims of Wonder Extension and Reorganized North Star mining companies and of Hidden Treasure Mng. Corp., etc., amounting to 328 patented and 73 unpatented acres in Wonder district, Churchill county. Also owns plant of the Churchill Milling Co., with capacity of 170 tons.

These mining properties becoming exhausted, all operations ceased in Dec., 1919; during 1920 and before, company has been in search of other properties. A one year lease from August 1918 on holdings of the Monitor Belmont Mng. Co. (q. v.), was relinquished as no ore was found, after expending about $90,000. An option on the Bell Mountain property in Nevada, was also surrendered; exploration cost $15,839. Examinations were made of mines in Nevada, Arizona, New Mexico, and California, at cost of $15,968. Also in 1920, company purchased 200,000 shares of the Peruvian Copper & Sm. Co., property of which is situated in the Youyos district of Peru.

Development: by shaft and winze to depth of 2,000'; total workings, 70,449'. Work done in 1918 aggregated 8,872', in 1919, 4,000'. Results in 1919 were not encouraging, either at depth or in upper levels.

Production:

	Tons	Ag. oz.	Au. oz.	Total Value	Av. Rec. %	Cost p. t.	Net. Oper. Profit p. t.
1919.....	40,570	468.797	5.514	$ 629,240	....	$ 8.11	$6.38
1918.....	49,710	657.815	5,108	742,306	91.82	10.09	3.62
1917.....	55,800	929,284	7,882	822,940	89.10	10.78	3.97
1916.....	72,241	1,352,615	11,466	1,112,835	92.67	8.90	5.37

During 1920, $16,376 was obtained from products resulting from mill clean-up.

For more detailed description, see Vol. XIV.

NEVADA ZINC CO. NEVADA

G. L. Bemis, Tobar, Elko county, Nev., gen. mgr., at last accounts.

Property: the Polar Star group near Tobar, has a zinc-lead deposit.

40′ wide and opened for 600′ on surface. Ore said to average from 30-35% zinc and from 4-5% lead. Developed by tunnel and 500′ shaft.

During 1917, reported that production amounted to 200 tons per month; in 1918 a small lot of oxidized zinc ore was shipped. No reports since.

NEW ALTO DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: Joseph Mayer, pres.-mgr.; J. K. Turner, v. p.-cons. engr.; Ben Gill, sec.-treas., with C. A. Leager and Chas. S. Sprague, directors.

Inc. in 1921 to take over holdings of Alto Divide Mining Co., of which the entire (1,500,000 shares) non-assessable stock had been issued and no funds available. **Cap.** $200,000; par 10c.; assessable; 470,000 treasury shares; shareholders of old company receiving new stock on a share for share basis.

Property: 4 claims, 70 acres, on eastern boundary of Tonopah Divide, Gold Zone and Gold Reef groups, Gold Mountain (Divide) district, Esmeralda county. New company owns also the adjoining Gold Zone Fraction claim.

Development: by a shaft, started in March, 1919, at a point 135′ S. of Arkansas claim of Gold Zone, near a prominent outcrop. Was 400′ deep, with total workings of 2,050′ in April, 1921. All lateral work is on 400′ level and a 190′ easterly crosscut has exposed a N.-S. vein, which in the S. drift is 10′ wide, averaging $8.60, largely in silver.

Equipment: 50-h. p. motor and 30 h. p. hoist, 6-drill compressor, machines, etc.

The same management as **East Divide Mining Co.**

NEW BONANZA COMSTOCK MINES CO. **NEVADA**

Inc. December, 1919, in Nevada, by C. A. Garret, T. B. Gordon, Gurney Gordon, F. M. Kleppe, and O. R. Vaughn. **Cap.** $75,000; 20c par. No information as to property obtainable.

NEW CALIFORNIA TONOPAH MINING CO. **NEVADA**

Formerly the California & Tonopah Mining Co., bankrupt, purchased by Frank Stall from receiver, late in 1919, and company reorganized under new name.

Address: Frank Stall, pres.-mgr., Tonopah, Nev. W. R. McCrea and Joseph Hutchins are other principals.

Property: of record in 1903, comprises 7 claims and 2 fractions, in Tonopah district, Nye county, E. of Jim Butler and S. of Rescue Eula. Is opened by 700′ shaft and winze to 950′; shipping ore has been found on 400′ and 600′ levels by present management, and some shipments are being made. Ground now being explored between 700′ and 950′ levels. Property fully equipped.

In summer of 1921, a lease was taken on the easterly end of the Wandering Boy claim of Jim Butler Tonopah Mng. Co., operations to be conducted through the latter's shaft.

NEW ELY CENTRAL COPPER CO. **NEVADA**

Company's affairs have been liquidated, its charter alone remaining; see Vols. XI and XIII. Entire property owned by **Cons. Coppermines Co.**, which see.

NEW EMPIRE GOLDFIELD MINES CO. **NEVADA**

Address: C. D. Terwilliger, Clay Peters Bldg., Reno, Nev.

Officers: C. D. Terwilliger, pres.; Chas. Wittenberg, v. p.; F. M. Manson, treas., with E. Marks, directors.

Inc. 1915, in Nevada. **Cap.** $1,500,000; shares $1 par.

Property: 3 claims and a fraction, 50 acres, adjoining the Lone Star on the E. and Commonwealth property on the N. at Goldfield, formerly owned by the Empire Gold Mining Co.

Development: by an old 150′ shaft and 150′ crosscut said to have disclosed a 16″ streak of $20 ore.

Equipment: includes electric power and 40-h. p. electric hoist. Company is still in existence, but presumably idle.

NEW GOLDFIELD SIERRA MINING CO. NEVADA

Described in Volume XIII. Merged December, 1919 with the **Yellow Tiger Consolidated Mining Co.**, which see.

NEW GOLDFIELD SIMMERONE MINING CO. NEVADA

Inc. 1915, in Nevada.

Property: the Simmerone Fraction at Goldfield, Esmeralda county and a 3-year lease and bond on the adjoining Blue Bull group, worked through the Simmerone workings. The Simmerone, acquired 1914 at sheriff's sale, is developed to 250'. Funds exhausted in 1917 and company presumably dead.

NEW JERSEY MINES CO. NEVADA

Offices: 628 Hudson St., Hoboken, N. J., and Goldfield, Nev.

Officers: Henry V. Broeser, pres.; L. A. Opdyke, v. p.; J. H. Stegman, treas.; Geo. H. Snyder, sec., Jersey City; above, with 14 others form the directorate. Harry Ernest, mgr.

Inc. Jan. 15, 1912, in Nev. **Cap.** $1,250,000; $1 par; outstanding, 1,010,850 shares; assessable 1c par share per year. Registrar & Transfer Co., New York, registrar, 5,000 shares sold for $29 the lot at public auction in New York on Dec. 22, 1920.

Treasurer's report for year ending March 31, 1917, shows receipts of $18,017. Disbursements amounted to $17,672, leaving balance on hand, $346. No later returns given out.

Property: 5 claims, 3 patented, 53 acres, several miles N. E. of Goldfield, said to show gold-silver ore, but not in commercial quantities.

Development: 507' shaft, with work done in 1916 on the 330' and 400' levels. Idle.

NEW SUTHERLAND DIVIDE MINING CO. NEVADA

A reorganization of the Sutherland Divide Mng. Co., effective Jan. 10, 1920, when 70% of stock issue of old company unanimously voted to change name and to place stock on assessment basis.

Office: Goldfield, Nev.

Officers: C. R. Evans, pres.; J. B. Kendall, v. p. and mgr.; R. W. Cattermole, sec.-treas., with C. H. Webster and F. B. Mechling, directors.

Inc. May 8, 1918, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable; 574,800 in treasury.

Stock of old company, 925,000 shares, was exchanged, share for share, for new stock, with initial assessment of 1c per share; Feb. 12, 1920, was final exchange date. Stock in treasury was increased by 260,800 shares; J. B. Kendall was trustee. Assessment No. 2 of 1c was levied, May 19, 1920. All obligations of old company will be paid.

Property: 6 claims, 130 acres, 1½ miles N. of the Tonopah Divide mine. Examined by J. B. Kendall, and A. H. Elftman, who said that outcrops assayed $2.20 in gold; silver increases with depth; and that sinking should be done to 600'. Ground is crossed by a well-defined vein proved by various opencuts and shallow shafts, from two of which ore was shipped by former lessees; a pit 800' E. of the new shaft now shows $6.50 ore.

Development: by 900' incline shaft sunk on a fault vein, opened on the 300' level by 30' crosscut and 239' of drifts, and a 25' crosscut on the 400' level, with a 201' drift on the vein. The 400' showed some $10.55 ore, and narrow seams of rich ore ($70) were found on the 300' level. This same shaft is said to have produced ore for shipment some 15 years ago, the ground being owned early in 1901 by the South Tonopah Mining Co., the second mining company to be incorporated in the Tonopah region.

Equipment: 50-h. p. hoist and all the machinery needed for development to depth of 1,000'.

NEW TONOPAH DIVIDEND MINING CO. NEVADA

Office: 219 State Bank Bldg., Tonopah, Nev.

Reorganization of the Tonopah Dividend Mng. Co., involving a change of name and the making of stock assessable, effective March 1, 1921.

Officers: J. R. Cunningham, pres.; J. M. Fenwick, v. p.; E. P. Cullinan, sec.-treas., with Ernest Cole and Herman Albert, directors. W. H. Hart, supt.

Inc. in Nevada. **Cap.** $200,000 increased April 1, 1919, from $150,000, 10c par; 1,280,000 issued. Tonopah Banking Corp., Tonopah, registrar. Listed on San Francisco Stock Exchange.

Shares of original company were exchangeable, share for share, for stock of new company, up to May 25, 1921, with payment of 1c per share. Assessment No. 1, of 1c., was levied Aug. 13, 1921.

The Dividend is controlled by H. G. Humphrey, of Reno; Zeb Kendall, George Wingfield, J. H. Miller, and others, all of whom are interested in Divide Extension.

Property: 6 claims, 85 acres, adjoining Tonopah Divide on south, Brougher, Divide Extension and Divide Consolidated, in Gold Mountain (Divide) district, Esmeralda county. Threatened litigation with the Midway Divide was adjusted in April, 1919.

Development: trenching in June, 1919, had exposed the Divide Extension vein, near the joint boundary, where it is joined by an E.-W. vein forming a large fractured area that is enriched to a high degree. At one point assays ranging from $50 to $150 were obtained across 12′ of this material. The ore is said to contain argentite and stephanite. Opened by 2 shafts, 800′ and 400′, in search respectively of Victory Divide and Divide Extension veins. Reported that $150,000 had been expended up to March, 1921.

Equipment: electric hoist, compressor, drill, etc.

NEW TRILBY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: D. F. Murphy, pres.; J. M. Fenwick, v. p.; E. Lang, sec., with Owen Murphy and C. J. Morabe, directors. This directorate is the same as that of the Reorg. Rosetta Divide.

Inc. March 28, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Organized to take over property and equipment of the Trilby Divide Mng. Co. sold out at sheriff's sale. Opportunity was given to stockholders of old company to exchange, share for share, for new stock plus 1c bonus, on or before March 31, 1921.

Property: 4 claims, 50 acres, adjoining the Belmont Divide, the Rosetta and Argonne, in Gold Mountain (Divide) district, Esmeralda county. Examined by A. H. Elftman. Surface exposures said to be good. Developed by shaft, 180′ deep, March, 1921, with the usual equipments.

Reported that a property had been acquired at Hornsilver, Esmeralda county, in January, 1922.

NEW TUSCARORA MINING CO. **NEVADA**

Address: Tuscarora, via Elko, Nev. **Officers:** W. J. Craig, pres.-mgr.; J. R. Austin, v. p.; W. J. Wolstenholme, sec.-treas., with E. L. Soule, H. S. Barnhart and P. D. Fenkell, directors.

Cap. $50,000; shares 5c par; 500,000 issued.

Property: 4 claims in the old Tuscarora district, Elko county, Nev., developed by 750′ tunnel. Shallow shafts said to show ore with high values in gold and silver.

NEW WILLARD GOLD MINES CO. **NEVADA**

Formerly Willard Metals Mng. Co.

Address: E. E. Roberts, pres., Lovelocks, Pershing county, Nev. L. C. Deady and W. J. Beauchamp (mgr.), directors.

Property: 10 claims close to the Sheepherder mine in the Loring district. Surface exposures said to be good.

NEW YERINGTON COPPER CO. **NEVADA**

Formerly Yerington Copper Co.

Company inactive and winding up its affairs, July, 1919. Property at Yerington, Lyon county, fully described, Volume XIII.

Address: Tonopah, Nev.

NEW YORK DIVIDE MINING CO. NEVADA

Address: Tonopah, Nev.

Officers: D. S. Dickerson, pres.; M. J. Sullivan, v. p.; H. A. Stewart, sec.-treas., with Joseph Hutchinson and A. G. Raycraft, directors.

Inc. in Nevada. **Cap.** $200,000; shares 10c par.

Property: 5 claims north of Sutherland and about 2 miles north of the Tonopah Divide. Is a prospect.

NEW YORK ORO CORP. NEVADA

Address: Geo. A. Manning, Campbell, N. Y.

Cap. $10,000,000; par $1.

A holding company, presumably, organized prior to 1912. In 1914, reported to be forming a consolidation of a number of properties in the Wonder district, Churchill county. Six years later it was announced that additional ground has been acquired and that a large mill would be erected.

The corporation controls also the **Goldfield Oro Mng. Co.** (q. v.). Mr. Manning is president of **Nevada Silver Cons. Co., Inc.**, successor to Vulture-Wonder Mines Co.

NICKLAS MINING CO. NEVADA

See Vol. XIV; property taken over by **Nevada Silverfields.**

NIVLOC MINING CO. NEVADA

See Vol. XIV; property now controlled by **Nivloc Northern Mines Co.**, which see.

NIVLOC NORTHERN MINES CO. NEVADA

Formerly Nivloc Mng. Co.

Address: Silverpeak, Nev.

Officers: A. G. Cummings, pres.-mgr.; John M. Cotter, v. p.; Fred Remick, sec.-treas., with Hy. Smith and Frank Minner, directors.

Inc. in Nevada to take over property of the former Nivloc Mining Co.

Property: the Harry C. Stimler group of 15 claims in Silver Peak district, Esmeralda county, 8 miles S. W. of Silverpeak. A quartz vein, upward of 100′ wide, averaging $10 gold, in limestone, is reported.

Development: by 440′ shaft; total workings, about 1,000′. In Oct., 1920, it was claimed that 1,500,000 tons of milling ore were developed, and that present management contemplated the erection of a 100-ton mill.

NIXON-NEVADA MINING CO. NEVADA

Dead; see Vol. XIV. In September, 1920, judgment for $1,343 was secfor $6,993, paid in behalf of creditors, and were not redeemed by the company. Equipment being salvaged and mines to be abandoned.

Address: W. M. Gardiner, Nixon Bldg., Reno, Nev.

NOME DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev. Bert Ward, res. agt.

Officers: Chas. W. Brandon, pres.; J. W. Van Winkle, v. p.; with J. T Walters, James Ford and Chas. McCall, directors.

Inc. May. 1919. in Nevada. **Cap.** $150.000: par 10c: 750.000 treasury shares.

Property: 12 claims, 141 acres, next to Marinetta and Yukon Divide.

NONPAREIL MINING CO. NEVADA

Mail returned from only known address, Reno, Nev.

Officers: L. T. McAtee, pres.; M. Helliere, sec.

Inc. 1919, in Nevada.

Property: Nonpareil group on Lincoln hill, Rochester mining district, Pershing county; mine is credited with a production of $30,000 in gold.

NORMAN SILVER MINING CO. NEVADA

Absorbed in November, 1919, by **Fagan Consolidated Silver Mines Co.**, which see.

NORRIS DIVIDE MINING CO. NEVADA

Mail returned from only known address, Tonopah, Nev.

Officers: Walter Norris, v. p. and mgr.; J. T. Murphy, v. p.; C. P. Johnson, sec.-treas., with Walter Hogg, and E. Marks, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: adjoins on the west the East Divide Extension, Big Divide, and Marne. The ground is supposedly crossed by the East Divide vein zone for a distance of 1,800'.

NORTH BEN HUR DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. B. E. Garnett, agt.

Officers: F. C. Beedle, pres.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas., with Albert Ninnis and A. B. Garnett, directors

Inc. in Nevada. **Cap.** $150,000; 10c par: 750,000 in treasury.

Property: 3 claims and a fraction, adjoins the Ben Hur, Chariot, Pershing and Romance group.

NORTH DIVIDE EXTENSION MINING CO. **NEVADA**

Address: J. G. Crumley, Erie Main St., Tonopah, Nev. R. W. Piercy, sec.

Company organized by J. G. Crumley to take over property of North Divide Mng. Co., of which he had been a director. Stock in new company was offered to shareholders of old company for 1c per share.

Property: the Moonlight group 6 claims, 120 acres, north of the Apex Divide and west of the Sutherland. Is one of the oldest properties of the district and covers strong veins.

Development: by 3 shafts, 60 to 450' deep, opening 3 gold veins.

Equipment: complete, including new electric hoist. Machinery of old company reported sold to Natural Soda Products Co., operating near Silver Peak. Esmeralda county.

NORTH DIVIDE MINING CO. **NEVADA**

Dead; see Vol. XIV. In September, 1920, judgment for $1,343 was secured against the company, property was sold by the sheriff and has been taken over by the **North Divide Ext. Co.**, which see.

NORTHERN LIGHT COPPER CO. **NEVADA**

Property: 6 claims in Lyon county, some 14 miles E. of Yerington. A 360' shaft has opened an orebody averaging 6% copper, with some ore of higher grade.

Property was taken under option by the Mason Valley Mines Co. early in 1919, but relinquished inside of 12 months, after shipping 2,800 tons of 4.8% copper ore; reported that orebody was not of sufficient size.

In August of 1920, company was in litigation regarding title.

NORTH MOUNTAIN MINING CO. **NEVADA.**

Controlled by John Dern, 600 Dooly Blk., Salt Lake City, Utah.

Property: Gilligan group, 11 patented claims in the Egan district, near Cherry Creek, White Pine county, first operated in 1870 under management of General Rosencrans.

Ore occurs in veins cutting quartzite, that are from 4 to 5' wide, run E.-W. and dip steeply N. In 1884, a 1,600' tunnel was driven which is reported to have cut the vein 1,100' from the portal at a depth of about 600' on its dip. The demonetization of silver stopped further development until 1918, when operations were resumed.

Lease held by Marion L. Thomas, et al., was relinquished.

NORTH NEVADA MINES CO. **NEVADA**

Mail returned from former address, Reno, Nev.

Property: claims at Fairview, and 7 claims on Rebel creek, northern Humboldt county, acquired late in 1919. The latter have 600' of tunnels and other work, ore carrying silver and gold.

NORTH STAR MINING CO. **NEVADA**

See Vol. XIV, and **Star Gold-Silver Mng. Co.** in this volume.

NORTHWEST DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: William Forman, pres.; W. I. Douglass, v. p.; C. C. Boak, sec.-treas., with W. E. Fuller (supt.) and M. H. Page, directors.

Inc. March 17, 1919, in Nevada. **Cap.** $150,000; 10c par; 485,000 in treasury; 1,015,000 issued. Listed on San Francisco Stock Exchange.

Property: 5 claims, 74 acres, lying N. of Divide Consolidated, and 3,500′ N. of Tonopah Divide. A ledge, 6 to 10′ wide, carrying from a trace to $4 in gold and silver, was opened on 3 levels.

Development: by shaft 300′ deep, March, 1921, when operations ceased; reported that leached conditions will necessitate development to greater depth.

OCCIDENTAL CONS. MINING CO. **NEVADA**

Address: care R. L. Richie, 116 Ridge St., Reno, Nev.

Inc. in Nevada. **Cap.** $1,500,000; $1 par; all issued.

Property: 5 claims, 74 acres, lying N. of Divide Consolidate, and along the Brunswick, or Occidental lode.

Development: to depth of 450′ as compared with 1,000′-1,500′ nearby. Ore reserves said to be 350,000 tons of low grade mill ore.

Production: under ownership of the late Senator Fair, mine produced nearly $2,000,000 to depth of 200′. In year ending Nov. 15, 1892, production was 3,864 tons of ore that averaged $5.90 gold and $14.33 silver, or $20.23 per ton. Mill recovery was but 86.6% of values.

OCCIDENT DIVIDE MINING CO. **NEVADA**

Address: P. O. Box 646, Goldfield, Nev.

Officers: R. S. Wilbur, pres., F. E. Schultz, v. p.; R. T. Armstrong, sec.-treas., with H. F Bruce, cons. engr., and J. R. Richardson, directors.

Inc. in Nevada. **Cap.** 1,500,000 shares. In August, 1920, 100,000 shares were being offered at 6c, and promotion stock was reported pooled.

Property: 8 claims in West Divide district, Esmeralda county, 5 miles W. of Tonopah, adjoins the West Divide Mng. Co. on the S. Reported that ground covers a series of quartz veins carrying silver, one of which is on the strike of the West Divide ledge; high grade seams assay 60 to 300 oz. silver per ton.

Development: by 70′ shaft and tunnels.

OLD IMPERIAL MINING & MILLING CO. **NEVADA**

Cherry Creek, White Pine county, Nev. Property advertised as sold for $125 delinquent tax, January, 1916.

OLD TIMER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. Ben D. Luce, res. agt.

Officers: W. Douglass, pres.; Roger Dougherty, v. p.; B. D. Luce, sec.-treas., with Wm. Watters, and R. Finn, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 shares in treasury.

Property: the 2 Afterthought claims and 2 fractions, adjoining the Sutherland on north, considered "inside ground," on the trend of well-defined veins.

Equipment: sufficient for shaft sinking and exploration.

OLYMPIC MINES CO. **NEVADA**

Address: Omeo, Mineral county, Nevada.

Officers: E. G. McConnell, pres.; Andrew Carrigan, v. p.; G. L. Panario, sec., 460 Montgomery St., San Francisco, Calif.; Italian-American Bank, San Francisco, treas., with Jas. P. Nelson, directors. R. J. Bonnemort, gen. mgr.

Inc. May, 1916, in Nevada. **Cap.** $200,000; 10c par; 1,200,000 issued.

Property: the Royal George group of 9 claims, 160 acres, in Bell district, Mineral county, 25 miles N. E. of Mina, and 4 miles N. of Simon Silver-Lead mine. Examined by R. H. Searles.

Ore: gold-silver occurs in a fissure vein, 4′ average width, in rhyolite. Mine has a fine orebody, which is unfortunately cut off westward by a fault, displaced segment not having yet been located. See U. S. G. S. Bul. 725 for geological conditions and possible solution for locating the W. segment

Development: by 225′ incline with levels at 100,150 and 200′.

Equipment: includes 25 h. p. engine, compressor, etc. Destroyed by fire on Nov. 21, 1919, the cyanide mill of 70-ton capacity was rebuilt and put

into operation, September, 1920; extraction was 90 to 92%. Water is supplied through a 9-mile pipe line.

Production: up to burning of mill, 35,000 tons of concentrating ore running $15 to $20 per ton. Gross returns from shipments in 1918 amounted to $212,000, mainly in gold.

Net profits from operations have been small, because of expense of exploration and rebuilding mill. On May 1, 1921, ore in sight being exhausted, all work was suspended.

Company is reported to have acquired (1921) holdings of Warrior Gold Mng. Co. (q. v.) in Goldyke district, Nye county, said to have a 2′ vein averaging $30 to $60 per ton, developed to 200′ depth.

ONONDAGO MINES CORPORATION — **NEVADA**

Dead. Corporation dissolved, February, 1920. Fully described in Vol. XIV.

OPERATOR DIVIDE MINING CO. — **NEVADA**

Office: Tonopah, Nev.

Officers: Julius Goldsmith, pres.; A. G. Raycraft, v. p.; T. J. Lynch, sec.-treas., with W. W. Kelly and L. Dunn, directors.

Inc. March 8, 1919, in Nevada. **Cap.** $150,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 4 claims, south of the Toggery Divide, developed by 400′ shaft. Has good showing on claims.

Equipment: 37-h. p. hoist, 5-drill compressor, etc.

In spring of 1920, reported that company was to be placed on an assessable basis; no information since.

OPHIR SILVER MINING CO. — **NEVADA**

Offices: 787 Mills Bldg., San Francisco, Calif., and Virginia City, Nev.

Officers: Zeb Kendall, pres. supt.; H. G. Humphrey, v. p.; Frederic Vincent, 2nd v. p.; A. P. Swain, sec.-treas., with Alex Wise, directors.

Inc. April 30, 1860, in California; reinc. Jan. 26, 1921, in Nevada. **Cap.** $504,000; 50c par; increased from $201,600; $1 par; and made assessable at time of reincorporation; all outstanding. Assessments of 3¢ each levied in May and September, 1921. Listed on New York Curb and San Francisco Exchnge. Annual meeting, Jan 2.

Property: the Ophir mine, 1 patented claim, 40 acres, extending for 675′ along the Comstock Lode at Virginia City, Storey county; bounded on the north by the Mexican mine, on the south by the Cons. Virginia and operated under the same management. Ore, as mined, varies from $15 to $50 per ton in gold and silver and occurs in veins up to 10′ in width.

The company also owns a ⅓ interest in the mill of the Mexican Milling Co., Virginia City.

Development: by 2,900′ shaft and several miles of workings. The general plan is to open old workings above the Sutro drainage tunnel, and block out low-grade ore left years ago. Part of the ore consists of stope filling.

In 1919, ore was developed on the 1,800, 1,900, and 2,000′ levels; while exploration was done at 1,465, 1,600 and 1,700′. This work continued during 1920, and early in 1921, a drift on the 2,000′ level of the Hardy vein, was reported to have encountered 6′ of ore, assaying $30 to $45.

Production: to date about $20,000,000. During 1919, output was about $30,000 per month, with equal value in gold and silver; in 1920, a total of 2,270 tons of ore was sent to the Mexican mill, having a gross value of $57,956, and netting $43,283.

ORGANIZERS CONS. GOLD MINES CO. — **NEVADA**

Office: 2250 Ninth St., Boulder, Colo.

Officers: Fred A. Fair, pres.; Dudley A. Degge, sec.-treas.-mgr., with T. V. Wilson, directors.

Inc. 1914, in Arizona. **Cap.** $100,000; par $1; 10,000 shares outstanding.

Property: 4 claims, 3 patented, 60 acres at Montezuma and Wellington,

Lyon county, said to show fissure veins with ore, carrying gold, silver, copper and lead.

Development: by 178′ vertical shaft and 200′ tunnel.

The company is the successor to the Wellington Association and related string of Colorado and Nevada incorporations, against which a fraud order was issued by the U. S. Postoffice Department in 1909.

Extravagant literature issued in 1914 was evidently put out solely for stock-selling purposes, as the property was not being developed. Unfavorably regarded.

ORIENTAL DIVIDE MINING CO. **NEVADA**

Organized by George Wingfield and H. C. Brougher to develop claims near those of Fortuna Divide, over 3 miles N. W. of Gold Mountain.

ORIENTAL MINING CO. **NEVADA**

Address: 565 Mills Bldg., San Francisco, Calif., and Tonopah, Nev.

Inc. 1919, by Geo. Wingfield, C. Brougher, and F. E. Ostwald, J. L. Joseph, pres. and mgr. **Cap.** $300,000; 20c par; 600,000 shares in treasury.

Property: New York-Tonopah group, 80 acres, adjoining the MacNamara-Crescent and under same management.

Development: by 850′ shaft. **Equipment:** electric hoist and 100 h. p. motor installed in June, 1919.

ORIGINAL BULLFROG MINES SYNDICATE **NEVADA**

Dead. A reorganization planned in 1917, to be known as the Reorganized Original Bullfrog Mines Syndicate, did not materilize, owing to disagreement between judgment creditors.

Reported in September, 1921, that claims were to be sold for taxes.

ORIGINAL KLONDYKE DIVIDE MINING CO. **NEVADA**

Address: Harry McNamara, pres., Box 474, Tonopah, Nev. Transfer agt., Security Transfer & Registrar Co., New York.

Property: 200 acres in Klondyke district, 6 miles south of Divide, Esmeralda county. Vein said to be exposed for 3,000′, and from 2 to 20′ wide on surface.

Development: by several old shafts, none below 200′.

Production: old records show that 100 cars sent to smelters carried 2 oz. gold and 40 oz. silver per ton; between Sept., 1911, and July, 1913, a lessee shipped ore valued at $290,000 gross; and in 1916, company shipped 123 cars of ore averaging $28 per ton.

In spring of 1921, property was being again operated by lessees and sublessees, who were shipping high grade ore in fair amounts.

ORIGINAL MINING CO. OF MANHATTAN **NEVADA**

See Vol. XIV. Report of March, 1921, from the secretary states that company is "probably dead as ore is very low grade".

ORIZABA MINING & DEVELOPING CO. **NEVADA**

Offices: Goldfield and Orizaba, Nev. Company is controlled by the Diamondfield Black Butte Reorganized Mining Co., which in turn is controlled by the **Mines Selection Co.** (q. v.).

Officers and directors: Chas. S. Sprague, pres.; P. V. Rovianek, v. p.; Ben Gill, treas.; Harry B. Ruhl, sec.; J. K. Turner, cons. engr., and L. L. Dellinger.

Inc. 1915. **Cap.** $1,000,000; $1 par; 715,000 issued; 515,000 shares owned by the Diamondfield Co.

Property: 9 claims, 180 acres, at Orizaba, Nye county, shows veins carrying gold-silver-copper and lead ore. Veins are 2′ to 7′ wide, and occur on a contact between limestone and granite. The main vein strikes S. 20° E., and dips 70° S. W.

Development: by 1,300′ of workings, including 150′ shaft.

J. K. Turner reported, November, 1918, no ore in sight; $6,000 worth of probable ore between the 35 and 65′ levels; $8,500 worth of possible ore from the 85 to 65′ level; ore on 3 dumps valued at $44,730.

Production: Sept. 1913, to April, 1918, amounted to $22,980 gross and

$16,156 net, the largest shipments being made when the price of silver was 60c per oz.

Further development, adequate modern equipment, and better railroad facilities are necessary to insure profitable operations. The nearest railroad point is Millers, about 38 miles south.

ORLEANS HORNSILVER MINING CO. **NEVADA**

Address: care H. D. King, Tonopah, Nev., and Hornsilver, Nev. Ed. Kitchen, supt.

Officers: A. I. D'Arcy, pres.; R. H. Downer, v. p.-mgr.; H. D. King, sec.-treas., with Geo. W. Young and M. A. Diskin, directors.

Inc. in Nevada in 1921. **Cap.** $150,000; par 10c. A public offering of 200,000 treasury shares was made in September, 1921, at 25¢ per share, raised later to 35¢. John S. Cook & Co., Goldfield, Nev., registering agent.

Property: the Orleans mine, 5 claims, 120 acres, in the Hornsilver district, Esmeralda county, 28 miles S. of Goldfield, shows a fissure vein, 8' average width, in diorite-lime-shale contact, carrying gold-silver ore. Two ore shoots, 500' apart, are exposed; ore as shipped averages $21 to $35, with a silver content of 3 to 6 oz.

Owned and opened about 1912, by the Champ d'Or Gold Mng. Co.; the mine was operated under lease and option by the Orleans Mng. & Mig. Co., of which J. W. Dunfee was the head; beginning with 1915 lease ran for 5 years and was renewed for a second period of 4 years. In 1921 the Orleans Hornsilver company was formed to take over lease with option to buy property for $40,000. It is reported that former leasing company will receive $50,000 and 150,000 shares of new company.

Development: by 200' Orleans shaft, and 580' Dunfee 40° incline now being sunk to the 7th level. Work in 1921 on the lowest level has shown the Dunfee shoot to be 130' long, 4 to 15' wide, with an average ore value of $30 per ton. Ore of lesser grade is said to continue for 170' additional.

Production: by French company, said to be $280,000 gross, and $263,000 by lessee company, largely from above 4th level.

ORLEANS MINING & MILLING CO. **NEVADA**

See Volume XIV. Was a leasing company operating the Orleans mine of the Champ-d'Or Gold Mng. Co., from 1915; J. W. Dunfee was the active principal. Property sold to **Orleans Hornsilver Mng. Co.** (q. v.) in 1921.

ORO AMIGO PLATINO MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Officers: S. E. Yount, pres.; Geo. A. Fayle, v. p.; H. K. Riddell, sec.-treas. and mgr., with N. B. Hunter, directors, at last accounts.

Inc. Nov., 1914, in Nevada. **Cap.** $1,000,000; $1 par; 515,100 shares issued. Listed on Los Angeles Exchange. Annual meeting, January 15th.

Property: 5 claims, 60 acres, in Yellow Pine district, Clark county, about 2 miles N. E. of the Boss mine. Ore carries copper, gold, platinum and palladium, occurring in shoots 6" to 4' wide.

Development: by 2 tunnels, 70' and 150' long, with 1,500' total workings. No recent returns secured.

ORO DIVIDE MINING & DEVELOPMENT CO. **NEVADA**

Office: 252 Virginia St., Reno, Nev.

Officers: S. C. Foster, pres.; C. A. Clinton, v. p.; F. W. Collins, sec.-treas., with Lee Henderson, and G. A. Bartlett, directors

Inc. in Nevada. **Cap.** $150,000; 10c par; 750,000 treasury shares.

Property: 3 claims and 2 fractions, 95 acres, in the N. W. part of the district said to contain a well-defined fracture zone or ledge leading from Gold Mountain to Fox Mountain. **Development:** by 100' shaft.

Equipment: hoist, etc. sufficient for prospect work.

ORO ZONA MINES CO. **NEVADA**

Address: Hawthorne, Nev.

Officers: Eugene Grutt, pres.; Emil Grutt, v. p.; John B. Platts, sec.-supt.

Inc. June 12, 1919, in Nevada. **Cap.** $150,000; 10¢ par.

Property: the Silver Dollar (old Sunrise) mine, about 20 miles S. of Hawthorne, Mineral county. Shaft sunk to 100' forty years ago has been re-opened.

OVERLOOK DIVIDE MINING CO. **NEVADA**

Office: Fenwick & Co., Tonopah, Nev.

Officers: J. A. T. Wilkinson, pres.; J. M. Fenwick, v. p.; M. J. Gray, sec.-treas., with S. M. Wilson and Elmer Burt, directors.

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 4 claims and a fraction adjoining the Lookout Divide.

OVERMAN MINING CO. **NEVADA**

Office: 342 Mills Bldg., San Francisco, Calif.

Officers: W. G. Morrow, pres.; James Newlands, Jr., sec.

Inc. 1898, in California. **Cap.** $230,400; par $2; 69,089 shares issued. Annual meeting in July.

Property: 20 acres at Gold Hill, Storey county, developed by 1,600' shaft, etc. Ore is gold and silver bearing.

OVERSIGHT MINING CO. **NEVADA**

Address: M. J. Scanlon, attorney, Reno; and Nick Schade, asst. sec., Tonopah, Nev. **Inc.** February, 1920, in Nevada.

Property: 3 claims in Oversight section of Tonopah district, said to be on direct strike of main E.-W. vein system. Shaft down 80' and machinery erected in March, 1920.

PACIFIC STATES MINING & MILLING CO. **NEVADA**

Dead. Dissolved, October, 1920; see **Belle-Helen Merger Mines Co.** for description of property; see also Vol. XIV.

PACIFIC TUNGSTEN CO. **NEVADA**

Office: W. J. Loring, pres.-gen. mgr., Crocker Bldg., San Francisco, Calif. J. H. Bell, supt., Mill City, Nev.

Inc. April, 1917, in Nevada. **Cap.** $1,000,000; par $1; all outstanding. Listed on Boston Curb.

Property: 30 claims, 600 acres, 8 miles N. W. of Mill City, Pershing county, shows a scheelite bed from 1 to 3' in width, with hornfels walls, assaying 2½% tungsten at depth of 120'. In 1919, took over the **Nevada Humboldt Tungsten Mines Co.**, which see.

Development: by 2 shafts and tunnel. Shipments to custom mill at Toulon in 1918 averaged $50 per ton, leaving a net profit of $27.50. Mill recovery was about 70%.

Equipment: a 125-ton mill was erected late in 1918 to treat the output of the Pacific Tungsten and the Mill City Tungsten Co., under the same management. There is also a 2-mile, 24" gauge tramway, using gasoline locomotives and 3-ton steel cars.

Production: in 1918 and 2 months of 1919, totaled 12,749 tons of ore producing 581,288 lb. of 70.41% concentrates, or 2.28% tungsten per ton of ore; of this, 380,667 lb. returned $337,067. During construction of the mill covering 10 months of 1918, ore shipped to the Humboldt County Tungsten M. & M. Co. mill, at cost of $7.75 per ton; company's mill ran 3 months only when forced to close down; during latter period, cost of production was $12.80 per ton of ore.

According to the auditor of the War Minerals Relief Com., expenditures of this company (in 1918), totaled $912,755, including property, $140,948; mine plant, $161,602; mill, $121,016; investment in Mill City T. Co., $131,909; operating costs, $168,304; administration $41,544; and bills payable, $70,700. Receipts were, $297,597; and deficit was $615,158. Reported at same time that ore in sight would cost $11.35 per ton to produce and that $10 per unit of tungsten is the minimum to make venture profitable: available ore, 32,713 tons carrying 1.57% tungsten gross, 1.14% net. Presumably idle.

PACKARD EXTENSION MINES CO. **NEVADA**

Address: Lovelocks, Nev.

Officers: B. F. Shepher, Jr. pres.; H. E. Woods, v. p.; Ray Stoddard, sec.-treas., Reno, with L. D. Richardson and L. A. Hilborn, directors, at last accounts

Inc. January 6, 1916, in Nevada. **Cap.** $1,250,000; $1 par; 750,000 issued.

Property: 5 claims, 90 acres, in Rochester district, Pershing county, adjoining the Nevada Packard ground, shows a shear zone of rhyolite with fissure veins, said to be 3-15′ wide, with N. E. strike and dip of from 20-30°. Veins carry silver chloride and free gold. David H. Skea, consulting engineer for the Packard Extension reported that the claims cover the extension of the Packard ore-shoots on their downward rake in a course to the S. W., and that they should be found in Extension ground at a depth of about 250-300′.

No recent information received.

PACKARD NORTH EXTENSION MINING CO. **NEVADA**

Dead. Described in full in Vol. XIV. See **Rochester Combined Mines Co.**

PACKARD SILVER MINES CO. **NEVADA**

Address: H. E. Stewart, Reno, Nev.

Inc. in 1919.

Property: claims adjoining those of the Nevada Packard company at Rochester, Pershing county.

PACK SADDLE GOLD MINES CO. **NEVADA**

Address: Carson City, Nev.

Officers: E. H. Walker, pres.; H. R. Mighels, v. p.; E. W. Miller, sec.-treas.; W. E. Casson, mgr., with F. M. Baker, directors. Geo. L. Hedges, supt., Schurz, Nev.

Inc. April 11, 1916, in Nevada. **Cap.** $1,000,000; $1 par; 665,000 outstanding. Annual meeting in January.

Property: 7 claims, about 120 acres, in Mountain View (Granite) district, Mineral county, four miles from Reservation Station, said to show a large iron-cap or gossan deposit cut by several quartz veins, carrying copper ore with gold-silver values.

Development: by 224′ tunnel. Though inactive 1919-'20, company was driving tunnel and developing an 8′ vein, in 1921.

PALISADE COPPER CO. **NEVADA**

Company is controlled in Boston, Mass. Stock listed on Boston Curb.

Property: the old Heckla & Silver King silver-lead mines, 2 claims, patented, at Bullion, Elko county, held under bond and lease. In May, a large body of high-grade copper ore was found in cleaning out an old tunnel; four 40-ton cars of $50 copper ore was shipped, May 22, 1916. Idle for many years.

PALMETTO CONSOLIDATED, INC. **NEVADA**

Office: Goldfield, Nev.

Officers: Edw. Cebrian, pres.; Robt. Blei, v. p.; L. Alegria, sec., 57 Post St., San Francisco, Calif. L. D. L. Cebrian, treas.; Clyde P. Johnson and John T. Murphy, mgr., Goldfield, Nev.

Inc. June 26, 1916, in Nevada. **Cap.** $1,500,000; $1 par; 1,150,000 issued. Stock listed on New York Curb. Was operated as a close corporation.

Property: 25 claims, 12 patented, about 500 acres, 42 miles S. E. of Goldfield in the Palmetto Mountains, Esmeralda county, credited with past production of $6,500,000 in silver. Development by shafts, deepest 400′. The mine is said to contain large bodies of ore carrying good values in gold-silver-copper.

Has been idle for 20 years.

PANAMA CANAL MINING CO. **NEVADA**

Address: 104 E. Holly St., Bellingham, Wash., or Carson City, Nev.

Officers and directors: Lorenz Neber, pres.; Henry Schupp, v. p.; A. C. Muller, sec-treas.; Geo. H. Cress, mgr.

Inc. March, 1917, in Washington. **Cap.** $100,000; par 10c. Income from 150 tons of silver ore sold in 1918, was $3,300.

Property: 12 claims, 224 acres in Voltaire district, Ormsby county. 5 miles from Carson City, developed by 550′ tunnel. Quartz veins in granite carry silver ore. Made shipments of silver ore in 1919.

PANTHER CITY MINING CO. **NEVADA**

Office: care M. R. Sanguinet, sec.-treas., 1st National Bank Bldg., Fort Worth, Texas. Wm. Bryce, pres.

Property: 7 patented claims in 2 groups, the Panther City and Olinda, in Salmon River district, Elko county. Ore said to carry copper, silver, and a trace of gold. Management report (Feb., 1921) that development awaits R. R. facilities.

PARAMOUNT COMSTOCK MINES CO. **NEVADA**

Address: Box 698, Reno, Nev.

Officers: Alex. Wise, pres.-supt. (Virginia City, Nev.); R. A. Hardy, v. p.; J. W. Davey, sec.-treas., with F. M. Kleppe and A. E. Kane, directors.

Cap. $2,000,000; $1 par; 750,000 shares in treasury. Transfers made at Reno.

Property: in the form of mineral rights on the ground above the 1,000′ level of the Best & Belcher, Gould & Curry and Savage properties, next S. to the Consolidated Virginia, Comstock district, Storey county.

A new company and not as yet active.

PATRICK MINING CO. **NEVADA**

See **William Patrick Mining Co.**

PATSY DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. E. Marks, res. agt.

Officers: Wm. Forman, pres.; W. J. Douglas, v. p.; M. L. Cooper, sec.; E. Marks, treas.; with A. G. Raycraft, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c; 500,000 treasury shares.

Property: the Lazy Boy group of 5 claims, near the Myra, in the eastern part of the district.

Inactive in 1921.

PAY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: T. Lindsay, pres.; H. F. Danberg, v. p.; A. G. Raycraft, treas.; D. K. Cain, sec.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares 10c par; 750,000 in treasury. Annual meeting in May.

Property: 60 acres, 4,000′ N. W. of the Tonopah Divide. Two dikes strike through the ground, and fair assays have been returned from the outcrops.

Development: by 100′ shaft, wih crosscut at this level to reach mineralized zone exposed at surface. Fully equipped.

PEAVINE SILVER CORPORATION **NEVADA**

Organized, in April, 1921, by J. C. Tranger, of Reno, and Pittsburg associates; A. L. Chappell of the Standard Metals Co. is also interested.

Property: the old Paymaster mine, 2 patented claims in the Peavine district, Washoe county, 5 miles N. W. of Reno, adjoining the Standard Metals on the west. Was a producer of high grade silver ore 40 years ago; recently was under bond to A. L. Chappell, who sank a shaft 160′. Old workings comprise 150′ shaft and 250′ of laterals, which expose a flat dipping fissure. 20′ wide.

Reported that company failed to meet its November 15, 1921, payment and has forfeited its bond on the Paymaster mine.

PEER GOLD MINING CO. **NEVADA**

Address: Clyde Garret, Burney Gordon and Harry Cutlet, chief stockholders, Reno, Nev.

Property: in Pine Nut range at Como, 8 miles south of Dayton, shows wide vein in andesite. High-grade ore discovered in 1916 showed values of $73 to $150.

Probably dead. Letters returned.

PEERLESS MINING CO. **NEVADA**

Probably dead; see Vol. XIV. Property taken over by **Irish Mtn Silver Mines**, which see.

PENN-STAR MINING CO. **NEVADA**

Address: Cherry Creek, Nev.

Officers: J. M. Murdock, pres.; Jos. McAneny, v. p.; P. W. Spaulding, sec.-treas.-mgr. (Evanston, Wyo.), with Chas Stahley and A. H. Martin, directors. F. W. Varney, supt.

Inc. in 1921, in Nevada. **Cap.** $1,000,000; par $1.

Property: 9 claims (4 patented) in Cherry Creek district, White Pine county. Ore occurs in shoots in a quartz vein, in a shale country rock. Examined by Wm. Dempster and L. C. Penhoel.

Development: by shaft and 3,500' tunnel; greatest depth of workings, 760'.

Equipment: includes hoist, compressor and 100-ton K. & K. flotation mill.

Operated in 1921 to August.

PENNSYLVANIA-TONOPAH GOLD MINING CO. **NEVADA**

Address. J. F. Gaehring, 6729 No. 8 St., Oak Lane, Philadelphia.

Officers: Jno. B. Mayer, pres.; J. F. Gaehring, v. p.; Jno. P. Mayer, treas.; Lewis Dalmos, sec.

Property: the Constellation group of 6 patented claims, 122 acres, in western section of Tonopah district, Esmeralda county.

Idle.

PERSEVERANCE MINES CO., LTD. **NEVADA**

Address: Searchlight, Nev.

Officers: A. M. Buley, pres.; F. E. Sharps, v. p. and mgr.

Is a trust, with $500,000 capitalization.

Property: 4 patented claims, 80 acres, 10 miles N. E. of Searchlight, Clark county, said to show contact vein in rhyolite-diorite. Ore is quartz with free gold and is said to average $22 per ton. Reserves, 4,000 tons blocked out.

Development: by 2 tunnels 325 and 375' long.

PERSHING COUNTY MINES CO. **NEVADA**

Office: Oreana, Nev.

Officers and directors: Glenn D. Cook, pres.-mgr.; R. M. Hardy, sec., and F. M. Cook, treas.

Inc. July 2, 1920, in Nevada. **Cap.** $250,000; 25¢ par; 615,130 treasury shares. Transfers at company's office. Annual meeting, January 2nd.

Property: 9 claims (2 patented) 149 acres in Arabia (Trinity) district, Pershing county, 4 miles W. of Oreana; includes the old Montezuma and Jersey mines, first worked in the 60's. Fissure veins traverse granodiorite and hornfels; the ore, consisting of the rarer antimony minerals, including bindheimite, occurs in 2 shoots, 2' to 10' wide, 120' and 900' long; an average analysis shows, 0.10 oz. gold, 80 oz. silver, and 28% each of lead and antimony.

Development: by glory hole and 120' incline; total workings, 1,000'. Management reports 1,500 tons blocked out, March, 1921. Prior to 1875, the Montezuma and Jersey mines produced about $1,000,000 gross; from 1917 on, shipments of old slag and $90 ore have been made, said to have a gross value of $80 000. Mine is equipped with 2 small hoists. Early day equipment included a stamp mill, and a smelter at Oreana.

Examined by Waldemar Lindgren, Adolph Knopf, R. A. Lemmon and Philip Wilson.

PERSHING DIVIDE EXTENSION MINING CO. **NEVADA**

Dead. See Vol. XIV for description.

PERSHING DIVIDE MINING CO. **NEVADA**

Dead. See Vol. XIV for description.

PERSHING LEAD-SILVER MINING CO. **NEVADA**

Address: Bert M. Smith, Red River Lumber Co., 335 E. 4th St., Reno, Nev.

Officers: Bert M. Smith, pres.; Wm. A. Kelly, v. p.; Sam Wilcox, sec.; and Owen Coughlin, treas.

Property: at Jungo, Humboldt county, 5 miles S. of Antelope on the W. P. R. R. A vein, from a few inches to 3′ wide, shows silver-lead ore with some gold of $35 to $40 gross value. Developed by 40′ shaft. At last accounts, property was operated by lessees.

PHOENIX DIVIDE MINING CO. NEVADA

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 3 claims, ¾ mile N. E. of Sutherland and 7,500′ east of north of Gold Mountain.

PIERMONT MINES CO., THE NEVADA

Address: John N. Popham, 17 State St., New York. **Mine office:** Aurum, Nev.

Property: an old silver mine first worked in the 70's, on the E. slope of Schell Creek range, White Pine county, 27 miles from Ray siding on the Nevada Northern line (Cobre-Ely) and 46 miles from Gold Hill on Western Pacific line in Utah. Ore used to be hauled 160 miles to Austin, Nev. Past production was considerable, unofficial records giving total as $6,000,000. Mine was closed in 1873, owing to low price of silver and litigation, and only assessment work done since.

Geology: ore occurs in a contact vein between brecciated limestone and porphyry; the vein runs N.-S. and dips W. and is apparently folded near the present face of the tunnel.

Development: by 2 tunnels, and several shallow shafts. The upper tunnel, driven on the vein for 350′, has a stope 300′ long, 8′ wide, and 75′ high. This ore-shoot yielded most of the output. The lower tunnel is 382′ long; in it the shoot was 260′ long, 7′ wide, and assays 18 oz. silver and $2.06 gold per ton. Little stoping has been done. Two winzes, 30 and 60′ deep, were sunk from the tunnel to cut the vein on the fold found in the upper tunnel. A sample from the second winze assays $19.70 per ton. It is now estimated that there is a block of ore developed 800′ long, 260 to 300′ wide, and 8 to 14′ thick, equal to 125,000 tons carrying from 16 to 30 oz. silver per ton.

Under present management, an air plant has been installed and a 300′ ore shoot, said to average $40 per ton, has been developed on S. E. dip of the fold, at an expenditure of $35,000; no shipments have been made.

An hydro-electric plant, run by water brought a distance of 5,260′ and with a head of 498′ is to be erected, also a mill.

PILOT COPPER CO. NEVADA

Presumably dead; see Vol. XIV. Was practically a reorganization of the Nevada Champion Copper Co. In hands of receiver from April, 1918, sold on Dec. 29, 1919, to Theodore Stebbins and A. M. Bennet for $13,600. Company's debts were about $13,000.

Address: Theo. Stebbins, 34 Gramercy Park, New York.

Property: the Champion group of 7 patented claims and Anderson group of 5 claims, in Santa Fe district, Mineral county, 4 miles E. of Luning. The orebody, 30′ wide and 400′ long, occurs in limestone and parallels a quartz monzonite dike. The oxidized zone reaches the 200′ level; ore is said to carry 3% copper.

Development: by 450′ 3-compartment shaft and 2 tunnels.

Equipment: 18-h. p. gas. hoist, shop, buildings, etc.

PILOT DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: M. R. Averill, pres.; L. L. Mushet, v. p.; E. R. Goetz, sec.; A. G. Raycraft, treas., with A. J. Cormack and R. D. Frisbie, directors.

Inc. in Nevada.

Property: near the Klondyke Divide, 6 miles S. of Divide. Idle.

PILOT KNOB GROUP NEVADA

Property: 5 claims in Snake Creek range, 2¼ miles S. of Osceola, White Pine county, developed by 400′ tunnel and 200′ shaft.

Ore: tungsten, occurs in quartz veins in limestone formation. Equipment includes a 20-stamp mill.

Uvada Tungsten Co. was organized to take over the property in 1917, but owing to low price of tungsten the lease was allowed to lapse.

PILOT PEAK SILVER MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: Dr. Frederick Bass, pres.; V. Andrus, v. p.; Chas. Lielich, sec.-treas., with Dr. Frank Pache, Chas. E. Bugg, Al W. Drew, and Geo. W. Myers, directors.

Inc. July 30, 1919, in Nevada. **Cap.** $150,000; 10c par.

PILOT SIMON SILVER MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. June 17, 1919, in Nevada, by J. T. Blake, H. Hamlin, Jr., and Dennis J. Fitzgerald. **Cap.** $150,000; 10c par.

PIOCHE-BRISTOL MINING CO. **NEVADA**

Address: 26 Stock Exchange Bldg., Salt Lake City, Utah.

Officers: John Dorius, pres.; C. L. Whitney, v. p.; M. C. Morris, sec.-treas., with Frank L. Copening and Seymour B. Robbins, directors. Chas. A. Thompson, res. agt., Pioche. Nev.

Inc. Feb. 19, 1916, in Utah. **Cap.** $50,000; 5c par; 839,166 issued. Stock listed on Salt Lake Exchange. An assessment of ¼¢ delinquent Oct. 20, 1920, was levied for development purposes.

Property: 6 claims in the Jack Rabbit district, adjoining the Day Bristol, near Pioche, Lincoln county, said to show lead-silver-copper ore.

Inactive from July, 1917, until fall of 1920, when contract was let for shaft sinking; by March, 1921, a depth of 80′ had been attained.

PIOCHE METALS MINING CO. **NEVADA**

Address: F. B. Cooke, pres., care Columbia Trust Co. Salt Lake City.

Property: 6 patented claims at Pioche, Lincoln couuty.

Company has been inactive for several years, but in 1920-21 lessees were operating; ore said to assay 0.08 oz. gold, 26 oz. silver, 16% lead and 1.2% copper.

PIOCHE MINES CO. **NEVADA**

Address: Pioche, Nev.

Property: at Pioche, Lincoln county. A 200-ton mill was to be completed September, 1921, to treat both company and custom ore.

PIONEER CONS. MINES CO. **NEVADA**

Fully described in Volume XIII. Reorganized as **Reorganized Pioneer Mines Co.**, which see.

PIONEER EXPLORATION CO. **NEVADA**

Mail returned from Hobert Bldg., San Francisco, Calif.

Reported to have acquired the Bloody Canyon antimony mine at Unionville, Pershing county, operated up to 1917 by the **Antimony Syndicate** and described thereunder.

PIONEER EXTENSION MINES CO. **NEVADA**

Office: 107 Boston Bldg., Denver, Colo. **Mine office:** Pioneer, Nye county, Nevada.

Officers: H. A. Riedel, pres.; T. S. Ellis, sec.; Col. A. J. Trone, treas.-gen. mgr.; Edwin S Giles, supt.

Inc. in Arizona. **Cap.** $1,500,000; $1 par; 400,000 shares in treasury.

Property: the Jolly Jane claim, 20 patented acres, adjoining Pioneer Cons., at Pioneer, developed by 250′ shaft. A crosscut was driven from this level through rhyolite to prospect a contact 175′ E. of the Jolly Jane shaft.

Beginning with 1916, mine was under 3 year lease to Jolly Jane Leasing Co., now defunct. A prospect.

PITTSBURG-COMSTOCK MINING CO. **NEVADA**

Office: National Bank Bldg., Reno, Nev. **Mine address:** Virginia City. Nev

Officers: H. G. Humphrey, pres.; Al. McCoy, v. p.-mgr.; A. E. Kane,

sec.-treas., with E. J. Haug, directors. F. M. Kleppe, asst. sec.; Wm. Sharp, cons.engr.

Inc. 1920, in Nevada. **Cap.** $1,500,000 shares.

Property: 5 claims, including the Bright Star, adjoining the United Comstock on the W. and Overman group on the S., in the Comstock district, Storey county. Said to have the extension of the Trojan vein of the Overman group.

Opened by 2 tunnels, 280 and 600' long, with backs of 80 and 480', respectively. The Bright Star vein, operated 40 years ago, is said to have produced $75,000 from upper tunnel. Present management driving lower tunnel to reach this vein. United Comstock's haulage tunnel passes under corner of the Pittsburg property at 1,400' depth.

PITTSBURG DIVIDE MINING CO. **NEVADA**

Inc. in Nevada. **Cap.** $150,000; 10c par.

Property: 4 claims 1¾ miles N. E. of Gold mountain, and adjoining the Treadwell.

PITTSBURG-DOLORES MINING CO. **NEVADA**

Dead; see Vol. XIV. Reorganized 1918 as the **Rockland Mng. Co.**, which see.

PITTSBURGH-ELY COPPER CO. **NEVADA**

Mail returned from Ely, Nev., the last address.

Officers: H. P. Harder, pres.; Louis H. Bock, v. p.; J. A. Varney, sec.; Frank Straub, treas., trustee and gen. mgr.

Inc. Dec., 1916, in Arizona. **Cap.** $5,000,000; $5 par; 695,285 shares outstanding at last reports.

Property: 11 claims, 220 acres, including the Keyboard group of 6 claims, 120 acres, near the Keystone mine of the Nevada Consolidated, and a small group near the Cumberland-Ely mine of the same company. Lands show porphyry and limestone, and company reports having copper oxides and sulphides, assaying 3 to 12% copper.

Develoment: by 2 shallow shafts and tunnels of 160' and 40'.

Equipment: includes a 40-h. p. steam hoist. Inactive, except for annual assessment work, since 1907.

PITTSBURG SILVER PEAK GOLD MINING CO. **NEVADA**

See Vol. XIV. Company, which also operated in California, is in liquidation, and property abandoned. Address: E. M. Succop, 912 California Bank Bldg., San Francisco.

PLATINO MINES CORPORATION **NEVADA**

Probably dead. R. Mausard, supt., Goodsprings, Clark county, Nev., at last accounts. Mine about 30 miles from Las Vegas, in the Platino district, is said to carry a 2' vein of copper ore. A winze sunk on vein was reported to have disclosed a body of manganese carrying platinum and gold.

POLARIS GOLD AND SILVER MINING CO. **NEVADA**

Address: Odd Fellows' Bld., Virginia City, Nev.

Officers: Geo. H. Drysdale, pres.; E. S. Chafey, v. p.; Chas. R. Morris, treas.; G. A. Ballard, sec.

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c; 780,000 outstanding. Transfer office, Virginia City, Nev.

Property: situated in Santa Fe mining district, 12 miles north of Luning, Mineral county. Country rock is rhyolite, strongly mineralized, with silver and gold in fracture zones.

Development: by 50' shaft and about 150' of drifting, etc. A 12' vein of $12 to $48 ore reported opened in 1919.

POLICEMAN DIVIDE MINING CO. **NEVADA**

Inc. in Nevada. **Cap.** $150,000; 10c par.

Property: 7,000' south of east of Gold Mountain.

POLO DIVIDE LEASING CO. **NEVADA**

Address: R. O. Post, sec., 1006 Hobart Bldg., San Francisco, or Tonopah.

Nev. Has a lease on property of Polo Divide Mining Co. (q. v.). Assessment No. 1 of 2½ mills was levied Jan. 1, 1921.

Officers: F. L. Sizer, pres.-treas.; W. S. Schuyler, v. p.; R. O. Post, sec., with H. L. Nutting and J. E. Kennedy, directors.

Inc. Aug. 15, 1919, in Nev. **Cap.** $100,000; par 10c.; 235,700 shares issued.assessable.

Property: 2 claims, 4½ acres, adjoining Silver King mine and Revert claims, in Divide district, 5 miles south of Tonopah, shows vertical fissure vein in porphyry.

Development: by 100′ shaft and 250′ of workings. No output to date.

POLO DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: in Esmeralda county under lease to Polo Divide Leasing Co.

PORTLAND DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; W. A. Bradley, v. p.; B. A. Rives, sec.-treas., with Zeb Kendall, S. F. Wittenberg and L. L. Mushett, directors.

Inc. April 7, 1919, in Nevada. **Cap.** $300,000; 20c par; assessable; 750,000 treasury shares.

Property: 7 claims, near the Operator Divide, showing well-defined contact, and mineralized fissure zones.

POTOSI GOLD SILVER MINING CO. **NEVADA**

Address: 339 Bush St., San Francisco, Calif.

Inc. 1904, in California. **Cap.** $112,000; $1 par; reduced from $1,120,000, with shares at $10 par. Listed on New York Curb.

Property: one of the old mines on the Comstock Lode, at Virginia City, Storey county, which with the Potosi made an early day production of $13,985,000. Ground covers 700′ of the lode, between the Potosi on the S. and Hale & Norcross on the N.

The Comstock Leasing Co. (q. v.) controls this and the Chollar properties, to a depth of 1,000′, under a grant purchase covering the right to operate for 30 years. Potosi will carry on its work through the Sutro tunnel.

In 1921, company joined other "Lode" companies in forming **Middle Mines Assoc.**, which see.

POTOSI MINE **NEVADA**

Owned by **Empire Zinc Co.** of Colorado, which see.

PRAIRIE FLOWER MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Property: 4 patented claims, 60 acres, 4 miles W. of Goodsprings, Clark county, adjoining the Yellow Pine mine on the N. Claims cover a replacement deposit in limestone with an orebody that is 6′ wide, dips 40° W. and has a N.-S. course. The ore, which contains carbonates of lead and zinc, is said to assay 15% lead, 30% zinc and 10 oz. silver.

Development: by 200′ and 300′ incline shafts and 2,500′ of workings; 55% lead-zinc ore cut at bottom of the 200′ shaft, thought to be the Yellow Pine ore-zone.

Equipment: 18-h. p. hoist, compressor, and distillate engine.

Property, formerly under lease to Prairie Flower Dev. Co., is now leased by the Yellow Pine Mng. Co.

PRAIRIE FLOWER DEVELOPMENT CO. **NEVADA**

Dead. See Vol. XIV. Company had a lease and bond on holdings of Prairie Flower Mng. Co.

PRINCE CONS. MINING & SMELTING CO. **NEVADA**

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Lincoln county, Nev.

Officers: A. H. Godbe, pres.; G. F. Wasson, v. p.; M. C. Godbe, sec.-gen. mgr., with A. Thomas and Fred C. Dern, directors. Murray Shepherd, asst. sec.; J. H. Hedges, mine supt.; Frank Shepherd, mill supt.

Inc. 1907 in Utah. **Cap.** $1,500,000; par 50c; reduced from $1 par, Oct.

10, 1921, stockholders exchanging share for share; 1,440,000 shares outstanding, Oct. 1, 1921. Prior to December, 1920, capitalization was $2,000,000, par $2. **Bonds:** issue of $300,000 authorized Oct. 10, 1921, secured by mortgage on property convertible at any time into stock at par. U. S. Corporation Co., New York registrar and transfer agent; transfers made also at company's office. Stock listed on Salt Lake Exchange and New York Curb.

On November 26, 1920, company reported its only indebtedness to be a $20,000 note; cash was $12,124, with a credit balance of $6,274.

Dividends: $124,924 in 1915; $250,000 in 1916; $200,000 in 1917. None since.

Property: 386 acres in Pioche district, Lincoln county.

Geology: ground contains large orebodies of iron-manganese, outcropping on surface for 800', having an aggregate thickness of 120', width of 250' and proven for a length of 1,200'. The ore occurs as interbedded deposits in limestone and shale, reported to average 3-4% lead, 34% iron, 13% manganese, 3 oz. silver and some gold, 3% lime, 11% insol. and 14% silica, valued at from $7.50 to $9.50 per ton. Owing to large percentage of iron, the ore is especially valuable as a flux to the lead smelters, the iron commanding a bonus over the cost of smelting, with silver, gold and lead values coming in as a profit.

Company also owns the Pioche King group of 9 claims, and about 1,000 acres of patented land at Dry Valley and Bullionville, 12 miles from Pioche, said to contain 110,000 tons of tailings on dumps, showing 5.34% lead, 10 oz. of silver, 0.11 oz. gold per ton, and estimated to average $5 per ton profit.

A 200-ton oil flotation mill was erected at Bullionville in 1916 to treat these tailings, but did not prove successful. Early in 1920, reported that mill was to be remodeled and tailings treated by lessees.

The Davidson mine, adjoining the Prince, was taken over in July, 1918, and is being extensively developed.

At end of 1920, company was not however sufficiently strong financially to continue development, and thus, with stock non-assessable and none in the treasury, company increased its share capital, and sold 440,000 additional shares to its stockholders for prices ranging between 25 and 40¢. But by Sept. 1, 1921, company was again in financial difficulties and again increased its share capital, at the same time authorizing a $300,000 bond issue.

When operations were temporarily suspended in August, 1921, for lack of funds, company's indebtedness was $37,686. Liquid assets were $26,625. The new shaft is said to have cost $166,000 down to 833'

Development: the Prince mine is developed by an old 550' incline, a new 2-compartment vertical shaft, 650' deep in April, 1921, and several miles of drifts. Diamond-drilling discovered an 11' bed of ore at depth of 825', assaying 25 oz. silver and $3.60 in gold; and a 10' bed of 30¢ zinc ore at 1,075' deep; the latter is immediately above the quartzite which underlies the shale and limestone. Ore in the Davidson, Big and "20' beds is apparently exhausted, or nearly so, but the silver bed opened by the 833' level (August, 1921) and the underlying zinc bed, promise to make the mine a new one.

Equipment: includes 600 h. p. steam power, hoist and compressor, in part moved from old to new shaft; a 9-mile standard gauge railway connecting with the Salt Lake Route from Pioche; and a mill, described above.

Production: in 1920, up to Oct. 31, was 46,688 tons; and total for 1915-1920 is 746,804 dry tons, yielding about 1,806,188 oz. silver, 43,588,850 lb. of lead and $145,395 in gold. This production came entirely from above the water level and of the most recent shipments, 75% was derived from the Davidson and 25% from the Prince. Smelter returns netted $3.29 per ton or $1,516,255, for period 1915-'18, and net profit after charging off losses of Bullionville operations was $1.604 per ton of ore.

Present management decidedly efficient. Receipts from ore sales had been meeting development costs in spite of low grade of ore. Shaft sinking

was suspended between June, 1920 and March, 1921. Operations were again suspended in August and had not resumed on Jan. 1, 1922.

See **Virginia Louise Mng. Co.** for account of litigation with the Prince Cons.

PRINCESS COPPER CO. **NEVADA**

Formerly the Ely Resurrection Copper Co., property deeded to C. W. Freed for judgment of $13,408.

Address: C. W. Freed, pres., 1007 First Ave., Salt Lake City, Utah.

Inc. 1911. **Cap.** $1,000,000; shares $1 par.

Property: 30 claims, about 550 acres, in the Robinson district, lying a little north and east of Ely.

Mine has 2 short tunnels and a 140′ shaft, said to show 18′ of ore assaying up to 5% copper, with gold and silver values, and some high-grade ore assaying up to 46% lead and 110 oz. silver per ton, with gold values.

PROSKEY REGENT MINING CO. **NEVADA**

Dead. Controlling interest in the property, the Proskey Regent group, acquired by the **Mogul Mining Co.** (q. v.) in 1916; later sold by the sheriff and now owned by the **Seminole Regent Mng. Co.**, which see.

PROVIDENCE EXTENSION GOLD MINING CO. **NEVADA**

Office: Morris, Ill.

Officers: I. F. Hatcher, pres.; W. F. Buck, v. p.; G. A. Leach, sec.-treas., with O. M. Barker, directors.

Inc. 1908, in Nevada. **Cap.** $1,500,000; shares $1 par; 1,100,000 shares outstanding.

Property: 3 patented claims and a fraction at Seven Troughs, Pershing county, reported by management to show high-grade free-milling quartz ore in fissure veins, 4″ to 2′ wide and to carry from $14 upwards in gold per ton. Examined by F. A. Wheeler.

Development: by 170′ vertical shaft. Idle since 1917, pending re-financing of the company.

PYRAMID DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Harry Dunseath, pres.; S. T. Bentley, v. p.-mgr.; Francis Moore, sec.-treas., with T. M. Bentley and E. M. Moore, directors.

Inc. April 8, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 treasury.

Property: 11 claims, 2½ miles N. of the Tonopah, Divide.

Development: by 75′ shaft cutting ore assaying from $2.65 to $14.20 per ton, with streaks of higher grade. Equipped with hoist and head-frame.

QUEEN DIVIDE MINING CO. **NEVADA**

Office: 109 Russ Bldg., San Francisco, Cal.

Officers: W. F. Sherman, pres.; J. L. Ord, v. p.; F. N. Lathrap, sec.-treas., with W. S. Owensby and Charles Kielhofer, directors. William Lichtenberg, supt.

Inc. May, 1919, in Nevada. **Cap.** $200,000; 10c par; assessable.

Property: 6 claims, 90 acres, adjoining Divide Syndicate, about 1 mile S. of Gold Mountain. Developed by 50′ shaft.

QUEEN REGENT MERGER MINES CO. **NEVADA**

Office: 337 Monadnock Bldg., San Francisco, Cal.

Officers: J. D. Brown, pres.; H. B. Wade, sec.; J. E. Kerr, gen. mgr., Wm. P. Miller, cons engr., at last accounts.

Inc. 1911, in California. **Cap.** $2,000,000; $1 par; 761,000 shares issued.

Property: 5 claims, bought June, 1915, for $60,000, in Rand mining district, Mineral county, 18 miles E. of Nolan, on the E. side of Walker lake. Tract is said to cover 4,000′ of the main fissure of the Rand district.

Development: by 500′ main working shaft with crosscuts at each 100′ and 2 shafts, each 100′ deep. Vein on 1st and 2nd levels is 30′-40′ wide in places, between andesite footwall and rhyolite hanging wall. On the 2nd level a 4′ vein cut at 406′ carried sulphides, and an 8′ cross vein cut at 460′ disclosed copper ore unlike the usual ore of the Rand district and carrying sulphides

with lead-copper ore, the copper content being 7% to 15%. On the 500' level dacite replaced the andesite; about 200' from the shaft the ore changed to heavy blue-black clay and talc. A highly disturbed formation was encountered in which the vein disappeared. Extensive development has so far failed to find the downward extension of the sulphide ore-bodies and all work has been discontinued.

QUICKSILVER MINES CO. NEVADA

Address: Winnemucca, Nev.

Controlled by John Ross, Unionville, Nev. Formerly operated by Ruby Silver Mining & Development Co. (Vol. XIII.) M. D. Faretta and Frank Childress are largely interested.

Property: the Ruby or Faretta group, in Jersey Valley, Lander county, 75 miles S.-S. W. of Battle Mountain equipped with 12-retort reduction plant and reported to have several hundred tons of 5% cinnabar ore on the dumps. A small output was reported for 1919. Presumably idle, 1920-'21.

QUO VADIS GOLD MINING CO. NEVADA

Idle. **Address:** Las Vegas, Nev.

Officers: Peter Buol, pres.; C. C. Ronnow, v. p.; Ed. W. Clark, sec.-treas., with F. A. Clark and J. B. Anderson, directors

Inc. Dec., 1915, in Nevada.

Property: the Quo Vadis mine at Las Vegas, Clark county, said to show rich stringers of free milling gold ore in latite and andesite formation. Developed by 300' tunnel and a shallow shaft.

RAINBOW DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev. F. K. Pittman, agt.

Officers: R. J. Cunningham, pres.; J. M. Fenwick, v. p.; E. P. Cullinan, sec.-treas., with H. G. Taylor, Ernest Cole, directors. Homer O'Connell, supt.

Inc. in Nevada. **Cap.** 1,500,000 shares; 10c par; 750,000 treasury shares.

Property: 2 claims adjoining the Apex on S., and Royal groups on the N.

RALSTON MINING CO. NEVADA

Officers: Chas. E. Perry, pres.; Wm. Forman, v. p.; T. A. MacDuff, sec.-treas.; J. H. Evans and R. J. Highland, directors.

Inc. July, 1916, in Nevada. **Cap.** $1,000,000; $1 par.

Property: the K. C., or Gori McBride group, east of the Halifax and adjoining the East End mine at Tonopah. The property was paid for with 601,000 shares at 3c.

RAND DIVIDE MINING CO. NEVADA

Office: Lovelocks, Nev. H. E. Loufek, agt.

Officers: J. T. Goodin, pres.; F. E. Baker, v. p.; T. P. Ebert, sec.-treas.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; half treasury stock.

Property: Little Theresa group, 5 claims, 2 fractions, E. of High Divide. 4,500' N. E. of Gold Mountain. **Development:** by 70' shaft.

RECO DIVIDE MINING CO. NEVADA

Office: 25 Broad St., New York, and Goldfield, Nev.

Officers: J. B. Kendall, pres.-mgr.; J. J. Wielip, v. p.; M. A. Kendall, sec.-treas., with T. W. Kendall, and C. B. Higginson, directors. W. C. Ralston, cons. eng.

Cap. 2,000,000 shares; 10c par.

Property: 5 claims north of the Sutherland Divide.

Company is reported to be in search of a promising property. An option on the Paradise Valley mine, in Spring City district, Humboldt county, reputed to have produced $3,000,000, was relinquished and 17 claims were located to W. of the Paradise. Also reported that a gold prospect at Spanish Flat, 20 miles from Kirby, in same county, was being developed.

RED HILL FLORENCE MINING CO. NEVADA

Office: Reno, Nev. **Officers:** Murdo MacKenzie, pres.; H. G. McMahon, v. p.-gen. mgr.; A. H. Howe, sec.-treas., with J. C. Robertson and J. C. Rhodes, directors.

Inc. November 20, 1916, in Nevada. **Cap.** 2,500,000 shares; 10c par; all outstanding; assessable. Stock listed on San Francisco Exchange. Assessments No. 8 and 9, of 1c each, were levied in Aug. and Nov., 1921. Company is a consolidation of the Red Hill Mining, Florence American Mining and Florence Extension Mining companies.

Property: 5 claims, 70 acres, owned outright, and 10 acres held under lease, at Goldfield, adjoining the Florence Goldfield on the S. and W. Ore contains gold, silver, and copper, occurring in a quartz vein in andesite. The property carries the extension of the Florence vein.

Development: by 600′ vertical shaft. During 1920-'21 a total of 3,000 linear feet of new ground was opened up by drifts, crosscuts and winzes on the 500′ and 600′ levels. Work has been confined largely to the 500′ level, but, although some milling ore was uncovered, work apparently proved disappointing. Discoveries by the Reorganized Cracker Jack on Florence Goldfield territory, and by the latter company itself, induced management of Red Hill to sink shaft to 800′ (June, 1921), and to drive 300′ crosscut to open Florence Goldfield vein. Reported that an ore width of 4 to 5′, assaying $6.20 to $7.40 gold, has been exposed.

Equipment: includes double drum electric hoist and compressor.

Company has a lease on a block of ground at depth of 430′ to 650′ in the Florence Goldfield mine, immediately beneath the rich ore mined by the Reorganized Cracker Jack.

Company has a speculative chance of finding bonanza ore.

RED LION CONSOLIDATED MINES CO. **NEVADA**

Described in Volume XIII. Merged December, 1919, with **Yellow Tiger Consolidated Mining Co.**, which see.

RED METALS CO. **NEVADA**

Apparently dead. **Last address:** 16 Washoe Bank Bldg., Reno, Nev. A. W. Holmes, pres.; Geo. T. Milner, sec. and gen. mgr.: Jas Howell, treas.

Inc. May 12, 1910, in Nevada. **Cap.** $1,000,000: $1 par; in $50,000 preferred and $950,000 common stock; issued, $1,500 peferred and $786,200 common stock. Annual meeting, first Monday in June.

Property: 16 claims, 300 acres, on Peavine Mountain, Washoe county. Claims carry lenticular deposits, between diabase and diorite, that are 1 to 12′ wide, show copper carbonate and bornite ore, said to average 9% copper, 15 oz. silver and $4.80 gold per ton.

Development: by tunnel, 1,200′ long. The mine was opened 1866, for silver, closed 1877, owing to the low price of that metal, and again re-opened 1908. See Copper Handbook, Vol. XI. Geology of this district is given in the U. S. G. S. Bull. 594, p. 194.

REDMOND CONSOLIDATED MINING CO. **NEVADA**

Address: A. A. Redmond, Luning, Nev.

Property: 15 claims, in Santa Fe district, Mineral county, 4 miles from Luning. Five parallel veins occur in lime-shale formation cut by porphyry intrusions. Developed by 300′ shaft, with total workings of more than 6,000′. Reported to have produced $750,000 worth of ore prior to 1915; $35 average per ton. Was operating summer of 1921.

RED STREAK COPPER MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Officers: E. B. Price, pres.; Jos. M. Sanders, sec., with N. B. Price, Jack H. Smith, and John O. Kemple, directors.

Property: adjoins the Copperside mine in the Yellow Pine mining district near Goodsprings, Clark county, said to show 3′ of copper-bearing ore. Carload shipments realized $100 per ton.

The ore has been shown to carry cobalt also, and test shipments were made late in 1921.

RED TOP MINING CO. **NEVADA**

Address: N. K. Franklin, supt, Manhattan, Nye county.

Property: developed by 2-compartment shaft, 110′ deep, in limestone

formation. **Equipment:** includes pump and compressor.

No recent information.

RENO DIVIDE MINING CO. **NEVADA**

Office: 301 Nixon Bldg., Reno, Nev. E. H. Mead, agt.

Officers: S. H. Wheeler, pres.; F. H. Norcross, v. p.; Wm. Woodburn, treas., with G. W. Davey and W. G. Kendall, directors. E. H. Mead, sec.; Ben Richardson, supt.

Inc. March 27, 1919, in Nevada. **Cap.** $150,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 5 claims adjoining the Grimes on the south.

Development: by 300′ shaft. At 10′ the shaft entered a crushed and oxidized zone, carrying silver and gold worth $7 per ton; this oxidized matter has persisted to the present depth.

Equipment: complete electric hoisting plant, etc.

RENO SILVER HILLS MINING CO. **NEVADA**

See Vol. XIV. Probably dead, and presumably succeeded by **Wedekind Silver Mng. Co.**, which see.

RENO-YERINGTON COPPER CO. **NEVADA**

Officers: E. L. Brown, pres.-mgr., 944 West 6th Street, Reno, Nev.; Victor Cokefair, v. p.; M. C. Brown, sec.; Farmers & Merchants Natl. Bank, treas.; preceding with Walter Harris, O. H. Sonne, Will McDonough, directors.

Inc. Jan. 25, 1907. **Cap.** $1,000,000; $1 par; 750,000 oustanding.

Property: 5 claims, about 100 acres, north of the Bluestone mine, at Yerington, Lyon county, said to show sulphide ore in granite with easterly dip, averaging 3% copper.

Development: by 700′ tunnel and 100′ incline shaft sunk on the contact.

Equipment: includes hoist and buildings.

Mail returned; presumably idle.

REORGANIZED ATLANTA MINES CO. **NEVADA**

Consolidated, in 1920, with other properties in Goldfield district under name of **Goldfield Deep Mines Co.** (q. v.) The Reorganized Atlanta company fully described in Vol. XIV.

REORGANIZED BELCHER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: N. M. McCormick, pres.-mgr.; S. E. Jameson, v. p.-supt.; E. J. Erickson, sec.-treas.; with H. C. Brougher and C. L. Richards, directors.

Inc. July 12, 1920, in Nevada. **Cap.** $200,000; 10¢ par; increased on reorganization from $15,000, par 1¢; assessable; 639,442 treasury shares. Listed on San Francisco Stock Exchange. Tonopah Banking Corp., Tonopah, Nev., registrar; transfer office, Tonopah, Nevada. Annual meeting, 2nd Wed. of January.

Company is a reorganization on an assessable basis of the Belcher Divide Mng. Co. (originally Gold Mtn. Dev. Co.); stockholders of old company exchanging stock, share for share, for stock of new company. Assessment No. 1, of 1¢, levied July 15, 1920; No. 2, of 1¢, Jan. 12, 1921; No. 3, of 1¢, Aug. 26, 1921.

For year ending Dec. 31, 1920, operating expenses were $15,862. Current assets over liabilities were $8,884; cash was $4,042. Equipment is valued at $8,789.

Property: 4 patented claims, adjoining the Verdi Divide on the N. W. corner and Victory Divide on west, shows a strong vein with 75% dip.

Development: by shaft, 550′ deep, April, 1920, and through shaft of adjoining Belcher Extension (q. v.); recent work confined to shaft sinking and crosscutting on 300′ level. Cost of shaft work, $39.61 per ft.; of drifts and crosscuts, $12.31. Three shafts were sunk on this ground, all in the footwall, several years ago by Mrs. Phoebe Hearst and "Lucky" Baldwin.

Equipment: electric hoist, 6-drill compressor, etc.

REORGANIZED BLUE BULL MINING CO. **NEVADA**

Organized in 1912 to acquire title to property of the Blue Bull Mng. Co.

In summer of 1920, was merged with adjoining properties into **Goldfield Deep Mines Co.**, which see. The Blue Bull company is fully described in Vol. XIV.

REORGANIZED BOOTH MNG. CO. OF GOLDFIELD NEVADA

Address: Goldfield, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zoebel, v. p.; C. F. Burton, sec.-treas.

Inc. 1912, in Nevada, as a reorganization of the Booth Mng. Co. Stock was exchanged, share for share, on payment of 1c. **Cap.** $1,000,000; $1 par; assessable; 999,957 outstanding. Annual meeting third Monday in December. Listed on San Francisco and Salt Lake City Exchanges; traded in on New York Curb. Stock transferred at company's office. Five assessments, aggregating 7c. have been levied; the fifth, 2c. per share, in January, 1915. Share prices, 2c. low, 22 high, 1918; 9c. low, 40c. high, 1919; 2c. low, 7c. high, 1920; 2c. low, 7c. high, 1921.

Dividends: No. 1, 5c. per share, paid March 6, 1916; No. 2, 15c. on April 6; No. 3, 10c., on April 26; No. 4, 5c., on June 6, making total of $349,984 for that year. On May 15, 1919, a cash dividend of 5c. per share and a stock dividend of 1 share of Tonopah Divide stock for each 50 shares of Booth stock held was declared payable from proceeds of sale of stock of the Reorganized, Kewanas Mining Co., 250,000 shares of Spearhead Gold Mining Co., Reorganized, and 2,000 shares of Tonopah Divide Mining Co.

For an account of litigation, etc., see Vol. XIII.

Property: formerly owned by the old Booth Mining Co., consists of one claim adjoining the Red Top and Laguna mines of the Goldfield Cons. In September, 1915, all development work was suspended, and it was reported the management would endeavor to purchase another property.

The company is said to have the distinction of being the only non-producing mine that receives an income without incurring the slightest expense for operating.

REORGANIZED CRACKER JACK MINING CO. NEVADA

Address: Goldfield, Nev.

Officers: E. P. Junor, pres.; Geo. K. Cremer, v. p.; H. G. McMahon, sec.-treas. and mgr., with C. H. Shirtz and J. A. Erickson, directors.

Inc. December 18, 1915, in Nevada, as a reorganization of the Cracker Jack Mining Co. **Cap.** $150,000; 10c. par; assessable; all outstanding. Company being financed by assessments. On December 21, 1915, a call of 1c. per share was made, each stockholder in the old company being required to pay the assessment before receiving share for share of the new company. Listed on San Francisco Exchange. Share prices, 1c. low and 6c. high in 1918; 2c. low and 10c. high, 1919; 3c. low and 25c. high, 1920.

Eleven assessments have been levied, the last, of 1c. per share in October, 1921.

Property: 5 patented claims, 80 acres, formerly owned by the Adams Goldfield Mng. Co., purchased at tax sale in 1916; the Great Western group of 2 patented claims, 30 acres, and several unpatented claims; recently purchased, all in the Goldfield district, Esmeralda county. Also owns by purchase in June, 1921, the Park group of 10 claims at Railroad Springs, 25 miles S. of Goldfield, which shows a well defined, oxidized quartz vein similar to that of the adjoining Gold Hill mine. The Great Western adjoins Goldfield Cons. ground and is purely speculative in value. The Adams group is said to show gold-silver ore in 20′ vein in rhyolite.

Development: on the Adams, by 320′ shaft, with winze to 440′ level and considerable lateral work, of which several thousand feet were performed in 1919 and up to summer of 1920, when work was discontinued. Results have apparently not been particularly favorable on this or on upper levels. At Railroad Sprs., work confined to prospecting.

Equipment: includes electric hoist, compressors and drills.

Company also holds a 5-year lease, ending March 1924, on part of the ground of Florence Goldfield Mng. Co., where extensive developments have

been conducted for 2 years to a depth of 500' through shaft of the Red Hill company. In 10 months ending with October, 1920, the Cracker Jack company operated principally on the Florence lease, with an output of $15,000 net in gold. Failing to find other orebodies of commercial value, the lease covering ground above the 500' level was relinquished; work below this level will await results of Red Hill company's development.

REORGANIZED DIAMONDFIELD TRIANGLE MNG. CO. NEVADA

Address: Ben Gill, treas., Goldfield, Nev.; J. K. Turner, cons. engr.

Inc. 1917, in Nevada. **Cap.** $2,000,000; $1 par. Is a reorganization of the Diamondfield Triangle Mng. Co.

Property: 7 claims in Diamond district, developed by vertical shaft said to show a promising quartz vein.

Idle since 1917, pending re-financing of company. Stockholders invited to exchange their stock, share for share and payment of 1c. assessment.

The probability that this company will again become active is very remote.

REORGANIZED DIVIDE ANNEX MINING CO. NEVADA

Office: State Bank & Trust Co. Bldg., Tonopah, Nev.

Officers: F. W. Taylor, pres.; W. J. Douglass and Walter Rowson, v. ps.; E. J. Ramsey, sec.-treas.; with Kenneth Hauer, directors.

Inc. Oct. 1, 1920, in Nevada, as a reorganization of the Divide Annex Mng. Co. **Cap.** $150,000; 10¢ par; assessable; assessment No. 1, of 1¢, levied Nov. 3, 1920. Listed on San Francisco Stock Exchange.

Property: 2 claims, adjoining the Tonopah Divide on N., in Gold Mountain district, Esmeralda county.

Development: by 265' shaft, with 400' of laterals on 250' level. Fully equipped. Active development reported, April, 1921.

REORGANIZED DIVIDE JUNIOR MINING CO. NEVADA

Address: W. J. Gomm, sec.-treas., Tonopah, Nev.

Officers: Gust. Hanson, pres.; Wm. Forman, v. p., with H. H. Brown, Fred Mechlin and Jas. Grimes, directors.

Is a reorganization of the Tonopah Divide Jr. Mng. Co., effective June, 1921 at which time shares were assessed 1c. each. **Cap.** $200,000, increased from $150,000, and placed on an assessable basis, at reorganization; 10c par.

Property: about 25 acres in the Gold Mtn. (Divide) district, Esmeralda county, between the Keystone D. and Grimes Divide, and adjoining Tonopah Divide on the S. Developed by 168' shaft and a crosscut, exposing a vein with 2½' pay streak, assaying $5 per ton in gold. Also a 20' vein was opened by 20' shaft. Equipped with hoist.

A 3 year lease has been granted the Ben Hur Divide Mng. Co., which is attacking Divide Junior's ground through shaft of the Keystone Divide at 625' depth.

REORGANIZED KEWANAS GOLD MINING CO. NEVADA

Address: Box 107, Goldfield, Nev.

Officers: A. I. D'Arcy, pres.; Corrin Barnes, v. p.; H. G. McMahon, sec.-treas.

Inc. July, 1913, in Nevada. **Cap.** $1,500,000; shares $1 par; all outstanding; assessable; 10 assessments have been levied, the last, of 1¢, in July, 1921. Listed in Salt Lake City and San Francisco; traded on New York Curb Share prices, 1c to 10c. 1918; 3c. to 8c. in 1919; 1c to 4c. in 1920; 1c. to 3c. in 1921.

Company is a reorganization of the Kewanas Mining Co., which became bankrupt in 1913. As a result of the apex suit filed in 1915 by Reorganized Booth Mining Co., which see, the latter company received 250,000 shares Kewanas stock which was disposed of during 1918.

Property: 2 claims and a fraction, about 40 acres, east of the Laguna group of the Goldfield Cons. at Goldfield.

Development: by means of the winze on the Kewanas ground below an east crosscut into it from the 700' level of the Laguna shaft of the Goldfield Cons. Exploratory work on this level encountered several veins, but ore

was too low grade to be profitably mined. Work was discontinued September, 1920, when a 5 year lease was taken on St. Ives claim of Goldfield Merger Mines, now a part of Goldfield Deep. In 1921, a 575′ crosscut driven on the 800′ level from Merger shaft failed to find the St. Ives vein, but was reached at a distance of 350′ on the 450′ level, and showed values from $4.80 to $56 per ton in gold. The St. Ives vein has been productive above the 350′ level.

A portion of Kewanas ground adjoining Grandma Cons. Mines Co. on E. leased to that company, fall of 1920.

REORGANIZED PIONEER MINES CO. NEVADA

Address: Goldfield, Nev. **Mine office:** Pioneer, Nev.

Officers: W. J. Tobin, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas. with E. A. Blakesley, directors.

Inc. May, 1918, in Nev. **Cap.** $500,000; 10c. par; assessable; 2,250,000 outstanding. Four assessments, of 1¢ each, have been levied, the last in January, 1922. Company is a reorganization of the Pioneer Cons. Mines Co. described in Volume XIII., the new company assuming all obligations of the Pioneer Cons. Stockholders were given the privilege of exchanging their holdings share for share upon payment of a 1c bonus for the new stock.

By March, 1920, entire indebtedness of the old company had been liquidated. Financial statement to Dec. 1, 1920 (10 mos.) shows; receipts, $11,970, and disbursements $11,842; of the latter, $8,926 was for mine development, and $1,387 for administration.

Property: 12 claims, 10 patented, 180 acres, at Pioneer, Nye county.

Geology: irregular masses of altered and mineralized rhyolite breccia are traversed by small, irregularly intersecting quartz-filled fractures containing gold-silver values. Isolated bunches of quite high-grade ore have been encountered, but not of commercial size.

Development: has made slow progress, but in September, 1921, main shaft reached water level at 800′; crosscuts will be driven N. W. to undercut the old Bonanza stope. Old workings total 15,000′, production from which is said to be $500,000. Lessees are operating in upper levels.

Equipment: includes 60-h. p. engine, 40-h. p. hoist, 5-drill compressor and 10-stamp mill.

REORGANIZED ROSETTA DIVIDE MINING CO. NEVADA

Company is a reorganization of the Rosetta Divide Mng. Co., inc. Nov. 25, 1918, and described in Vol. XIV.

Office: Tonopah, Nev.

Officers: D. F. Murphy, pres.-gen. mgr.; L. J. Brown, v. p.; J. M. Fenwick, sec.-treas., with Owen Murphy and W. H. Hart, directors.

Inc. July 22, 1920, in Nevada. **Cap.** $200,000 (increased from $150,000); 10¢ par; assessable; assessment No. 2. of 2¢ levied Mar. 31, 1921. Listed on San Francisco Stock Exchange.

Property: 4 claims, in the S. E. part of the district, surrounded by Divide Syndicate, Trilby, Argonne, Anchor, and Operator. Examined by A. H. Elftman, who considered that an extension of the Divide fault-vein, 100 to 300′ wide, passes through the ground, with numerous cross veins. The formation is well exposed for 1,000′.

In 1921 company acquired property at Hornsilver, Esmeralda county, which shows a wide vein, an ore width of 4′ assaying $30 per ton.

Development: by 315′ shaft on Murphy vein and 1,858′ total workings.

Equipment: hoist, compressor, etc.

REORGANIZED UNITED MINES CO. NEVADA-ARIZONA

Address: 405 Hobart Bldg., San Francisco, Calif. **Mine office:** Castle Dome, Ariz. Res. Agent, Harry G. Pray, Clay Peters Bldg., Reno, Nev.

Officers and directors: Fred Lindeman, pres.; W. W. Davis, v. p.; B. W. Lindeman, treas.; K. Van Winkle, sec.

Inc. in Nevada as a reorganization of the Rochester United Mines Co., described in Volumes XII and XIII. **Cap.** $1,500,000; $1 par; assessable; 1,012,000 shares issued. Assessment No. 3. of 2½¢, was delinquent Jan. 14 1920.

Property: 21 claims, 240 acres, in Rochester district, Pershing county, Nev., and a lease on 22 claims at Castle Dome, Yuma county, Arizona. Work by this company is reported to have developed 55,000 tons of ore in the Castle Dome, assaying 12½% lead, and 2½ oz. silver per ton.

A 75-ton concentrator was installed early in 1919, and the Arizona property for some time produced 5 tons of concentrate daily. Reported, late in 1920, that company had taken an interest in the Humboldt King mine, Pershing county, Nev. The Nevada holdings are not being operated.

REORGANIZED VICTORY DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: A. I. D'Arcy, pres.; H. E. Clark, v. p.; Andrew Walz, 2nd v. p.; H. B. Ruhl, sec.-treas.; with C. A. Heller, directors. B. E. Garnett, asst. sec.-treas. John Schweble, supt.

Inc. Jan. 11, 1919, in Nevada. **Cap.** 2,000,000 shares; 10¢ par; assessable; 1,885,000 issued. Listed on San Francisco stock exchange. Transfers made at company's office: Columbia Trust Co., New York, registrar. Company is a reorganization, June, 1921, of Victory Divide Mng. Co., on an assessable basis; stockholders exchanging old stock for new, share for share, plus an assessment of 1¢ payable on July 1st.

Revenue in 1919 was $89,562, mostly from share sales; expenses were $44,464; cash on hand at end of year, $45,098.

Property: 4 claims and 2 fractions, 50 acres, adjoining the Divide Consolidated, Verdi, Brougher and Belcher, shows a well defined vein system faulted on 200′ level near shaft. An irregular shoot in winze carries some high grade ore and considerable assaying $12 to $15.

Development: by 2-compartment shaft to 200′ level from where winze has been sunk to 300′ with levels at 200, 250, 310, 360 and 500′; total workings, over 2,000′. Inactive between March and September, 1921; company is now driving N. E. to locate faulted vein segment.

Equipment: includes electrically driven hoist and compressor.

RESCUE-EULA MINING CO. NEVADA

Offices: 265 Russ Bldg., San Francisco, Cal., and Tonopah, Nev.

Officers: Chas. D. Laing, pres.; Herman Zadig, v. p.; with J. W. Dorsey, Oscar Daube and W. G. Morrow, directors. Chas D. Olney, sec.; J. J. McQuillan, gen. mgr.; H. D. Moore, supt.

Inc. in Nevada. **Cap.** $1,500,000; $1 par; assessable; outstanding, 1,421,578 shares. Assessment No. 11 was levied in December, 1918. Stock transferred at company's office; Registration Surety Co., San Francisco, registrar. Listed on San Francisco Stock Exchange and traded in on New York Curb.

One dividend of 2½¢ per share was paid June 8, 1917. On May 31, 1921, liquid assets were $20,774 and accounts payable, $1,926. Share prices, low 13¢, high 31¢, in 1920; 13¢ and 23¢, in 1921.

Property: the Rescue, Eula, Last Thought and Maggie May claims, 80 acres, at Tonopah, said to show silver-bearing ore in veins.

Development: by 1,100′ shaft, with recent work all below the 900′ level. Stopes are 80 to 150′ long, with milling ore 2 to 4′ wide.

Production: for year ended May 31, 1921, was $100,509 gross, and $8,701 net. Value per ton $25.70, as against $25.07 in previous year.

RESERVATION HILL M. & M. CO. NEVADA

Address: W. E. Cassan, mgr. Carson City, Nev.

Officers: R. A. Trimble, pres.; W. E. Baldy, v. p.; R. A. McKay, sec.-treas., with H. R. Burlington and J. E. Monahan, directors.

Inc. 1907, in Nevada. **Cap.** $1,000,000; $1 par; 788,000 issued.

Property: 2 claims, 35 acres, 1 mile from Reservation station, Mineral county, partly under lease.

Development: by short tunnel and shallow shaft, the latter said to show 18″ of ore that assayed high in silver, lead, and gold.

A prospect not being operated 1919-20.

REVELATION DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Inc. in Nevada. **Cap.** $15,000; shares 1c par.

Property: a group of 2 claims in the northwestern part of district, 3 miles from Gold Mountain.

REVERT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: A. Revert, pres.; B. L. Revert, v. p.; P. Revert, sec.-treas.

Inc. March 26, 1919, in Nevada. **Cap.** $15,000; 1c par. Listed on San Francisco Stock Exchange.

Property: 4 claims, 1,200′ west of Tonopah Divide, and between which is the Verdi.

Development: by shaft, 400′ deep, Dec., 1920. Reported that a 35′ quartz vein had been uncovered in a W. crosscut; ore is of nominal value. Three entire claims and greater part of Polo claim are under 3 years lease, from July, 1920, to the **Kernick Divide Mng. Co.** (q. v.); operations are carried on through the 900′ Kernick shaft.

Equipment: hoist and compressor, the latter supplying air to the Verdi Divide.

REVIEW SILVER MINING CO. **NEVADA**

Address: Schurz, Nev.

Property: in the Reservation district, Mineral county. Reported, October, 1921, that a merger had been effected with **V-7 Mng. Co.**, which see.

REX DIVIDE MINING CO. **NEVADA**

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

Property: 6 claims adjoining the Ajax over 2 miles S. E. of Gold Mountain.

REX MINES CO. **NEVADA**

Address: Midas, Nev.

Property: the Rex mine, in the Gold Circle district, Elko county, about one mile E. of Midas, shows a fault fissure 5 to 16′ wide, between rhyolite and andesite. The ore is a crushed and silicified rhyolite, much oxidized, said to carry $5 to $28 in gold-silver per ton. Developed by an incline. In 1919, the ore produced was treated at the Elko Prince mill.

RICHLAND MINES CO. **NEVADA**

Idle. Mail returned from Imlay, Nev.

Officers: John R. Tullis, pres.-supt.; B. J. Sears, v. p.-treas.-mgr. J. W. Ferguson, sec., with F. L. Reber and C. T. Smith, directors. C. T. Smith, res. agent and registrar.

Inc. May 15, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 shares in treasury. Annual meeting, May 15th.

Property: 4 claims, 80 acres, in Richland mining district, 7 miles N. of Imlay, Pershing county, is said to show veins in granite and shale. The main vein has an easterly course and dips due north; it is reported to be 2′ wide and to average $35 per ton in gold, silver and lead.

Development: by tunnel to cut veins at 100′ depth.

RICHMOND-EUREKA MINING CO. **NEVADA**

Controlled by U. S. S. R. & M. Co., which see.

ROBUST GROUP **NEVADA**

Address: L. F. Clar, owner, Manhattan, Nev.

Property: 5 claims in Manhattan gulch, Nye county, developed by shallow shafts. Ore occurs in gravel beds said to average $8 per cu. yd. in gold and silver.

Equipment: electric hoist and pump. Idle.

ROCHESTER BUCK & CHARLEY MINES CO. **NEVADA**

Successor to Buck & Charley Mng. Co.

Office: 18 Fordonia Bldg., Reno, Nev. **Mine address:** Winnemucca, Nev.

Officers: Geo. A. Bartlett, pres.; R. A. Preston, v. p.; Frank Reber, sec., with J. W. Davey and Jas. Boyd, directors.

Inc. in Nevada. **Cap.** $1,000,000; outstanding, $750,000; $1 par. Annual meeting, first Wednesday in April.

Property: 8 claims, 150 acres, of Buck and Charley group at town of Rochester, Pershing county, shows contact deposits 6-16′ wide between rhyolite and limestone, said to carry gold, silver and some lead ore. Was discovered in 1913.

Development: by 220′ tunnel, with 600′ of workings.

Equipment: includes electric hoist and air compressor.

A bonded lease on the property held by General Mines Co. was relinquished August 1919. At last account mine was being worked by individual lessees. Mine was a producer, 1918-20.

ROCHESTER COMBINED MINES CO. **NEVADA**

Bankrupt, 1920. Included the **Packard North Extension Mng. Co.** and was itself to have been merged into the Rochester Nevada Silver Mines Co., a plan which however did not materialize. In August, 1920, the entire property, including a 300-ton mill that was never operated, was sold to satisfy a judgment for $200,000. Officially reported that the Rochester Combined holdings will be redeemed by the **Rochester Silver Corp.** (q. v.), which now owns a majority of the stock; payment will be made with Rochester Silver treasury stock on basis of $1.40 per share. Rochester Combined is described in Vol. XIII of this Handbook.

ROCHESTER ELDA FINA MINING CO. **NEVADA**

Described in Vol. XIII. Merged into Rochester Nevada Silver Mines Co., now the **Rochester Silver Corp.**, which see.

ROCHESTER HOME TRAIL MINES CO. **NEVADA**

Address: 716 Phelan Bldg., San Francisco, Calif.

Officers: G. S. Johnson, pres.; C. C. Higgins, v. p. and mgr.; A. J. Wright, sec.-treas.

Inc. 1916, in Nevada. **Cap.** $1,000,000; shares $1 par; 575,000 issued.

Property: in Rochester district, Pershing county, adjoining the Buck & Charley, a small producer. Home Trail is said to have all the "earmarks" and geologic characteristics of the district. Ore opened assays from $15 to $75 per ton in silver and gold.

ROCHESTER LINCOLN CONSOLIDATED CO. **NEVADA**

Address: Lower Rochester, Nev.

Property: on Lincoln Hill, Rochester district, Pershing county, includes Flunky No. 2. Shipments were being made in 1918.

ROCHESTER LINCOLN HILL G. & S. MINING CO. **NEVADA**

Main office: Lower Rochester, Nev. **Eastern office:** 303 Granite Bldg., Pittsburg, Pa.

Officers: John J. Munzer, pres., Pittsburg; E. H. Meyers, treas.; W. H. Stott, sec. Stock of company is closely held, 4 men only meeting the expenses. There are no debts or other incumbrances.

Property: the Abe Lincoln mine, 70 acres, on Lincoln Hill, Rochester district, Pershing county. Four fissure veins in rhyolite, 2½′ to 4′ wide, are traceable for 500′ to 850′; ore is tourmaline-bearing quartz, carrying silver and gold in ratio of 8 to 1, with a value of $15 to $25 per ton. For geologic description, see Bull. 580, U. S. Geol. Survey, 354.

Development: by tunnels, etc., totaling 1,600′. Property being developed slowly at present and without incurring indebtedness.

ROCHESTER MERGER MINES CO. **NEVADA**

Described in Vol. XIII. Merged into the Rochester Nevada Silver Mines Co., now **Rochester Silver Corp.**, which see.

ROCHESTER MINES CO. **NEVADA**

Fully described in Vol. XIII. Merged into the Rochester Nevada Silver Mines Co., now **Rochester Silver Corp.**, which see.

ROCHESTER NEVADA SILVER MINES CO. **NEVADA**

Described in full in Vol. XIV. Title changed to **Rochester Silver Corporation**, which see.

ROCHESTER OCTOPUS MINES CO. **NEVADA**

Controlled by entire stock ownership by **General Mines Co. of Nevada**, which see.

Address: Lovelocks, Nev.

Office: Sam O'Connell, pres.-mgr.; W. E. Wright, v. p.-supt., R. J. Pierson, sec.-treas.

Inc. 1916 in Nevada. **Cap.** $1,000,000; $1 par.

Property: 65 acres at Lower Rochester, Pershing county, ¼ mile from a railroad, developed by tunnels. Ore is reported to assay 20 to 25 oz. silver and $2 to $5 gold per ton. Was a shipper in 1918.

ROCHESTER RAVEN MINES CO. **NEVADA**

Address: Lower Rochester, Humboldt county, Nev.

Officers: J. J. Morley, pres.; Frank L. Reber, v. p.; T. J. D. Salter, sec.-treas. and res. agt., with E. S. Howard, Frank Towelly and C. F. Hardley, directors.

Cap. 1,000,000 shares, 25c par.

Property: 3 claims, in Lower Rochester district, operated at last accounts by lessees who are reported shipping ore with values of $34 per ton in gold and silver. Said to have shipped $10,000 gross worth of ore in first few months of 1916. Geologic conditions are similar to those of district in general. During 1920, shaft was sunk 75' exposing vein 9' wide said to carry values of nearly $25.

ROCHESTER SILVER CORPORATION **NEVADA**

Formerly Rochester Nevada Silver Mines Co.

Office: 310 Reno Natl. Bank Bldg., Reno, Nev. **Mine office:** Rochester, Nev.

Officers: O. W. Jones, pres.; F. M. Manson, v. p.; J. W. Davey, v. p.-treas.; with J. W. Snyder, R. W. Street, E. M. Lyon and Wm. Adams, directors. Executive Com., two vice-presidents and Jay H. Clemons. Fred A. Sawyer, sec.-asst. treas.; J. C. Rix, asst. sec.; C. D. Kaeding, consulting engr.-gen. mgr.; C. A. Bennett, gen. supt.

Inc. May 2, 1919, in Nevada. **Cap.** $2,000,000; par $1; $1,775,079, outstanding, Sept. 30, 1921. Capitalization reduced from $8,000,000 and change of name necessitated, Feb. 19, 1920, as a result of modification of original plan of consolidation. Under former title, **Rochester Nevada Silver Mines Co.**, a consolidation was effected May, 1919, of **Rochester Elda Fina Mng. Co.**, **Rochester Merger Mines Co.** and **Rochester Mines Co.**; the Nenzel Crown Point Mng. and Rochester Combined Mines companies, orginally included, refused to join the merger. The proportionate holdings of each shareholder remains the same as under larger capitalization.

The three companies received 937,500 shares of R. S. Corp. stock in exchange for theirs; 437,500 for Rochester Mines; and 250,000 each for Elda Fina and Merger. The scheme of consolidation was effected by dealing directly with individual shareholders who exchanged their stock for that of new company. This consolidation settled serious litigation over apex rights.

Corporation also owns controlling stock interest, 1,222,980 shares, in the **Nenzel Crown Point**, which became bankrupt, November, 1920, and in the Rochester Combined, whose property was sold for debts early in 1920; the latter will be redeemed and paid for with Corporation treasury stock at $1.40 per share. Annual meeting, 2nd Monday in May.

During last quarter of 1919, the gross earnings from bullion were $199,068; total operating costs, $127,346, of which, $33,485 was for stoping; $24,310 for development; and $34,508 for milling. Operating profit was $71,722, and after deducting depreciation and old unpaid operating accounts, $47,592. Excess of current assets over liabilities, $142,382.

Balance sheet for year ending Dec. 31, 1920, shows, current assets, $267,911, including cash, $62,216; bullion, $75,015; supplies, $43,634; and liberty bonds, $77,590. Liabilities were $22,493. Total assets were $1,711,708, and surplus, $304,889. In same period, bullion sold was $596,355 and

total operating cost, $427,084, of which $105,491 was for mining, $73,504, development; $129,663, milling; and $22,127, administration. Net operating profit before deductions was $169,271.

At end of third quarter, 1921, current assets were $274,618, and liabilities $33,521. Cash on hand was $68,625 and bullion, $70,925. Surplus was $396,812.

A dividend of 5¢ (initial) per share was paid June 20, 2½¢ Sept. 20, and 2½ Dec. 30, 1921.

Property: 41 claims (2 patented) in the Rochester district, Pershing county. The 3 merged companies are described fully in Vol. XIII under individual titles and the Rochester Nevada in Vol. XIV.

Geology: in the Elda Fina—a contact deposit between rhyolite and felsite; in the Merger—quartz veins in rhyolite, carrying oxide and sulphide ore; in the Rochester Mines—replacement veins of tourmaliniferous, siliceous silver ore along fissures and shear-zones in sheeted rhyolite. See Bull. 580 U. S. Geol. Survey, 1914, p. 325 and Bull. 735, p. 16, 1922.

Development: the total amount of workings and surface exploration is extensive. In the Elda Fina, by 4 shafts, deepest 190′ and by a drift at 500′ through Nenzel Crown Point workings; in the Merger, by the Friedman and Pitt tunnels, 1,560′ and 900′ long, giving backs of 1,200′ and 900′. Rochester Mines is the most fully developed, largely by tunnels; total workings cover several miles.

When present management took hold in 1919, but little commercial ore was available and "physical condition of the properties was very poor"; by expenditure of $57,049 in development, largely on the Rochester Mines, a year's reserve was in sight at end of 1919; extensions of 2,898′ being made during last quarter. In 1920, an aggregate of 7,813′ was driven on 11 different levels, much of work being preformed on the 500′, 600′, 700′, and 1,200′ levels; a ratio of 1′ of work to 5 tons of ore produced is maintained. Though little commercial ore is likely to be uncovered at depths of 1,000 or 1,200′, development on 500′, to 600′ and 700′ levels, in the west vein is reported to have been very encouraging. On Jan. 1, 1921, 8 months ore was in reserve, some part of previous reserve being written off because unprofitable at the lower price of silver.

For first 6 months in 1921, total advance was 3,031′.

Equipment: all of the mines have hoists, compressors, etc., including electric locomotives for main haulage tunnel and underground water service. Ore from Rochester Mines is handled by 12,000′ aerial tram. The corporation uses Rochester Mines remodeled 180-ton cyanide mill, giving an increased saving of 2.5% in gold and 7% in silver. Electric power is available for all operations in the district except during great droughts. Expenditures for construction and equipment were, $28,840 in 1919, and $23,581 in 1920.

Production: early records of the 3 properties not complete, but Rochester Mines was the principal producer; for the 12 months ending April 30, 1918, the yield was $606,541 from 63,541 tons of ore. Over $3,000,000 produced, 1913-1918.

Since consolidation in last quarter of 1919, mill treated 13,923 tons of ore yielding $14.30 bullion per ton, at an operating cost of $9.14 per ton. During 1920 (287 days), 42,820 tons of ore were treated, 5,965 oz. gold and 540,912 oz. of silver being recovered, or an extraction of 91.7% and 82.1%; bullion value, $13.90 per ton of ore; operating cost $9.97 per ton. In 1921, for 9 months beginning with March, production was $449,844 from about 36,300 tons of ore.

Reported late in 1921, that the Rochester corporation had agreed to loan the Candelaria Mines Co. up to $200,000 for the construction of a 300-ton cyanide mill. The directorates of the two companies are in part the same.

Consolidation of this group, with which additional territory is to be included later, is the best thing that could have been done, settling litigation,

centralizing management, operations and treatment of ore. The failure of electric power (80 days) in 1920 somewhat retarded operations, but, beginning with the first dividend, future possibilities seem bright.

ROCHESTER TREASURE MINING CO. **NEVADA**

Officers at last accounts: J. C. Colligan, pres.; J. W. Kromer, v. p.; John Golden and Harry J. Murrish, directors. J. E. McGovern, sec.-treas.

Inc. April 14, 1913, in Nevada. **Cap.** $1,500,000; $1 par; 500,750 issued.

Property: the Old Relief mine, 5 claims, 100 acres in Relief canyon in Rochester district, Pershing county, 4 miles south of Nenzel Hill. **Geology:** a silver-bearing quartz vein 12 to 25′ wide, cutting limestone and running S. E., dipping 55° west with a pay shoot 10 by 25′

Development: by tunnels 75 to 450′ long. Workings to depth of 300′ total 1,000′. See U. S. G. S. Bull. 580, p. 362.

Examined by J. C. Bray. Presumably idle.

ROCHESTER UNITED MINES CO. **NEVADA**

Fully described in Vol. XIII. Reorganized 1918, as **Reorganized United Mines Co.**, which see.

ROCK HILL PLACER CO. **NEVADA**

Out of business. See Volume XIV.

ROCKLAND MINING CO. **NEVADA**

A reorganization (about 1918) of the Pittsburg-Dolores Mng. Co.

Address: L. F. Curtis, trustee in bankruptcy, Reno, Nev. **Mine address:** Yerington, Nev. Chas. Vignos, pres.; Canton, Ohio.

Property: 17 claims, 320 acres, at Rockland, in Pine Grove (Wilson) district, Mineral county, 27 miles S. of Yerington, comprises the claims of the old Rockland mine, discovered in 1868. Ore is quartz, with gold and silver values, occurring in a fissure vein from 1½ to 9′ wide, with rhyolite hanging wall and granodiorite footwall. Vein strikes N. E., dips 40° E. and carries pay ore in shoots, 2 to 6′ wide and 20 to 100′ long, averaging about 0.44 oz. gold and 3.4 oz. silver, value about $12.

Development: by tunnels and shafts; greatest depth of workings being 1,100′ and total workings about 13,000′. Ore reserves estimated to be 3,000 to 5,000 tons.

Equipment: includes 45 h. p. hoist, 400′ compressor and 75-ton cyanide plant, making a 92% extraction. Power supplied by Truckee River General Electric Co., in which Rockland has an ½ interest.

Production: for 18 months to Dec., 1916, was 27,268 tons of ore, including some from dumps and tailings, yielding $230,370. Total to 1921, $700,000. See under Pittsburg-Dolores in Vol. XIII and XIV for full details.

Present indebtedness, $55,000 incurred to equip mill with expectation that funds would be raised by principal stockholders. Funds did not materialize and company became bankrupt in July, 1919.

ROMANCE DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. J. E. Ewing, agt.

Officers: A. H. Elftman, pres.; J. W. Dunfee, v. p.; Clyde Cannon, sec.; J. E. Ewing, treas., with C. W. Taylor, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000 10c par; 750,000 treasury shares.

Property: 5 claims adjoining Capital Divide on S. and Pershing Divide on N. E., in the S. E. part of the district.

ROOSEVELT DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Officers: E. S. Berney, pres.; Fred Strassberg, v. p.; Milton Detch, sec.; A. G. Foster, treas. and mgr.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 60 acres S. of the Sunbeam and 2 miles N. of Tonopah Divide

ROSALIND DIVIDE MINING CO. **NEVADA**

Office: Kind Co. Store, Tonopah, Nev.

Officers: M. R. Averill, pres.; F. J. Klenznig, v. p.; L. M. Kind, sec.-treas., with W. J. Douglass and S. Fox, directors.

Inc. April 9, 1919, in Nevada. **Cap.** $100,000; shares 10c par.

Property: 6 claims in the extreme N. E. part of the district, nearly 4 miles from Gold Mountain. Geologic indications considered good.

ROSETTA DIVIDE MINING CO. **NEVADA**

See **Reorganized Rosetta Divide Mng. Co.**

ROUND MOUNTAIN HOMESTAKE MINING CO. **NEVADA**

Controlled presumably by **Round Mountain Mining Co.**

Property: mineral rights to the Dixon Stebbins and Lookout lode claims by transfer from Round Mountain Mng. Co., which received the placer rights of the Homestake group, 71 acres, and 100,000 of R. M. Homestake Mng. Co. shares.

ROUND MOUNTAIN MINING CO. **NEVADA**

Offices: 1011 First Nat'l Bank Bldg., San Francisco, Goldfield, and Round Mountain, Nye county, Nev.

Officers: L. D. Gordon, pres. and gen. mgr.; J. R. Davis, v. p.; H. G. Mayer, sec.-treas., with W. H. Webber and W. C. Erb, directors. Gibson Berry, gen. supt.; R. J. Ledwick, mine supt.; E. Michal, mill supt.; J. H. Bergin, placer supt.

Inc. March 28, 1906, in Nevada. **Cap.** $1,000,000; increased to $1,500,000 in 1914; $1 par; outstanding 1,358,899. Stock transferred in company's San Francisco office; Anglo-California Trust Co., San Francisco, registrar. Annual meeting, third Monday in February. Listed on San Francisco and Nevada exchanges, and on New York Curb. Company owns 200,000 shares in Fairview Round Mountain M. Co.; 500,000 shares in Fairview Extension Mng. Co.; and 100,000 in Round Mountain Homestake Mng. Co.; interest in the 2 latter obtained in exchange for mineral rights on lode claims.

Dividends: total $363,965; the last one, 4c per share, was paid in August, 1913.

The following table gives financial results during the past three years, the 1915-16 period being for 21 months

Year	Revenue	Operating profit	Depreciation	Current Assets	Current Liabilities
1920.....	$106,923	*$ 15,933	$40,029	$ 92,141	$143,057
1919.....	113,533	9,493	70,069	112,104	124,541
1918.....	98,889	24,646	39,405	100,357	82,886
1917.....	225,586	123,751	28,910	88,027	90,090
1915-'16.....	503,508	100,490	35,631	71,198	140,000

* Deficit.

Assets 1919-'20 include stocks owned; liabilities include notes payable. $120,000 in 1915-'16, $90,000 in 1917, and $60,000 in 1918, $52,500 in 1919, $94,500 in 1920.

Revenue includes dividends from Fairview Round Mtn. M. Co. of $4,000 in 1918, $28,000 in 1919, and $6,000 in 1920.

Property: 2,009 acres (347 patented and 280 acres surveyed) in Round Mountain district, Nye county, 70 miles N. E. of Tonopah, the nearest R. R. point, exclusive of property in Jett and Jefferson canyons. Company also owns placer rights to 216 acres.

Geology: claims show large, low-grade, oxidized gold-silver deposits that are replacements along fissures and sheeted zones in rhyolite, with E.-W. strike, dip 15°, average width of lode ore, 8'.

In 1914, company took over the Round Mountain Sphinx M. Co.'s claims, thus ending several years of litigation involving apex rights in Los Gazabo claim.

Development: by 1,000' incline shaft with about 40,000' of workings. Management reports a large tonnage of $2 to $7 ore blocked out in the mine. Lode exploration disclosed a large sulphide orebody at 900'. Selective mining raised the grade to $7.10 per ton in 1916 from $5.68 in 1915, $6.57 in 1914 and $5.28 in 1913. Four year's lode mining indicated that

operations were conducted at a small profit with the 180-ton mill, and not less than 500 tons should be treated daily. These large low-grade deposits are the result of dissemination of gold throughout strongly silicified zones in the rhyolite mass of the mountain. In many places the rhyolite is much altered, and the better parts of this ore yielded $4 per ton. Enrichments occur throughout and the mass should be profitable, so a large expenditure on its exploitation is justified.

The ore is free milling. Large scale tests were made in 1917. Separate mill runs being tried on ore from separate zones in the mine. Only three were completed as the fourth was too low-grade. A. W. Geiger was in charge of this work. From section 921, there was milled 1,422 tons of $3.20 ore, of which 78.5% was recovered by amalgamation. A 55 or 60-cent tailing could be depended upon. This section is one of the largest ore-zones in the mine and is favorable for future exploitation. Sections 710 and 473 are too poor for consideration.

The lode mine has been worked largely by lessees during past few years who produced ore yielding $8,010 in 1917, $78,207 in 1918, $112,623 in 1919; ore averaged $39.53 per ton; the royalties to company amounted to $1,817, $17,442 and $25,350. Company resumed lode mining to a limited degree making extensions of 1,879′, and mining 560 tons yielding $3,232. Including lessees, total advance was 3,965′. In 1920, output by company (to July 1) was 4,513 tons of ore yielding $21,378 bullion; by lessees, 1,279 tons valued at $67,352 net, of which $15,341 was royalties. Extensions in 1920 were 20,006′ by company and 2,139′ by lessees.

The company's operations for 1918-'20 were mainly confined to placer mining. Company has over 1,523 acres of placer ground and estimates 3,000,000 yards of gravel worth $1 a yard as available. Two monitors are used, tearing down and sluicing 1,200 to 1,500 yd. a day; main tail race is 5,276′ long, lined throughout with 25 lb. rail, with two long laterals. The high-pressure pipe-line is 45,000′ long, is spiral steel, commencing with 30″ and reducing to 20, 18 and 16″; head 600′ with 400 miner's inches of water. Total cost of the Jett Creek pipe-line, water-rights and placer equipment has been over $200,000. Operations started in June, 1915.

The controlling factor in these placer operations is the water-supply, giving various results in different seasons. In 1916, a shortage of water was aided by teams and scrapers; in 1917, the high-water season lasted 85 days, so a dam was built in Jett canyon, and the waters of Jefferson and Shoshone creeks were purchased; in 1918, the season was the poorest yet experienced, the hydraulic head being only 45% of that in 1917; in 1919, in spite of indications to the contrary, the placer water season was very short, and in 1920, not much better; season of 1921 started a month earlier and proved satisfactory. A new dam has been built to impound flood waters from Jett and Jefferson canyons.

Equipment: other than placer, includes two 50-h. p. hoists, 10-drill compressor, electric power and 180-ton plant, including Huntington and tube-mills. Company also operates the Toquima Stores Co., which carries a complete stock of domestic supplies.

Production: not including that of lessees, shows the following:

Year	Tons	Value	Profit	Yards	Value	Profit
To end of 1916	398,897	$3,004,229	$752,934	175,477	$139,912	$65,813
1917.....	12,118	78,483	29,773	127,788	140,016	91,016
1918.....	.....	.....	.....	71,367	68,324	19,532
1919.....	560	3,862	15,572*	62,640	46,258	7,787*
1920.....	4,513	21,378	13,938*	64,665	56,277	11,646

* Loss.

The profits do not include royalty or sundry revenue.

For first 6 months in 1921, the bullion yield from lessee operations was $47,900 and royalties to company, $11,406.

In 1921, to July 22, 100,000 yards of gravel were hyraulicked giving a head box yield of $83,000, indicating a final cleanup value of $116,000.

Company has an efficient management and has made a good record, despite unfavorable conditions. The future depends on its ability to mill a large quantity of low-grade ore at low cost, and on the profits from placer mining.

ROYAL CONSOLIDATED COPPER CO. **NEVADA-ARIZONA**

Presumably dead. Well described in Vol. XIV, and more fully in Vol XI, Copper Handbook.

ROYAL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. L. Joseph, pres. and treas.; E. C. Simpson, v. p.; Otto Falk, sec., with Hugh Brown, Joseph Golden, Joseph Seeley, L. Blumenthal and L. H. Norris, directors. Charles Mayote, supt.

Inc. April 10, 1919, in Nevada. **Cap.** $300,000; 20c par; assessable. Listed on San Francisco Stock Exchange.

Property: the Ford group and others, 13 claims, 4,500' N. E. of Tonopah Divide.

Development: shaft down 50'.

Equipment: 50-h. p. hoist, 75-h. p. compressor, drills, etc.

RUBY HILL DEVELOPMENT CO. **NEVADA**

Address: E. O. Holter (pres., Mng. & Dev. Corp.), 60 Broadway, New York. Robert Frese, sec.-treas.

Inc. 1920, in Delaware

Held lease by assignment from the Mining & Development Corp. (q. v.) on mine of the Richmond-Eureka Mng. Co. (controlled by U. S. S. R. & M. Co.) from January 1920, with option until 1922 on 250,000 Richmond-Eureka shares; the M. & D. Corp. to receive 100,000 Ruby Hill shares. Operations including dewatering of Locan 1,200' shaft, and shipment of 1,000 tons of low grade ore, were conducted intermittently until April, 1921, when lease was relinquished.

RUBY SILVER MINING & DEVELOPMENT CO. **NEVADA**

Dead. Fully described Vol. XIII. See **Quicksilver Mines Co.**

RYAN DAVIS DIVIDE MINING CO. **NEVADA**

Letters returned from Tonopah, Nevada.

Officers: Louis O'Neal, pres.; J. B. Davis, v. p.; J. C. Kind, sec.-treas.; with F. E. Chapin and W. R. Porter, directors.

Inc. in Nevada. **Cap.** $250,000; 10c par.

Property: a group that adjoins Iron Crown, and another claim near the Hasbrouck; also owns a group of claims at Keeler, Calif.

RYE PATCH MINES CO. **NEVADA**

Office: Judge Bldg., Salt Lake City, Utah.

Officers: H. A. Smith, pres.; J. E. Ray, v. p.; S. A. Greenwood, sec., with B. F. Bauer, M. I. Finnigan, E. L. Marsh and H. E. Clement, directors. The same in part as those of the American Mng. & Expl. Co.

Property: two old mines (the Alpha and Silver Bell) 17 claims formerly property of Silver Bell and Alpha Cons. Mines Co., in the Star (Rye Patch) district, Pershing county. Has for many years been know as the Rye Patch mine and was for a time under lease to the Rye Patch Mng. & Leasing Co. (described in Vol. XIII), and more recently operated by the American Mng. & Expl. Co. The Alpha and Silver Bell are reported to have produced $11,000,000.

A quartz-lime ore, carrying lead- zinc, copper and silver occurs in irregular masses in much shattered limestone covering an area 250 x 600'. Early workings comprise several tunnels and extensive stopes. See Am. M. & Ex. Co. for recent activities which however ceased in mid-1921.

RYE PATCH MINING & LEASING CO. **NEVADA**

Fully described Vol. XIII. See Rye Patch Mines Co.

SAFFORD COPPER CO. **NEVADA**

Office: 67 Milk St., Boston, Mass.

Officers: Jas. H. Kimball, pres.; Jas. S. Whitelock, v. p.; Owen Goldsmith, treas.; Frank W. Smith, supt.; preceding officers are directors.

Inc. 1915. **Cap.** $300,000; $1 par. Metropolitan Trust Co., Boston, transfer agents.

Property: claims in Safford district, Eureka county, said to show copper-silver ore in quartz veins from 18"-30" wide, traversing porphyry and rhyolite formation.

Development: by 2 shafts, 30' and 100' deep, on the Evening Star claim. First shipment in 1917, returned 8.28% copper and 128 oz. silver per ton. Merely a prospect.

SAINT ANTHONY MINES CO. **NEVADA**

Owned by Atolia Mining Co.

Property: Toy tungsten mine and a 75-ton mill at Toy, 21 miles S. W. of Lovelocks. Ore occurs in an 8' vein carrying 3% scheelite. Development fairly extensive; deepest workings 200'.

Property operated on a small scale by lessees during 1918 and yielded 32 tons of concentrate.

Company suspended operations early in 1917 as mine was practically exhausted. Entire equipment offered for sale in December, 1921.

SAINT ANTHONY MINING CO. **NEVADA**

Address: Goodsprings, Clark county, Nev. Jos. Dederichs, gen. mgr. and chief owner.

Property: 7 claims, 140 acres, in the Yellow Pine district, 2½ miles W. of Goodsprings, Clark county. Ore is said to assay 10% to 18% copper in orebodies up to 15' width. Developed by 2 incline shafts, 240 and 175' deep, located 500' apart.

Equipment:: includes 2 gasoline hoists and an aerial tram 850' long.

Production: to June, 1915, reported as $60,000. Reported shipping one car of ore every 6 weeks during 1916, but no recent returns secured.

ST. LOUIS MINING CO. **NEVADA**

Address: 365 Bush St., San Francisco, Calif.

Officers: W. F. Davis, pres.; A. K. Durbrow, sec.

Inc. in California. **Cap.** $108,000; par $1.

Property: in Storey county.

ST. PATRICK DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: G. W. Allen, pres.; J. H. Shepard, v. p.; C. R. Evans, sec.; John Barrier, treas., with Wm Forman, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; none issued.

Property: 6 claims, 100 acres, in the S. E. part of the district, adjoining the Airedale on the south. Surface work only.

SALMON RIVER MINING CO. **NEVADA**

Probably defunct. **Former office:** 19 West Granite St., Butte, Mont. Mine near Contact, Elko county. Carries gold and silver-bearing copper ore. Had gasoline power and a small smelter. Not operating, at last accounts.

SALT LAKE TUNGSTONIA MINES CO. **NEVADA**

Office: care Allen T. Sanford, counsel, Boston Bldg., Salt Lake City, **Mine office:** Tungstonia, White Pine county, Nev.

Officers: L. W. Roberts, pres. and gen. mgr.; Gustav Wissler, v. p.; A. F. Stumpf, sec and treas., with S. T Merrill and J A. Rasmussen, directors. William Peterson, cons. eng.

Cap. 1,000,000 shares; assessable.

Property: 15 claims adjoining the Shepherd mine, in north end of Snake range, shows a number of veins 1-48" wide, carrying hubnerite ores said to average 2% tungstic acid. The veins occur in granite, near a limestone contact.

Company has a 25-ton mill, using Marcy ball-mill and Wilfley tables. Concentrate is said to contain 71% tungstic oxide.

A lower tunnel is 300′ long, and cuts 3 fissure veins.

SANDSTORM-KENDALL CONSOLIDATED MINING CO. NEVADA

Address: Reno, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zoebel, v. p.; H. G. McMahon, sec.; A. I. D'Arcy, mgr.

Inc. in Nevada. **Cap.** $1,500,000; $1 par; assessable outstanding 1,320,724. Assessment No. 16, of 1c, levied Jan. 22, 1921. Listed in San Francisco.

Property: 70 acres at Goldfield developed by shaft to 500′ with a winze to the 700′ level. Ore carries gold and is a contact deposit between andesite and rhyolite. **Development:** has not shown the existence of important orebodies.

After several years idleness, company has come to life and taken 2 year option on Bonanza group of 7 claims, adjoining the Gold Hill group of the Goldfield Dev. Co. on the W.; also a 10 year lease on part of the Gold Hill group. A 14′ to 70′ vein showing low grade ore extends from the later into Bonanza ground. A shaft is to be sunk at the joint expense of this company and Goldfield Dev.

SAUNDERS DIVIDE MINING CO. NEVADA

Inc. 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 in treasury.

Property: a group of 6 claims in the N. W. part of district, 3½ miles from Gold Mountain.

SAVAGE GOLD & SILVER MNG. CO. NEVADA

Office: 315 Bush St., San Francisco.

Property: about 20 acres, patented at Virginia City, Storey county, on the Comstock Lode between the Gould & Curry on the N. and Hale & Norcross. Covers 771′ on the lode and is developed by a 2,400′ shaft. Reputed to have produced $20,552,000 from above the 16th level in early days. Assessments are levied from time to time.

Claim forms a part of properties consolidated by the **Middle Mines Assoc.**, which see.

SCOOP DIVIDE MINES CORPORATION NEVADA

Mail returned from Tonopah, Nev.

Property: 5 claims, adjoining Dyke Divide on north, in N. E. corner of the Gold Mountain district, Esmeralda county.

SCORPION MINING CO. NEVADA

Address: 333 Kearny St., San Francisco.

Officers: Herman Zadig, pres.; A. V. Fisher, sec.

Inc. 1889, in California. **Cap.** $200,000; par $1.

Property: in Storey county.

SEARCHLIGHT MERCANTILE CO. NEVADA

Address: Searchlight, Nev.

Property: a gold-copper mine near Searchlight, Clark county. Inactive 1919-'20.

SEATTLE CONTACT MINING CO. NEVADA

Address: J. V. Marshall, gen. mgr., Contact, Elko county, Nev. T. A. Marshall, pres., L. B. Walters, sec., Seattle, Wash.

Property: the Delano mine, 8 claims, very near Contact, shows the Brooklyn contact vein, and the Palo Alto and Blue Bird veins, 150′ apart. The latter is a fissure vein, 1-15′ wide, in grano-diorite, with high-grade streak mined for 2′ to 10′ wide, and yielding copper ore.

Geology: and development of this group are fully described by Schrader. Bull. 497, U. S. Geol. Survey, 1912, pp. 119 and 121.

Development: mainly by tunnels and a 170′ shaft.

Production: in 1916, 1,950 tons, averaging $45 per ton, and carrying 18% to 23% copper, 6 oz. silver and 80 cts. gold per ton. Production costs given at $17.50 per ton. In summer of 1920, reported to be shipping high grade ore; reported also that first dividend has been paid.

SEATTLE MINING, MILLING & POWER CO. **NEVADA**

Contact, Nevada. Henry Smith, mgr. Company owns the Mammoth mine, covering 12,000′ along a contact deposit 20′ to 125′ wide, reported to show 55′ of 5% ore in one face.

Production: in 1916, amounted to 165 tons containing 9.5% copper, 6 oz. silver and $2 gold, averaging $43 per ton. No recent returns.

SEMINOLE-REGENT MINING CO. **NEVADA**

Address: 314 Clay Peters Bldg., Reno, Nev. **Mine address:** Rawhide, Nevada.

Officers: Alexander S. Proskey, pres.-gen. supt.; W. R. Grant, sec.-treas., with S. Frederic Taylor and Dr. Byron E. Eldred, directors.

Inc. Feb., 1919, in Nevada. **Cap.** $1,000,000; $1 par; 400,000 outstanding.

Property: the Proskey Regent group, formerly operated by the Mogul Mng. Co., about 14 full and 3 half claims, 300 acres, 2 miles from Rawhide, Mineral county and 27 miles by wagon-road from Schurz on the Goldfield branch of the S. P. R. R. See both Mogul Mng.Co. (Nev.) and Proskey Regent Mng. Co.

Ore: carrying gold and silver occurs in veins, 1 to 6′ in width. Opened by 400′ shaft. **Equipment:** includes 125-ton Black Eagle mill, compressors, tools and houses.

The mine is credited with past production of $150,000. Re-opened late in 1919, and crosscut driven on 400′ to cut the orebody. Was operating in 1920.

SEVEN TROUGHS COALITION MINING CO. **NEVADA**

Dead; see Vol. XIV. Was consolidated, Dec. 1920, with Seven Troughs Mng. Co. under name of **Seven Troughs Reorg. Mines Co.**, which see. The Coalition property was reported sold by the sheriff in November, 1920, to satisfy a judgment in favor of L. A. Friedman, president of the company, for $51,041; was presumably redeemed.

SEVEN TROUGHS MINING CO. **NEVADA**

Dead; see Vol. XIV. Consolidated with Seven Troughs Coalition Mng. Co. to form **Seven Troughs Reorg. Mines Co.**, which see.

SEVEN TROUGHS REORGANIZED MINES CO. **NEVADA**

Is a consolidation of the Seven Troughs Coalition Mng. Co. and Seven Troughs Mng. Co., effective about Dec. 1, 1921. See Volume XIV for description of these companies.

Address: Lovelocks, Nev. John G. Huntington, of Reno, Nev. is cons. engr.

Dividends of former Coalition totalled $252,533.; last in December, 1915.

Property: the Kindergarten and Wihuja groups, 14 patented claims, 264 acres, and the Fairview mine, 29 miles (26 patented), 2 miles S., all in Seven Troughs (Vernon) district, Pershing county, 32 miles N. W. of Lovelocks. Narrow quartz-filled veins 4″ to 30″ wide occur in basalt; the ore carries gold and silver in proportions of 1.3 to 1.1. The Kindergarten vein showed an ore shoot 130′ long and 2′ average width at 212′ depth. Rich bunches of ore found in the Fairview mine yielded $65,000 prior to 1908.

Development: the Kindergarten to a depth of 1,630′ by shafts and tunnel; at Fairview, by 2 shafts, deepest 700′. The new company proposes to drive a 5,700′ tunnel to cut the Coalition at depth of 1,100′ to cost $200.000.

Equipment: includes hoists and a 10-stamp mill (at the Kindergarten)

Production: of 1915 is the last on record, and consisted of 260 tons of $15,000 gross value and 4,509 tons yielding $416,084, from the Fairview and Kindergarten respectively. Except for work of lessees on the Coalition property, the mines have been idle for past 5 years.

SEYLER-HUMPHREY GOLD MINING CO. **NEVADA**

Address: C. T. Lawrence, agt., Manhattan, Nev.

Officers: F. E. Seylet, pres.; F. G. Humphrey, v. p.; J. C. Humphrey, sec., with C. T. Lawrence, directors.

Inc. 1906, in South Dakota. **Cap.** $1,000,000; $1 par; 975,000 issued.

Property: 5 claims, 2 patented, 100 acres, includes the April Fool, War Eagle, Ida and Lottie claims at Manhatan, Nye county. Ore, which occurs in pockets, is said to average better than $40 per ton.

Development: by tunnels driven towards a lime-shale contact. Operated intermittently by lessees on a royalty basis.

SHAMROCK DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. A. H. Keenan, agt.

Officers: M. J. Sullivan, pres; P. A. McCarron, v. p.; A. H. Keenan, sec.-treas., with Roger Dougherty, and R. F. Wendover, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 4 claims, ½ mile W. of Royal Divide and 1¼ miles N. W. of Tonopah Divide.

SHEBA GOLD & SILVER MINING CO. **NEVADA**

Office: Houghton, Mich. **Mine office:** Imlay, Nev.

Inc. in Utah.

Property: the old Sheba mine, 43 claims, 8 patented, about 800 acres, in the Sierra district, Pershing county, near Dun Glen and 14 miles S. of Imlay; also a mill site and water rights. In the Sheba vein irregular bonanza ore shoots occurred near the surface in bedding planes in limestone, or between limestone, sandstone and rhyolite, connected with a well defined fissure vein, up to 3' wide, at comparatively shallow depth. The ore is quartz carrying antimonial silver, lead, zinc and copper. Ground is said to show 3 other veins. The Sheba mine was opened in 1860 and is reputed to have produced $5,000,000 from an area 200 x 300', prior to 1871.

Development: by a 1,480' tunnel cutting the Sheba vein at 800', and at the Mammoth vein by a 520' tunnel with a back of 300'.

Equipment: includes 210' compressor, water power, aerial tram and necessary buildings. A 5-stamp mill was burned in 1920.

Property: was under lease and option first to the Nevada Sheba Silver Mng. Co. (q. v.) to about Jan. 1921, and latter to the **Little Giant Gold & Silver Mng. Co.** (q. v.), formed by the same interests.

SHEEPHERDER MINE **NEVADA**

Lovelocks Pershing county, Nev.

Operated under lease by **Jose-Davis M. & M. Co.**, which see.

SHEPHERD SILVER MINING CO. **NEVADA**

Mail returned from 1108 Hearst Bldg., San Francisco. B. B. Shepherd, sec.-mgr., Marietta, via Mina, Nev.

Inc. 1919, in Nevada.

Property: 2½ miles from the Silver Gulch mine in the old Black Mountain district, 10 miles S. of Mina. Two 35' shafts and surface cuts have exposed lead-silver ore. A 180' crosscut tunnel driven during 1920 uncovered a 5' vein at depth of 108'; ore is said to range from $12 to $800 per ton.

SHIPPER COPPER MINING CO. **NEVADA**

Address: Luning, Mineral county, Nev. Frank Everett, pres.; Jas. E. Quinlan, mgr.

Property: 2 claims, 4 miles S. W. of Luning, developed by a 400' shaft shows a small vein of high-grade copper ore in dolomite, shipments from which are reported to have yielded 8% copper.

SHOSHONE POLARIS MINING CO. **NEVADA**

Idle since 1911. See Vol. XII.

SIERRA DIVIDE MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Codd, pres.; H. F. Bruce, v. p. and cons. engr.; W. H. G. Buck, sec-treas., with Al. Modeen, and R. H. Bates, directors.

Inc. April, 1919 in Nevada. **Cap.** $150,000; par 10c; 776,200 issued.

Property: 3 claims, 3,000' north of Tonopah Divide, surrounded by Divide City, Horseshoe, Midway, Smuggler, Florence, and Knox. Also owns control of the Morning Glory gold mine at Alleghany, Calif., which ad-

joins Tightner mine and has a complete equipment costing $50,000, including a 5-stamp mill. Idle.

SIERRA NEVADA MINING CO. NEVADA

Office: 342 Mills Bldg., San Francisco, Calif.

Officers: W. G. Morrows, pres.; W. E. Sharon, v. p.; Jas. Newlands, Jr., sec., with Frederic Vincent and R. H. Morrow, directors Alex Wise, supt.

Inc. Nov., 1904, in California. **Cap.** $200,000; $1 par; assessable, all outstanding. Listed on San Francisco Exchange.

Property: 5,000′ at the north end of the Comstock Lode, north of the Union Consolidated mine, in the Virginia mining district, Storey county, credited with a production of over $1,000,000.

Exploration is being done by tunnel.

SIERRA SILVER MINES CORPORATION NEVADA

Successor to Arizona Annex Silver Mines.

Address: Mill City, or Unionville, Nev. Edw. S. Van Dyck, pres.

A stock, and probably controlling, interest is held by **Universal Silvers Co.**

Property: the old Essex mine at Chafey (Dun Glen) in the Sierra district, Pershing county, 6 miles N. E. of Mill City, shows a vein 6-7′ wide, said to be traceable for 3,000′, with smaller cross veins. The country rock consists of slates, with interbedded limestone lenses, and andesite flows all cut by diabase dikes. The ore is essentially silver.

The mine originally worked in the 70's, was reopened by present company early in 1921; reported in October that a rich shoot had been uncovered.

SIGNAL DIVIDE MINING CO. NEVADA

Richardson, Woodson & Foster, fiscal agent. Tonopah, Nev.

Officers: G. C. Fetterman, pres.; A. B. Hall, v. p.; Milton Detch, sec.; G. A. Foster, treas.; W. J. Douglass, cons.eng.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable.

Property: 6 claims, north of Sutherland and over 1¼ miles north of Tonopah Divide. Surface exposures said to be favorable.

SILGOLED MINING CO. OF NEVADA NEVADA

Address: Pioche, Nev.

Officers: John W. Hamilton, Jr., pres.; Arthur Reall, v. p.-sec.-mgr.; Walter Pincus, treas., with E. M. Cooper and Wm. J. Yoell, directors.

Inc. 1915, in Nevada. **Cap.** $100,000; 25c par; 248,000 treasury shares

Property: Ely Valley group, 9 patented claims, 134 acres, in Ely mining district, near Pioche,Lincoln county.

Ore: occurs in fissure veins and as chamber deposit in limestone, said to average 0.325 oz. gold, 3.05 oz. silver, 9% lead.

Development: by incline shaft to depth of 445′, with 4,500′ of workings.

Equipment: includes 25-h. p. hoist and compressor.

Management estimates ore reserves at 3,000 tons, with 1,500 tons blocked out.

Inactive 1919-'20.

SILVADA MINES CO. NEVADA

Address: E. S. Chafey, Luning, Nev.

Inc. 1920, in Nevada, by E. S. Chafey, C. C. Boak and B. F. Baker. **Cap.** $150,000; 10c par; 750,000 treasury shares.

Property: 9 claims in Santa Fe district, Mineral county, 4 miles E. of Luning. Silver-lead ore occurs in limestone; said to assay $31 for a width of 11′. Still in exploratory stage.

SILVER BAR MINE NEVADA

See **California Crude Oil Co.**

SILVER BELL & ALPHA CONSOLIDATED MINES CO. NEVADA

Dead. Described in Vol. XIV. Property taken over by **Rye Patch Mines Co.**

SILVER BELL DIVIDE MINING CO. NEVADA.

Inc. 1919, in Nevada.

Property: 4 claims, adjoining Treadwell Divide on east, about 2 miles north of east of Gold Mountain.

SILVER BLOSSOM MINES CO. NEVADA

Office: 442 Gazette Bldg., Reno, Nev.

Officers: W. E. Burch, pres.; Edward Bickmore, sec.; L. T. Brockbank, treas.-mgr.; U. G. Johnson, supt.

Inc. July 27, 1920, in Nevada. **Cap.** $1,500,000; par $1. Permit for sale of stock in California has been given. In February, 1921, treasury stock was being offered for sale, at 25c. per share.

Property: 8 patented claims, 160 acres, in Peavine district, Washoe county, 19 miles N. W. of Reno, shows 2 veins in diorite, 4' and 11' wide; ore carries copper and silver, with some gold and lead; average value, $15 per ton, with high grade pockets.

Development: by 80' shaft. **Equipment:** hoist, etc.

SILVER BOW DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: S. T. Bentley, pres.; C. H. Ellsworth, v. p.; H. B. Ruhl, sec.-treas., with G. W. Morris and G. M. Bentley, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury.

Property: 3 claims N. of Ben Hur, nearly 4 miles S. E. of Gold Mountain. Company also has lease and bond on a developed mine at Silver Bow, that has 800' development tunnel with ore of $20 to $48 per ton in sight.

SILVER CARLISLE MINING CO. NEVADA

Address: C. Van R. Cogswell, 35 Wall St., New York, or Pioche, Nev.

Officers: Robert Mulford, pres.; Fred. G. Corning, v. p.; C. Van R. Cogswell, sec.-treas., with Sidney Green and Theo. H. M. Crampton, (mgr.) directors.

Property: east of the Silver Peer Mining Co. holdings, at Silverhorn, Lincoln county, 23 miles N. W. of Pioche. See **Nevada Silver Horn Co.** for geological conditions, etc.

SILVER CENTER MINING CO. NEVADA

Address: 232 No. Virginia St., Reno, Nev.

Officers: C. E. Flagg, pres.; A. D. Bird, sec.-treas.

Inc. May 3, 1919, in Nevada. **Cap.** $200,000; 10c par.

Property: adjoins that of the Nevada Black Hawk S. M. Co. in Silver Star district, Mineral county, 17 miles S. W. of Mina. In prospective stage.

SILVER CHIEF MINING CO. NEVADA

Address: Nixon Bldg., Reno, Nev.

Officers: D. A. Smith, pres.; W. T. Wilson, v. p.; J. B. James, sec.-treas., with E. H. Smith, and B. S. Gregory, directors.

Inc. 1919, in Nevada. **Cap.** 1,500,000 shares.

Property: 6 claims in the Gillis range, 12 miles N. of Luning, Mineral county, on the Rawhide-Luning road. Claims show granite-rhyolite contact, in which silver ore occurs.

$30,000 had been expended up to November, 1920; and that $50,000 worth of milling ore had been mined.

SILVER COIN MINING CO. NEVADA

Address: Ben Gill, Goldfield, Nev.

Officers: W. E. Sirbeck, pres.-mgr.; J. K. Turner, v. p.; Ben Gill, sec.-treas., with J. M. Hunker and B. W. Ward, directors.

Inc. January, 1920, in Nevada. **Cap.** $150,000; par 10c; 750,000 treasury shares; assessable. Stock transferred and registered by company. Annual meeting, 3rd Monday in Feb.

Property: 9 claims in Railroad Spgs. section of the Lida district, Esmeralda county, 23 miles S. W. of Goldfield, and 4 miles E. of Allied M. & M. Co.'s ground. Three veins are shown in a shale-limestone formation, paralleling intrusions of diorite; quartz ore occurs in shoots, carrying gold

and silver, the latter predominating; assay value is said to be $35 for a width of 3'. Developed by shafts, deepest 100', and tunnels longest 200'. Equipped with 15 h. p. hoist, etc.; a small flotation plant is contemplated.

At last accounts (July, 1920), operations were being conducted by the **Crescent Divide Mng. Co.**

SILVER COMET MINING CO. **NEVADA**

Address: Panaca, Lincoln county, Nev.

Officers: at last accounts, E. D. Smiley, pres.-mgr.; M. J. Smiley, sec.; J. W. Baker, treas., with W. A. Burnett, directors, all of Boston, except E. D. Smiley.

Inc. Jan., 1913, in Nevada. **Cap.** $500,000; $1 par. Annual meeting in July.

Property: 5 claims, 100 acres, in the Comet district, Lincoln county. **Ore:** gold -lead-silver-tungsten, occurs in nearly vertical fissure veins in quartzite, said to assay $30 per ton in gold, silver and lead. Developed by 145' vertical shaft, with 950' of workings.

Equipment: includes a gasoline hoist and 50-ton mill completed in 1915; the mill contains a crusher, rolls, mill and magnetic separator. No recent information.

SILVERDALE EXTENSION MINING CO. **NEVADA**

Address: Pioche, Nev. Company controlled by Wm. H. Pike et al, of Las Vegas, Nev. Wm. Schauss, supt.

Property: 5 claims, N. W. of the Silver-Dale group, at new camp of Silverhorn, at S. end of Ely range, Lincoln county, 23 miles N. W. of Pioche.

SILVER DALE MINING CO. **NEVADA**

Address: Pioche, Nev.

Officers: Peter Buol, pres.; J. L. Whipple, v. p.; C. C. Waring, sec.-treas., with Frank A. Crampton, mgr., and E. C. Marriage, directors. C. W. Geddes, of 25 Broad St., New York, has been active in promoting this and the Silver Peer Mng. Co.

Inc. Feb. 19, 1921, in Nevada. **Cap.** $200,000; 10c par; 1,200,000 shares in treasury at incorporation. Transfer agt. and registrar, Security Transfer & Registrar Co., New York.

Property: 4 claims, 80 acres, at new Silverhorn camp, Lincoln county, 23 miles N. W. of Pioche, adjoins the Nevada Silver Horn on W. The vein outcrops 20' wide to a height of 10', in a shale-limestone formation; an ore shoot is said to be 400' long. Ore is quartz carrying silver, ranging from nothing to hundreds of ounces per ton. Still in prospective stage, but a depth of 100' has been attained.

SILVER DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. C. Brougher, pres.; J. L. Joseph, v. p.; E. J. Erickson, sec.-treas., with C. C. Boak, Gust. Hanson, (supt.) James Grimes, and W. J. Douglass, directors.

Inc. March 31, 1919, in Nevada. **Cap.** $300,000 20c par; assessable Listed on San Francisco Stock Exchange.

Property: the Bazaar group of 6 claims, adjoining the Gold Reef and Lincoln county, 23 miles N. W. of Pioche.
Gold Zone on the S., 2,200' S. of Tonopah Divide.

Development: by shaft down 400' in 1919, and gasoline hoist erected. A continuation of the Tonopah Divide vein was reported cut on the 400' level. In 1920-21, a new inclined shaft reached a depth of 250', and 800' of drifts were driven on this level to explore a 20' ledge. Patent application has been filed.

SILVER DIVIDEND MINING CO. **NEVADA**

Address: Pioche, Nev. Church and Crampton, owners.

Property: N. and W. of the Silver Dale, at the new Silverhorn camp in

Address: Mina, Nev. Joe Beane, pres.; L. B. Spencer, cons. engr. Inc. Lincoln county, 23 miles N. W. of Pioche.

SILVER DYKE AND TUNGSTEN MINES, INC. NEVADA

Address: Mina, Nev.; Jos Beane, pres.; L. B. Spencer, cons. engr.

Inc. 1919, in Nevada.

Property: 4 claims in Silver Star (Gold Range) district, Mineral county, 12 miles by road S. W. of Mina. Originally located for its silver and gold in 1915, this property became a tungsten producer under the title Silver Dike Tungsten Mine (see Vol. XIII) and so continued under 2 different operators until November, 1918. In Sept., 1919, a 23′ silver vein was opened at surface for 100′, with average assay value of $4.60 in gold and 42 oz. of silver. Orebody occurs in a fracture zone in a shale-limestone formation, intruded by diorite.

Development: by the 375′ Silver tunnel, driven by present company; said to have uncovered both silver and tungsten ores, the former running $29 per ton.

Production figures uncertain, but shipments of tungsten concentrate said to have been fairly large.

Equipment: includes 2 hoists, etc., and a mill, designed for concentration of scheelite, 85% completed. An earlier mill, erected by Atkins-Kroll, former owners was dismantled in 1917.

Early in 1920, reports to the stockholders of the company's activities were published as advertising matter in the "Nevada Mining Press"; in spring of 1921, it was reported that property had been leased.

SILVER DYKE DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev. H. C. Price, agt.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., also directors.

Inc. 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 4 claims and fractions adjoining Bonanza Divide.

SILVERFIELDS AJAX MINES CO. NEVADA

Name changed to **Elgin-Bellehelen Divide Mining Co.**, which see.

SILVERFIELDS MINING CO.,LTD. NEVADA

Address: C. F. Breitung, sec., 7 Hanover St., New York City.

Inc. Dec. 27, 1906, in Great Britian, as Golconda Cons. Co., Ltd. and changed name to present title Feb., 1909. **Cap.** £250,000; shares £1 par; issued, £143,353, fully paid.

The **Nevada Silverfields Co.** (q. v.) was incorporated in 1918 and acquired rights to develop, operate and purchase holdings of Silverfields Mng. Co., Ltd. and acquired the Nicklas (q. v.) Mng. Co. by stock exchange.

Property: 26½ claims, 400 acres, in Galena sub-district, Lander county, 13 miles S. W. of Battle Mountain. Ores carry gold, silver and lead.

Proven ores of this and the Nicklas Mng. Co. combined, amount to 217,000 tons of $12.35 gross value per ton.

Idle many years.

SILVER GLANCE MINING CO. NEVADA

Address: Louis Sigmund, Goldfield, Nev. **Inc.** in 1919.

Property: 4 claims, 3 miles S. of Redlich station on the T. & G. railroad in Esmeralda county. Limestone, schist-gneiss, and shale are cut by 5 veins, that are from 5′ to 14′ wide and carry ore assaying from $2.50 to $222 per ton in gold, silver and copper. Former owners did 2,000′ of stoping from a 60′ inclined shaft.

SILVER GULCH MINING CO NEVADA

Address: H. B. Vandersole, Mina, Nev. C. E. Noble, mgr.

Inc. 1919, in Nevada. **Cap.** $150,000.

Property: 3 claims in the Silver Star district of Mineral county, 17 miles S. W. of Mina and 10 miles northwesterly of Belleville. Eleven narrow, though rich, silver veins have been exposed. Work was started late in 1919, and a small shipment of 60% lead ore, carrying 200 oz. silver per ton, was made.

SILVER HILL DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: C. O. Rogers, pres.; V. M. Place, v. p.; C. L. Rogers, sec.-treas.; also directors.

Inc. May, 1919, in Nevada. **Cap.** $200,000; 10c par; 1,000,000 in treasury.

Property: 7 claims, 8 miles S. W. of Divide and about 2 miles N. E. of Gold Mountain. Said to show ore at surface.

Development: 335' shaft. Has spent $30,000 on development.

SILVER HILL MINING CO. NEVADA

Address: 333 Kearny St., San Francisco, Calif. and Silver City, Nev.

Officers: C. A. Torello, pres.; A. V. Fisher, sec.

Inc. 1872 in Calif. **Cap.** $108,000; par $1; 84,897 shares issued. Last dividend of 5c in 1907.

Property: at Gold Hill, Storey county, was a producer in 1919.

SILVER HILLS NEVADA MINES CO. NEVADA

Address: E. P. Esser, Tonopah, Nev.

Officers: W. J. Loring, pres.; H. C. Stimler, v. p.-mgr.; E. P. Esser, sec.-treas., with E. A. Clark and E. W. Blair, directors. Chas. D. Wilkinson, supt.

Inc. 1920, in Nevada. **Cap.** $150,000; par 10¢. Listed on New York Curb and San Francisco Stock Exchange.

Property: 9 claims of the Ingalls mine, an old silver producer, and the adjoining Jaeggers group, 6 claims, in Lida (Tule Canyon) district, Esmeralda county, 37 miles southwest of Goldfield; the Ingalls group is under a 2 year lease and option to purchase, expiring March 12, 1922. A vein that extends for 2,000' across the two groups contains silver-lead ore carrying some gold. The South Silver Hills Mng. Co. had a lease on part of the Ingalls group; lessees work the Jaeggers group.

Development: in early days by numerous shafts and tunnels; deepest workings, 100'. Present management has sunk to 200' level, on which it is exploring the ore shoot which at surface and to depth of 100', was 12' wide and 100' long. Production for past 30 years said to total $200,000, including $45,000 worth of ore extracted by lessees, 1917-1919.

Equipment: 2 hoists, compressor, etc., and 30-ton 8-stamp mill. The remodelled mill was placed in commission on June 1, 1921, and operated intermittently for experimental purposes on $30 and $40 ore until October, when a bullion shipment of $14,000 gross was made, and operations ceased. This was immediately followed by an official statement that during the 18 months' operations, cost of production had exceeded the proceeds from output; that orebodies would not be likely to extend to any appreciable depth and that total available ore in mine had a gross value of but $25,000. This statement was supplemented by a letter from W. J. Loring in which he says: "Failure of a mining property to realize expectations is, of course, unpleasant, but because one property has failed there is no reason to assume that all chances of finding a property are lost." The Ingalls mine reverted to owners on Dec. 31, 1921.

In February, 1922, Silver Hills Nevada was reported to have taken over holdings of the **Buckeye Cons. Mng. Co.** (q. v.), near Silver City, Lyon county. The Silver Hills company being without funds, it was proposed to form a new corporation "Silver Hills Comstock Mng. Co." of same capitalization and to exchange stock on an equal basis plus a 1¢ assessment.

The Silver Hills shares were manipulated up to 65¢ in summer of 1921, by cross sales, enabling the broker who held an option on 453,000 shares to make a profit of $102,000 from sales of $271,000 worth of stock, for which the California Commissioner of Corporations revoked the broker's license.

SILVER HORN MINING CO. NEVADA

Mail returned from former address, L. R. Thatcher, Elko, Nev.

Property: 4 claims, on which a 70' shaft cut ore running from $5 to $40 per ton. Equipped with 25 h. p. hoist and 3-drill compressor.

SILVER HORN MINING & DEVELOPMENT CO. **NEVADA**

Promoted by J. C. Weir, 25 Broad St., New York. A market letter in April, 1921, invited subscriptions upon an initial 100,000 shares at 7½¢ per share.

Property: the Nickel group of 3 claims, in the new Silverhorn camp, near the Bristol district, Lincoln county, 23 miles N. W. of Pioche. It is situated close to the Nevada Silver Horn Mng. Co. (q. v.), and has the same character of ore and formation as the latter.

Early in July, 1921, it was stated that financing of the company was well under way and that an active development campaign was about to be announced.

SILVER KING DIVIDE MINING CO. **NEVADA**

Address: A. L. McPherson, 341 Bush St., San Francisco, and Goldfield, Nev.

Officers: Jacob Berger, pres.; R. L. Colburn, v. p.; A. L. McPherson, sec.-treas.; Wm. Forman, res. agt., with W. E. Cunningham, directors. Gust Hanson, mgr.

Inc. Feb. 25, 1919, in Nevada. **Cap.** $100,000; 10c par; 900,000 issued. Listed on San Francisco Stock Exchange.

Property: 3 claims, patented, 40 acres, 2,100′ W. of Tonopah, Divide, and adjoining the Mecca and Hasbrouck Extension. Said to show two strong veins.

Development: a 60′ shaft sunk on ore, several years ago, gave assays of $12 to $35 per ton. In 1919, a new shaft was sunk 215′ and a 160′ crosscut at this level was said to have cut the Revert vein, 3′ to 4′ wide.

Equipment: hoist, compressor, etc., good for depth of 300′.

Reported, March, 1921, that company is in process of reorganization on an assessable basis.

SILVERMINES CORPORATION, THE **NEVADA**

Office: S. H. Brady, receiver, 805 Alto Bldg., San Francisco.

Inc. in Nevada. **Cap.** $1,500,000; $1 par.

Property: owns 85% of capital stock of Southwestern Mines Co., which has 11 claims at Hornsilver, 28 miles S. W. of Goldfield. The company also owns 6 other claims, the townsite of Hornsilver, telephone line to Goldfield and a 150-ton cyanide plant, built, 1917, to treat Southwestern company's ore.

On account of financial difficulties, lease on Southwestern was cancelled, and company ceased all operations, November, 1918; surface equipment, excepting mill and 8½ mile pipe line to Lida, has since been sold. See **Southwestern Mines Co.**

SILVERPAH CONS. MINES CO. **NEVADA**

Was controlled by Frank D. Qualey, pres. of the Excelsior Mtn. C. Co. L. T. Brockbank, sec., Tonopah, Nev.

Inc. June, 1919, to operate the Silver Hill group in Lone Mountain range, 20 miles from Tonopah, Nye county. Originally worked in the early 70's.

Up to 1919, only prospecting work by shallow shafts had been done, but rich silver ore was reported opened at depth of 65′ in ground between 2 shafts. Reported that R. B. H. Morrill acquired the property, Dec. 13, 1921, and that name of company would be changed to Morris Silver Mng. Co.

SILVERPAH EXTENSION MINES CORPORATION **NEVADA**

Mail returned from last address, Tonopah, Nev.

Inc. Aug., 1919, in Nevada.

Property: 10 claims adjoining the Silverpah Cons. in Lone Mountain district, Nye county. Extension of veins of its neighbor are believed to run through this ground.

SILVER PEER MINING CO. **NEVADA**

Address: Pioche, Nev.

Officers: Peter Buol, pres.; L. F. Peer, v. p.; C. C. Waring, sec.-treas., with Frank A. Crampton, mgr., and E. C. Marriage, directors. C. W. Geddes,

25 Broad St., New York, has been active in promoting the Silver Peer Mng. Co. and Silver Dale Mng. Co.

Inc. Feb. 25, 1921, in Nev. **Cap.** $200,000; 10¢ par; 1,200,000 treasury shares at incorporation. Transfer agt. and registrar, Security Transfer and Registrar Co., New York.

Property: 6 claims, 120 acres, at new Silverhorn camp, Lincoln county, 23 miles N. W. of Pioche, adjoins the Nevada Silver Horn on S. E. and is believed to cover extension of Silver Horn orebody. The ore is quartz, or silicified country rock; carrying silver and gold, in an ore zone 40′ to 50′ wide surrounded by a shale-limestone formation; the silver ranges up to 700 oz. per ton.

SILVER PICK CONSOLIDATED MINES CO. **NEVADA**

Offices: 265 Russ Bldg., San Francisco, Calif, and Goldfield, Nev.

Officers: Hermann Zadig, pres.; A. S. Wollberg, v. p.; C. D. Olney, sec., with M. Grotyohn, O. A. Newcomer, J. J. McCarthy and Edw. S. Van Dyck, directors. Matt Murphy, supt.

Inc. September, 1911, in Nevada. **Cap.** $1,500,000; $1 par; assessable; all outstanding. An assessment, of 1¢, became delinquent Feb. 11, 1922. Transfers made at company's office; registrar, Registration Surety Co., San Francisco. Annual meeting in October. Shares listed on San Francisco Exchange. Share prices, 2c to 10c, 1918; 5c to 15c in 1919; 2c to 26c in 1920; 3c to 15c in 1921.

Property: 5 patented claims, 60 acres at Goldfield, Esmeralda county, being developed by 1,500′ shaft on the Deserted claim and a 280′ shaft on North End claim. A large body of low-grade sulphide ore is exposed in the Deserted, but there is no quantity of commercial ore yet. Company has taken a 5-year lease from 1919, on south end of Mohawk No. 1 claim, north end of Mohawk No. 2 claim, and north end of Combination No. 1 claim of Goldfield Cons. Mines Co., comprising about 20 acres. In August, 1920, a 5 years' lease was secured on part of Red Top group of the Goldfield Cons., which has a reputed production of $250,000.

Development: additional to that noted above; the Mohawk lease has been explored on the 118′ and 271′ levels, but though small shipments have been made, results have been discouraging. Old levels have shown better results and discovery of good ore on 313′ level is reported; shipments of $35 to $50 ore to the Tonopah Mng. Co's mill at Millers began in February, 1921. Ore of still higher grade was mined from the 265′ level in Red Top ground beginning with July.

SILVER PRINCE CONS. MINING CO. **NEVADA**

Address: Caliente, Nev. R. P. Jones, supt.

Property: a silver-lead mine on Mount Irish, near Hiko, developed by an inclined shaft.

SILVER RANGE MINES CO. **NEVADA**

Address: Fallon, Nev.

Officers: Chas. B. Hall, pres.-mgr. Geo. Edson Porter and J. W. Martin, of Los Angeles, are stockholders. Ned Schroeraff, supt.

Property: 52 claims in Cox canyon, Silver mtns., Churchill county, 32 miles E. of Fallon. Apparently an old property, reopened late in 1920. Said to show two distinct mineralized zones, one silver-lead, the other copper.

Development: consists of a 70′ shaft, with total workings of 5,000′. Reported that pay ore, assaying $40 in lead and silver for width of 2′, has been uncovered.

SILVER REEF DIVIDE MINING CO. **NEVADA**

Incorporation never completed. This fact did not deter "Diamondfield Jack" Davis from selling shares in California without permission of the Corporations Commission. He was found guilty by the San Francisco court late in 1919.

SILVER REEF MINES CO. **NEVADA**

Controlled by **Universal Silvers Co.**

Address: Chas. E. Van Riper, 50 Broad St., New York City. Edw. S. Van Dyck, pres.; Unionville, Nev.

Inc. 1919, in Nevada. **Cap.** $200,000; par 10c; 1,000,000 treasury shares.

Property: 5 claims adjoining those of the Arizona Extension and Cons. Silver, which see, near Unionville, Pershing county. Claims said to show 3 veins carrying 17 oz. silver ore, with 50c. to $1 gold. Ore reserves were said to be 12,000 tons in sight, with "300,000 tons in the reasonable extensions of known orebodies". It was said company planned to ship ore to the Arizona Silver mill for treatment.

Early in 1920 it was proposed to merge the Silver Reef, Arizona Silver, Arizona Extension and Consolidated Silvers Inc., into the Universal Silvers Co., the "final Silver" of the above named brokerage house. No definite information is obtainable, that available being largely derived from several brokers circulars and advertisements, which do not present facts. The methods pursued in the promotion of these companies is regarded as highly suspicious. See **Arizona Silver Mines Co.**

SILVER STANDARD MNG. & EXTRACTION CO. **NEVADA**

Address: R. W. Martin, Las Vegas, Nev.

Officers: R. W. Martin, pres.; W. C. Borchers, v. p.; W. E. Ferron, sec.-treas.; with R. T. Leonards and C. D. Breeze, directors. G. A. Duncan, supt.

Property: the Duncan mine, Flagstaff group, Nelson townsite, and water-rights in Eldorado canyon, Clark county. The Flagstaff property is said to have yielded $500,000 in silver and gold up to 1915. One shoot was 8′ wide and 450′ long, and yielded 18,000 tons of $22.80 ore. Recent development has opened a new 6′ vein of high value. Property is fully equipped, and enough ore was said to be available early in 1920 to supply the mill.

No recent information.

SILVER STAR DIVIDE MINING CO. **NEVADA**

Office: State Bank & Trust Co. Bldg., Tonopah, Nev.

Officers: W. J. Douglass, pres.; Roger Dougherty, v. p.-treas.; Albert Erickson, sec.; with G. H. Lewis (mgr.) and D. Holland, directors. F. H. Nielson, supt.

Inc. May 5, 1919, in Nevada. **Cap.** $150,000; 10c par. Annual meeting, May 10.

Property: 5 claims, 120 acres, north of Mizpah, contains quartz vein in rhyolite and breccia. Assays said to yield from $2.50 to $17 per ton.

Development: by vertical shaft, down 50′.

Equipment: 32-h. p. electric hoist and compressor.

SILVER STATE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H. C. Price, agt.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with H. C. Price and Tim Connolly, directors

Inc. April 24, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: in the Klondyke district, 6 miles south of Divide, adjoining the Golden State.

SILVER TOP DIVIDE MINING CO. **NEVADA**

Address: Ed. Bevis, Tonopah, Nev.

Inc. in Nevada. **Cap.** $150,000; shares 10c par.

SILVER TUNGSTEN MINING CO. **NEVADA**

Dead. See Vol. XIV for full description.

SILVER WEDGE DIVIDE MINES CO. **NEVADA**

Dead. Incorporation not completed.

SILVER ZONE DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev.

Officers: James Grimes, pres.; W. J. Douglass, v. p.; E. J. Ramsey, sec.-treas., with F. F. Garside and R. F. Wendover, directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 6 claims, adjoining Divide Charter and Banner Divide.

SILVERZONE EXTENSION MINING CO. **NEVADA**

Organized by Geo. W. Quigley, J. W. Hanson and O. G. Wolther, of Tonopah.

Property: 5 claims, covering 3,000′ on a ledge or dike said to assay $13 to $147 per ton, mostly in silver.

SILVERZONE MINES CO. **NEVADA**

Mail addressed to J. J. Clark, Tonopah, returned.

Silverzone (Hannapah), Nev.

Inc. 1919, by Wm. F. Gray and J. J. Clark.

Property: the Silver Glance mine, which was worked by "glory hole" years ago. An ore-shoot opened for 150′ in length and to depth of 125′, said to run $8-$10 per ton, with 160,000 tons developed. Company has given leases on parts of its holdings.

SILVERZONE MOHAWK CO. **NEVADA**

Care Wm. F. Gray, Silverzone (Hannapah) P. O., Nevada. This is also a Gray & Clark property.

A new shaft sunk in 1919 is said to have cut 4′ of $30 ore at a depth of 80′, with $445 ore on the hanging wall. On the west end of this group, leased to Chas. Spilman, ore in the old Tripod shaft said to range from $10 to $80 per ton.

SIMON DISTRICT

The section in which the Simon Silver Lead mine and its Simonized neighbors are located is part of the old Bell mining district, in which the Olympic or Royal George mine discovered in 1915, has been a gold producer for four years. The Simon mine itself was worked desultorily for thirty years or more for its lead carbonate ores.

In 1919, th opening up of the big orebody of the Simon mine, coming as it did during the extraordinary "boom" at Divide, gave the place a sudden prominence, and started active prospecting operations over an extensive area.

The district covers the foot slope and middle portion of the southern flank of the Cedar mountains, an east-west range, 14 miles long and about 6 miles wide that reaches an elevation of 8,000′ above sea level. This range is formed of a granite or grano-diorite core flanked by upturned limestone, of Paleozoic, and later age, cut by dikes and intrusive bodies of quartz porphyry and andesite, the whole capped in part by extrusive lava flows of rhyolite and andesite rocks. Faulting has brought old and new rocks together (see G. R. Stevens, M. & S. Press, Jan. 27, 1917).

In the area covered by mining claims, the feature of chief commercial interest is the contact belt of limestone, baked and altered by the heat or igneous intrusions and more or less mineralized throughout this area of contact metamorphism. The lower foot hill slopes which include the southerly claims of the district are covered by flat lake beds which conceal the rock structure.

At the Simon Silver Lead mine the contact between limestone and quartz porphyry is an irregular one as is that with granite which occurs a short distance east. The claims cover the igneous contacts, as well as various dikes and cross faults. In the underground workings the big deposit of concentrating ore is partly in limestone, partly in rhyolite, the richest or hanging wall streak being on the hanging wall side. Post mineral faulting, cuts off the ore to the west, the surface displacement being 300′ horizontally. So far as known the ore occurrence on the various other properties nearby is quite similar.

SIMON ANCHOR MNG. CO. **NEVADA**

Address: Tonopah, Nev.

Inc. May 31, 1919, in Nevada, by J. C. Williamson, F. K. Pittman, and Alfred Boyle. **Cap.** $300,000; 20c par.

SIMON ANNEX MINING CO. NEVADA

Address: Tonopah, Nev.

Inc. June 4, 1919, in Nevada, by T. J. Flynn and Ray French. **Cap.** $150,000; 10c. par.

SIMON CENTRAL MINING CO. NEVADA

Address: C. J. Miller, sec., Journal Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; G. M. Smitten, v. p.; with A. J. Mergen, Peter Demosthenes, and Marle Woodson, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: 6 claims in the Simon district.

SIMON CONTACT EXTENSION MINING CO. NEVADA

Address: P. O. Box 501, Tonopah, Nev.

Officers: C. C. Boak, pres.; H. O. Hall, v. p.; Thos. H. Griffin, sec.-treas., with A. A. Clute and W. R. McFadden, directors.

Property: 5 claims adjoining the Simon Contact in the Simon district, via Mina, Mineral county.

SIMON CONTACT MINES CO. NEVADA

Address: Mina, Nev.

Officers: P. A. Simon, pres. and mgr.; C. C. Boak, v. p.; B. W. Zachau, sec.-treas., with B. F. Baker, A. H. Schwinn, directors. E. W. King, supt.

Inc. April 29, 1919, in Nevada. **Cap.** $1,500,000; $1 par; 500,000 shares in treasury. Annual meeting, first Monday in May.

Property: 6 claims, about 105 acres, adjoins the big Simon mine on N. E. in Simon district, Mineral county, said to show a body of $40 lead-silver-zinc-copper ore in limestone cut by an alaskite porphyry dike.

Development: by 350′ inclined shaft and lateral workings on 250′ and 350′ levels. Reported that an ore shoot, first opened in the limestone porphyry contact above, had been cut on lowest level, in June, 1920; ore is of milling grade with high grade streaks.

Equipment: gasoline hoist.

Presumably idle; no information since fall of 1920.

SIMON DISTRICT MINES CO. NEVADA

Mail returned from Luning, Nev.

Directors: W. G. Zulch, F. T. Dann and A. Shannon.

Inc. May 5, 1919. **Cap.** $150,000; 10c par.

Property: in Simon mining district. A prospect.

SIMON DIVIDE MINING CO. NEVADA

See Vol. XIV. Has consolidated, mid-summer 1921, with Simon Silver Bell Mng. to become the **Simon Merger Mines Co.**, which see.

SIMON DOUGLASS MINING CO. NEVADA

Address: Tonopah, Nev. Sponsored by C. N. Miller & Co., of Tonopah.

Officers: C. A. Calhoun, pres.; M. E. Albert, v. p.; H. S. Deane, v. p.; H. B. Smith, sec.-treas., with C. R. Douglass, E. S. Mulford and C. N. Miller, directors. E. S. Chafey, gen. mgr.

Inc. May, 1919. **Cap.** $150,000; 10c par; 25,000 outstanding.

Property: Cleopatra group, comprising 3 claims, 60 acres in Simon district, north of the Simon Divide and south of the Fagan group. The massive boulders of lead ore, supposedly from the south extension of the main Simon contact are said to assay $68 per ton in silver.

SIMON EXTENSION MINES CO. NEVADA

See Vol. XIV. Title changed to **Simon Sterling Mines Co.**, which see.

SIMON FAGAN HONEYMOON CO. NEVADA

Office: Mina, Nev.

Officers: Fred Balzar, pres.; F. W. Fall, v. p.; Ed. C. Eustace, sec.-treas.; R. G. McDonald, gen mgr., with F. A. Nussberger, Henry Ohlandt, Jr., Chas. Enquist and I. R. Eustace, directors.

Inc. August 26, 1919, in Nevada. **Cap.** $150,000; par 10c; 40,000 in treasury. Transfer office; Mina, Nev.

Property: about ½ mile S. of the Simon Fagan, developed by 100′ tunnel. A prospect.

SIMON FAGAN MINES CO. NEVADA

Absorbed in November, 1919, by **Fagan Consolidated Silver Mines Co.**, which see.

SIMON GOLD MINING CO. NEVADA

Address: Tonopah, Nev.

Officers: Dave F. Murphy, pres. and gen. mgr.; Owen Murphy, v. p.; Julius Goldsmith, sec.-treas., with Wm. Davis and Ott Ziegler, directors.

Inc. 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 shares in treasury, June ,1919.

Property: Golden Eagle group of 6 claims, 120 acres, 23 miles E. of Mina, 1,200′ from the Olympic mine at Omco, Mineral county.

Ore: said to occur in a contact between andesite and rhyolite, with a well-defined fissure vein traceable for 3,000′ along a well-mineralized course, and to average $8.70 per ton.

SIMON JUNIOR SILVER-LEAD MINING CO. NEVADA

Address: E. C. Watson, Luning, Nev.

Officers and directors: T. R. Pledge, pres.; E. C. Watson, sec.-treas., with A. C. Bachman, N. D. Marakas, and W. D. Jones.

Inc. May 7, 1919, in Nevada. **Cap.** $150,000; 10¢ par; 1,084,555 outstanding; assessable. Transfers made at Luning; depository, Reno Natl. Bank, Reno, Nev.

Company has no debts; cash on hand, Jan. 1, 1921, $1,188.

Property: a group of 9 claims, S. W. of the Simon mine, in Simon district, close in and owned outright. Said to carry a big dike of silicified breccia running $3 per ton in gold; the material is used for ball-mill pebbles at the nearby Olympic gold mill.

In January, 1921, company purchased a silver-lead prospect in Santa Fe district, Mineral county, 6 miles S. W. of Luning; at surface, ore assays 41 oz. silver and 29% lead.

Development: at Simon, by 2 tunnels, 200′ and 100′ in length.

Idle.

SIMON LEAD MINES CO. NEVADA

Name changed May, 1919, to **Simon Silver-Lead Mines Co.**, which see.

SIMON LEAD & SILVER MINES EXTENSION CO. NEVADA

Officers: W. J. Douglass, pres.; T. J. Flynn, v. p.; W. O. Dougherty, C. S. McCarthy, Louis Cirac, directors. Ray French, sec.-treas.

Property: 5½ claims, 110 acres, adjoining the Simon mine on the east.

SIMON MERGER MINES CO. NEVADA

Is a consolidation in mid-summer of 1921 of the Simon Divide Mng. Co. and Simon Silver Bell Mng. Co., both described in Volume XIV.

Office: Mina, Nev.

Officers: P. A. Simon, pres.; W. J. Douglass, 1st v. p.; C. W. Taylor, 2nd v. p.; C. C. Boak, sec.-treas., with C. F. Wittenberg, directors.

Inc. 1921 in Nevada. **Cap.** 2,000,000 shares, with about one-half in treasury at incorporation. Stockholders of participating companies were to receive 6.5 Simon Merger shares for each 10 shares of old stock held.

Property: the Bell group of 7 claims, 80 acres, side-lining the Simon lead-silver mine on the S., and 4 claims, 3 miles to the S. E., all in the Bell (Simon) district, Mineral county, 22 miles E. of Mina. The latter, according to A. H. Elftman, cover 3,000′ of the apex of the S. E. Simon contact, with mineralized outcrop, 40′ wide, proved for 1,500′, indications which rank second only to those of the Simon mine. Ore occurs in streaks, 4 to 5′ wide, said to run 10 to 12 oz. silver, 6% copper and a little lead.

Development: on the 4 claim group, by several shafts, 25 to 150′ deep. About 1,000 tons of ore averaging $40 in silver and copper were shipped in 1918-19. New company is driving a tunnel.

SIMON MINA MINES CO. NEVADA

Idle.

Office: 318 State Bank Bldg., Tonopah, Nev.

Officers: J. K. Turner, pres.; C. A. Calhoun, v. p.; L. L. Dellinger, mgr.; Branch H. Smith, sec.-treas., with R. E. Smith, directors.

Inc. May 14, 1919, in Nevada. **Cap.** $150,000; 10c par; 950,000 shares outstanding. Listed on San Francisco Stock Exchange.

Property: 5 claims covering 3,000′ along a limestone rhyolite contact, 1½ miles S. of the Simon mine.

Development: by 280′ shaft, at bottom of which $12 silver-lead ore was encountered in an 80′ crosscut.

Equipment: gasoline hoist and buildings.

Control of company is reported to have changed hands.

Examined by F. M. Maloney, formerly of Cerro de Pasco. A prospect

SIMON SILVER BELL MINING CO. **NEVADA**

See Vol. XIV. Consolidated in 1921 with Simon Divide Mng. Co. to form **Simon Merger Mines Co.**

SIMON SILVER LEAD EAST EXT. MINES CO. **NEVADA**

Address: 221 Odd Fellows Bldg., Reno, Nev. **Operating office:** Mina, Nevada.

Officers: C. B. Burkham, pres.; J. M. Andrews, v. p.; Geo. S. Green, sec.; B. F. Baker, treas., with Ernest Rackliff, directors.

Inc. April, 1919, in Nevada. **Cap.** $375,000; increased from $250,000; 25c. par; 96,000 shares outstanding. Transfer office: Reno, Nev.

Property: adjoins the Simon property on the east and south. Developed by 2 shafts, 35′ and 65′ deep, and equipped with gasoline hoist.

Presumably idle.

SIMON SILVER LEAD EXTENSION M. CO. **NEVADA**

Mail returned from Mina, Nev.

Inc. April 21, 1919, in Nev. **Cap.** $150,000; 10c par. T. J. Flynn, Chris McCarthy, and A. C. Kearns, incorporators.

Property: the Extension group in Simon district. Work said to disclose ore at places along trend of vein.

SIMON SILVER-LEAD MINES CO. **NEVADA**

Formerly the Simon Lead Mines Co.

Office: Mina, Nev.

Officers: P. A. Simon, pres.; C. C. Boak, v. p.; B. F. Baker, sec.-treas., with C. D. Kaeding, cons. engr. and Jasper T. Robertson, directors. E. W. King, res. engr.; Leonard F. Barber, met. engr.; Tom McNamara, supt.; H. F. Hilliard, mill supt.

Inc. November, 1919. **Cap.** $2,000,000, increased from $1,500,000, April, 1920; par $1; 1,100,000 shares outstanding. Transfers made at company's office; registrar, Bankers Trust Co., New York. Annual meeting, 1st Monday in May. Listed on New York Curb and San Francisco Stock Exchange.

First annual report, covering 8 months, to Dec. 31, 1919, shows total receipts $319,624 and disbursements, $217,871. Total investment is about $750,000 to Jan. 1, 1922.

Property: 10 patented claims, including the Mammoth, in Simon (officially known as Bell) district, Mineral county, 22 miles east of Mina. Originally discovered 50 years ago, and intermittently worked until real development began in 1919. Examined in 1919 by W. H. Weed.

Geology: claims cover a limestone-porphyry contact with irregular intrusions of older andesite and granite. Ore is found in veins which cross all rocks, but in part follow fault contacts. The orebody is a replacement deposit mainly in limestone, and in part in porphyry; it runs E.-W. and dips 60° N. Two shoots of sulphide ore occur, separated by mineralized porphyry. Values fade in footwall limestone, but show high-grade ore against limestone hanging. Shipping ore carrying 15-30% lead, 12-32 oz. silver per ton, and 8% zinc, occurs for a width of 8′ or so, in main orebody, and also beyond a cross fault in newly discovered orebody 300′ or more to the east of the shaft; yet the value of the mine rests upon the 600,000 tons of developed and partly developed sulphide milling ore, between the 230′

and 565′ levels, averaging 5 oz. silver, 8% lead and 9% zinc, and estimated to yield a net profit of about $7.20 per ton.

Development: by the old 230′ (4th level) vertical shaft, which has been inclined to follow footwall to 7th level (565′). The S. orebody is crosscut at intervals to sixth level, and N. orebody is crosscut and proven between 4th and 6th levels. Old work totaled about 2,000′, increased by January, 1920, to 5,139′. Development in 1920-21 was somewhat curtailed to await completion of mill, but late in 1921, a new ore shoot beyond the W. fault was exposed on the 400′ level; 50 tons averaged 0.04 oz. gold, 23.24 oz. silver and 2.9% lead. Surface work shows pay ore at numerous points along outcrop of vein for a distance of 2,300′, of which only 700′ is explored underground. Ores are largely carbonates down to the 2nd level.

Equipment: includes 60 h. p. gas hoist, 100 h. p. semi-Diesel engine, compressor, pumps, lighting plant, etc. A 38-mile line to Millers has been constructed to supply electric power from the Nevada California Power Co.

A 150-ton mill treating ore by preferential flotation, was completed on Nov. 15, 1921.

The silver lead concentrate averages 35 oz. silver, 50% lead and 8% zinc, the recovery being 80%. The zinc concentrate assays 42% zinc, 6% lead and 5 oz. silver; total recovery of lead and silver is 90%. The mill turns out about 150 tons of silver-lead concentrate weekly and about the same amount of zinc concentrate that is shipped to company's Harbor City smelter,, Calif.

Flotation tests, with mill heads assaying 6.46 oz. silver, 9.1% lead, 9.2% zinc and 6.5% iron, gave a lead-silver concentrate carrying 39 oz. silver, 67.6% lead and 9.6% zinc, and a zinc-silver concentrate with 8.2 oz. silver, 3.2% lead and 46.8% zinc; a recovery of 93.9 oz. of silver, 97.3% of lead and 71.3% of zinc.

In mid-1921, company acquired control of a smelting company, to be henceforth known as Kirk-Simon Smelting Co. The plant situated on tidewater at Harbor City, Calif., 18 miles from Los Angeles, has been remodeled to treat the zinc concentrate and manufacture lead-free zinc oxide and lead-silver bullion. Lead concentrate will be shipped to the U. S. S. R. & M. Co.'s Midvale smelter under a 2 years' contract.

It is considered possible that the mine will develop into one of the largest silver-lead properties of this country.

SIMONS JACKPOT MINING CO. **NEVADA**

Mail returned from San Francisco address.

Officers: Oscar A. Daube, pres.; P. J. Daube, sec.-treas.; Otto Hiffner, mgr., with Joe de Forrest, directors.

Inc. June 7, 1919, in Nevada. **Cap.** $100,000; 10c par; all outstanding; 400,000 shares held by president as trustee. Transfer office: Company's office.

Property: 6 claims, 60 acres in Simon district. An undeveloped prospect.

SIMON STERLING MINE CO. **NEVADA**

Formerly the Simon Extension Mines Co.; name changed early in 1920.

Address: Mina, Nev.

Officers: P. A. Simon, pres.-gen. mgr.; Geo. S. Green, v. p.; B. W. Zachau, sec.-treas., with W. J. Douglass, B. F. Baker, directors.

Inc. April 21, 1919, in Nevada. **Cap.** $750,000; shares 50c par.

Property: 4 claims adjoining the Simon Silver-Lead on the N., in Simon (Bell) district, Mineral county, 23 miles N. E. of Luning. Shows a strong vein carrying silver-lead values, with some zinc, in a sheeted zone of breccia; the width varies from a few inches to 2′.

Development: by 180′ incline and 150′ tunnel driven on fault plant; both in ore. Equipped with hoist.

Company apparently closely allied with Simon Silver-Lead.

SIMON TRIANGLE MINING CO. NEVADA

Address: Mina, Nev. and Tonopah, Nev.

Officers: E. S. Mulford, pres.; Geo. F. Thompson, v. p.; C. C. Boak, sec., with A. H. Elftman, J. W. Dunphy, E. S. Chafey and W. J. Douglass, directors.

Inc. May, 1919. **Cap.** $150,000; 10c par.

Property: 4 claims in the Simon district, adjoining the Cons. West Extension and said to be on the Simon contact.

SIOUX DIVIDE MINING CO. NEVADA

Inc. March, 1910, in Delaware. **Cap.** $150,000; 10c par; 750,000 in treasury.

Property: 7 claims, 4,500′ long, about 2 miles N. W. of Tonopah Divide and N. W. of the Hasbrouck mine.

SMITH VALLEY MINES CO. NEVADA

Dead. Company's affairs to be wound up in 1921. See Vol. XIV for description.

SMOKEY DEVELOPMENT CO. NEVADA

Consolidated 1919, with Boston Ely Mng Co., and Ely Northern Copper Co. as **Boston & Ely Cons. Mng. Co.**, which see.

SMUGGLER DIVIDE MINING CO. NEVADA

Address: Elmer Bisbee, agt., Tonopah, Nev.

Officers: John Miller, pres.; A. F. Price, v. p.; C. N. Miller, sec.-treas. with E. N. Bannon and W. Lucot, directors.

Inc. April 1, 1919, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: the 3 Lone Cabin claims, 4,500′ north of Tonopah Divide, said to have one of the strongest fracture systems in the district. Developed by 250′ shaft.

No information since spring of 1920.

SOUTH ARROWHEAD MINING CO. NEVADA

Mail returned from J. W. Stewart, mgr., Arrow Head, Nev.

Property: in Needles district, Nye county, 60 miles E. of Tonopah. In 1920, reported to have driven an 180′ tunnel; some $30 to $50 ore has been opened.

SOUTH DIVIDE MINES CO. NEVADA

Office: Tonopah, Nev.

Officers: J. G. Crumley, pres.; F. K. Pittman, v. p.; C. E. Oyster, sec.-treas., with L. L. Crumley, and A. H .Elftman (cons. engr.) directors.

Inc. April, 1919, in Nevada. Cap. $150,000; 10c par; 750,000 in treasury.

Property: 5 claims, in the S. E. part of the district, 2 miles from Gold Mountain, adjoining the Gold Wedge Divide on the south. Work was done several years ago, with fair prospects.

SOUTHEASTERN MINING CO. NEVADA

Formerly the Arrow Mining Co., reorganized in May, 1918.

Address: 418 Vermont Bldg., Salt Lake City, Utah.

Officers: Geo. F. Busch, pres.-treas.; Willard Scowcroft, v. p.; J. H. Moss, sec.; M. J. West, supt.

Inc. May, 1918, in Nevada. **Cap.** 1,000,000 shares; assessable; assessment No. 2, of 1¢, levied March 1, 1921.

Property: 26 claims (18 patented), 500 acres, in Arrow district, Lincoln county 8 miles from Groom and 65 miles N. E. of Las Vegas. Ore occurs in fissure veins in quartzite and lime, said to carry silver, lead and copper.

Development: by 206′ shaft, in which pockets of ore, assaying 90 oz. silver, 46% lead and 10% copper were cut. About $20,000 has been spent on property by previous owners, and $40,000 more recently.

Equipment: head-frame, gasoline hoist, shaft-house, smithy and shop, tools, dwellings, bunk-house, 2 autos, truck ,assay outfit, etc.

A prospect that seems to have good indications.

SOUTHERN DIVIDE MINING CO. NEVADA

Mail returned from Tonopah, Nev.

Officers: C. P. Campbell, pres.; Wm. Huggard, v. p.; R. H. Tune, sec.-treas.

Inc. May, 1919, in Nevada. **Cap.** $150,000; par 10c; 750,000 shares in treasury.

Property: 40 acres, patented, about 3 miles south of Tonopah Divide mine.

SOUTH SILVER HILLS MINING CO. **NEVADA**

Address: Harry C. Stimler, Mizpah Hotel, Tonopah, Nev.

Officers: Jas. N. Hyman, pres.; Harry C. Stimler, v. p.-gen. mgr.; John S. Turnbull, sec.-treas.; with Geo. Fuss and E. P. Esser, directors. C. D. Wilkinson, cons. engr.

Cap. 1,500,000 shares; 500,000 in treasury. Stock offered at 25¢ per share, April, 1920.

Property: the Cadillac group of 3 claims in Lida (Tule Canyon) district, Esmeralda county, 37 miles southwesterly of Goldfield. Company also had a lease on part of the nearby Ingalls mine of the Silver Hills Nevada (q. v.). Cadillac said to show a strong fissure vein, 4' to 10' wide, for 4,500'; the ore carries gold, silver and lead.

A mill was to have been in operation by June 15, 1920, but no further word from, or about, the company has been received since April of that year.

SOUTHWEST COMSTOCK EXTENSION MINING CO. **NEVADA**

Address: Thurman G. Roberts, Virginia City, Nev.

Property: the Roberts and Regan mine in Storey county, 3 miles N. of Carson City, adjoins Comstock Superior and Nevada Protective holdings. A 200' shaft has opened 3' of high grade quartz ore. In Nov., 1920, property was leased to Dickson Bros. who were reported actively operating, April, 1921. Equipped with electric hoist.

SOUTHWESTERN MINES CO. **NEVADA**

Idle.

Office: care S. H. Brady, pres.; 805 Alto Bldg., San Francisco. **Mine office:** Hornsilver, Esmeralda county, Nev.

Inc. in Nevada. **Cap.** $1,250,000; $1 par. The Silvermines Corporation, a holding company, controls 85% of shares in the Southwestern, and built a 150-ton cyanide plant.

Property: 11 claims, 135 acres, at Hornsilver, 28 miles S. W. of Goldfield, formerly known as the Great Western mine. Claims said to show silver-gold ore with silver predominating, occurring as chlorides and bromides, the gold being free milling. The veins occur in limestone and shales intruded by diorite dikes, the largest vein said to vary from 5' to 20' in width and to traverse the property for 4,000'.

Development: by 900' shaft and 3,000' of lateral workings. The Silvermines Corp. (q. v.) becoming bankrupt in November 1918, its lease on the Southwestern property was cancelled. Recent activities at the Hornsilver camp, particularly in connection with the Orleans mine, have apparently made Southwestern ground of greater potential value. Prospective locaters alleging that assessment work had not been done, controversy over title to claims arose, July 1921.

SOUTHWESTERN NEVADA MINES CO. **NEVADA**

Address: Julius Siegbert, 900 Broadway, New York.

A company with holdings in Reveille district, Nye county, of which the Louisiana Cons. M. Co. (q. v.) owns the entire issued capital stock. A small production of oxidized lead ore carrying silver was made in 1918 and 1919; inactive since.

SPANISH BELT EXTENSION SILVER MINING CO. **NEVADA**

Address: State Bank Bldg., Tonopah, Nev.

Officers: Warren V. Richardson, pres.; Hugh H. Brown, v. p.; Arthur H. Keenan, sec.-treas.-res. agt.; with M. M. Brown and E. A. Keenan, directors.

Inc. April, 1919, in Nevada. **Cap.** $1,000,000; $1 par; 500,000 treasury shares.

Property: the Blizzard group of 3 claims in Spanish Belt district, Nye county, adjoining to the east the holdings of the Cons. Sp. Belt S. M. Co. and said to carry the continuation of the Ernst and Barcelona veins. To be developed in conjunction with the Cons. Sp. Belt.

SPARKS DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Property: 2 claims, 3 miles south of Gold mountain and S. W. of the Black Hawk Divide.

SPARTA MINING CO. **NEVADA**

Mail returned from Mina, Mineral county, Nev. W. E. Bell, pres.

Cap. $1,000,000; shares $1 par.

Property: 19 claims in Gold Range district, with about 300′ of development work, said to show 3,000 tons silver-lead ore. Is a prospect.

SPEARHEAD GOLD MINING CO., REORGANIZED **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Busey, pres.; H. Berg, v. p.; A. A. Codd, sec.-treas., with A. H. Butler, Jr., and H. H. Blair, directors.

Reorganized March 25, 1916, in Nevada. **Cap.** $1,500,000; increased from $1,000,000; shares $1 par; all issued; assessable; 15 assessments levied to date, the last of 1c. on Jan. 18, 1922. Listed on San Francisco Exchange. Stock registered and transferred at company's office.

Property: 2 claims, 27 acres, at Goldfield, adjoins the Kewanas, Jumbo Extension and Merger Mines Co. on the east; includes property of former Goldfield Shale Mng. Co. Several years ago lessees sank 4 shafts, 80′ to 100′ in depth. Mine was worked intermittently until October, 1915, with the idea of continuing the 240′ shaft to the shale-latite contact. This formation was cut at 880′ and the shaft bottomed at 910′. In sinking, 3 wide quartz veins of no value were passed through. At 910′ depth stringers containing chalcocite and chalcopyrite were cut, some said to assay $30 per ton. During 1918, a total of 2,127′ of work was done on the 250, 285′ and 910′ levels. High-grade ore was encountered in a zone of silicified shale on the 910′ level and several raises were driven towards the shale-latite contact, which was reached at 150′. No ore was found.

In 1919, total new work was 2,049′ and in 1920, 1,113′. Most of recent development has been on and below 910′ level; during 1920, 2 winzes, 250 and 80′, sunk from this level, failed to discover ore of commercial value. On Nov. 1, 1921, company suspended all work indefinitely. Mine has been developed for many years and to a depth of over 1,100′, but results have been disappointing. Ground will be turned over to lessees.

Company had a lease on the Never Sweat claim of the Goldfield Blue Bull Mining Co. adjoining. Spearhead 450′ and 910′ levels are headed toward this claim.

In January, 1922, the company joined forces with Comstock-Eldorado company (q. v.) in acquiring 5 patented claims in 2 groups, S. of Gold Hill, in the Comstock district, Storey county. The Spearhead group comprises the Succor and White Lode claims, about 20 acres, a few hundred feet S. W. of the Comstock-Eldorado and Comstock Silver holdings, purchased for $8,000 and covers some 1,500′ of the Succor vein where it connects with the S. E. branch of the Comstock Lode. It is developed to 350′ depth by shaft and winze, and by tunnel opening orebodies said to be 40′ wide where crossfissures intersect the Succor vein. Equipment valued at $10,000 will be moved from the Goldfield property.

SPRUCE MONARCH CONSOLIDATED MINING CO. **NEVADA**

Address: B. S. Woodward, mgr., Wells, Elko county, Nev.

Officers: Herbert Badt, pres.; David Neff, v. p.; J. L. Vandiver, sec.; with Samuel Neff and B. S. Woodward, directors.

Property: in Spruce Mtn. district, Elko county, 60 miles southeasterly of Wells and 27 miles S. of Tobar the shipping point on W. P. R. R. First

worked in 1870; idle 1902-18; early production reported to have totaled $200,000. Replacement bodies of silver-lead ore occur in fractures and bedding planes in limestone cut by intrusives; ore is largely lead carbonate with fairly high iron content.

Development: by new 2,000′ tunnel with 400′ back; from which connection has been made with old 300′ level, and winze sunk to 500′. A 300′ ore shoot, extending from 3rd to 5th level, with widths up to 26′, has been opened.

Ore reserves: estimated to be 20,000 tons, assaying 20 oz. silver and 17% lead, and 35,000 tons assaying 10 to 15% lead.

Production: in 1919 not recorded; in 1920, up to Dec. 1, totaled 7,464 tons of ore carrying 22 oz. of silver and 17.7% lead per ton; gross value $250,000, net $112,000. Shipments ceased on Jan. 1, 1921, to await more favorable freight rates but were reported to have resumed in September at rate of 200 tons per month.

STANDARD COPPER CO. **NEVADA**

Presumably defunct. See Vol. XI (Copper Handbook) for description. Formerly the Union Copper Co.

STANDARD DIVIDE EXTENSION MINING CO. **NEVADA**

Inc. in Nevada.

Property: 6 claims north of Sutherland Divide and 2½ miles north of Gold Mountain.

STANDARD DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H.H. Brown, agt.

Officers: J. C. Martin, pres.; G. A. Trubody, v. p.; H. A. Darms, sec.-treas., with Wm. Watters and W. J. Douglass, directors.

Inc. April 11, 1919, in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury.

Property: 5 claims, about 110 acres, 2½ miles north of Gold Mountain, adjoining the Sunbeam and the New England shaft.

STANDARD METALS CO. **NEVADA**

Office: 805 Arrott Bldg., Pittsburg, Pa. **Mine office:** Gazette Bldg., Reno, Nev.

Officers: Wm. P. Lemley, pres.; B. L. Elliott, v. p.; G. J. Schondelmeyer, sec.-treas.; A. L. Chappell, res. agt.-gen. mgr.; with Walter K. Elder, J. A. Albert, John Lofink, Jr., Hy. A. Dapper and A. A. Lutz, directors. C. A. Neff, asst. sec.-asst. treas.

Inc. April 16, 1916, in Nevada. **Cap.** $1,500,000; $1 par; 625,000 treasury shares. Transfers made at Pittsburg office.

Property: 240 patented acres in Peavine district, Washoe county, 8 miles N. W. of Reno, adjoins the Peavine Silver Corp.; first worked in 1867. The main vein, in schists traversed by quartz monzonite porphyry dikes, dips 50° to W. The ores are sulphide, carrying gold, silver and copper, with some lead and zinc; one assay return shows 1.8% copper, 0.07 oz. gold and 24 oz. silver across 7′.

Development: by incline to 300′ vertical depth. In early days, an ore shoot, 10′ to 50′ wide, and 120′ long, was exploited in leached zone above 100′ level. In sulphide zone on 3rd level, 2 ore shoots, 100′ and 130′ long, with average width of 15′, have been opened. Reported, Sept. 1921, that shaft would be sunk to the 5th level.

Equipment: includes electric hoist, compressor, etc., and 150-ton mill, employing Wilfley tables and flotation plant, making a $75 to $200 concentrate; ratio 11:1. Mill completed early in 1920, operated a few days only; after remodelling, operations resumed in April, 1921, on a 20% capacity basis. It is hoped that an average milling grade of $20 ore will be possible. Concentrate shipments began May, 1921, and up to Aug. 12, totaled about 160 tons with gross value of about $125 per ton.

STANDARD METALS CORPORATION **NEVADA**

Offices: 805 Arrott Bldg., Pittsburgh, Pa. Wm. P. Lemley, pres.

Incorporated in Delaware with capital of $3,000,000 with the intention

of taking over Standard Metals Co., which see, and the Paymaster mine, in Peavine district, Washoe county. Plan abandoned in light of later developments.

STAR GOLD-SILVER MINING CO. **NEVADA**

Formerly North Star Mng. Co.

Addresses: Geo. F. Brown, pres., Brown, Kearn Co., Calif; B. J. Brown, fiscal agt., Yerington, Nev., and W. E. Harry, supt., Mina, Nev. There are 9 directors.

Inc. in Nevada. **Cap.** $500,000; par $10; $200,000 underwritten by Chinese capitalists of California.

Property: 26 claims, including North Star, Midas, Southern Cross, Venus, and Morning Star groups, situated between Stewart Springs and Olympic Mines Co., in Bell district, Mineral county, 20 miles N. E. of Mina. A silver-gold bearing vein was being developed in 1921; assay value $16 to $90; shaft 132′ deep.

STAR OF THE WEST MINING CO. **NEVADA**

Office: Gazette Bldg., Reno, Nev.

Officers: Robt. B. Todd, pres.-mgr.; M. W. O'Boyle v. p.; G. M. Todd, sec.-treas., with Chas. M. O'Boyle and R. G. Withers, directors.

Inc. April, 1919, in Delaware. **Cap.** $1,000,000; $1 par; 500,000 shares in treasury. Security Transfer & Registrar Co., registrar and transfer agents.

Property: 14 claims, 4 patented, in Gold Park district, Nye county, 40 miles S. W. of Austin, the nearest rail point, formerly owned by the Nevada M. Co. Ore occurs in fissure veins in porphyry with N. E.-S. W. course and dip of 45° said to average $50 per ton in silver and gold. One vein, 15′ wide, shows $15 per ton milling ore and a 2′ pay streak. Is an old producer claiming a past production of $1,000,000.

Development: by more than one mile of drifts and tunnels. Recent work includes two tunnels, one 900′ long, with maximum back of 500′. Reported that ore reserves are sufficient to supply mill for 4 years.

Equipment: includes 50-ton mill, employing amalgamation, concentration and flotation; operations began March, 1921, and a small quantity of $140 concentrate has been shipped. About $100,000 was expended on plant and development in 12 months ending March 1, 1921. The transportation problem is difficult of solution.

STATES MUTUAL CONS. MINES CO. **NEVADA**

Address: Searchlight, Nev.

Officers: Mrs. V. A. Brewer, pres.-mgr.; J. W. Carnic, v. p.; Robt. McKee, sec., with Geo. Allan and Albert Cappel, directors.

Cap. $5,000,000; $1 par.

Property: 140 acres in Campaign copper mining district, Searchlight, Clark county, said to carry a deposit 4,500′ long running from 2 to 30% copper. **Development:** by tunnels.

Company announces, March, 1921, that additional holdings comprise 320 acres placer ground, 40 acres of lode claims and 400 acres of oil lands in 2 tracts, all near Searchlight. Pay-as-you-go principle adopted and company has no debts.

STEPTOE VALLEY SMELTING & MINING CO. **NEVADA**

Company dissolved 1914. Property owned and operated by Nevada Cons. Copper Co., which see.

STELLA MINES CO. **NEVADA**

Address: Pioche, Nev.

A close corporation, the principal owners being, Chas. Culverwell, Jennie Culverwell, D. J. Ronnow, Fred Mansir and the Hybla Mng. Co. (q. v.)

Property: is in the Comet district, Lincoln county, 12 miles W. of Pioche. Orebodies occur in shale with porphyry intrusions. Worked on a small scale at shallow depth by lessees, the Hybla M. Co. being one of them. Shipping ore said to average $124 per ton, mostly in silver, but gold,

copper, lead and zinc values are also present. Developed by incline and 200' tunnel. Reported that owners have received royalties of $10,000 up to June 1, 1921.

STERLING DIVIDE MINING CO. NEVADA

Office: M. E. Scott, res. agt., Reno, Nev.

Officers: Capt. A. S. Proskey, pres.; H. E. Scott, sec.; A. N. Salisbury, treas. **Inc.** April, 1919, in Nevada.

Property: 5 claims, ¾ mile N. E. of the Ben Hur.

STEWART-TUSCARORA MINING CO. NEVADA

Formerly Holden M. & M. Co. (Controlled by Stewart Mng Co.)

Addresses: J. E. Harrington, pres., 1465 Broadway, New York, and Tuscarora, Nev.

Officers: J. E. Harrington, pres.; Nash Rockwood, dir. and counsel. David J. Cook, gen. mgr.

Inc. 1916, in Nevada. **Cap.** $500,000; $10 par. **Property:** a 10-yr. $175,000 lease and bond on 2 claims of the Tuscarora-Nevada Mng. Co. and the Nevada rights of the Holden patents for concentrating and reducing ores. The mine is said to contain between 400,000 and 600,000 of $14 mill ore.

A 50-ton mill, completed in 1919, was destroyed Nov., 1919, by fire; reported that new 250-ton mill is to be built in 1922.

SULTANA SILVER MINES CO. NEVADA

Address: A. F. Price, sec., 412 No. Center St., Reno, Nev., or C. N. Miller, P. O. Box 1137, Tonopah, Nev.

Cap. $1,000,000; $1 par; 750,000 issued.

Location: via Black mountain district, Mineral county, 15 miles W. of Belleville on S. P. R. R. (Keeler branch) and 4 miles from Marietta. Accessible by good road from Tonopah via Candelaria, and 30 miles from Mina, the nearest supply point.

Property: 3 claims, 60 acres, covering 2,000' on outcrop of strong vein, running N. W.-S. E. on south slope of Big Elephant mountain in Excelsior range. Ore: argentiferous galena with silver sulphide. The mine is in the heart of district, extending for 8 miles from Foster mine on east end of Excelsior range to Borax (F. M.) Smith mine on west. The range shows limestone intruded by quartz-porphyry, the silver-bearing rock of the region.

Mine reported on by J. Young Anderson and A. F. Price.

Development: old workings at 5 places along the vein to depth of 135' and a 100' shaft show the vein to have 3 to 5' of ore that carries 60 to 250 oz. silver. An 8' width of vein in shaft samples $96.80 in gold, silver and lead. Water is obtainable at Marietta.

In mid-1921, company was advertising in the public press for lessees.

SULTAN MINE NEVADA

Address: Henry Robbins, owner, Goodsprings, Nev.

Property: in Yellow Pine district, Clark county, said to show a replacement orebody in limestone. Minerals are zinc and lead carbonates, the ore averaging 1¼ oz. silver to each 1% lead. Surface outcrops are said to be extensive.

Equipment: includes 50-ton dry concentrating plant, separating the lead, making a 35% lead and 40 oz. silver concentrate. Tailing carries 15% zinc, 4% lead and 4 oz. silver per ton.

Was a small producer in 1919.

SUNBEAM DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: W. E. Sirbeck, pres.; A. B. Hall, v. p.; Arthur Woods, treas., Milton M. Detch, sec., with F. F. Garside, directors.

Inc. April 12, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable; 550,000 issued. Assessment No. 1, of 1¢, was payable March 15, 1921, and

No. 2 of 1¢ was levied in November. Listed on San Francisco Stock Exchange.

Property: 7 claims, 2¼ miles north of the Tonopah Divide.

Development: by 150′ shaft, sunk on a rhyolite dike. Assays showed rock to carry from $1 to $2.80 per ton, but stringers at 120′ returned from $17 to $96 per ton. At 150′ the stringers assayed $133, and 12″ vein $10.50 per ton. Fully equipped.

In spring of 1921, company secured leases on portions of ground of the Florence Goldfield (q. v.) and Jumbo Extension (q. v.) at Goldfield. By August, discovery of an ore-body 4′ wide on the Florence was reported.

SUNNY DIVIDE MINING CO. **NEVADA**

Office: Room 1 Journal Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; C. H. Duborg, v. p.; with G. H. Kent, W. T. McNeil, and O. J. Clifford, directors. Chas. T. Miller, sec.-res. agt.

Inc. in Nevada. **Cap.** $150,000; 10c par; 800,000 treasury shares.

Property: 7 claims, 1¼ miles S. W. of Tonopah Divide, and adjoining the Aztec Divide on the south. Company also advertised its ownership in 9 claims in the So. Arrowhead district, Nye county.

SUNSET MINING & DEVELOPMENT CO. **NEVADA**

Office: 265 Russ Bldg., San Francisco, Cal. **Mine office:** Unionville, Pershing county, or Rhyolite, Nye county, Nev.

Officers: Edw. S. Van Dyck, pres.-treas.; Herman Zadig, v.p., with O. A. Newcomer, directors. Chas. D. Olney, sec.; F. W. Lockman, mgr.

Inc. Dec. 9, 1912, in Nevada, as a reorganization of the Tramps Consolidated Mining Co., Bullfrog Sunset Mining Co. and Denver Bullfrog Annex Mining Co. **Cap.** $5,000,000; $1 par; issued, 1,750,000. Stricken from New York Curb August 1, 1918. Security Transfer & Registrar Co., New York, transfer agent and registrar.

Property: 20 acres, patented, in the Bullfrog district, Nye county, said to show ore occurring in fissure veins in rhyolite, with dip of 30°. Veins vary from 6′ to 20′ in width.

Development: by 5,000′ of tunnels. During 1918 the Denver shaft was deepened to 700′ and a drift run on a quartz vein, assaying $11.20 per ton.

Late in 1918, the Arizona mine in Unionville district, Pershing county, was taken over and drained by tunnel to 400′ level. This property prior to 1880 had a production record of $5,000,000 gross. A 35-ton flotation mill was completed by Feb. 1919. In April, suit was brought against the company's officers for cancellation of sale of property to the Arizona Silver M. Co. (q. v.); the contention being that the Arizona mine had been developed and equipped at a cost of $40,000, raised by assessments levied on stock of the Sunset company. The officers of the two companies are identical.

SUNSHINE MINES CO. **NEVADA**

Address: Winnemucca, Nev., or O. W. Jones, (pres. of Rochester Silver Corp.), Reno, Nev.

Property: claims in Pershing county, 17 miles S. of Winnemucca, shows fissure veins in limestone containing quartz ore carrying argentiferous lead carbonate. Developed by 100′ tunnel, with an 80′ back, and winze to the 180′ level. Equipped with compressor and drills.

SUPER SIX MINING CO. **NEVADA**

Address: Nat P. Wilson, 1440 Stanley St., Los Angeles, Calif. Rapp Bros., also of Los Angeles, are said to be interested.

Property: the Frisco and other claims at the new camp of Royston, San Antone district, Nye county, adjoins the Hudson company on the S. A vein, 5′ wide, has been cut by a tunnel; ore is silver. Developed also by 2 shafts. Claims are operated largely by lessees.

SUTHERLAND DIVIDE ANNEX MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; F. C. Beedle, v. p.; B. E. Garnett, sec.-treas., with T. F. Potthoff, and A. B. Garnett, directors.

Inc. April 1919, in Nevada. **Cap.** $150,000; 10c par.

Property: 4 claims adjoining the Sutherland Divide on the north.

SUTHERLAND DIVIDE EXTENSION MINING CO. **NEVADA**

Address: T. O. Ward, res. agt., Reno, Nev.

Officers: Jos. McEachin, pres.; R. G. Ward, v. p.; T. O. Ward, sec.-treas.; above, with T. J. Lynch and F. P. Dunn, directors.

Inc. March, 1919, in Nevada. **Cap.** $10,000; 1c par; 500,000 in treasury.

Property: about 75 acres, adjoining the North Divide on the north.

SUTHERLAND DIVIDE MINING CO. **NEVADA**

See reorganized company, the **New Sutherland Divide Mining Co.**

SYNCLINE GOLD-SILVER-COPPER MINING CO. **NEVADA**

Mail returned from mine address, Lida, Nev.

Officers: L. Kershaw, pres., Tacoma, Wash.; H. C. Peet, v. p.; L. E. Campbell, sec.-treas. and gen. mgr., with F. A. Campbell, B. A. Howes, E. P. O'Leary, E. B. Campbell and E. C. Peet, directors.

Inc. June 4, 1910 ,in Nevada, as successor of Washington-Nevada Mining & Milling Co. **Cap.** $1,000,000; shares $1 par; issued $799,420. Annual meeting, first Monday in January.

Property: 11 claims, 3 patented, 57 acres, with 120 acres mill and smelter sites, 30 miles S. W. of Goldfield and 10 miles from a railway, in the Lida district. District shows Cambrian limestone and shale, cut by quartz monzonite capped by volcanic rocks. The ores occur as impregnations and veins. The claims are reported by the management to carry 12 deposits, 4 under development of 4 to 20′ average width, traceable 5,000′, carrying a sulphide ore, said to give assays of 8.7% copper, 17 to 19% lead, 11% zinc, 11 oz. silver and $1.90 gold per ton.

Development: by 9 shafts, of 31 to 120′ depth, and by 6 tunnels of 12 to 140′ length; the tunnels are not being used.

Equipment: includes a 15-h. p. gasoline hoist and 5 mine buildings. The management planned deepening the main shaft to 200′ at last report.

TALAPOOSA COMPANY **NEVADA**

Office: Fernley, Nev.

Officers: Winfield Scott Proskey, pres., 2 Wall St., New York; Wm. H. Ferguson, cons. engr.

Cap. $1,500,000; $1 par; 600,000 treasury shares. U. S. Corp. Trust Co., New York, registrar and transfer agt. Listed on New York Curb.

Property: 18 claims and fractions, 290 acres, in Talapoosa district, Lyon county, 14 miles S. of Fernley on the S. P. R. R. District known since 1864 but no record of early production. Three, or more, parallel quartz veins, 4′ to 20′ wide, outcrop prominently in rhyolite cut by altered andesite dikes; ore values, largely silver, ranges from $1.64 to $196.10 per ton for many assays. Developed by shafts, 100′ maximum, and 2 tunnels; equipped with hoists.

Property is said to have been under present control since 1905, and that $100,000 has been expended. Is being operated to some extent by lessees, who are reported, Dec. 1921, to have opened a high grade ore shoot. Most of information is obtained from market letters and "review" of Irving K. Farrington & Co., of New York, which has been assiduously boosting Talapoosa for a year past.

Examined by Robt. W. Betts and J. L. Kelly.

TEACUP MINING CO. **NEVADA**

Address: McGill, or Cherry Creek, Nev.

Officers and directors: Geo. Granopolus, pres.; J. M. Lockhart, v. p.; H. J. Mueller, sec.- treas.; J. W. Wenzel, mgr.

Inc. June 27, 1919, in Nevada. **Cap.** $1,000,000; $1 par; assessable; 322,500 issued. Operating expenses for 1918 averaged $5,000 per month.

Property: 22 claims, 2 patented, 440 acres in Cherry Creek district, White Pine county, shows two veins under development. The Teacup, worked since 1868, lies along a contact between lime and shale, is from 4 to 12′ wide, runs N.-S. and dips 45° W. The Exchequer is a fissure vein in

quartzite, is 4 to 11′ wide, and runs S. 70° W., crossing the Teacup vein 675′ S. of shaft. Claims cover 5,000′ along strike of Exchequer vein and 3,000′ on the Teacup.

Development: by a 1,000′ shaft and a 450′ incline; a total of 4,000′ of workings. A crosscut on 900′ level intersects the Exchequer vein.

Equipment: includes 60-h. p. gasoline hoist, assay-office and buildings; compressor, 7,250′ tramway, and 100-ton mill.

Mine is credited with past production of 3,000,000 oz. silver, and management reports reserves of 100,000 tons, running 14 to 27 oz. silver.

TECHATTICUP MINE **NEVADA**

Address: C. L. Dennison, lessee, New York . Owned by Wharton Estate, Philadelphia, M. A. Newman, supt., Nelson, Nev.

Property: 9 claims, 8 patented, 1 mile E. of Nelson, in Eldorado Canyon district, Clark county, said to show a quartz vein in monzonite, dipping 10 to 80° and pitching E. W. Ore is a sulphide.

Development: by 600′ incline shaft, and 3,000′ of workings.

Equipment: 25-h. p. gasoline hoist, 3 compressors and 50-ton cyanide mill.

Production: in 1916 was 7,676 oz. gold and 58,393 oz. silver. Operating, but no record available; in 1919, was the largest producer of the district.

TECOMA CONSOLIDATED MINING CO. **NEVADA**

Fully described in Vol. XIV; property taken over by **Utah Zinc Co.**, which see.

TELEPHONE GIRL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H. R. Cooke, res. agt.

Officers: J. J. McGregor, pres.; E. B. Ingram, v. p.; James Moffatt, sec.; James Monahan, treas., and directors.

Inc. in Nevada. **Cap.** $150,000; 10c par; 750,000 in treasury.

Property: 6 claims in the extreme S. E. part of the district, 4 miles from Gold Mountain and N. E. of the Ajax mine.

Mail returned from Portland, Ore., address.

TENABO MILL & MINES CO. **NEVADA**

Fully described in Vol. XIII. Property acquired in 1920 by **Consolidated Cortez Silver Mines Co.**, which see.

THOMPSON-WALSH MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: J. H. Walsh, pres.; G. F. Thompson, v. p.; G. W. Dwight, sec.-treas.

Inc. June, 1919, in Nevada. **Cap.** $150,000; 10c par; 702,000 shares outstanding.

Property: adjoins Cons. West Extension on W., developed by 40′ shaft.

THOMSON DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. D. McLeod, pres.; Wm. E. Watters and W. J. Douglass, v. p.'s; E. J. Erickson, sec.-treas., with Hugh Sutherland, directors.

Inc. May 14, 1919, in Nevada. **Cap.** $300,000; 20c par; assessable. Listed on San Francisco Stock Exchange.

Property: 7 claims, 90 acres, adjoining Belcher Extension, Royal and Pay Divide properties. Is about 4,500′ N. W. of Tonopah Divide. Patent application has been filed. Fully equipped.

THOUSAND MEMBER GOLD MNG. ASSOCIATION **NEVADA**

A get-rich-quick scheme fostered, if not fathered by the G. S. Johnson Co., in 1914, in an attempt to sell Eastern Star Mng. Co. stock.

TIGER MINING CO. **NEVADA**

Mail returned from Lovelocks, Nev. Not incorporated.

A. L. Towne, mgr.; G. E. Pitt, supt.

Property: 4 claims, 80 acres, 9 miles E. of Lovelocks, Pershing county, said to carry a 4′ vein with gold, silver and copper. Owners claim to have 2,000 tons of ore blocked out. An 18-ton concentrating mill installed, May, 1919.

TODD MINING CO., R. B. **NEVADA**

Merged early in 1920 into the **Luning Consolidated Silver Mines Co.** of Nevada, which see.

TOGGERY DIVIDE MINING CO. **NEVADA**

Officers: T. J. O'Donnell, pres. Ernst & Cranmer Bldg., Denver; F. S. Hutchins, v. p.; Darwin S. Root, sec.-treas. (Room 1517, 25 Broad St., New York), with J. W. Graham, G. W. Bachman, E. B. Caldwell, directors.

Inc. April 19, 1919, in Nevada. **Cap.** $150,000; 10c par. Listed on San Francisco Stock Exchange. Corporation Trust Co., New York, transfer agent.

Balance sheet of April 15, 1921, shows assets of $247,184, of which $29,357 was charged to profit and loss account.

Property: 12 claims, 200 acres, adjoining the Gold Zone on north, and 1,800′ south of Tonopah Divide. Located in 1902 by James Grimes. Many strong dikes or iron-stained fracture ledges of appreciable silver value are said to traverse claims. Examined by A. H. Warner.

Development: by 4 shafts, deepest 325′. All surface work had shown minimum assays of 1 oz. silver per ton. At 135′ in main shaft, ore carrying free gold was opened.

Mine shut down early in 1920, dismantled and machinery junked. A reorganization on an assessable basis did not materialize, and in June, 1920, a circular letter from Weir Bros. & Co., 25 Broad St., New York, reported merger of Toggery Divide and Gibraltar Silver Mines Co. in the **Mines Selection Co.** (q. v.). Stockholders of each company to exchange their stock for stock in new company, share for share, plus a fee of 3¢. See Vol. XIV for complete description of Toggery Divide.

TOGGERY EXTENSION MINING CO. **NEVADA**

Office: Reno, Nev. James Boland, res. agt.

Officers: W. A. Hooton, pres.-mgr.; J. R. Chamberlain, sec.-treas.; with James Boland and R. G. Withers, directors.

Inc. June, 1919, in Nevada. **Cap** $150,000; 10c par; 750,000 issued.

Property: 2 claims, 600′ N. of Myra Divide. Lease held by company (or its president) on the Toggery Divide was relinquished.

Probably dead.

TOHOQUA MINING CO. **NEVADA**

Property: acquired by Leadville Divide Mng. Co. and later by **Leadville Mines Co.**, which see.

TOMBOY DIVIDE MINING CO. **NEVADA**

Dead. Had been a company "on paper" only.

TONOPAH BANKERS DIVIDE MINING CO. **NEVADA**

Officers: A. W. Copps, pres.; W. P. O'Meara, v. p. and mgr.; F. W. Gillette, sec.; Thomas Normile, treas., with F. C. Jordan and P. C. Thorn, directors.

Property: 4,500′ north of Tonopah Divide; with the High Divide Annex, High Divide, Harmill, and Hennessy ground in between.

TONOPAH BELMONT DEVELOPMENT CO. **NEVADA**

Office: 500 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Tonopah, Nev.

Officers: C. A. Heller, pres.; W. M. Potts, v. p.; C. B. Taylor, gen. counsel, with H. C. Brougher, M. B. Cutter, J. C. Fraley, S. Deas Sinkler, G. Wilson, asst. sec.-asst. treas.

Operating officials: Frederick Bradshaw, gen. mgr., G. H. Garrey, cons. geologist; Albert Silver, supt. of milling; Herman Dauth, mng. engr.; L. R. Robins, mine supt.; W. H. Royston, mill supt.; Fred Steen, auditor.

In. 1902, in New Jersey. **Cap.** $1,500,000; $1 par; increased, 1906, from $1,000,000, but $500,000 was later cancelled, leaving $1,500,000 outstanding. Stock transferred at company's main office. Fourth Street National Bank, Philadelphia, registrar. Annual meeting, last Tuesday in May, at Camden,

N. J. Listed on Philadelphia Stock Exchange, and traded in on New York and Boston curbs.

The company controls three subsidiaries, namely the Belmont Surf Inlet Mines, Ltd. of British Columbia, in which it invested $1,294,101; the Belmont Shawmut Mining Co., California, $743,850; and the Belmont Wagner Mining Co., Colorado, $797,770. The total sum is $2,835,721, and the first-named company has repaid all loans advanced. Details of these companies will be found under their respective titles.

Comparative general balance sheet; years ending on March 1, 1918, and December 31 from then on:

Assets.

Year	Property	Invest's	Def. Chgs.	Supplies	Ore on Hand	Total Current	Total
1920..	$2,361,039	$2,881,372	.....	$234,028	$61,686	$652,896	$5,895,307
1919..	2 600,999	2,665,614	$4,256	160,139	43,882	480,379	5,746,992
1918*.	3 477,627	2,368,379	8,994	172,480	51,593	643,097	6,498,097
1917-18	1,055,770	1,913,213	6,337	215,141	51,546	966,790	3,942,111
1917..	1,360,717	20,125	1,078,525	212,800	89,159	1,255,044	4,016,370
1916..	1,563,189	27,500	360,888	188,813	108,499	1,473,522	3,722,411
1915..	2,141,473	29,453	100,040	157,735	139,796	1,425,441	3,993,938

* 10 months. The large deferred charges represent money advanced for development of subsidiaries; the large investments represent the interest in these subsidiaries. "Total Current" includes three previous items.

Liabilities.

Year	Capital Stock	Current	Property Reserve	Tax Reserve	Net surplus	Total
1920..	$1,500,000	$121,382	$2,989,041	.....	$1,284,884	$5,895,307
1919..	1,500,000	120,890	2,989,041	.....	1,137,061	5,746,992
1918*..	1,500,000	170,165	2,989,041	.....	1,838,891	6,490,098
1917-18	1,500,000	186,611	.....	105,656	2,149,843	3,942,110
1917..	1,500,000	136,820	.....	.....	2,379,550	4,016,370
1916..	1,500,000	137,670	.....	.....	2,084,741	3,722,411

Comparative Operating Account:

Year	Metal Receipts	Oper. Expense	Oper. Profit	Total Income	Deductions	Surplus	P. & L. Surplus
1920....	$1,654,803	$1,252,395	$457,826	(b)$662,358	$209,211	$453,149	$1,284,884
1919....	1,124,857	742,861	410,100	(b)614,452	419,645	194,807	1,137,062
1918*...	1 313,106	739,631	591,489	605,391	384,912	220,479	1,838,892
1917-'18	2,048,504	1,097,802	1,026,702	1,142,449	874,342	268,107	2,149,843
1917....	2,365,991	1,112,349	1,253,642	1,436,474	941,391	495,083	2,379,550
1916....	2,160,522	1,184,865	975,657	1,047,768	796,756	251,012	2,084,741

Deductions include dividends and administration, taxes, etc. (a) Deficit. (b) Includes dividends from Belmont Surf, in which the Belmont Devel. interest is 80%.

The net income for last quarter of 1920 was $117, 275, and available resources on Dec. 31 totaled $352,235. The total net for 1921 to Sept. 30, was $299,155, and resources on Dec. 1, were $563,998. The net earnings of Belmont Surf Inlet for 9 months of 1921 were $8,318 and a $50,000 dividend was paid to the parent company. A 4 months' labor strike at Tonopah made a substantial cut in 1921 earnings; the expense involved does not show in the above figures. No returns have come recently from the Wagoner or Tonopah Placers.

Dividends: 20c. in 1906; 20c in 1907; none in 1908-09; 15c in 1910; 90c. in 1911; $1 in 1912; $1.10 in 1913; $1.10 in 1914; 50c in 1915; 50c in 1916; 50c in 1917; 35c in 1918; 25c in 1919; 10c in 1920; 10c in 1921; and 5c in 1922, to Jan. 2; a total of 44 distributions, equal to $10,418,063.

Property: 11 claims, 161 acres, adjoining the Montana Tonopah and Tonopah Mining properties on the east, at Tonopah; and control of the sub-

sidiaries mentioned. In October, 1919, 360 acres of land, said to contain coal and indications of oil, near the Walker river, were purchased.

Geology: the Tonopah district is made up of a thick series of rhyolitic and andesitic rocks, which is faulted in a very intricate manner, together with the accompanying veins. The deposits are quartz veins, in part filled and in part replacement, intersecting the earlier andesite and to some extent entering into the underlying rhyolite. Principal ore minerals are argentite and polybasite, with small amounts of pyrite, chalcopyrite, galena, zinc blende and gold. Veins vary in width from 3′ to 25′. The principal producer of the Tonopah Belmont has been the Belmont vein, cut off near 1,500′ depth by the Mizpah fault; the veins now producing are not as productive as they were.

Company has also an investment in the Esmeralda Power Co., and, according to rumor, a substantial interest in the Tonopah Divide. An option on the Berry property in the Flowery district has been relinquished.

Development: by 3-compartment vertical shafts, 1,127′ and 1,718′ deep. The advance for 1919 and 1920 was 5,284′ and 8,149′, respectively, as compared with 9,263′ for 10 months in 1918. Total workings, 37 miles. Due to strikes and scarcity of labor, unfavorable operating conditions existed throughout last 2 years.

Development early in 1920 was largely between the 7th and 11th levels; later, the 550′ intermediate level was opened, and work extended down to 13th level; in 1921, the 14th level was included, and it was reported that the 1,100 and 1,200′ levels had opened ore of good milling grade.

Ore reserves: (January 1) in 1921 were 124,757 tons; 1920, 112,133 tons; 1919, 82,798 tons. Estimates naturally depend upon prevailing silver prices, labor conditions, etc.

Equipment: includes a 60-stamp cyanide mill, which started operations in July, 1912. For a detailed description of this plant see Trans. A. I. M. E., August, 1915. To treat custom ore, this plant was enlarged in November, 1917, and recently has been treating 50 tons daily of Tonopah Divide ores. During 1920, an additional cyanide unit for the treatment of concentrate was installed, operations beginning in August; results are said to be satisfactory. The plant at Millers was closed during 1918, and has since been largely dismantled.

An electric haulage system was installed on the 10th level in 1919.

Production:

	Tons Milled	Value p. ton	Oper. Costs Mine	Mill	Extr. %	Profit p. ton	Production—Oz. Gold	Silver
1920....	131,303	$13.70	$5.28	$3.18	92.22	$ 4.13	13,744	1,296,389
1919....	79,687	15.46	4.73	3.20	91.16	6.37	8,630	848,447
1918*....	87,089	16.41	4.56	2.95	92.13	7.82	10,974	1,076,944
1917-'18.	130,991	16.57	4.44	3.21	94.13	8.10	19,953	1,946,757
1917....	144,762	17.54	4.65	2.76	93.35	8.64	27,831	2,629,466
1916....	165,157	13.88	3.92	2.68	92.97	6.59	31,112	2,968,565
1915....	181,424	16.74	4.02	2.56	92.99	....	40,591	3,714,862
1914....	172,398	21.08	4.35	3.05	94.45	8.83	44,465	4,251,746
1913....	60,359	24.21	4.35	3.66	94.43	12.42	38,371	3,826,399
1912....	87,349	20.84	4.85	3.36	....	14.31	45,069	4,535,762

*10 months.

Gross value of production to Dec. 1, in 1921, was about $1,680,000.

To offset the decreasing production of the original claims at Tonopah, the company has been branching out, acquiring new properties, thus making the company a permanent organization independent of the life of the Tonopah mines, the end of which is now visible.

To meet a lower grade of ore and the increase in smelter and freight charges, treatment of concentrate on the ground has been adopted; 312 tons thus treated show a saving of $20.66 per ton as compared with cost of ship-

ping concentrate to the smelter; the extraction was 96% plus that from the retreatment of tailing.

The indications that the closing years of this property will not be without profit, seem fairly bright.

TONOPAH BONANZA MINING CO. **NEVADA**

Address: 365 Bush St., San Francisco, Calif., and care John McGee, Box X, Tonopah, Nev.

Assessment No. 5 of 1c levied May, 1918. Cash on hand, July 30, 1919, $3,201.

An interest in this property was acquired, 1915, by the Greenwater Copper Mines and Smelter Co., which see.

Property: 15 claims, 380 acres, at Tonopah, Nev., increased 1916 by acquisition of the Desert King Mining Co.'s property, 40 acres, adjoining on the S. E. The claims, which lie in the western section of the district, had a 2-compartment shaft, 1,100′ deep, when new company took over the property and some crosscutting had been done on the 600′ level, but no commercial ore developed. During 1918 about 600′ of crosscutting was done on the 1,637′, but no ore was found and all work was suspended in October.

No recent information.

TONOPAH DIVIDE JUNIOR MINING CO. **NEVADA**

See Vol. XIV. Reorganized in 1921, and assumed name of **Reorganized Divide Junior Mng. Co.**, which see.

TONOPAH DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. C. Brougher, pres. gen. mgr.; W. J. Douglass, v. p.; E. J. Erickson, sec.-treas., with E. W. Blair, and Clyde A. Heller, directors. E. B. Paxson, asst. sec.-asst. treas. William Watters, supt.; G. H. Garrey, cons. geologist.

Inc. June 3, 1912, in Nevada. A reorganization of the **Tonopah Gold Mountain Mining Co.** **Cap.** $1,250,000; $1 par; 1,014,800 issued. Listed on San Francisco Stock Exchange and New York Curb. Annual meeting, first Wednesday in March. Tonopah Banking Corporation, registrar; transfers made at company's office.

Financial statement: balance sheet of Dec. 31, 1921, shows assets of $1,074,471, including $804,823 for property and equipment and $26,945 cash. Surplus was $59,671 compared with $6,042 at end of 1920.

Income account shows net ore recovery of $301,863 and $3,033 miscellaneous earnings. Expenses were $198,176, including $73,916 for mining and development, $98,460 for treatment and transportation, and $10,382 general. Net profit was $101,559, after depreciation of $5,160. The 1920 net was $10,897.

Property: 14 claims, patented, 160 acres, in the center of the Divide district, on the eastern slope of Gold Mountain.

Geology: the Divide vein, as the main ore fissure of the mine is called, is a shear-zone in the Divide breccia, a rock formed of rhyolite fragments. The vein is large, varying from 15 to 30′ across and has sharp walls. A vertical post-mineral slip runs with the vein, but crosses it, and is accompanied by many sympathetic minor slips with all sorts of strikes and dips. This fracture has been followed by the mine levels, which accounts for some apparent irregularities of the orebody. The 2 ore shoots are often bounded by clay seams, but in places the values fade out into the wall rock. At one place the ore is 90′ across, though it does not generally exceed 20 to 25′ in width. The outcrop is a soft altered rhyolitic breccia, stained with red and yellow iron oxides, without conspicuous quartz, and of rather unattractive appearance, although a red seam carries horn silver. A rhyolite dike intersects the vein at a small angle at the northwestern end of the 365′ level.

A second mineralized zone know as the Gold Veins, outcrops on the property and was mined in former years. It runs E.-W. and would intersect

the Brougher vein to south, if not faulted. A crosscut to the Gold Veins shows two normal faults running north 75° west and with steep south dip, bringing down the overlying formation.

The gangue of the Divide ore is a kaolinized rhyolite breccia, in which scercely any silicification can be noted. On the 165′ level an oxidized molybdenum mineral powellite, a molybdate of lime, constitutes an important portion of the gangue, but this material decreases with depth.

Development: by a 1,229′ shaft with main levels at 165, 265, 370, 480, 585′, 800′ and 1,000′. Two pay shoots, 8 to 30′ wide and 75 to 100′ long, have been uncovered in the mineralized zone. which has been explored for over 1,000′ horizontally. Development is going ahead throughout mine down to the 1,000′ level, but in 1921 much of the work done was above the 585′ level. Advance in 1919 was 4,605′; in 1920, 6,849′; in 1921, 3,369′ total workings, Jan. 1, 1922, 17,796′. These figures do not include 3,000′ of workings on the Gold Veins, which it is planned to develop at depth from the main shaft in 1922. Development in 1921 was much handicapped by 3 months' labor trouble.

Including development, cost at mine in 1921 was $5.79 per ton, compared with $11.17 in 1920. Shaft sinking cost $31.16; drifts and crosscuts, $9.40; and raises, $9.39, per foot.

Ore Reserves: on July 1, 1919, the then manager unfortunately reported that, although development was not sufficiently advanced to measure ore reserves, "as a matter of speculation" the mine could produce 330,000 tons of $27.60 ore, silver at $1.30 to yield $9,108,000 gross. This was followed on Dec. 31, by a report of E. A. Julian, consulting engineer, estimating reserves to be 52,000 tons of "developed and probable first class ore, averaging 20 oz. of silver and 0.08 oz. gold, to yield a gross value of $1,385,000, with silver at $1.25." A substantial check of these latter figures was made by J. H. Farrell on October 21, 1920, who reported the then reserves to be 53,158 tons of $21.78 ore (silver at $1.00) or a total of $1,158,733.

Although new estimates were not made, for 1921 the indications are that reserves both of shipping and milling have been considerably increased.

Equipment: all machinery is motor-driven (with three 50-k. w. transformers), and includes a large hoist at surface, auxiliary hoist at 370 ft. depth, one 350 and one 1,200 cu. ft. compressor. Plant includes assay office. houses, etc. for 100 men and complete outfit for extensive operations. A 75 h. p. hoist was added in 1921.

Production: ore shipments to the Goldfield Consolidated mill began in October, 1918, and continued at rate of 220 tons per week until January, 1919, when shipments were transferred to the MacNamara mill at Tonopah. Beginning with Nov. 1, 1920, all shipments have been made to the Tonopah Belmont mill.

Company is endeavoring to develop to a point when erection of mill might be warranted: and present policy is to only make sufficient shipments to meet expenses. Ore is drawn from all parts of the mine and as much as possible from development on 4 upper levels and connecting raises. Offical figures are as follows:

		——Per Ton——				
Year	Tons	Value	Loss	Extr Cost	Profit	Total Profit
1921	12,763	$26.48	$2.72	$23.76 $15.52	$8.24	$105,167
1920	9,989	26.65	2.69	23.96 22.85	1.11	11,088
1919	9,612	29.35	2.82	26.53 20.22	6.31	60,541
1918 (3 mos)	788	20.89	2 28	18.61 17.98	0.63	1,245

It is the company's announced plan to continue shaft to the water level. This will not only determine if workable orebodies exist at greater depth but may supply the water needed for milling purposes. With a mill of its own, company should be able to decrease total costs and enable it to mine

and treat the "large tonnages of $8 to $15 ore" already developed and make available 22,346 tons of $8.73 ore now in stock pile. At present time only high grade ore is shipped, and the cost is $7.71 p. t. (1921) for haulage and treatment.

The controversy brought on by the apparent discrepancy in estimates of ore reserves, had a most disastrous effect on share prices and knocked the bottom out of the Divide "boom" but the possibilities of the mine are not yet fully known and under the present management it is expected to eventually become a dividend payer.

TONOPAH DIVIDEND MINING CO. **NEVADA**

See **New Tonopah Dividend Mining Co.**, a reorganization which became effective March 1, 1921.

TONOPAH EAST END DEVELOPMENT CO. **NEVADA**

Address: E. P. Cullinan, sec., Tonopah, Nev.

Inc. in South Dakota. **Cap** 1,500,000 shares.

Property: east of Mizpah Extension at Tonopah. Idle several years.

TONOPAH EXTENSION MINING CO. **NEVADA**

Office: 30 Church St., New York. **Mine office:** Tonopah, Nev.

Officers: M. R. Ward, pres.; W. A. Mitchell, v. p.; with S. A. Brown, C. M. Schwab and W. R. Rose, directors. W. G. Benham, sec.-treas.; J. G. Kirchen, gen. mgr.

Inc. 1902, in Arizona. **Cap.** $2,000,000; $1 par; outstanding 1,292,801. Original capital of 1,000,000 shares was increased June, 1915, to 2,000,000 and issue authorized of 156,294 shares for acquiring Tonopah Merger and 173,074 shares for Tonopah Victor Co. U. S. Corporation Co., New York, transfer office and registrar. Annual meeting in May. Listed on San Francisco Stock Exchange and traded in on the New York Curb.

Comparative General Balance Sheet, year ending March 31:

Assets—

	Property & Equip.	Supplies	Invest's	Bullion & Cash	Other Current	Total
1921....	$1,866,617	$107,283	$707,956	$ 86,596	$144,381	$2,932,833
1920....	2,061,680	121,194	708,494	124,578	106,930	3,122,876
1919....	1,472,670	132,297	679,041	211,698	151,642	2,647,349
1918....	1,584,562	213,770	229,945	148,133	142,017	2,318,427
1917....	1,692,766	134,965	179,945	319,586	12,238	2,339,500
1916....	1,636,283	97,892	209,470	206,507	156,387	2,306,539
1915....	1,217,246	79,048	130,462	190,606	128,208	1,745,570

Liabilities—

	Capital	Current	Surplus	Total
1921.....	$1,292,800	$140,866	$1,499,167	$2,932,833
1920.....	1,292,801	136,348	1,693,727	3,122,876
1919.....	1,282,801	254,928	1,109,619	2,647,349
1918.....	1,282,801	98,318	937,308	2,318,427
1917.....	1,282,802	246,184	810,514	2,339,500
1916.....	1,272,801	194,126	839,612	2,306,539
1915.....	943,433	134,450	667,687	1,745,570

Current liabilities include dividends payable.

Comparative Profit and Loss Statement, year ending March 31:

	Metal Receipts	Total Income	Oper'g Expenses	Admin. & Gen.	Federal Taxes	Profit For Year
1921.....	$1,278,292	$1,255,321	$938,956	$87,028	.....	$229,337
1920.....	1,083,145	1,056,754	666,601	74,789	.....	315,355
1919.....	1,652,031	1,630,280	946,769	63,635	$104,366	515,509
1918.....	1,250,983	1,229,143	923,230	61,577	26,460	217,875
1917.....	1,707,174	1,663,918	963,020	43,863	.....	673,394
1916.....	1,532,900	1,555,639	859,089	66,017	.....	584,421
1915.....	1,289,817	1,341,620	662,269	50,140	.....	596,892

Due to labor troubles April to August and to heavy development costs, indications are that the 1921-'22 fiscal year will not be as profitable as usual.

Dividends: (calendar year) 15% in 1905; 15% in 1906; 5% in 1912; 15% in 1913; 20% in 1914; 32½% in 1915; 47½% in 1916; 25% in 1917; 5% in 1918; 30% in 1919; 15% in 1920; 20% in 1921, and 5% on Jan. 1, 1922, total of $2,878,434.

Property: 647 acres in the Tonopah mining district, Nye county, adjoins Tonopah Mining Co. on the W. and West End Cons. Mining Co. on the N.

During the fiscal year 1910-11 the company acquired the properties of the Red Rock Cons. Mining Co., McKane Mining Co. and Pittsburg Tonopah Extension Mining Co. and in June, 1915, properties of the Tonopah Merger Mining Co. and the Tonopah Victor Mining Co.

The Sully claims of 77 acres were bought for $10,000 in 1916 and in 1920, the patented Accidental claim was acquired from the **Iowa Tonopah Mng. Co.** for 10,000 Tonopah Extension shares.

Early in 1921, litigation involving extralateral rights and alleged trespass began between Tonopah Ex. and the Cash Boy Cons. Mng. Co., the latter being the plaintiff in the first instance, followed in August by a counter suit brought by Tonopah Ex. Then in December it was announced that the Cash Boy mine had been purchased by Tonopah Ex. for 100,000 shares of its stock, or on basis of one share for 20 Cash Boy shares, and equivalent to about $145,000 based on market value of Tonopah Ex. shares. The Cash Boy property of 30 patented acres is nearly surrounded by holdings of the purchaser, and has been developed to a depth of 1,700'. See under its title for complete description.

Geology: ore carries silver and gold in quartz veins in rhyolite, trachyte and volcanic breccia. The ore minerals are argentite, stephanite, polybasite, some proustite and pyrargyrite. There are 5 main veins, from N. to S., the Merger, O. K., New Victor, Lower Contact, and Murray, of which the Murray is the most important, showing a stoping width of 14'. The veins strike N. 45° W., S. 70° W., and N. 70° W., with dip 20 to 70°, growing steeper with depth. The orebodies occur in shoots ranging in width from 3-60', with a maximum length of 600' for any single shoot.

Development: by 3 vertical main working shafts, the No. 2, McKane and Victor, 1,440', 1,650' and 1,880' deep, respectively. No. 1 shaft has been idle in recent years. The Victor and McKane are to be the principal operating shafts, as the known orebodies reached by No. 2 are about exhausted. Extensions during recent years, ending March 31, were 13,967' in 1916; 12,017' in 1917; 10,993' in 1918; 10,322' in 1919; 5,941' in 1920 and 9,114' in 1921. Total workings 31 miles. In addition, 595' of drilling was done in 1920 and 305' in 1921.

For the 2 year period ended March 31, 1921, the known orebodies reached by No. 2 shaft were practically exhausted. At the Victor shaft, the Murray and Merger veins were developed particularly on the 1,680' and 1,760' levels and the former being the main producer. Two new veins, Deming and Anchor were discovered. No production was made from the deepened McKane shaft, work here consisted of establishing levels and improving the general mine ventilation by connections with other workings. During latter part of 1921 and early 1922, reports indicated that the deep workings at the Victor shaft have proved most satisfactory. Ore is extracted by overhead stoping and subsequent waste filling. Because of the character of the orebodies, no attempt is made to estimate ore reserves.

Equipment: at the mine includes two 150 h. p. hoists, duplex and quintuplex pumps, 2 compressors of 1,700' capacity and tramway from mine to mill. The new double drum hoist at the Victor shaft has a capacity of 8 tons when in counter-balance at a speed of 1,000' per min. from a depth of 3,000'. All machinery is electrically driven. The 50-stamp cyanide mill has a capacity of 400 tons. In 1917 an auxiliary 500 k. w. power plant was added. This is to generate electricity when the Nevada-California Power

Co's supply fails. A 500-gal. p. m. turbine pump was installed on the 1,680' level in 1920 and a 200 h. p. compressor added; the compressor plant is now centralized at the Victor shaft.

Production (year ending March 31):

Year	Tons Milled	Value Per Ton	Extr. %	Oper. Cost p. Ton Mine	Mill	Total	Metal Sold—Oz. Silver	Gold
1921..	89,022	$15.591	92.01	$6.44	$4.36	$10.80	1,057,082	10,571
1920..	70,611	16,676	92.00	5.51	4.20	9.71	788,246	7,618
1919..	114,921	15.449	93.05	4.80	3.68	8.49	1,367,440	13,143
1918..	110,188	12.543	90.51	5.26	3.38	8.64	1,169,671	11,809
1917..	109,402	17.107	....	4.90	3.62	8.82	1,882,402	18,052
1916..	91,981	18.038	92.39	4.61	4.48	9.59	1,106,519	20,570
1915..	71,882	19.966	89.57	5.19	3.75	9.39	1,790,032	17,585

Milling cost includes that of marketing.

The Tonopah Extension is in much better physical condition than it was some years back and should continue to pay regular dividends. Management is capable and careful.

TONOPAH GOLD HILL DEVELOPMENT CO. **NEVADA**

Offices: 300 Call Bldg., San Francisco, and 505 State Bank & Trust Bldg., Tonopah, Nev.

Officers: W. T. Moran, pres.; J. Neriega, sec.; J. C. Allen, supt. Annual meeting, in May. Three assessments of 1c each have been levied, the last July 19, 1921.

Property: 12 claims in the Lone Mountain district, Esmeralda county, 14 miles uorthwesterly of Goldfield. Reported to have an orebody, 7' x 160', on the 538' level averaging $19.70 in gold silver and lead.

Development: by 2 shafts, 650' and 100' deep. It is said that development was first begun 9 years ago, its cost being borne by individual stockholders.

Equipment: 40 h. p. hoist, compressor and small test mill. Reported that a reorganization with change of officers took place in summer of 1921, and that work was to be resumed.

TONOPAH GOLD MOUNTAIN MNG. CO. **NEVADA**

Reorganized in May, 1912, as the **Tonopah Divide Mining Co.**, which see.

TONOPAH GOLD ZONE MINING CO. **NEVADA**

Reorganized as **Gold Zone Divide Mining Co.**, of the Divide district, which see.

TONOPAH HASBROUCK EXTENSION MNG. CO. **NEVADA**

Office: Tonopah, Nev. P. J. Somers, res. agt.

Officers: P. J. Somers, pres.; Jos. F. Ford, v. p.; B. J. Byrne, sec.; Geo. K. Ford, treas.

Inc. May 4, 1918, in Nevada. **Cap.** $150,000; 10c par.

Property: 4 claims adjoining the Hasbrouck mine on west.

TONOPAH HASBROUCK MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Busey, pres.-gen. mgr.; A. H. Butler, Jr., v. p.; A. A. Codd, sec.-treas.

Inc. Feb. 6, 1918, in Nevada. **Cap.** 1,500,000 shares; 10c par; assessable; all issued. Four assessments, of 1c each, have been levied, the last Jan. 6 1922. Listed on San Francisco Stock Exchange. Transfers made at company's office.

Property: 6 claims (4 patented), 115 acres, includes the old Hasbrouck mine (q. v.), in Gold Mtn. district, Esmeralda county, 3,000' W. of the Tonopah Divide, between which are the Hasbrouck Annex, Kernick, and Verdi

Development: a 200′ shaft, sunk about 16 years ago, opened 10 to 25′ of milling ore. A tunnel driven on the vein somewhat later yielded 1,000 tons of ore, and a recent extension of the tunnel cut another vein. The ore is in rhyolite. During 1919, the old shaft was sunk to 360′, 1,000′ of old workings reopened and 1,100′ of new work performed; since then, work has been continued on the 200′ and 360′ levels and in tunnel, but considered of more importance is the crosscut being driven from the Kernick (q. v.) shaft, on the 900′ level.

Equipment: hoist, 4-drill compressor, etc.

The company was a producer in 1919.

TONOPAH KAWICH MINING CO. NEVADA

Name changed to **Belle-Helen Merger Mines Co.**, which see.

TONOPAH MIDWAY CONSOLIDATED MINING CO. NEVADA

Address: Tonopah, Nev.

Officers: H. C. Brougher, pres.-mgr.; R. P. Stenson, v. p.; E. J. Erickson, sec.-treas.; W. Brougher, R. B. Govan, W. J. Douglass, C. C. Boak, directors; W. J. Douglass, supt.

Inc. in Arizona; reorganized 1915, in Nevada. **Cap.** $1,500,000; $1 par; assessable; 141,660 treasury shares. In November, 1921, assessment No. 9, of 2c per share, was levied; total assessments 12c per share. Annual meeting, in February. Listed on San Francisco Exchange.

Balance sheet of Dec. 31, 1920, shows; assets, $1,600,519, of which property is $1,378,367; equipment, $22,826. Liabilities include assessments, $100,-324. The net loss for 1919 and 1920, was $47,164. Operating expense for 1920 was $61,499. There was received from lessees, etc., $87,693; cash on hand, Jan 1, 1921, $977.

Property: 5 patented claims, 50.58 acres, in Tonopah district, said to show silver and gold ore. The quartz vein in trachyte dips 45° and pay ore occurs in shoots. Five veins have been opened on the 600 and 800′ levels. During 1918 work was confined to the 600′ level. The S. crosscut from No. 2 shaft was advanced 700′ and connection made with the Tonopah Mining Co.'s workings on the Last Chance vein. This vein on the Midway is said to be from 6-15′ in width and in places runs as high as $384 per ton.

Developments by 2 shafts, 1,600′ and 835′ deep. In 1919 work was largely confined to the 800′ and 1,200′ levels; in 1920, main shaft was sunk 270′ to the 16th level and crosscuts were driven, 1921, to cut the vein system of the Tonopah Extension. On 600′, 700′, and 1,200′, low grade ore only has been found. Old (835′) shaft given over to lessees. Ore shipments were $3,-814 in 1920.

Equipment: hoist, compressor, etc.

Threatened litigation with the Tonopah M. Co. over the Last Chance vein has been amicably settled, the Midway receiving $34,527 in cash and a vertical side-line agreement which will obviate future apex claims.

TONOPAH MINING CO. OF NEVADA NEVADA

Office: 572 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Tonopah, Nev.

Officers: J. H. Whiteman, pres.; C. R. Miller, v. p.; with Samuel Bell, Jr., Barton Hoopes, Jr., Walter L. Haehnlen, Geo. S. Munson and H. D. Moore, directors. P. S. Bickmore, sec.-treas.; W. H. Blackburn, gen. supt.; H. A. Johnson, mine and mill supt.

Inc. July 12, 1901, in Delaware. **Cap.** $1,000,000; $1 par; all outstanding. Annual meeting, 3rd Wed. in March. Transfer office: 572 Bullitt Bldg., Philadelphia, Pa.; registrar, Fourth St. Natl. Bank, Philadelphia. Listed on Philadelphia and San Francisco stock exchanges and on New York and Boston curbs.

Comparative General Balance Sheet, year to March 1, and to Dec. 31, for 1916 and thereafter;

Assets.

	Prop. & Equip.	Invest's	Loans & Advances	Def'd Ch'g's	Other Current	Total
1920.....	.....	$2,515,130	$2,759,468	$ 614	$602,519	$5,877,731
1919.....	.....	2,364,189	2,985,045	327	263,589	5,613,150
1918.....	$141,183	2,363,230	2,816,120	189	351,711	5,672,434
1917.....	213,003	2,331,863	2,319,745	422	491,894	5,356,929
1916.....	127,234	3,085,876	1,480,667	226	661,222	5,355,224
1915-16..	113,530	3,147,832	911,432	1,603	512,364	4,686,861
1914-15..	162,970	3,104,511	566,265	1,370	929,178	4,764,294

The loans are to subsidiaries.

Liabilities.

	Capital Stock	Deprec. Reserve	Current	Net Surplus	Total
1920....	$1,000,000	$159,069	$ 76,530	$4,642,132	$5,877,731
1919....	1,000,000	143,029	88,874	4,381,247	5,613,150
1918....	1,000,000	316,740	156,251	4,199,444	5,672,434
1917....	1,000,000	316,740	177,306	3,862,884	5,356,929
1916....	1,000,000	320,502	356,605	3,678,117	5,355,224
1915-16..	1,000,000	250,000	53,941	3,382,920	4,686,861
1914-15..	1,000,000	50,000	64,760	3,649,534	4,764,294

The capital account shows not only that mine and plant at Tonopah have been completely written off, but that the Eden and Mandy investments are valued at zero.

Comparative Income Account, year to March 1 and Dec. 31, for 1916 and thereafter.

	Metal Receipts	Total Receipts	Oper. Expense	Net Income	Taxes	Divid's & Deprec'n	P. & L. Surplus
1920..	$836,023	$1,577,430	$700,364	$410,399	$15,978	$66,039	$4,642,131
1919..	616,807	994,048	290,012	402,207	61,021	537,973	4,381,247
1918..	1,555,692	1,848,659	722,812	782,062	101,441	375,000	4,199,444
1917..	1,068,401	2,818,134	959,078	825,259	52,198	600,000	3,862,884
1916..	1,141,181	.....	823,093	918,065	.....	560,602	3,748,127
1915-'16	1,831,589	.....	1,380,693	783,064	.....	1,089,678	3,704,259
1914-'16	.....	.....	1,628,548	925,557	.....	1,165,234	3,860,244

Dividends: 1905. 75% of capital stock: 1906 and 1907, 120%; 1908. 50%; 1909, 130%; 1910, 150%; 1911 and 1912, 160%; 1913, 145%; 1914, 100%; 1915, 90%; 1916, 60%; in 1917, 60%; in 1918, 37½%; in 1919, 30%; in 1920. 5%; and 10% in 1921. The total paid is now $15,025,000.

Property: 160 acres at Tonopah, Nye county, adjoins Tonopah Extension on the east and north and Jim Butler Tonopah Mng. Co. on the north. Also owns controlling interest in the Tonopah & Goldfield R. R. Co., 55% in the Eden Mining Co. of Nicaragua, control of he Tonopah Nicaragua Co., and 83⅓% in the Tonopah Placers Co. of Colorado. Also owns 75% of the capital stock of the Esmeralda Power Co. and 78% of the Mandy Mng. Co., owning property in the Schist and Flin Flon lake districts of Manitoba. Also controls the Nevada Copper Co. For descriptions see under respective titles.

For geology of the Tonopah district see Tonopah-Belmont Mining Co., and Tonopah Extension.

Development: to a depth of 1,500', chiefly through the Mizpah Desert Queen, Silver Top, and Red Plume shafts. In 1916 the Red Plume shaft was shut down and the hoist moved to the Sand Grass, which is 1,500' deep and is connected with the 1,170' level of the Merger shaft. The Mizpah shaft is bottomed at 1,500'.

Workings total about 11 miles, of which, 4,619' was performed in 1918, 3,804' in 1919, and 6,648' in 1920. No large orebodies have been disclosed, but small ore tonnages continue to be found, notably in the Mizpah section on 4th and 5th levels; the Silver Top section has yielded a small amount of ore; the Sand Grass section has been practically abandoned. Medium grade milling ore was drawn from the Mizpah stopes during 1919 and 1920, and some dump ores were found to be of commercial grade, but nothing more may be expected from the latter source. Development in 1919 was much curtailed because of labor troubles, but has been pushed since then with the hope that ore shoots may be located. Ore reserve figures are not given because of the impossibility of estimating small irregular tonnages. On Jan. 1, 1921, 150 tons per day for 4 months were actually in sight, but during the year large bodies of medium grade ore were opened in the Mizpah section of the mine.

Equipment: includes 100-stamp cyanide mill at Millers, 12 miles from the mine and complete mining plants. The mill was closed down for some time, but was re-opened Feb. 15, 1920, the contract with the Belmont mill for treating company ores not being renewed.

Production:

Year	Tons	Value	Extrac., %	Cost
1920	63,566	$15.93	90.2	$10.02
1919	41,298	18.74	....	6.37
1918	157,182	9.91	91.4	7.85
1917	109,835	14.85	91.9	9.16
1916*	81,782	15.65	90.1	8.71
1915	136,246	13.66	....	7.78
1914	143,432	16.25	....	8.51

* Nine months.

During 1919, the entire mine output was shipped to the Belmont mill; in 1920, company mill treated 54,024 tons mine ore, 6,979 tons dump ore and 4,806 tons custom ore; total, 65,809 tons; the recovery per ton was, 0.135 oz. gold and 11.71 oz. silver. Reported that production for 1921 was at rate of 1,200 to 1,600 tons per week.

The productive life of the Tonopah property is fast nearing an end. To counteract this and to make a permanent dividend-paying organization, new properties have been, and are being, acquired. There is no doubt that the plan is succeeding. The management is thoroughly experienced and capable.

Company reported at various times to be investigating properties in the Jarbidge district, Elko county, and in the Palmetto and Hornsilver districts, Esmeralda county.

TONOPAH NORTH STAR TUNNEL & DEV. CO. NEVADA

Office: 265 Russ Bldg., San Francisco, Cal. **Mine office:** Tonopah, Nev.

Officers: H. Zadig, pres.; J. J. McCarthy, v. p.; C. D. Olney, sec., with O. A. Newcomer, and R. L. Colburn, directors. A. E. Lowe, supt.

Inc. 1912, in Nevada. **Cap.** $1,500,000; $1 par; 1,320,000 shares outstanding. Assessable. Assessment No. 14 of 1¢ was levied in November, 1921. Company's San Francisco office, transfer agent; Registration Surety Co., San Francisco, registrar. Annual meeting in August. Listed on San Francisco Exchange.

Property: 5 claims, Ivanpah, Elaine, Pyramid Fraction, Crosscut and Crosscut Extension, 46 acres in Tonopah, said to show gold and silver ore.

Development: by shaft, 1,250' deep; lateral workings total about 5,000'.

Soon after reorganization the company struck a shoot which yielded some hundred of tons of shipping ore in 1913 and 1914, but the shoot proved of limited extent and shipments declined. Development is hampered by lack of funds.

In 1920, rich ore was found between the 950′ and 1.050′ levels, and development on these and on 700′ level was continued throughout 1921. Reported that shipments for 1920 averaged 3 cars per month of $30 ore, increased to 5 cars per month of the same grade in 1921.

TONOPAH ORIENTAL MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: in the Tonopah district, Nye county close to the Esmeralda county line. Includes the New York claim, developed by a 900′ shaft, title of which has been in dispute.

TONOPAH-RAND MINING CORP. **NEVADA**

Address: Box 988, Tonopah, Nev.

Officers and Directors: M. T. Severson, pres.-mgr.; A. M. Hardy, sec.; B. B. Brown, treas.

Inc. June 26, 1919, in Nevada. **Cap.** $250,000; par 5¢; 2,465,000 treasury shares. Annual meeting, last Monday in June.

Property: 21 claims, 400 acres, in the Tonopah district, Nye county, 3 miles N. of Tonopah. Reported to show 8 N. and S. veins in a limestone-shale formation, with value in gold and silver. Development thus far nominal.

TONOPAH 76 CONSOLIDATED MINING CO. **NEVADA**

Address: L. S. Reese, Box 374, Reno, Nev.

Officers: Mark R. Averill, pres.; W. J. Harris, v. p.; L. S. Reese, sec.-treas., with H. E. Reid and H. H. Atkinson, directors.

Inc. 1911, in Nevada. **Cap.** $1,800,000, increased from $1,500,000, April 11, 1921; $1 par; 300,000 treasury shares. Annual meeting, 2nd Monday in January. Listed on San Francisco Stock Exchange.

Property: 6 patented claims and fractions, about 60 acres, in Esmeralda county, ½ mile W. of Tonopah.

Development: by vertical shaft 300′ deep. The West End Cons. is now exploring 76 ground through the 800′ level of the West End workings; such work being paid for with 76 stock at 10¢ per share; the cost has varied between $11 and $15 per foot.

TONOPAH VICTOR MINING CO. **NEVADA**

Out of business. Property acquired by **Tonopah Extension Mining Co.**, Tonopah, Nev., which see.

TONOPAH WESTERN CONS. MINING CO. **NEVADA**

Address: 85 Devonshire St., Boston, Mass.

Officers: Robt. H. Gross, pres.; F. W. Paine, v. p.; W. S. Rooney, sec.-treas., with B. W. Turner, Oscar Rohn, Wm. P. Everts, and Frank Price, directors.

Inc. in 1916.

Property: 500 acres, between the holdings of the Tonopah Bonanza Mining Co. on the north and the Great Western Cons. Mng. Co. on the south.

TOO CLOSE MINING CO. **NEVADA**

Address: P. O. Box 315 Winnemucca, Nev.

Officers: A. L. Waggoner, pres.-engr.; J. D. Varger, v. p.; J. E. Ward, sec.; First National Bank, Winnemucca, treas.

Inc. April 26, 1919, in Nevada. **Cap.** $100,000; 10c par; 400,000 shares in treasury. Annual meeting, second Tuesday in July.

Property: 10 claims, 200 acres, 2 miles N. of Winnemucca, Humboldt county. Ore occurs in veins and lodes in diorite and granite formation. Narrow veins in quartzite and limonite said to assay better than $50 per ton in silver, gold and lead, with a trace of copper.

Development: by tunnels with 600′ of workings. Several small shipments made. Work continues intermittently, the last reported Dec., 1920.

TORPEDO DIVIDE MINING CO. NEVADA

Office: 205 Nixon Bldg., Reno, Nev.

Officers: Wm. Watters, pres.; J. L. McCarthy, v. p.; J. F. Kunz, sec.-treas., with Roger Dougherty and Richard Finn, directors. A. I. D'Arcy, cons. engineer.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares 10c par.

Property: 50 acres north of the Divide City, and 3,000′ north of Tonopah Divide, adjoining the Midway and Homestake mines.

TRADE DOLLAR DIVIDE MINING CO. NEVADA

Address: C. L. Farr, Ogden, Utah.

Property: the Rim Divide group of 7 claims in the N. W. part of district, near the Goldsmith Divide, acquired on August 14, 1919.

TREADWELL DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: F. M. Manson, pres.; J. H. Miller, v. p.; Allen Rives, sec.-treas., with Zeb Kendall, J. E. Adams and A. G. Raycraft, directors.

Inc. April 2, 1919, in Nevada. **Cap.** $150,000; 10c par; assessable.

Property: 8 claims, about 1¼ miles N. E. of Gold mountain and nearly adjoining the Mizpah Divide on the East.

Inactive.

TREASURE DIVIDE MINING & LEASING CO. NEVADA

Address: 218 North Virginia St., Reno, Nev.

Officers: J. G. Huntington, pres.; S. H. Rosenthal, v. p.; H. F. McCray, sec.; P. R. Whytock, cons. engr.; Thomas Bosanko, supt., with F. H. Davis, directors.

Inc. 1919, in Nevada. **Cap.** $100,000; 10¢ par; 500,000 treasury shares.

Property: a 2-year lease on part of the Polo claim of the Revert Divide Mining Co., has been relinquished.

TREASURE HILL DEPOSIT MINES CO. NEVADA

Address: the secretary, Ely, Nev.

Officers: N. A. Dunvon, pres.; Axel T. Shields, v,. p.; G. F. Boreman, sec.; Ed. Wilson, treas., with N. McGill, directors

Cap. $1.000,000.

Property: 125 acres in the White Pine district, White Pine county, 3 miles S. W. of Hamilton. Silver-lead ores occur as replacement in limestone within an E. W. mineralized zone, said to be 3,000′ wide. There is a 250′ shaft.

TRILBY DIVIDE MINING CO. NEVADA

See **New Trilby Divide Mng. Co.** Original company sold by sheriff. and new company organized to acquire holdings, March, 1921.

TRINITY DIVIDE MINING CO. NEVADA

Mail returned from Tonopah address.

Officers: F. E. Baker, pres.; H. E. Loufek, v. p.; V. M. Place, sec.-treas.; with J. G. Huntington and H. H. Hunter, Jr., directors.

Inc. May, 1919, in Nevada. **Cap.** $150,000; shares, 10c par.

Property: 3 claims, one of the outsiders, 4 miles S. E. of Gold Mountain and 1½ miles S. of the Goldsmith Divide.

TUNGSTEN COMET MINING CO. NEVADA

Address: Panaca, Nev. E. D. Smiley, pres.

Property: in Lincoln county, shows a vein up to 9′ wide, said to carry tungsten, lead, silver and gold. Developed by 500′ shaft; equipped with hoist and compressor, etc.

TUSCARORA-NEVADA MINES CO. NEVADA

Bankrupt. **Address:** J. E. Harrington, chairman of Reorg. Committee, 1465 Broadway, New York. Henry Stanley Haskin, receiver; $150,000 receiver's certificates authorized; 95,000 issued; $600,000 claim against company allowed by Court.

Property: leased August 18, 1915, for ten years to Jas. E. Harrington of

the Stewart Mining Co. of Idaho, and part of property transferred to Stewart Tuscarora Mng. Co. (formerly Holden M. & M. Co.) in 1917.

The mortgage held by the Dexter Tuscarora Cons. G. M. Co. on the Dexter group of this company has been foreclosed and the property purchased by the mortgage holders for account of the reorganization committee. This includes 17 claims and the Jack Creek power plant, all under bond and lease for $175,000. Ore in sight and old stope filling were estimated to total 400,000 tons assaying $14 per ton, largely in silver. A concentrator erected in 1919 to treat this ore was burned in November, 9 days after completion.

UMATILLA-TONOPAH MINING CO. NEVADA

Office: 265 Russ Bldg., San Francisco, Calif. **Mine office:** Tonopah.

Officers: Herman Zadig, pres.; A. S. Wollberg, v. p.; C. D. Olney, sec., with R. L. Colburn and S. D. Landecker, directors. A. S. Haskell, supt.

Inc. in Nevada. **Cap.** $1,500,000; $1 par; assessable. Assessment No. 12, of ½¢, levied Sept. 17, 1920. Company office, transfer office. Registration Surety Co., San Francisco, registrar.

Property: 8 claims, 80 acres, in Tonopah district, Nye county, developed by 1,200′ shaft Greater part of mineral holdings deeded to After-All Mines Co., in 1916.

Inactive, 1919-'20.

UNEVIDA GOLD MINING CO. NEVADA

Described under Utah mines.

UNION AMALGAMATED MINING CO. NEVADA

Fully described in Vol. XIII. Reorganized December, 1917, as **Manhattan Union Amalgamated Mines Syndicate,** which see.

UNION CONSOLIDATED MINING CO. NEVADA

Offices: 261 Mills Bldg., San Francisco, Cal., and Virginia City, Nev.

Officers: R. L. Rader, pres.; J. R. Pereira, Jr., v. p.; Geo. P. Thurston, sec., with Fred. Vincent and A. P. Swain, directors.

Inc. Nov., 1904, in California. **Cap.** $200,000; shares $1 par; all outstanding; assessable. Last assessment, the 45th, of 10 cents, called October 31, 1919.

Transfer office: 381 Bush St., San Francisco, Cal. Registration Surety Co., San Francisco, registrar. Annual meeting, third Thursday in November. Listed on San Francisco Exchange. Removed from New York Curb listing Jan. 13, 1921.

Gross earnings for 1916 were $378,818, less $164,727 for operating charges.

Property: 600′ along the Comstock lode at Virginia City, north of the Mexican mine and south of the Sierra Nevada mine.

Development: on the 2,700′ and 2,900′ levels was abandoned, following a change in management. The ore in sight on the 2,600′ level was extracted and the water allowed to rise to 2,100′. Exploration is being conducted on the 1,630′ level; a crosscut, 610′ Nov. 1, 1921, is being driven to reach the lode.

Production: during recent years about $1,000,000, the ore averaging $30 per ton. Was producing 1918-'19, but apparently not in 1920-'21. Total production approximately $4,000,000.

UNION COPPER CO. NEVADA

Yerington, Nev. Title changed to Standard Copper Co., in 1912.

UNION DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev. F. K. Pittman, res. agt.

Officers: J. B. Hutchinson, pres.; A. S. Haskell, v. p.; J. T. Wall, sec.-treas.; above with Frank K. Pittman and Peter Halloran, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; 10c. par; assessable. 750,000 in treasury.

Owns 4 claims adjoining the Signal and north of the Sutherland.

UNION MINES CO. NEVADA

Mail returned from Union, Nev.

Officers: W. P. Fairman, pres.; E. T. Comfort, sec.; L. R. Thatcher, mgr. A. close corporation and prefers not to have us publish information.

Operates a silver-lead mine, 35 miles S. of Palisade, Eureka county, Nev.

UNIONVILLE MINING CO. **NEVADA**

Address: J. A. Spiker, pres.-mgr., Unionville, Nev. Stock is closely held. Property cost $53,000, fully paid.

Property: at Unionville, Pershing county, said to show 5 fissure veins in rhyolite. During 1920, one 2′ vein was attacked by 3 tunnels opening vein for 500′ with a 200′ back; a small high grade shoot of $35 ore was exposed. The ore is treated in a 5-stamp mill and concentrator, in part salvaged from Seven Troughs. A cyanide mill is in contemplation. Producing in a small way, since 1919.

UNITED COMSTOCK MINES CO., THE **NEVADA**

A subsidiary of Metals Exploration Co., Calif.

Office: 582 Market St., San Francisco. **Mine office:** Gold Hill, Nev.

Officers: Bikeley Wells, pres.; H. G. Humphrey and Roy H. Elliott, v. ps.; with R. A. Hardy, (mgr.) and Rufus Thayer, directors. A. D. Snodgrass, sec.-treas.; W. L. Reid, met.

Inc. 1920, in Nevada. **Cap.** $7,000,000, increased from $5,000,000 about Jan. 1, 1922; par $1. Annual meeting 2nd Wed. in May. Company is a merger of the Jacket-Crown-Point-Belcher Mines Co., the Kentuck Mng. Co. of Nevada, and other Comstock lode companies which have been inactive in recent years. Details of the merger have not been as yet announced.

Property: embraces 13 early-day mines, viz., the Alpha, Challenge & Confidence, Globe, Imperial, Jacket-Crown Point-Belcher (Yellow Jacket, Crown Point and Belcher), Kentuck, Knickerbocker, Overman, Segregated Belcher and Trojan groups, in the Gold Hill section of Comstock district, Storey county. Ground covers 5,000′ along the Comstock lode from the Globe on the S. W. to the Alpha-Exchequer boundary line. Company owns also a mill-site in American Flat and 100 acres of placer ground. The Jacket-Crown Point group comprises the bonanza mines that made the fortunes of Flood, Mackay, Lucky Baldwin and D. O. Mills, it is said that production from 3,200′ of the Lode has been over $118,000,000.

The Comstock Lode, described in Monograph 3, U. S. Geological Survey, is a great fissure vein, 4 miles long, filling a fault plane in the andesite-diorite rocks of Mt. Davidson, near Virginia City. The ore is quartz, carrying silver and gold, the former largely predominating, and occurs in shoots up to several million tons in extent. In the Crown Point, the bonanza ore shoot was 360′ long and 90′ wide in the Imperial, vein widths of 65′ to 270′ are found and in the Overman a 76′ width is reported. Much of ore today is of milling grade only.

Development: in early days, very extensive to a maximum depth of 2,900′. Present company will make use of 4 old shafts, Belcher, Yellow Jacket, Knickerbocker and Imperial, the latter having been sunk recently to 650′; principal development, however, to be by new 8′ x 8′ adit tunnel, 9,585′ long, with portal in American Flat, which, entering lode at Knickerbocker shaft, will connect with other shafts, giving maximum back of 650′. Begun in Oct., 1920, and, driven from 7 headings, it was 85% complete by Nov. 1, 1921, including the 3,025′ from portal to the Knickerbocker shaft.

Ore reserves are estimated to be 4,000,000 tons of $6 ore, ⅓ gold, largely in the Imperial group above the 400′ level. Old dumps and stope-filling are expected to yield ore of milling grade.

Equipment: includes electric hoists, etc. A 2,500-ton mill, employing all sliming cyanidation process, and to cost $1,500,000, will be completed about mid-1922; it is believed that an average extraction of 94% will be possible. Tunnel driving is aided by mechanical shovels and haulage is by electric motors. A 2-mile connection has been made with the Virginia and Truckee R. R. It is estimated that working costs can be kept down to $3 per ton.

UNITED COMSTOCK PUMPING ASSOCIATION **NEVADA**

Operates electrically-driven pumps to drain the lower levels of the North end mines on the Comstock Lode at Virginia City, owned and operated by the Sierra Nevada Mining Cons. Virginia Mining, Mexican Gold & Silver Mining, and Union Cons, Mining companies.

The lower levels were completely re-opened to the 2,900′ level in September, 1917, after being filled with water for 33 years. Expenses incurred are apportioned among the mines.

The system comprises 3 Riedler pumps on the 2,000′, 3 centrifugals on the 2,310′. 3 vertical centrifugals on the 2,500′, and 2 vertical centrifugals on the 2,700 and 2,900′ levels.

UNITED LODI MINES CO. **NEVADA**

Perhaps dead. In 1919, had a lease on holdings of Lodi Mines Co. and made a small production.

UNITED METALS CO. **NEVADA**

Office: 417 Clay Peters Bldg., Reno, Nev.

Officers: A. N. Salisbury, pres.; M. Woolever, v. p.; E. E. Granger, sec.-treas.-mgr., with E. F. Lunsford and W. F. Gates, directors.

Cap. $150,000; 10¢ par; 630,000 treasury shares. Transfers made at company's office. Annual meeting, April 23.

Property: 60 acres of lode claims, including the old Emma mine, and 160 acres, agricultural land in the Peavine district, Washoe county, 5 miles N. of Reno, and midway between the Black Panther and Standard Metals holdings. The ground is said to show 3 principal veins, 4 to 10′ wide, in quartz monzonite with value in gold and silver. The Emma was worked 40 years ago through a 300′ shaft. Developed by 2 other shafts, 70 and 80′.

Is a prospect and company seeking financial assistance.

UNITED MINING CO. **NEVADA**

Probably dead. Letters returned from former mine office: Carson City, Nev.

Officers: H. D. Cowden, pres. and gen. mgr., Bloomington, Ill.; R. H. Hingston, treas. and gen. supt.; F. W. Boston, sec.; L. B. Perry, asst. sec.

Inc. 1905, in Nevada. **Cap.** $3,000,000; shares $1 par; 500,000 preferred and 2,500,000 common; issude $1,876,150.

Property: 34 claims, 680 acres, in the Delaware district, 12 miles from Carson City, Washoe county.

Reported in 1915 that the Nevada mine was abandoned and stockholders given shares in the Boston American Mining Co., Wash., an equally unpromising and doubtful proposition. It is evident from the literature sent out by these companies that the management preferred to mine the public instead of its mines.

Management reported, January, 1916 "property is not working now, as we are looking for some process that will enable us to handle our ores and have our own plant."

U. S. SMELTING REFINING & MINING CO. **NEVADA**

See under United States section for general statement. Company holds stock control of the **Richmond-Eureka Mng. Co.**

UNITED STATE TUNGSTEN CORPORATION **NEVADA**

Dead. See Vols. XII and XIV.

UNIVERSAL SILVER CO. **NEVADA**

Address: Edw. S. Van Dyck, pres., Unionville, Nev.

Cap. 10,000,000 shares; 5,025,874 outstanding; assessable. Two assessments of 1c each have been levied; No. 2 for the purpose of taking up Arizona Silvers $200,000 bond issue.

In first 18 months of company's existence, total receipts were $50,000. Expenses were: organizaton, $10.000; operating, $20,000; investment in Sierra district, $6,000; in Arizona Silver, $15,000. All in "round numbers".

This company is the "final silver" promotion of Chas. E. Van Riper.

the brokerage house responsible for Arizona Silver Reef, Consolidated Silvers, etc. Exact information is all but unobtainable, as the promotors of all these companies are apparently disinclined to give any real information.

Property: the Inskip group of 6 claims in the Unionville district, Pershing county, east of the Arizona Extension claims. The tract is said to show 4 to 8' of milling ore opened on the 70' level. A company report states there is "a considerable quantity of ore ready for extraction and treatment", at the Arizona Silver mill. A tunnel to give back of 200' is being driven. Also claims in the Sierra district, 20 miles from Unionville, whch will eventually it is said, be operated by its subsidiary, the Sierra Silver Mines Corporation, which see. Company also said to own controlling interest in Silver Reef. Arizona Extension, Cons. Silver and a stock interest in Arizona Silver and Arizona Annex. See our opinion under **Arizona Silver Mines Co.**

UPPER COMSTOCK MINING CO. — **NEVADA**

Address: Box 698, Reno, Nev.

Officers: Chas. E. Knox, pres.; J. B. Humphrey, v. p.; A. E. Kane, sec.-treas.; with J. W. Danut and F. M. Kleppe, directors. Alex Wise, mgr., Virginia City, Nev.

Inc. May 17, 1920, in Nevada. **Cap.** $150,000; par 10¢; 500,000 treasury shares. Transfer made at company's office. Annual meeting 4th Tuesday in May.

Property: by deed from the Bullion Gold & Silver Mng. Co. (q. v.), comprises that part of Bullion ground which lies above the Sutro tunnel, in the Comstock district, Storey county, between the Potosi and Exchequer; deed covers ground above the Sutro tunnel only. Property idle for several years past and present company does not contemplate immediate operation.

UTAH-YERINGTON MINING CO. — **NEVADA**

Reorganized as the **Mason-Yerington Mines,** which see.

UVADA COPPER CO. — **NEVADA AND UTAH**

Address: W. F. Snyder, Pioche, Lincoln county, Nev.

Inc. 1915 (by F. C. Richmond, pres., Richmond Machinery Co., 117 W. Second St., Salt Lake City, Utah,) to take over property of the Cons. Cailfornia-Nevada Co., succeeding Day Bristol Cons. Mines Co. **Cap.** $600,000; $1 par. Initial dividend of 1c a share paid September, 1916, equal to $6,000.

Company apparently operated for about one year; then in 1918-'19 property was under lease to Black Metals Mines Co. until the larger part was purchased 1920-'21 by the **Bristol Silver Mines Co.** (q. v.). See Vol. XIV for complete description of Uvada.

UVADA TUNGSTEN CO. — **NEVADA**

Organized 1916, by A. V. Taylor, Dooly Block, Salt Lake City, to take over the Pilot Knob group near Osceola, White Pine county, said to show quartz veins in limestone, overlying quartzite, underlain by granite, but owing to low price of tungsten the property was allowed to revert to original owners in 1917.

VERDI DIVIDE MINING CO. — **NEVADA**

Office: Tonopah, Nev. and Reno, Nev. Paul Revert, agt.

Officers and directors: A. Revert, pres.; B. L. Revert, v. p.; and P. Revert, sec.-treas.

Inc. March 21, 1919, in Nevada. **Cap.** $15,000; 1c. par. Listed on San Francisco Stock Exchange.

Property: 6 claims, adjoining Tonopah Divide on its west end. This tract was located 18 years ago, and a 240' shaft sunk.

Development: a new shaft was put down to 300' in 1919, and an electric hoist and compressor installed. Careful sampling of 100 tons of ore on the dump show it to average $25 per ton, indicating that the old shaft and workings are worth reopening.

VERNAL DIVIDE MINING CO. — **NEVADA**

Property: near Verdi Divide, west of Tonopah Divide.

VERNAL MINING CO. OF GOLDFIELD NEVADA

Main and transfer office: 351 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Goldfield, Nev.

Officers: Meyer Schamberg, pres.; N. S. Keith, sec.-treas.

Inc. 1904, in Arizona. **Cap.** $1,500,000; $1 par; increased, 1915 from $1,000,000.

Property: 2 claims, in Diamondfield district, Goldfield, adjoins Goldfield Bull Dog Mng. Co. and is controlled by same interests. Developed for a few hundred feet, partly by lessees. Has shipped in a small way.

VETA GRANDE MINING CO. NEVADA

Address: E. J. Roberts, pres.-mgr., 747 Mills Bldg., San Francisco, Calif. Mine near Carter Station, Douglas Co., Nev. San Francisco men are said to be in control of company.

Property: 9 claims, in the Gardnerville district, Douglas county, 14 miles S. E. of Minden, covers 4,500′ on the strike of a quartz fissure vein, 20 to 40′ wide, in andesite. The ore carries silver, with a value of $20 per ton and up.

Development: by old workings to depth of 250′, including a tunnel said to be 1,400′ long. Present management began July 1, 1921 to restore these former openings.

VICTORIA COPPER MINES CO. NEVADA

Mail returned from Goldfield address.

Property: the Victoria mine, an old copper producer.

VICTORIA NEVADA MINING CO. NEVADA

Address: Pioche, Nev.

Officers: Edw. P. Donohue, pres.; Chas. Stindt, v. p.-mgr.; R. H. Nix, sec.; M. L. Lee, treas.

Inc. 1919, in Nevada. **Cap.** $300,000; $1 par.

Property: 4 claims, adjoining Amalgamated Pioche at Pioche, Lincoln county.

VICTORY DIVIDE MINING CO. NEVADA

Reorganized, summer of 1921, on an assessable basis. See Vol. XIV and **Reorg. Victory Divide Mng. Co.**

VICTORY GOLD MINES CO. NEVADA

Address: H. W. Robinson, Lovelocks, Pershing county, Nev.

Officers: W. H. Schewan, pres.; H. W. Robinson, v. p.; W. C. Van Huit, sec.; R. J. Pierson, treas., and B. B. Goodman, directors.

Property: a group of claims in the Loring district, Pershing county.

VINDICATOR DIVIDE MINING CO. NEVADA

Office: 155 Main St., Tonopah, Nev. F. T. Dunn, agt.

Officers: A. J. Rigali, pres.; D. W. Ryan, v. p.; P. E. Brown, sec.-treas., with W. H. Hart (supt.) and E. J. Robertson, directors.

Inc. in Nevada. **Cap.** $150,000; shares, 10c. par.

Property: 5 claims, 60 acres west of the Hasbrouck groups and 1¼ miles west of Tonopah Divide. Also owns 4 claims in Lone Mountain district.

VIRGINIA LOUISE MINING CO. NEVADA

Address: 1203 Hibernian Bldg., Los Angeles, Calif., or Pioche, Nev.

Officers: Chas. Lee Horsey, pres.; J. D. Thompson, v. p.; C. A. Thompson, sec.-treas.; L. G. Gillett, supt.

Inc. 1912. **Cap.** $1,500,000, increased, Dec. 20, 1921, from $1,000,000; par $1; 1,112,000 shares issued. Shareholders were permitted to subscribe to 100,000 shares of the increase at 25¢. Bond issue, $60,000—6's, June 7, 1920, may be retired summer of 1921. Transfer office at Los Angeles. Listed on Los Angeles Stock Exchange.

Property: 1 patented claim, adjoining Prince Cons. M. & S. Co., in Ely mining district, 4 miles S. W. of Pioche, Lincoln county. Two claims adjoining on W. were acquired in 1920.

Ore occurs as a blanket deposit. Five veins have been opened varying from 5 to 80′ in thickness, and said to carry low-grade silver-lead ore with a

high excess of iron and manganese, making a desirable smelter flux. Litigation with the Prince Cons. during 1917-18 terminated in favor of the Virginia Louise, the latter obtaining a judgment of $27,334 for trespass. A compromise was effected whereby the Prince Cons. dismissed the apex suit filed against the Virginia Louise and granted the right to ship ore over its private railroad at the rate of 50c. per ton in return for the dismissal of the trespass judgment.

Development: by 600′ shaft and 7,900′ of drifts and raises. Ore blocked out is estimated as equal to 3 years' supply at 100 tons per day, and an equal quantity probable ore.

During 1918 the property was entirely re-equipped, development work resumed and shipments commenced in September to the Midvale smelter in Utah at the rate of 50 tons daily. Total tonnage shipped was 5,447 dry tons. In October, 1919, daily shipments were 100 tons.

During 1920, extensions were made on 1st, 2nd and 5th levels, and total ore shipments were 37,887 tons. Reported that shipments will continue at 125 tons per day, of which 50 tons will be fluxing ore. Equipment for larger tonnage is contemplated. Reserves estimated at 1,318,750 tons possible ore, not including that on the 833′ level, or the zinc ore found by diamond drilling.

VULCAN MINING, SMELTING & REFINING CO. NEVADA

Office: 708 First Nat'l Bank Bldg., Denver, Colo.

Officers: H. Ornauer, pres.; E. E. Whitted, v. p.; A. E. Brooks, sec.; O. L. Dines, treas., with H. C. James, Tyson S. Dines and J. M. Herbert, directors.

Inc. in Wyoming. **Cap.** $2,500,000; $1 par; 2,000,000 outstanding.

Property: Hunter mine, 16 patented claims, 132 acres, in the Hunter district, White Pine county, about 30 miles from Ely, the nearest rail point, shows copper, silver and lead ores occurring in fissure veins in monzonite and limestone. Developed by 300′ and 500′ shafts, and tunnel, with a total of 2,000′ underground workings.

Equipment: includes hoist, compressor and steam power. Mine is operated by lessees who made a small production in 1915 to 1918, and in 1920. Company has been inactive since 1912.

V 7 MINING CO. NEVADA

Address: W. E. Casson, sec., Carson City, Nev. G. L. Hedges, mgr.

Property: 5 claims in the Reservation district near Schurz, Mineral county. A 3′ vein, a contact between lime and granite, carrying silver-lead ore, has been opened to a depth of 100′. Late in 1921, company was reported to have effected a consolidation with **Review Silver Mng. Co.**

VULTURE-WONDER MINES CO. NEVADA

Title changed to **Nevada Silver Consolidated Co.**, which see.

WALKER RIVER COPPER CO. NEVADA

Offices: 402 Madison Ave., New York, and Yerington, Nev.

Officers: R. M. Atwater, Jr., pres.; W. M. Sanders, v. p.; with J. H. Susmann, C. N. Edge, H. B. Lake, J. A. Martin and W. J. Hand, directors. C. E. Brady, sec.; C. S. Dodge, treas.; J. E. Gelder, mgr.

Inc. June, 1915, in Nevada. **Cap.** $12,500,000; $5 par; outstanding 675,000 shares. Transfer office: Company office; registrar, Registrar & Transfer Co., New York. Annual meeting, 2nd Monday in April.

Property: 15 claims, 250 acres, including millsite, near Yerington, Lyon county, being developed in conjunction with the Empire Nevada mine of the Empire Nevada C. M. & S. Co., held under a perpetual lease. Title will pass to the Walker River Co. when royalties paid amount to $500,000. Claims show a low-grade copper deposit said to cover an area 1,000 by 4,800′ so far as drilled.

Ore is said to assay 3% Cu.; 0.5% S.; 72% SiO_2; 5% Fe_2O_3; 11% Al_2O_3; 2% CaO; 1% MgO.

Development: by 350′ vertical shaft. During 1918, $36,000 was expended in

diamond-drilling on the Empire Nevada, said to have proved the orebody to extend to 500' depth. Present work is by quarrying.

Ore reserves: management claims 550,000 tons of 2% ore proven by drilling and surface and underground work.

Equipment: includes 25-ton leaching plant, built to use the Midland ferric chloride process, but changed 1920 to leaching with precipitation on scrap iron, and increased the capacity to 50 tons. Plans call for a 2,500-ton plant, after experimental work is completed.

Production: total output to date 32,861 tons representing a gross value of $615,550. Shipments during 1918 averaged 4.16% copper.

Drilling and metallurgical experiments were continued to mid-1920; presumably inactive since. Examined by Louis A. Wright and John H. Banks.

WALL STREET COPPER CO. NEVADA

Address: A. H. Howe, Reno, Nev.

Inc. 1916 in Nevada. **Cap.** 100,000 shares divided equally between C. R. Evans and A. H. Howe.

Property: 14 claims (2 patented) in the Santa Fe district, Mineral county, 7 miles E. of Luning, includes the old Wall Street and Turk mines. Record of property dates back nearly 40 years, and lessees are known to have shipped ore averaging 17.5% copper and 7.5 oz. silver. Operations of present company began March, 1916. Copper carbonate ore occurs in a brecciated zone in silicious limestone near its contact with quartz monzonite: the ledge with 8' average width is said to outcrop for 3,000'. The shipping ore, 50% of the total, ranges between 8 and 10% copper.

Development: by 2 shafts, 428' and 200', and tunnels; lateral workings total 11,000'. Reported to have 70,000 tons of ore carrying 3% copper and 1 oz. of silver per ton in dump and stope-filling, with 60,000 tons possible ore of same grade in place. Between March, 1916, and December, 1918, gross production was $1,243,000; operations ceased because of unfavorable copper market.

Equipment: includes 2 hoists, etc.; drilling was by hand.

WARD LEASING CO. NEVADA

Successor to **Nevada United Mines Leasing Co.**

Address: Julius Goldsmith, Tonopah, Nev S. B. Elbert, mgr. Operating under lease the property of the **Nevada Mines Co.**, which see, for details of lessees' activities.

WARMACK GOLD MINING CO. NEVADA

Mail returned from Chicago address.

Officers: J. T. Cawthorn, pres.; Harry Warren, v. p.; Winnemucca, Nev.; S. C. McIntyre, sec.; also directors. G. R. Stevens, supt., Golconda, Nevada.

Inc. March 31, 1916, in Arizona. **Cap.** $200,000; shares $1 par; non-assessable; all issued. Annual meeting, April 15.

Property: 945 acres of placer ground, 12 miles S. of Golconda, Humboldt county. Examined in May, 1912, by J. A. St. Clair, editor of "Inside Investments." Gravel available estimated at 22,000,000 cu. yd., with a probable gold value of 61 cts. per yard. Gold in the disintegrated quartz formation said to be triangular."

If even one quarter of the above value actually occurs it is good ground, and it is hoped the owners will find it true.

WARRIOR GOLD MINING CO. NEVADA

Address: Olympia Mines Co., Omco, Nev.

Company is understood to have been organized by R. J. Bonnemort on behalf of the **Olympic Mines Co.** (q. v.), which is reported to have exercised its option on property in July, 1921.

Property: the MacNamara group in the Goldyke district, Nye county, 32 miles N. E. of Luning. Ore is gold-bearing and is said to average $30 per ton.

WASHINGTON GOLD QUARTZ MINING CO. **NEVADA**

A reorganization of the Randolph Mining Co.

Office: 26 Liberty St., New York City.

Officers: Jas. W. McCoy, pres.; G. G. Wolf, v. p.-treas.; with Frank Lindley, Frank W. Donaldson, A. S. Terrill, Geo. N. Neise, directors. W. H. Tice, sec.: J. K. Turner, mgr.

Inc. October 30, 1917, in Nevada. **Cap.** $1,000,000; $1 par; 713,400 issued Listed on New York Curb. U. S. Corporation Co., registrar and transfer agent.

Property: 9 claims in Gold Mountain district (not the Gold Mountain of Divide district), 9 miles from Bonnie Clair, Esmeralda county. Ore: lead sulphide and carbonate occurs in veins 5-15′ wide said to carry gold and silver. There are 3 veins crossing the ground, most of the work being done on the Butte Goldfield.

Development: workings of old company total 2,200′ and production was considerable. New York comprises a 400′ shaft and 725′ tunnel; a second tunnel was driven during 1920, and new equipment installed.

WASHINGTON MONTEZUMA MNG. CO. (THE) **NEVADA**

Office: Postal Telegraph Bldg., Chicago. **Mine office:** Goldfield, Nev.

Officers: R. H. Kiehm, pres.; John J. Sullivan, v. p.; Gustave Schulz, treas., with Jos. C. Mullin and A. F. Kane, directors. John M. Zamecnik, sec., 4625 N. Knox Ave., Chicago.

Inc. in Arizona. **Cap.** $1,500,000; $1 par; 1,500 treasury shares. Transfers made at company's office. Annual meeting, March 21.

Property: 2 patented claims, 40 acres, in Montezuma district, Esmeralda county, 8 miles N. W. of Goldfield. Gold ore occurs in a 45′ quartz vein in a limestone formation. A 200′ shaft has shown values from $11 to $22 for widths of 4′ to 10′; equipped with hoist, etc.

WASHOE COPPER CO. **NEVADA.**

Presumably idle.

Officers: Wm. H. Butler, pres., 27 Pine St., New York; Percival S. Jones, v. p.; S. A. Cunningham, sec.-treas., with B. J. Dwyer, Robt. W. Schuette, P. P. Brady and Geo. J. Gould, Jr., directors.

Inc. September 28, 1917, in Delaware. **Cap.** $3,000,000; $1 par; 1,108,335 shares outstanding. Listed as a prospect, but stricken from New York Curb, May 6, 1920, at company's request. Registrar & Transfer Co., New York, registrar and transfer agent.

Property: about 695 acres at Copperfield, Washoe county, near the holdings of the Nixon-Nevada and controlled by same interests.

A syndicate was formed in April, 1918, to underwrite a block of stock, sufficient to finance running a 1,000′ tunnel and equipping the mine, which plans apparently did not materialize.

WATERVILLE MINING & MILLING CO. **NEVADA**

Office: Nelson, Clark Co., Nev.

Officers: Dr. Roy W. Martin, pres.; F. A. Wait, v. p., with M. E. Fisher, Jas. German and Harry Dale, directors.

Property: in Eldorado canyon, near Nelson. A small mill installed 1919.

WEDEKIND SILVER MINING CO. **NEVADA**

Successor to Reno Silver Hills Mng. Co.

Address: C. H. Dennison, mgr., Reno, Nev.

Property: the old Wedekind silver-lead mine, in Peavine district, Washoe county, 4 miles N. E. of Reno. Ore is found in shoots and chambers in mineralized zones in altered andesite; lead carbonates and sulphides carry silver and gold; silver also present as chloride. Old workings reach depth of over 200′. Property said to have produced $500,000 prior to 1896. Equipped with small mill, etc.

Reported, October 1921, that work was being pushed on the 100′ level in a vein 3 to 6′ wide.

WEDGE COPPER CO. NEVADA

Address: Luning, Nev. H. H. Hunter, managing director, Lovelocks, Nev. Mark Walser and H. O. Howard, directors. Knud Freitag, cons. engr.

Inc. March, 1916, in Nevada. **Cap.** $1,000,000; $1 par.

Property: 6 claims, 8 miles from Luning, Mineral county, developed by crosscut tunnel cutting copper ore at 800′ depth. Said to show 2′ of 2% ore in a 6′ vein.

Company reported consolidated with adjoining properties and flotation plant erected in 1918, but no confirmation available.

WELL-EMMA MINES CORP. NEVADA

Address: H. P. Kervin, Silver City, Nev., or M. A. Diskin, Reno, Nev.

Officers: Wm. Woodburn, pres.; C. P. Stout, v. p.; M. A. Diskin, sec.-treas.; H. P. Kervin, cons. engr.

Property: in the Silver City district, Lyon county, adjoining the Buckeye mine, reputed to have a production record of $1,000,000; is said to cover extension of the Brunswick-Occidental lode

Development: by 200′ shaft, with 3 levels working. Reported to have produced $21,500 worth of ore from 100′ level, up to March, 1921.

WEST ARROWHEAD MINES CO. NEVADA

Address: R. L. Sloan, sec., Main St., Tonopah, Nev., or Arrowhead, Nevada.

Property: in the Needles district, Nye county, 60 miles E. of Tonopah. Developed by 100′ shaft; equipped with 25 h. p. hoist.

WEST DIVIDE EXTENSION MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: J. F. Good, pres.; R. C. McCarthy, v. p.; J. W. Dunfee, v. p.; W. A. Wright, sec.-treas., and H. C. Kane, directors.

Property: 2 claims adjoining those of the West Divide Mining Co.

WEST DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev., care of Allan Rives.

Officers: L. L. Patrick, pres. and mgr.; H. B. Ruhl, v. p.; with K. M. Patrick and Al. McCoy, directors. Edw. Bevis, mgr.

Inc. May, 1919, in Nevada. **Cap.** $150,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 5 claims, in the West Divide district, 5 miles W. of Tonopah Divide on west slope of Lone mountain. The main vein trends N. E.-S. W., and dips E. It has been opened by trenching for a length of 2,000′ and shows a width of 2 to 7′. An east vein also opened by a surface trench, shows ore running 98.8 oz. silver per ton.

Development: by 60′ shaft, and 150′ tunnel (145′ level) driven some years ago. During 1920, the tunnel was continued to undercut ore found in shaft; some was uncovered and will be followed by a winze.

Equipment: includes a complete plant for sinking.

WEST END CONSOLIDATED MINING CO. NEVADA

Office: Syndicate Bldg., Oakland, Calif. **Mine office:** Tonopah, Nev.

Officers: F. M. (Borax) Smith, pres.-treas.; J. F. Carlston, v. p.; G. C. Ellis, sec., with L. W. Bennett, R. P. Jennings, C. P. Murdock and R. L. Oliver, directors. J. W. Sherwin, gen. mgr.; H. D. Budelman, mine supt.; C. E. Waldner, mine engr.; F. C. Ninnis, mill supt.; J. R. Blair, auditor.

Inc. May 2, 1906, in Arizona. **Cap.** $10,000,000; $5 par; 1,788,486 shares outstanding. Listed on San Francisco Exchange and New York Curb. Registrar & Transfer Co., New York, transfer agent and registrar. Annual meeting, in May.

Financial Statement.

Year	Cash on hand	Revenue	Disbursements	Dividends	Balance
1920.....	$17,839	$1,686,075	$1,471,263	$216,819	$15,772
1919.....	253,907	1,310,248	1,383,777	162,539	17,839
1918.....	47,656	2,030,897*	1,466,949	357,697	253,907
1917.....	130,772	1,204,442	1,198,134	89,424	47,656

* The apparent revenue is swollen by inclusion of bullion coming from custom ore treated in mill as well as the sums received in settlement of the dispute with the Jim Butler company.

Net operating profit (estimated) for 1921 was $650,000 compared with $572,054 in 1920.

Assets and Liabilities.

Year	Cash & Bullion	Property	Invest.	Other Assets	Total Assets	Surplus
1919..	220,839	6,104,276	1,157,941	267,132	7,750,188	957,030
1920*.	$248,811	$6,104,276	$ 573,123	$288,449	$7,214,689	$ 443,095
1918..	530,743	.....	690,330	390,363	1,611,448	1,409,868
1917..	346,734	.....	530,680	700,986	1,578,400	1,006,024

* To April 1st; and after segregations of California and Honduras properties to new corporations. On Dec. 31, bullion was $119,993 and loans receivable, $435,025.

Dividends: in 1913, 5c.; in 1914, 15c.; in 1915, 10c.; in 1916, 5c.; in 1917, 5c.; in 1918, 20c.; in 1919, 10c.; in 1920, 15c.; none in 1921; total, $1,520,213. In addition, a stock dividend was distributed on May 1, 1920, of one share ($1 par) each of West End Chemical Co. and West End Opoteca Mines Co. for every outstanding share of West End Cons.

Property: 10 patented and 7 unpatented claims, 184 acres, in the Tonopah district. In the settlement of the suit of Jim Butler vs. West End, concerning apex rights on the Fraction vein, begun in 1914 and ending in 1918 in favor of West End, the latter is given the right to extract such ore from Jim Butler ground, proceeds of which are equivalent to the amount of the Jim Butler trespass. Also, company has leases on portions of Jim Butler and Mizpah Extension territory. For a number of years company has had a stock interest in, and controlled the development of, the Halifax-Tonopah Mng. Co. Reported to own also a 350,000 share interest in the Santa Rosa Mng. Co., of California. For description of these companies see under separate titles.

In mid-1921, company acquired by purchase the Mable group in the Hawthorne district, Mineral county, adjoining the Old Garfield mine on the W. and 20 miles N. W. of Mina with Acme, 6 miles away, the nearest rail point. There are 3 parallel gold-silver bearing veins opened by tunnel, shaft and winze to depth of 335', said to have produced ore to value of $20,000 net since 1919. Reported that the Garfield with an early day production of many millions is under option.

Development: by 3 shafts, deepest 1,212', with 14 miles of workings. In 1917, extension amounted to 7,625', also sinking the Ohio shaft to 1,212'. A new vein in trachyte was found on the Ohio 500' level. During 1918, results in the Ohio were good, reserves increasing to 82,000 tons worth $2,000,000. During 1919, work was divided between the Ohio and West End veins; the former was developed down to the 800' level and the latter produced most of the ore. This work was continued through 1920, and, in addition, stopes were opened on the Ohio and some work was performed on the Fraction vein. Extensions in 1919 amounted to 6,128' at cost of $9.75 per foot; ore reserves at end of 1919 estimated at 125,000 tons, or

probably over $2,500,000 gross value. The per ton operating profit was $10.19 in 1920; $9.94 in 1919; $8.01 in 1918.

Work on Halifax-Tonopah for 1919 showed a net loss of $60,247, but conditions, both on this and the Mizpah Ext. property, showed considerable improvement in 1920, and in 1921, a large orebody was opened on the Halifax 800′ level between West End and Ohio shafts and extending down to the 900′ level.

Equipment: includes hoists, buildings, compressors, etc., and stamp-mill and cyanide plant. The daily capacity of the mill was originally 100 tons, but has been increased to 225 tons. Total cost of plant is more than $170,000.

Formerly, a considerable tonnage of custom ore was treated, but beginning with April 1920, mill was devoted to West End and Halifax-Tonopah production.

Production:

Year	Ore Treated	Extraction %	Gross Value	Silver oz.	Gold oz.	Cost per ton
1920.....	53,517	91.06	$1,212,810	974,422	.....	.....
1919.....	33,140	91.40	780,786	580,445	6,115	$13.60
1918.....	50,195	91.97	990,185	826,577	8,676	11.72
1917*.....	45,910	92.69	721,937	677,117	7,161	10.69
1916.....	61,535	91.22	1,319,651	1,351,658	14,752	....
1915.....	56,976	90.92	958,657	1,210,038	13,219	.....

*From 1917 on, these figures refer to company ore only.

Former holdings, viz., 2,200 acres at Searles Lake, Calif., under lease from U. S. Government, and mine at **Opoteca**, Honduras, taken over. April, 1920, by two new corporations, the **West End Chemical Co. and West End Opoteca Mines Co.**, which see under these titles. West End Cons. stockholders received one share ($1 par) of each new corporation for each share of West End Cons. held. The original plan, calling for the formation of 3 companies, was amended Feb. 7, 1920, and thus the West End Cons. will continue to own and operate Tonopah property.

Disbursements by the West End Cons. on account of these properties were: Searles Lake, $74,592 in 1918 and $321,817 in 1919; Opoteca, $33,953 in 1918 and $86,527 in 1919.

It is generally believed that the West End mine at Tonopah has ore reserves sufficient to operate the mill for a number of years, and that in addition it has virgin territory yet to be explored. With silver at existing prices, the outlook seems bright.

WEST END EXTENSION MINING CO. **NEVADA**

Idle.

Officers: Franz Sigel, pres.; Frank S. Harris, v. p.; Daniel O. Hulse, sec.-treas., with M. T. Rowland and Jas. M. Satterfield, directors, at last accounts.

Inc. in Delaware. **Cap.** $1,000,000; issued $600,000; $1 par; U. S. Corp., New York, transfer agent and registrar. Report for year ending December 31, 1919, shows an indebtedness of $2,100.

Property: 4 claims, the Bank group, 70 acres, at Tonopah; adjoins West End Cons. on the north and Tonopah 76 on the west.

WESTERN DIVIDE MINING & MILLING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Busey, pres.; A. H. Butler, Jr., v. p.; A. A. Codd, sec.-treas.; with W. A. Muller, Jr., and H. H Blair, directors.

Inc. February 12, 1919, in Nevada. **Cap.** $150,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 7 claims, 119 acres E. of the Hasbrouck Annex and 1,500′ S. W. of Tonopah Divide; in process of patent.

Development: includes an old 900′ tunnel, which cut a vein at a point 700′ in. Well equipped.

Reported that this and adjoining properties are to be explored through deep shaft of Kernick Divide (q. v.), of which A. A. Busey is also president.

WESTERN MINERALS DEVELOPMENT CO. **NEVADA**

Office. 24 E. 2nd. St., Reno, Nev. **Cap.** $1,000,000; par $1.

January Jones of Reno in a circular letter to his clients on April 24, 1920, invites subscriptions to preorganization stock, at 10¢ per share, in this company. Its purpose is three-fold, to acquire, develop and promote mines; to develop the production of oil; and to return large profits to the stockholders. Nothing has recently been heard of, or from, the Western M. D. Co. Enough said.

WESTERN MINES DEVELOPMENT CO. **NEVADA**

Out of business. Fully described in Vol. XIII.

WESTERN ORE PURCHASING CO. **NEVADA**

Address: F. M. Manson, Reno, Nev. Company operates a 900-ton sampler at Hazen; also has plants at Goldfield, Nev., and Murray, Utah. Is well and favorably known.

WESTERN SILVER MINES CO. **NEVADA**

Office: Dooly Blk., Salt Lake City, Utah.

Officers: J. M. Howell, pres.-mgr.; A. R. Irvine, v. p.; W. G. Howell, sec.-treas., with David Neff and J. A. Spencer, directors. C. F. Williams, Elko, Nev., resident agent.

Inc. 1917 in Nev. **Cap.** $1,500,000; $1 par; 600,000 shares outstanding March, 1919. Stock offered at 50c. in 1918 to provide capital for 500-ton mill and further development.

Property: 10 patented claims, includes the Moho mine, in Silver Star district, Mineral county, 12 miles S. W. of Mina. Gold-silver-lead ore occurs in fissure veins in andesite, and is said to assay $9.

Development: 5,000′ of workings to depth of 360′. Management reports ore reserves of 200,000 tons.

WEST SPANISH BELT SILVER MINING CO. **NEVADA**

Property adjoins holdings of the Cons. Spanish Belt Silver Mng. Co. on the west in Spanish Belt district, Nye county, said to be explored through workings of that company.

WEST TONOPAH MINING CO. **NEVADA**

Office: 301 Nat'l Bank Bldg., Tonopah, Nev.

Officers: M. R. Ward, pres.; R. E. Mulcahy, v. p.; J. A. Perry, sec.-treas., with A. Hamilton, F. S. Glover, C. W. Buthmann and E. C. B. Adams, directors; J. G. Kirchen, mgr.; H. L. Williams, supt.

Inc. in Nevada. **Cap.** 1,000,000; $1 par; all issued; assessable. Listed on San Francisco Exchange. Annual meeting, first Tuesday after first Monday in January.

Property: 7 patented claims, 123 acres, in Esmeralda county. **Geology:** quartz vein in trachyte and rhyolite, dipping 65 to 70°, with E. W. course. Ore contains gold and silver.

Development: by 1,100′ shaft; on 950′ level, an 800′ crosscut reaches the vein.

Equipment: 75-h. p. hoist, compressor, 75-h. p. triplex pump. Work temporarily suspended because of heavy flow of water.

WHALE MINING CO. **NEVADA**

Dead. Fully described in Vol. XIV.

WHITE CAPS EXTENSION MINES CO. **NEVADA**

Address: J. G. Kirchen, Tonopah, Nev. **Mine office:** Manhattan, Nev.

Officers: J. G. Kirchen, pres.; J. H. Miller, v. p.; A. G. Raycraft, sec.-treas. with Hugh H. Brown and W. L. Mangum, directors.

Inc. 1917, in Nevada. **Cap.** $200,000; 10c par; assessable; 1,595,005 issued. Listed on New York Curb and San Francisco Exchange.

Property: 13 claims, in Manhattan district, Nye county, said to show ore

deposits occurring as chimneys in limestone, with 50° dip. Ore carries gold and a trace of silver.

Development: by vertical shaft to depth of 400'.

Equipment: includes 50-h. p. hoist, compressor, drills and pumps.

Is in development stage, but is backed by strong interests and regarded as promising. Inactive, 1919-20; awaiting developments in neighboring mine.

WHITE CAPS MINING CO. NEVADA

Offices: Tonopah and Manhattan, Nev.

Officers: John G. Kirchen, pres.; H. R. Cooke, v. p.; A. G. Kaveraft, sec.-treas., with C. J. Blumenthal and W. L. Taylor, directors. R. L. Taylor, supt.; H. A. Burk, mill supt.

Inc. June, 1915, in Nevada. **Cap.** $200,000; 10c. par; 1,915,300 shares issued; assessable. Assessment No. 8, of 2c. per share, levied April 25, 1921; total to this date, 16¢. Listed on New York Curb and San Francisco Exchange. U. S. Corporation Co., New York, transfer agent and registrar.

Balance sheet of April 30, 1918, shows assets: property and equipment, $560,477; accounts receivable, $25,953. Liabilities show surplus, $108,288; current liabilities, $181,918. Net income from ore sale amounted to $110,254; expenditures were $269,111, including depreciation, $25,752, litigation, $14,730; operating deficit, $35,380.

Property: 3 patented claims and 4 unpatented near Manhattan, Nye county, formerly owned by the Dexter White Caps M. Co. and the milling plant of Assoc. M. Co. paid for with 1,295,000 shares of treasury stock. In August, 1917, holdings of the White Caps So. Extens. were obtained for $6,500 cash and 50,000 shares of treasury stock.

Geology: ore is a replacement of limestone by quartz, containing pyrite, realgar, orpiment, and stibnite along old fault-planes. Later faulting is very common and complex. Ore is hard to reduce and requires an oxidized roast prior to cyanidation. Company has experienced considerable difficulty in getting good extraction of the gold. Deposit is fully described in 'Economic Geology' of Jan., 1921, by H. G. Ferguson.

Development: by 800' shaft, with levels at 210, 310, 435, 550, 650 and 800'. East orebody has been developed on the 8th level, and new tonnage blocked out, estimated at 17,500 tons of $18 ore. The West, and other, orebodies uncovered at 550' are being explored on 8th level.

Litigation with Manhattan Cons. settled in 1917; that with Manhattan Morning Glory in May, 1918.

Equipment: includes hoist, 2 compressors, drills, sinking and station pumps, 100-ton milling plant with crushers, rolls, trommels, 7-hearth Wedge roasting furnace, tube-mill and cyanide plant. A 100 h. p. hoist was added in 1920; the addition of a flotation plant is contemplated.

Production: 8,480 tons in fiscal year ending April 30, 1918, averaging $13 per ton and in 3 following months $81,540 worth of ore was shipped. For 6 months ending June, 1920, 1,420 tons were shipped, averaging 1.06 oz. gold and 26.8% arsenic.

Company has had a rather unhappy career with finances, litigation, and treatment problems, but seems to be improving slowly and surely. The presence of arsenic in the ore is one of the troubles. In January, 1920, mill was closed down and ore was being shipped elsewhere for treatment.

Development during 1920 and early 1921, has apparently met with fair success . Milling operations were resumed in July, 1921.

WHITE PINE COPPER CO. NEVADA

Address: 602 Kearns Bldg., Salt Lake City, Utah., or Schellbourne, Nev.

Officers: John F. Cowan, pres.; W. Snyder, v. p.; Shand Smith, sec.-treas., with C. W. Knudson and F. B. Stephens, directors.

Inc. November, 1918, in Utah. **Cap.** $1,000,000; $1 par; assessable; 600,000 shares issued. Authorized bond issue, $300,000; $200,000 outstanding.

Property: 10 claims, 186 acres, at Aurum, White Pine county, developed

by 1,500′ of workings to depth of 250′. Ore occurs as chalcopyrite in fissure veins in shaly limestone, said to average 5% copper and 4 oz. silver.

Equipment: includes 1,400′ aerial tram.

Expenditures for development work amounted to $36,000 in 1918 and $14,000 in 1919. During 1920, property was under lease, and a small shipment made.

WHITE PINE MINING CO. **NEVADA**

Address C. H. McCarter, 407 Sansom St., Philadelphia.

Officers: M. S. Lewin, pres.; D. M. Hewey, v. p.; C. H. McCarter, sec.-treas.; also directors

Inc. Aug. 5, 1915, in Nevada. **Cap.** $1,000,000; $1 par; 725,000 issued. Annual meeting, first Wednesday in January.

Income from ore sales in 1916 was $18,000 and expenses $47,000.

Property: the Green Monster Extension at Goodsprings, idle at present. Mine examined by J. M. Nevius, O. B. Suhr and F. A. Crampton.

Production: in 1915, 10 tons of copper and 35 tons zinc ores.

WHITE PINE SILVER MINES CO. **NEVADA**

Address: Web. Greene, sec., care Fritsch Loan & Trust Co., 201 Felt Bldg., Salt Lake City, Utah.

Officers: August Vogeler, pres.; Arthur Robinson, v. p.; W. H. Penney, treas.; L. R. Nelson, mgr.

Inc. 1918, in Utah. **Cap.** $100,000; 10c par; 500,000 shares in treasury.

Property: 3 claims, 8 miles E. of Lovelocks, Pershing county, which Pine county, developed by tunnel and shaft said to show copper, lead, and silver running from $16 to $80 per ton.

WILLARD METALS MINING CO. **NEVADA**

See **New Willard Gold Mines Co.**

WILLARD MINES CO. **NEVADA**

Idle, at last accounts.

Officers: F. H. Bird, pres.; J. T. Goodwin, v. p.; R. Nenzel, sec.; V. A. Twigg, treas, with L. A. Friedman and D. C. Wheeler, directors. H. H. Hunter, mgr. and supt.

Inc. in Nevada. **Cap.** $1,000,000; $1 par; outstanding, 662,000. No bonded indebtedness. Annual meeting, third Wednesday in January.

Property: 3 claims, 8 miles E. of Lovelocks, Pershing county, which shows a vein carrying pay ore in shoots.

Development: by several shafts, deepest 50′, and a 70′ tunnel. Shipments averaged $54 per ton in gold and silver.

Property in a district that was feverishly active in 1915, but the temperature subsided in 1916. See Nevada Honey Bee and other mines of Loring (formerly Willard), Nevada.

WILLIAM PATRICK MINING CO. **NEVADA**

Address: Manhattan, Nev.

Officers: Wm. C. Houppert, pres.-mgr., Otto Johnson, v. p.; W. P. Socwell, sec.-treas., with Wm. E. Osborn and W. A. Bastian, directors.

Inc. December 26, 1917, in Nevada. **Cap.** $100,000; 10c par; 847,000 issued.

Property: 2 patented claims, 40 acres, near Manhattan, Nye county, said to show free-milling ore in quartz vein with E.-W. course and dip of about 35°. Pay-ore occurs in shoots assaying from $2-18 per ton in gold. Developed by 169′ shaft and crosscuts. Ore is mined by glory-hole method.

Equipment: includes 25-h. p. electric hoist, pump, tramway, 35-ton mill.

Management reports 1,200 tons of ore on dump, assaying about $8 per ton, and 20,000 tons of ore blocked out.

The mine was closed down December, 1918, but was to be re-opened when conditions returned to normal.

WILSON DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. R. Cunningham, pres.; J. M. Fenwick, v. p.; E. P. Cullinan,

sec.-treas., with M. J. Fitzgerald and T. M. Sheets, directors. Homer O'Connell, supt.

Inc. April 2, 1919, in Nevada. **Cap.** $150,000 shares; 10c par. Listed on San Francisco Stock Exchange.

Property: 4 claims, 75 acres, over 1 mile from Tonopah Divide and adjoining the Mohawk Divide. A shaft had been sunk to 400' up to April, 1920.

WILSON SILVER MINES CONS. CO. **NEVADA**

Main office: Goldfield, Nev. **Agent's office:** A. P. J. Theo, 15 William St., New York City.

Officers: J. B. Kendall, pres.; N. P. Theo. v. p.; M. A. Kendall, sec.-treas

Inc. in Nevada. **Cap.** $2,000,000; $1 par. Traded in on New York Curb.

Property: 18 claims, 16 patented, 300 acres, in Esmeralda county, 5 miles from McLean on T. & G. R. R. Silver-lead ore occurs in a replacement deposit in limestone and is reported to carry from 50-300 oz. silver and 70-80% lead per ton.

Development: by 3,000' of old workings, with reserves estimated at 10,000 tons blocked out, valued at $500,000, and 20,000 tons of ore on the dumps. Past production given as $325,000 net.

Treasury stock was offered the Eastern public June, 1919, to provide funds for necessary equipment. A similar offering, at $1.35 per share, was made one year later; the advertisement announces that estimated ore reserves are $16,830,000 and 40,000 tons of $35 ore on dumps; that daily earnings from manufacture of "Silica Whiting" from limestone on property were expected to be $1,600; and that a 160-ton plant had been bought. With such assets, funds to erect the desired 500-ton mill should surely be forthcoming.

WINNEMUCCA MOUNTAIN MINING CO. **NEVADA**

Address: Winnemucca, Nev.

Officers: H. A. Swanson, pres.; with W. G. Adamson, sec.-treas.

Cap. $2,000,000; $1 par; outstanding, 1,200,000; no bonded indebtedness. 2,000 shares sold for $3 the lot at public auction in New York on Dec. 16, 1920.

Property: 25 claims, 2 patented, 7 miles from Winnemucca, Humboldt county, including 9 claims owned by the Winnemucca and Bonanza companies now merged with the present organization. The claims show a N. E.-S. W. fissure vein, traceable through the property for 3,000'. This vein cuts shale intruded by dikes of diorite and andesite. The orebody varies from 3' to 30' in width, and ore carries gold and small silver values. Dumps contained 3,000 tons of $15 ore.

In July, 1917, company purchased 6 potash-bearing claims in Coal Canyon, 8 miles from Lovelocks, for $100,000.

Development: by 5,000' of tunnel work. The working tunnel, 425' long, enters a fault-zone at a point 29' below an ore-shoot 175' long and 30' wide. The work defines 15,000 tons of indicated ore said to average $15 per ton. In 1917 a shaft was sunk below 300' tunnel-level and good ore was reported. The mine was taken over by W. G. Adamson, under lease, in 1919, who is reported drifting and crosscutting 175' below the old tunnel-level.

Equipment: includes electric hoist, compressor and a 50-ton cyanide mill. Property is a prospect.

WOLFTONE EXTENSION MINING CO. **NEVADA**

Mail returned from former address: V. J. Bonaby, sec., 110 Sutter St., San Francisco, Cal.

Dividends paid in 1914 amounted to $2,820.

Property: in Manhattan district, Nye county; includes the Sunrise and African claims said to show 12 parallel quartz veins, 2 to 12" wide, supposed to be feeders to the main orebody that should be found in the limestone. Ore from a shaft on the Sunrise reported to have yielded $18 gold per ton.

WOLVERINE COPPER CO. **NEVADA**

Probably defunct. **Last address:** E. S. Deardorf, mgr., Winnemucca, Nevada.

Property: 15 claims, 300 acres in Harmony or Sonoma Mts., 5 miles S. E. of Winnemucca, Humboldt county, shows 5 veins carrying copper ore with silver and gold values.

Development: by a 65' shaft. Equipment: includes gasoline hoist.

WONDER DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: D. S. Ward, pres.; Joseph Bruder, v. p.; F. E. O'Neal, sec. and supt.; E. Marks, treas., with L. F. Detweiler, directors.

Inc. March 21, 1919, in Nevada. **Cap.** $150,000; 10c. par. Listed on San Francisco Stock Exchange.

Property: 2 claims, adjoining the Mammoth Gold Reef and Silver Divide, developed by 50' shaft.

Equipment: electric hoist and compressor installed.

WYOMING MINING & MILLING CO. **NEVADA**

Not incorporated. **Address:** W. S. Bennett, mgr.-treas., Cody, Wyo.

Company is a syndicate of five members who put up $75,000 for development and equipment; they are, W. S. Bennett, E. P. Bowman, D. H. Wilson, Fred. A. Whitney and Martin L. Pratt. Operations begun in 1918.

Property: 16 claims, 2 patented, includes the old Argus silver-gold mine at Taylor, White Pine county, 16 miles S. of Ely. Orebody is a contact deposit in limestone, dipping 40° with an E. course and is from 7-40' thick. Silver occurs as chloride and ore assays $26 per ton. Said to have an early day production of 2,000,000 oz. of silver.

Development: to a depth of 300'. In 1919, 60,000 tons of ore were reported blocked out. In addition, there are said to be 20,000 tons of dump ore carrying 265,000 oz. of silver, and 18,000 tons of tailing assaying 6 oz. silver and some gold.

Equipment: 25-h. p. gasoline hoist and a 100-ton cyanide plant erected in April, 1919.

Reported that syndicate secured control, March, 1920, of additional property at Hamilton, White Pine county. Following a period of idleness, work was resumed at Taylor in Aug. 1921; 40 to 50 tons of ore, largely from dumps, are treated daily.

WYOMING-NEVADA COPPER CO. **NEVADA**

Address: C. T. Smith, supt., Humboldt, Nev.

Officers: Fred. C. Fisher, pres.

Property: includes the old Fifty-Six copper mine in the southern end of the Eugene Mtns., W. of Mill City, Pershing county, said to be the first quartz mine located in Nevada, having been staked out in 1856.

YANKEE DIVIDE MINING CO. **NEVADA**

Mail returned from both Divide and Tonopah, Nev.

Officers: Hon. C. R. Evans, pres.; G. H. Howard, v. p.; C. P. Johnson, sec.-treas., with J. W. Crane and J. T. Murphy, directors.

Inc. April, 1919, in Nevada. **Cap.** $150,000; shares, 10c par.

Property: 1 claim, 3 fractions in the S. E. section of the district adjoining the Liberty, Bingo, Champion and Gold Seam. Said to show veins carrying good ore.

Equipment: includes hoist and electric compressor.

YELLOW ASTER DIVIDE MINING CO. **NEVADA**

Property: over 3 miles S. E. of Gold Mountain.

YELLOW JACKET G. & S. MNG. CO. **NEVADA**

Property sold to and company merged with Jacket-Crown Point-Belcher Mines Co., March 10, 1915, for 360,000 common and 12,000 preferred shares of the new corporation. In 1920, the latter was merged into the **United Comstock Mines Co.**, which see.

YELLOW PINE EXTENSION CO. **NEVADA**

Main office: Goodsprings, Nev.

Officers: A. J. Robbins, pres.-gen. mgr.; E. B. Critchlow, v. p.; Reynolds Robbins, sec.-treas., with A. J. McDermott and G. A. Fayle, directors.

Inc. in Utah. **Cap.** $100,000; 10c par; assessable; 575,000 issued.

Property: 12 claims, 190 acres, in Yellow Pine district, Clark county, said to show a chamber deposit in limestone, dipping 45° W., with N. S. course. Ore shoots are 2 to 8′ wide and 10 to 40′ long. Ore contains carbonates of zinc and lead, with some copper and silver; zinc content is 35%.

Development: by 800′ incline shaft, 200′ tunnel and total of 4,500′ of workings. During 1918 about 500′ of drifting was done.

Production: to 1917 about $100,000, average in 1916 being $25 per ton. In 1918 output was 250 tons. Small shipments of lead zinc ore were made in 1919; apparently idle, 1920 and 1921.

YELLOW PINE MINING CO. NEVADA

Main office: Goodsprings, Nev.

Officers: J. F. Kent, pres.; C. W. Kent, v. p.; C. K. Barnes, sec. gen. mgr.; S. E. Yount, treas., with S. H. Westfall, directors.

Inc. 1905, in Nevada. **Cap.** $1,000,000; $1 par; all issued. No bonded indebtedness. Stock transferred and registered, 431 Security Bldg., Los Angeles, Cal. Listed on Los Angeles Stock Exchange. Annual meeting in January.

Financial statement for year ending January, 1921, shows: gross receipts, $390,841; total expenditures, $245,907.

Dividends: in 1918, $300,000; in 1919, $150,000; in 1920, $90,000; total, $2,610,000.

Property: 13 patented claims, 240 acres, in Yellow Pine district, Clark county, 4½ miles N. W. of Goodsprings, and 12 miles W. of Jean, nearest rail point. In 1917, the Charleston claim, held under lease, was turned over to the Charleston Mining Co. (which see), the Yellow Pine retaining a half interest in the new company. Company also has a lease on the adjoining Prairie Flower ground. In 1921, property of the Fayle estate at Jean and Goodsprings was purchased for $25,000.

Ore occurs as replacement deposits in limestone, and averages 30% zinc, 14% lead and 14 oz. silver. The main deposit dips about 30° W. and strikes N. S. Faulting is frequent, and oxidation continues to present depth. Lead increases, and zinc decreases at depth. The property is of interest because of a small amount of platinum found in some of the ore.

Development: by 900′ incline and winze, 100′ deeper, total workings, 29,000′. New work in 1920 amounted to 3,062′; the body of zinc carbonate ore opened on upper levels was cut at 1,000′ depth.

Equipment: includes 50-h. p. oil engine, hoist good for depth of 2,500′, compressors, generator, 4½ miles of tramway from mine to mill, 12 miles of 36″ gauge railway with Shay locomotive between Goodsprings and Jean on the Salt Lake Route; 120-ton wet concentrator using jigs and tables. The mill, strictly speaking, is a separator rather than a concentrator. The ore is a high-grade silver-lead-zinc material, and in the treatment at this plant no rejection is made, all products of the mill being shipped. In 1919 a calciner was added to eliminate moisture and carbon dioxide in the zinc carbonates. Additional equipment was secured through the Fayle purchase.

During 1920, company cooperated with U. S. Bureau of Mines in erecting testing plant for investigating the chloride volatilization process and its effect upon zinc concentrate.

Production	Ore. Tons	Lead.. %	Zinc %	Silver. oz.	Total Cost
1920 (11 mos.)	15,419	....	....	....	$16.00
1917	19,976	14.85	29.1	7.55	12.348
1916	20,581	10.5	30.4	4.53	9.919
1915	16,136	10.2	31.8	5.40	.....

No figures of total ore production available for 1918-19, but total shipments of ore and concentrates was 19,366 in 1918 and 11,279 tons in 1919. Total ore production to Dec. 1, 1920, is 153,575 tons; active operations began about 1911.

Operations were suspended from March to August, 1919, on account of fire, which destroyed much of the plant, since re-built. The Yellow Pine is well managed and should pay dividends for a long while. Mine was again shut down Dec. 1, 1920, because of high costs and low prices of metals.

YELLOW TIGER CONSOLIDATED MINING CO. **NEVADA**

Formerly Yellow Tiger Mng. Co.

Office: Goldfield, Nev.

Officers: H. A. Riedel, pres.; with H. G. McMahon and A. I. D'Arcy, directors. G. B. Bettles, mgr.

Cap. $450,000; shares 10c par; assessable; 1,764,176 shares in treasury. Assessments are limited to 2c. per share per annum; four of 1¢ each have been levied, the last in Nov., 1921. Stock is listed on San Francisco Exchange. Share prices were 3¢ high and 1¢ low in 1921.

From Dec. 8, 1919 to June 1, 1921, total receipts, including assessments 2 and 3, were $45,129; expenditures were $44,331, including $25,645 at the mine and $7,121 for property purchase.

Property: 350 acres, next south of the Goldfield Consolidated and E. of the Columbia Mountain fault, including ground of the Red Lion Consolidated Mines Co., Desert Chief Consolidated Mining Co., and the New Goldfield Sierra Mining Co., absorbed in December, 1919.

Desert Chief is described under its title; see Vol. XIII for the other two. The Yellow Tiger has a 750′ shaft; the ore carries gold and copper. Since consolidation, company has done a small amount of prospecting only on its holdings in Goldfield district.

Company also has acquired for a stock consideration the Sterlag group of 6 claims in Stonewall Mtn. district, Nye county, 14 miles southeasterly of Goldfield. The vein, 7′ to 22′ wide, is in a lime-porphyry contact: the ore is quartz with an average value of $21, largely in silver. Developed by 240′ shaft, and tunnel to cut vein at depth of 400 to 500′. Operations, suspended, Sept., 1920, for lack of funds, were resumed in 1921 and by Feb. 1922, tunnel was in 1,000′.

YELOW TIGER MINING CO. **NEVADA**

Reorganized as **Yellow Tiger Consolidated Mining Co.**, which see.

YERINGTON BULLION MINING CO. **NEVADA**

Idle, and mail returned from former address, Ludwig, Lyon county, Nev.

Officers: A. J. Schmidt, pres.; J. A. Knox, sec.-gen. mgr.; J. M. Moyle, mgr.-treas., preceding with J. A. Sisk, E. W. Brush, F. S. Stanley and Henry Hertz, directors. W. F. Pflegler, supt., at last accounts.

Inc. May 31, 1909, in Nevada . **Cap.** $2,500,000; $1 par; 1,000,000 shares preferred stock, fully paid; 300,000 shares issued; 1,500,000 shares common or promotion stock; assessable, 1,275,759 shares issued.

Property: 56 mining locations, 1,120 acres, 2 miles N. of the Nevada Douglas property in Yerington district, developed by 400′ main working shaft and 2 tunnels 300′ long, E. and W. of the shaft on the 300′ level, showing a deposit of sulphide ore with gold and copper values.

Equipment: includes a smelter, 2 hoists, compressor and tools.

Company apparently without funds and its literature of a suspicious character.

YERINGTON CONSOLIDATED COPPER CO. **NEVADA**

Office: 312 McCormick Bldg., Salt Lake City, Utah. **Mine office:** Mason, Lyon county, Nev. Officers: F. J. Hagenbarth, pres.; John Dern, v. p.; M. B. Johnson, sec.

Inc. February 11, 1907, in Utah. **Cap.** $100,000; 10c par; assessable; issued, 725,000 shares. Assessment No. 1 of 1c. per share levied

February 23, 1918. Debentures, $100,000 at 6% authorized. Annual meeting, second Monday in July.

Property: 14 claims, patented, in 2 groups, known as the Copper King and Copper Deposit, the former, lying between the Bluestone and Mason Valley mines, developed by a 70′ shaft and 2 tunnels of 500′ and 600′, showing carbonate ores. Worked in a small way by lessees in 1918.

Inactive during 1920.

YERINGTON MALACHITE COPPER CO. **NEVADA**

Idle.

Office: 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Yerington, Lyon county, Nev.

Officers: W. F. Snyder, pres.; Grant Snyder, v. p.-gen. mgr.; Gideon Snyder, sec.-treas., with S. M. Levy, Geo. N. Snyder and W. F. Snyder, directors.

Inc. October, 1906. **Cap.** $5,000,000; $5 par; assessable; issued 666,333 shares.

Property: 11 claims, patented, adjoining the Mason Valley mine show 3 mineralized zones of 20 to 150′ width, proven on surface for a distance of 2,000′. Orebodies are fissure veins in limestone, carrying oxidized ores to a depth of about 100′, below which ore minerals are mainly chalcopyrite, associated with epidote and garnet.

Development: by numerous short tunnels, shafts, etc., totaling 3,800′, on the vein with the Mason Valley workings. Ores as mined average about 6% copper. An examination, 1917, reported to have revealed 800,000 tons of 2% oxide ore to a depth of 100′, where the sulphide zone commences.

Equipment: includes a 125-h. p. motor, steam hoist good for 600′ depth and compressor. There are several mine buildings.

Production: was begun May, 1912, and company shipped ore returning 174,407 lb. copper to the Mason Valley smelter in 1913. No later output until 1919, when small production was made.

YERINGTON MINES & EXPLORATION CO. **NEVADA**

Office: Yerington, Lyon county, Nevada.

Officers: C. S. Durand, pres.; B. F. Kurz, v. p.; V. B. Durand, with W. S. Weaver and Wm. Cramer, directors

Inc. February 27, 1909, in Nevada. **Cap.** $1,000,000; $1 par; issued $875,000. Annual meeting, first Monday in March.

Property: 24 claims, including the Effie May group of 2 gold claims, the Copper Flat group of 10 copper claims, and the Mohawk group of 12 gold-copper claims, the latter two situated 8 miles N. W. of Yerington. All 3 groups are on or near the Nevada Copper Belt Ry.

The **Mohawk** group is developed by 3 shafts, 115′, 125′ and 130′. Shipments have shown from 2 to 6% copper and ½ oz. of gold.

In 1921, operations were confined to deepest shaft on the Mohawk; ore assayed up to 7.8% copper and $3.20 gold.

The **Copper Flat** group is developed by about 20 pits and shallow shafts, deepest 60′. Shipments in 1917 averaged 6.46% copper.

The **Effie May** group is a gold prospect developed by a 135′ shaft, with about 2,000 tons of ore blocked out; a mill run on 30 tons yielded $705.

YERINGTON MOUNTAIN COPPER CO. **NEVADA**

Offices: 302 Natl. Bank Bldg., Tonopah and Golconda, Nev.

Officers: J. G. Kirchen, pres.-mgr.; E. M. Kirchen, v. p.; H. Perry, sec.-treas., with H. J. Toner, W. A. Krasselt, H. R. Cooke and E. J. Haug, directors. W. L. Taylor, supt.

Inc. February 10, 1912, in Nevada. **Cap.** $3,000,000; $1 par; issued $2,300,000. First Natl. Bank of Tonopah, Nev., and U. S. Corporation Co., New York, registrars and transfer agents. Listed on New York Curb and San Francisco Exchanges.

Property: 90 acres in Klondyke section of the Divide district, 6 miles N. W. of Schurz and 12 miles E. of Yerington, shows fissures in granodiorite, that run N. 40° E., and dip 65°. Ore minerals are mainly chalcocite,

with chalcopyrite, chrysocolla, malachite, cuprite and occasional native copper. Ore assays 4½ to 8% copper, 2 to 4 oz. silver and 80c. to $2 gold per ton.

In July, 1916 company purchased the Adelaide mine, near Golconda, Humboldt county, from the Glasgow & Western Expl. Co. This mine shows a contact deposit in limestone and granite, opened by a 300′ shaft and 1,450′ of tunnels, with a total of 6,500′ of openings. In 1917, the ore-body on the 200′ level was 20′ wide, and monthly shipments were 200 tons of 5% ore.

In 1918 a group of five gold-silver claims 100 miles N. W. of Tonopah was acquired.

Development: at the Yerington by a vertical 300′ main shaft, and 1,200′ of tunnels, with about 8,000′ of openings. The Azurite tunnel was driven from the other side of the mountain to cut ore exposed in the Levine tunnel and at 400′ greater depth. Tunnel discloses ore in bunches and streaks. The Beach tunnel yielded a good grade of shipping ore of about 5.5% copper.

Equipment: includes gasoline hoists, 2 compressors, pumps, etc.

Production: in 1916 was from 400 to 600 tons per month. All work was temporarily suspended February, 1918, on account of heavy flow of water in lower workings. Suspension of operations continued 1919-'21.

YUBA LEASING & DEVELOPMENT CO. **NEVADA**

Out of business. Formerly at Pioche, Lincoln county.

YUKON DIVIDE MINING CO. **NEVADA**

Mail returned from Tonopah, Nev.

Inc. 1919, in Nevada.

Property: 90 acres in Klondyke section of the Divide district 6 miles, south of Divide mine.

ZANZIBAR MINING CO. OF NEVADA **NEVADA**

Idle.

Address: P. O. Box 374, Reno, Nev.

Officers: J. M. Short, pres.; L. S. Reese, sec.-treas.

Company is a reorganization of the Zanzibar Mng. Co., effective Oct. 30, 1919.

Property: 2 claims between the White Caps and White Caps Extension at Manhattan, Nye county, developed by 400′ shaft.

NEW JERSEY

There were but six companies engaged in mining iron ore and one producing zinc mine in the state in 1919. Production was 404,428 tons iron ore in 1919 and 431,567 tons in 1920.

BALBACH SMELTING & REFINING CO. **NEW JERSEY**

Office: 580 Market St., and Works, 111 Passaic Ave., Newark, and on Newark Bay, N. J. Purchase and sales depts: 280 Broadway, New York City.

Officers: Archibald R. Watson, pres.-treas.; Julian B. Beaty, v. p.; E. E. Dieffenbach supt., with W. I. Cooper and E. T. Villareal, directors: F. Schmutzer, sec.

Inc. 1891, in New Jersey. **Cap.** $1,000,000; $100 par; in 500,000 preferred and $500,000 common stock; 3,900 preferred and 3,900 common shares issued and outstanding.

Works: at Newark comprise a lead desilvering plant, a copper smelting plant; gold, silver and platinum refinery; copper sulphate plant. The metallurgical practice of the works ranks high. The lead refinery, with a capacity of 6,000 tons per month, erected at Newark Bay, went into operation in July, 1913. Company does a custom business in ores, bullion, residues, blister copper, etc., containing gold, silver, platinum, copper and lead.

Company also owns real estate in the vicinity of Newark Bay, valued at $750,000 to $1,000,000.

IRVINGTON SMELTING & REFINING CO. NEW JERSEY

Address: Charles Engelhard, treas., 30 Church St., New York Works at Irvington, N. J

Officers: Chas. Engelhard, pres.; C. Blair Mitchell, v. p.; C. W. Baker, v. p.; F. Coester, sec.

Property: is an electrolytic smelter and refinery for gold, silver, platinum and copper ores.

NEW JERSEY ZINC CO. NEW JERSEY

See full description in United States section.

Company not only owns the Franklin Furnace, N. J., mines, but has holdings in various states and is, therefore, grouped with the Am. Smelting & Refining, U. S. Smelting and other large companies with widely scattered holdings.

NORTH JERSEY STEEL CO. NEW JERSEY

Address: Dover, N. J.

Inc. 1920 by H. M. Roche, Jesse C. Stoddard and E. E. Yensel. **Cap.** $500,000.

Property: formerly owned by the **Beach Glen Iron Mng. Co.**

Under development and a concentration mill with capacity of 75 tons crude ore an hour, installed in 1921.

ORFORD NICKEL-COPPER REFINERY NEW JERSEY

Property of International Nickel Co., 43 Exchange Place, New York. Plant at Bayonne, N. J., treats nickel-copper matte from Sudbury smelter. A. J. Wadhams, supt. of plant; H. W. Walter, asst. supt.

PERTH AMBOY SMELTER NEW JERSEY

Office: 120 Broadway, New York. **Works address:** J. F. Austin, mgr., Maurer, N. J. Owned by **American Sm. & Ref. Co.**

Has 900-ton copper-lead smelter, 360-ton lead refinery 270-ton electrolytic copper refinery, and a 50-ton tin smelter and refinery, near Perth Amboy, employing about 2,000 men.

RARITAN COPPER WORKS NEW JERSEY

Works address: E. C. Clark, supt., Perth Amboy, N. J.

Operates a copper refinery; described under **International Smelting Co.**

REPLOGLE STEEL CO. NEW JERSEY

Office: 120 Broadway, New York City. S. H. Bell sec.-pur. agt., Wharton, N. J.

Inc. Oct. 30, 1919 in Delaware. **Cap.** 500,000 shares, no par value; 250,000 shares issued. Stock listed on N. Y. Stock Exchange. Empire Trust Co., transfer agent; U. S. Mortgage & Trust Co., registrar.

Company controls through stock ownership the **Wharton Steel Co.**, which see.

THOMAS IRON CO. NEW JERSEY

Office: Hokendauqua, Pa. **Mine office:** Wharton, N. J.

Officers: W. A. Barrows, Jr., pres.-mgr.; Fred R. Drake, v. p.; with Ja. Samuel Krause, Edwin Thomas, Andrew D. Chidsey, J. Mark Mauser, Thos. E. Ritter, directors. Oliver T. Case, sec.-treas.; L. H. Stone, supt.

Inc. April 4, 1854, in Pennsylvania. **Cap.** $2,500,000; $50 par; Authorized bond issue, $1,000,000; 596,500 issued. Net income for 1920 amounted to $23,235. **Dividends:** 3% July, 1920; 3%, Feb., 1921. Stock transferred at company office.

Property: Richard iron mine at Wharton, Morris county. Ore magnetite (Fe_3O_4) occurs in lenses in gneiss, and averages 58% iron. The mine is worked by back stoping and shrinkage methods.

Development: by vertical shaft to depth of 1,400', with 10,000' of workings.

Equipment: includes 200-h. p. electric double drum hoist, two electric

compressors of 800 and 2,800 cu. ft. capacity and 1,000-ton magnetic conc. mill.

Production: to 1918, 3,000,000 tons. Mine was not operated in 1918.

Company operates five blast furnaces at Alburtes, Helertown and Hokendauqua, Pa., producing 131,631 tons pig iron in 1920.

Operations since 1920, seriously hampered by unsatisfactory labor conditions and low market prices.

UNITED STATES METALS REFINING CO. **NEW JERSEY**

Subsidiary of the **American Metal Co.**, which see.

Works address: R. W. Deacon, gen. supt., Chrome, N. J.

Operates a custom copper smelter and refinery.

WHARTON STEEL CO. **NEW JERSEY**

Controlled through stock ownership by **Replogle Steel Co.**

Address: 111 Broadway, New York City and Wharton, N. J.

Officers: J. L. Replogle, chairman, Wm. H. Brevoort, pres.; I. Townsend Burden, v. p.; Ernest Hillman, v. p.; L. K. Diffenderfer, treas., with Leroy W. Baldwin, J. J. Flannery, L. E. Waring, J. R. Flannery, and Chas M. MacNeill, directors. S. H. Bell, sec.

Cap. $10,000,000; $100 par; $3,145,000 issued. Bonds authorized and outstanding, $3,000,000. Annual meeting, 3rd Friday in February.

Property: 29 mines, covering about 5,000 acres in Morris county, New Jersey, including the Scrub Oaks mine of the old Andover Iron Co., 3 miles W. of Dover, first opened in 1868; prior to 1881 had produced 56,000 tons iron ore, but little activity thereafter until 1917. Main, or Replogle, orebody is of familiar lenticular shape in gneiss; has been explored to depth of 1,240′ and exposed for 2,500′ in length on first level; estimates give 27,000,000 tons probable ore. Ore is magnetite and martite disseminated in feldspathic gangue, high in silica, low in phosphorus, with a 36% iron content. The Brevoort vein in same mineralized belt parallels the Replogle 400′ away.

Development: operations confined to Replogle mine. Present management has done considerable drilling, main shaft enlarged to 4 compartments and opening of 2nd level begun. In October, 1920, there were 300,000 tons broken ore in stopes.

Equipment: includes 2,500-ton concentrating mill, blast furnaces, sintering plant, etc.

Production: 156,981 tons in 1918; 25,987 tons in 1919.

Company also owns the Wharton & Northern R. R. Co.

NEW MEXICO

The metal production of New Mexico for 1921 was the lowest known for many years, the total value being but $2,685,000, compared with $11,934,992 in 1920, a decline of 77% in one year. This compares with $11,500,000 in 1919, $28,625,000 in 1918 and a record of $34,986,765 in 1917. The big decline in 1921 was due to the suspension of operations at Chino.

The gold output declined from $480,302 in 1920 to $184,000 in 1921; silver from 768,042 ounces to 671,000 ounces; copper from 54,400,691 lb. to 14,460,000 lb.; lead from 2,869,525 to 500,000 lb. and zinc from 10,013,580 lb. to 20,000 lb.

ADMIRAL GOLD AND COPPER MINING CO. **NEW MEXICO**

Idle. Mail returned from former office, Tusas, Rio Arriba county, N. M.

Inc. 1900, in New Mexico. **Cap.** $500,000; shares $1 par.

Property: 8 claims, 160 acres, in the Bromide district, shows 3 fissure veins carrying silver copper and gold ores, opened by 3 shafts, deepest 150′, Inactive owing to lack of funds.

ALHAMBRA MINING CO. **NEW MEXICO**

Defunct. Silver City, New Mexico.

AMERICAN COBALT CORPORATION NEW MEXICO

Address: Box 74, Tyrone, New Mexico.

Officers: Albert A. Leach, pres.-mgr.; Simon H. Casey, v. p.; Francis I. Leach, sec.-treas., with A. W. Casey and Peter M. Shelley, directors.

Inc. in New Mexico. **Cap.** $100,000; $25 par; 2,000 shares outstanding. Operated as a close corporation.

Property: 28 claims, 12 miles N. W. of Tyrone, in Bullards Peak mining district, Grant county, surrounding the Black Hawk mine. Ore occurs as native silver and arsenical nickel cobalt in a net work of fissure veins 18"-3' wide, in granitic gneiss, running as high as $400 per ton.

Development: by shafts to depth of 200'. Management plans extensive prospecting and development work. Property examined by W. H. Weed.

AMERICAN EXPLORATION & MG. CO. NEW MEXICO

Presumably dead. Fully described in Vol. XIV.

AMERICAN GOLD, COPPER M. & SM. CO. NEW MEXICO

Company was forced into receivership and properties were purchased by George Heineman, of 1524 Poplar St., Kansas City, Mo., at receivers sale. Awaiting final decision of court.

AMERICAN SILVER CORPORATION NEW MEXICO

Office: 200 Fifth Ave., New York City.

Inc. 1920 in West Virginia, to acquire property at **Socorro M. & M. Co.** **Cap.** $3,000,000. Company paid off the indebtedness of the Sorcorro Co. and receivership expenses. Stockholders in the old company received two shares of American Silver for 5 shares of Socorro stock. Reported 130,690 shares sold for $100 the lot at public auction in New York on January, 1921. Empire Trust Co., registrar.

Property: 66 claims, partly patented, over 1,200 acres, including the Cooney, Peacock, Little Charlie, Independence, and Fluoride groups, sometimes known as the Silver Bar mine, in the Cooney district of the Mogollon mountains, 85 miles N. E. of Silver City, the nearest rail point. The Fanny is the principal mine, it having yielded $4,869,000 in gold and silver; followed by the Cooney with $1,700,000 in copper and silver. See account by D. B. Scott in Bull. A. I. M. & M. E. February, 1920.

Geology: the property shows porphyry and andesite, carrying the Fanny fissure vein of 5 to 10' average width, with a paystreak of about 3' average and 30' maximum width, having numerous narrow feeders, some of which carry high value gold. Ores include slightly auriferous and strongly argentiferous chalcopyrite, bornite and chalcocite, claimed to carry increasing silver values at depth, and the east vein has been said to show native copper at depth of 600'.

Development: 3 mines—the Fanny, Johnson and Cooney. The Fanny has a 1,200' shaft, and the Johnson, a mile west, has 400 and 450' incline shafts. The Fanny is the largest mine of the district and the chief producer. There are also various tunnels on the several groups with an approximate total of 30,000' of workings.

Equipment: includes hoists, compressor, aerial tram and 250-ton mill, with ball-mills and cyanide plant. The power plant has four crude oil engines developing 960 h. p.

The old mill was destroyed by fire in October, 1917; late in 1918, the new plant was put in operation, but was closed April 1, 1919. Operations suspended, August, 1920, after 2 months of development work under new management.

ANDERSON-APACHE COPPER CO. NEW MEXICO

Dead. Former address: Hachita, Hidalgo Co., N. M.

Fully described Vol. XIV.

ANIMAS PEAK GOLD MNG. CO. NEW MEXICO

Probably dead. Formerly held property at Hillsboro, Sierra county, N. M., once owned by the defunct Hillsboro Cons. Mng. Co. of odious fame.

ANITA COPPER CO. **NEW MEXICO**

Address: Geo. W. Foreman, v. p.-gen. mgr.; Lordsburg, N. M.

Inc. 1921 in California, to absorb **Octo Mining Co.**, which see. District Court at Lordsburg gave judgment by default in an action for $28,000 owed by Octo Co.

ATWOOD COPPER CO. **NEW MEXICO**

Name changed to **Boston-Emerald Mining Co.**, which see.

AUSTIN-AMAZON COPPER CO. **NEW MEXICO**

Offices: 116 Texas Bldg., El Paso, Texas; Room 4 Porterfield Bldg., Silver City, N. M. **Mine address:** Tyrone, N. M.

Officers: Chas. E. Davis, of El Paso, pres.; M. W. Porterfield, sec.-treas., with John M. Wiley, managing director, C. H. Leavell and V. C. Moore, directors.

Inc. Dec. 1, 1916, in New Mexico. **Cap.** $1,500,000; $1 par; 1,070,000 outstanding. El Paso Bank & Trust Co., registrar and transfer agents. Stock formerly traded in on N. Y. Curb. Annual meeting, second Tuesday in March.

Property: 14 claims, 275 acres, in Burro Mtns., Grant county, 6 miles W. of Tyrone.

Ore: chalcopyrite occurs in contact and quartz veins, running N. E.-S. W. through monzonite (quartz-diorite), and said to average 6% copper. A N.-S. mineralized shear zone, in places 150′ wide, is said to traverse several claims.

Development: 3,000′ of shafts, drifting, etc. Over 30 shallow openings show ore. Management planned sinking to 700′ level, in 1917-18, but due to war conditions, high costs, etc., the property was closed down January 1, 1918.

Equipment: includes 18-h. p. gasoline hoist and compressor. Shipments to October 1st, 1917, 137 cars of 6.26% copper ore.

AZTEC COPPER CO. **NEW MEXICO**

Office: 707 Colorado Bldg., Washington, D. C. **Mine office:** Organ, Dona Ana Co. N. M.

Officers: Gen. H. H. C. Dunwoody, pres. and mgr.; C. C. Clements, v. p.; B. K. Roberts, sec.-treas, with Col. M. C. Wyeth, C. F. Humphrey and Admiral C. H. Davis, directors.

Inc. in Arizona. **Cap.** $1,000,000; $1 par; 600.000 shares issued.

Lands: 4 claims, 6 acres, in the Organ Mountain mining district, about 12 miles by good road southeast from Las Cruces. Claims cover the mineralized limestone porphyry contact worked by the Modoc mine. Developments are on the Orejon claim, opened by a 140′ 45° inclined shaft, sunk on a 12 to 18″ vein, reported to carry copper silver, lead and zinc ore, averaging $40 per ton. No recent reports available.

AZTEC MINE **NEW MEXICO**

Mine at Baldy, Elizabethtown district, Colfax county, was operating throughout 1919, with regular monthly shipments of gold bullion and occasional shipments of concentrates carrying high gold contents.

Has a 10-stamp amalgamation-concentration mill.

AZURE MINING CO. **NEW MEXICO**

Office: 170 Broadway, New York City. **Mine office:** Tyrone, Grant county, N. M. Louis Kahn, pres.; M. D. Rothchild, sec.-treas.

Inc. 1890, in New York. Is operated as a close corporation.

Lands: 110 claims, 1,800 acres, near the Burro Chief group of the Chemung Copper Co. Company sold 73½ acres, 1909, to Mangas Development Company.

Geology: the Burro Mountain property shows monzonite, quartz-porphyry and granite, with fissure veins in granite and disseminated ore in porphyry, there being 7 orebodies with 2 under development. The Santa Fe vein is from 15 to 75′ wide, averaging 40′ and is traceable for 6,000′. This vein is developed by a 417′ shaft, having 5 levels with 15,500′ of workings

showing gem turquoise as well as copper ore. The old turquoise mine has 2 tunnels and large open-cast workings.

Besides the Santa Fe vein, the property has disseminated ore, one ore-body on the contact between granite-porphyry and monzonite-porphyry being 152′ thick, developed for 500′ in length and carrying 2½% copper present as disseminated particles of chalcocite. Property has been explored by churn drills and diamond drilling.

The mine was at one time the largest turquoise property in the world, systematic mining having begun in 1891. Gem production has practically ceased and the property is considered valuable for its copper ore alone.

Company also owns the Tres Hermanos zinc mine in the Tres Hermanos district, 23 miles S. of Deming, Luna county, N. M., said to show oxidized ores carrying zinc-lead-silver values.

Ore: occurs as blanket and chamber deposits in limestone, 2-5′ wide, reported to assay from 30-35% zinc, 30-40% lead, and 6-8 oz. silver. Developed by several vertical shafts, from 30-100′ deep.

Equipment: includes compressor and 20-h. p. gasoline hoist.

Production: in 1915, mainly from development work, was 720,000 lbs. zinc, 300,000 lbs. lead and 2,000 oz. silver.

BATTLESHIP MINING & MILLING CO. NEW MEXICO

Probaby dead. See Vol. XII. Former office: 412 Mack Bldg., Denver, Colo. Mine near Lordsburg, Hidalgo county, N. M.

BENNETT-STEPHENSON M. & M. CO. NEW MEXICO

Officers: O. Jolliffe, pres.; Jas. C. White, v. p.; C. B. Gill, treas.; J. L. McCullough, sec. Annual meeting, April 7th, at Las Cruces. Controls, through stock ownership, the **Organ Mountain Mining Co.**, which see. Fully described, Vol. X.

Mines were under lease until 1921 to Phelps Dodge Corp.

BETHLEHEM COPPER CO. (INC.) NEW MEXICO

Dead;former address: Steins, N. M.

Fully described Volume XIV.

BITTER CREEK MINING CO. NEW MEXICO

Address: Taos, New Mexico.

Officers: Fred S. Lewis, pres.; Wm. T. Hinde, v. p.; Condon C. Lowe, sec.-treas.-mgr., with Wm. McKean, and Alvin Burch, directors. L. O. Haberstich, supt., Red River, N. M.

Inc. July, 1916, in New Mexico. **Cap.** $1,000,000; 425,070 shares outstanding, March, 1919. U. S. Corporation., New York, registrar and transfer agents. C. W. Galvin & Co., 80 Pine St., New York City, selling agents.

Property: 5 claims, 100 acres, known as the Hub mines, at Red River, Taos county, said to show telluride ore in fissure veins in andesite. Values are gold and silver.

Development: by prospect shaft and several shallow tunnels. Plan continuing the Dorothy tunnel. Company purchased an additional claim, 20 acres, in 1918, said to show a 150′ body of quartz and quartz-porphyry ore, assaying from $1-$7 in gold, to be developed by crosscut tunnel.

BLACK COPPER CO. NEW MEXICO

Probably dead. See Vol. XIV.

BLACK HAWK CONS. MINES CO. NEW MEXICO

Formerly **Black Hawk Mining & Milling Co.**

Office: 611 First Natl. Bank Bldg., Milwaukee, Wis. Ira L. Wright, mgr., Silver City, N. M.; Wm. Downie, supt., Vanadium, N. M.

Officers: Wm. Krasselt, pres.; Theo. Millver, v. p.; John Camm, v. p.; J. F. Gerdis, sec.; G. H. Cheyne, treas., with Frank Boutin and J. P. Fetsch, directors.

Inc. May, 1919 in Delaware. **Cap.** $1,500,000; $1 par. Reorganized June, 1921 in Colorado. **Cap.** $1,500,000; $1 par; assessable; 1,350,000 shares outstanding. Operating loss for 1919-1920 was $62,514.

Property: two groups, a total of 370 acres of mineral land in the Hanover-Santa Rita district, Grant county, New Mexico. Also 8 claims, 90 acres, in Bullards Peak district N. W. of Burro mountain, comprising all holdings of Black Hawk M. & M. Co.

The **Hanover** comprises two groups, one on each side of the A. T. & Santa Fe. R. R. line at Hanover junction. There are seven shafts. This is a young mine with promising orebodies and is in a district that has been productive for half a century. Mine idle during most of 1920.

Development: in 1920 on the Lucky Bill totaled 2,000′ on the 200 and 300′ levels, opening up considerable low grade oxidized copper.

Equipment: hoists, air-compressors, buildings, etc.

Production in 1919 and 1920, was 3,922 tons of ore, containing 1,434,699 lb lead, 10,477 oz. silver, 149,903 lb. zinc and 63,427 lb. copper, all from the Lucky Bill claim. The Black Hawk group, S. W. of Silver City, is idle. It yielded bonanza silver ore in former years, but is not in shape for economic working at present.

BLACK HAWK MINING & MILLING CO. — **NEW MEXICO**

Fully described in Volume XIII. Holdings purchased in May, 1919 by the **Black Hawk Consolidated Mines Co.**, which see.

BLACK RANGE TUNNEL & MINING CO. — **NEW MEXICO**

Address: E. D. Randolph, sec.-gen. mgr., 219 Main St., Lafayette, Ind.

Officers: H. E. Black, pres.; A. O. Behrn, v. p.; W. C. Mitchell, treas., with T. F. Gaylord, B. L. Phillips and Martin Hardsocg, directors; C. B. Hullinger, supt., Choloride, Sierra county, N. M.

Company presumably a reorganization of the Black Range Copper Mining Co. and Black Range Reduction Co. (see Vol. X), both now dead.

Property: the Silver Monument mine, showing a vein of silver-copper ore.

Development: 2,300′ tunnel and shaft. Main vein has apparently not been found. Equipped with steam plant compressor and a 25-ton concentration mill. Actively developing, 1919-'20.

BONNEY CONSOLIDATED COPPER CO. — **NEW MEXICO**

Office: Lordsburg, Hidalgo county, N. M.

Officers: D. L. Hill, pres.; H. W. Peak, v. p.; R. S. Spann, sec.; J. P. Porteus, supt.

Inc. 1919, in Texas. **Cap.** $2,000,000; $1 par. Company reports that it is an unincorporated association, operating under declaration of trust, without personal liability, in any event, of the trustees or of any stockholder.

Property: Bonney mine group, property of **Tyndale Copper Mining Co.**, El Dorado group, Manilla group, Misers Chest Extension group and others, in all about 750 acres, located in Virginia district, about 5 miles S. W. of Lordsburg. The **Bonney Mining Co.**, on September 15, 1918, refused to extend the lease on the property held by the **Lawrence Mining Co.**, and accordingly the mine was operated by the Bonney Mining Co. until January, 1919, when the copper market was demoralized. Property was purchased in July, 1919, by D. L. Hill, of Lordsburg, N. M., who consolidated it with adjoining mineral ground, under the present title.

Geology: veins are strong, well-defined fissures, 4-20′ wide, which below water level, carry sulphides well disseminated through quartz gangue. Country rock is andesite, with monzonite, diorite and rhyolite.

Ore: of the Bonney mine occurs as chalcopyrite, bornite, chalcocite and some covellite, carrying gold, and silver values in five fissure veins in andesite. Veins are located in isolated hills, 4 miles N. E. of Pyramid Peak, but entirely separated therefrom. Shipments of 2,077 tons from 500′ level gave average smelter returns of .664 oz. gold, 4 oz. silver and 5.2% copper.

Development: at Bonney mine, by 3 shafts, 500, 400 and 300′ deep; 500′ of raises and 4,500′ of drifts and crosscuts. Company has opened 1,400′ on main vein and 600′ on 500′ level. New work during 1919-20 amounted to 1,000′.

Ore reserves: broken ore 22,000 tons; blocked out 21,000 tons.

Equipment: includes 205 h. p. boiler, steam and gas hoists, compressors, air and steam pumps, water works, machine shop, power plant, dwellings, concrete office, etc.

Production: for 16 months prior to January, 1919, company shipped 12,671 tons of ore to Copper Queen smelter, Douglas, Ariz., containing 1,882 oz. gold, 50,732 oz. silver and 898,421 lb. of copper all valued at $286,056. No shipments were made during 1919-20.

BONNEY MINING CO. **NEW MEXICO**

Dead. See Vol. XIV.

BOSTON & BRICE COPPER CO. **NEW MEXICO**

A reorganization of the Jarilla Consolidated Copper Co. Mine at Brice, Otero county, N. M.

Officers: at last accounts, E. E. Locklin, pres.; W. W. C. Spencer, treas.-gen. mgr., with Clinton Gowdy, G. E. Moffett and John Colthrop, directors.

Inc. 1917, in New Mexico. **Cap.** $2,000,000; $1 par; issued, 1,000,000. Annual meeting, first Monday in May.

Property: 40 claims, about 800 acres, in Jarilla (Silver Hill) district, Otero county, carrying sulphide ore in contact deposits between limestone and monzonite porphyry. Vein said to be 3 to 30′ wide, 300′ to a half mile long, and proven to 170′ depth, averaging 3 to 5% copper, 2 oz. silver and $1 gold per ton.

Development: by 5 shafts, deepest 172′, and the Harvey tunnel, 165′ long.

Company is a merger of and holds the properties formerly owned by the Eureka Mines Cons Co., Boston Jarilla Copper Co., Amarillo Mining Co. and Eureka Placer Mining Co., whose combined capitalization of $8,000,000 was reduced to $2,000,000. No recent report obtainable.

BOSTON EMERALD MINING CO. **NEW MEXICO**

Formerly known as the Atwood Copper Co. **Address:** J. Tangye, supt., Lordsburg, New Mexico.

Property: the Atwood mine, near Lordsburg, Hidalgo county, reported owned by H. V. Snell, of Globe, Ariz., and Morningstar & Augustine, of Lordsburg, N. M.

Development: by shaft, said to show vein of good grade of milling ore. Shipments made to El Paso smelter.

BOSTON-HECLA MINING CO. **NEW MEXICO**

Office: 40 Court St., Boston, Mass. **Mine office:** Lordsburg, N. M.

Officers: R. E. Candruff, pres.-treas.; J. B. Piscope, v. p.; D. W. Taylor, sec., with R. S. Fisher and M. W. Lawlor, directors.

Inc. April 18, 1918, in Arizona. **Cap.** $2,000,000; $1 par; 1,000,800 shares outstanding. Equitable Trust Co., Boston, Mass., transfer agent.

Property: 9 claims, 3 patented, 120 acres, about 3 miles S. W. of Lordsburg, Hidalgo county, between the 85 and Octo mines.

Ore: sulphide occurs in quartz-fissure veins in andesite and diorite, reported to assay 0.04 oz. gold, 2.17 oz. silver and 2.6% copper. Orebody reported to be 20-125′ wide, with E.-W. course and dip of 70°.

Development: by 300′ shaft. **Equipment:** includes 40-h. p. hoist and compressor.

Property has been examined by O. H. Reinholt, San Diego, Calif. and J. T. Bickle, Globe, Ariz.

BUFFALO-NEW MEXICO MINES CO. **NEW MEXICO**

Office: 430 Brisbane Bldg., Buffalo, N. Y.

Officers: J. F. Rooney, pres.; D. W. Haist, v. p.; C. H. Reeser, sec.-treas.; R. P. Kelly, supt.; R. H. R. Rochester, cons. engr.

Inc. 1910, in Arizona. **Cap.** $1,000,000; $1 par; 650,000 shares outstanding.

Property: 17 unpatented claims, 277 acres, at Red River, Taos county.

said to snow a "quartz porphyry vein," 18-20′ wide in andesite and rhyolite with gold and silver values.

Development: by 200′ shaft and 600′ of workings. A 2,300′ tunnel, being driven to drain the mine and cut several other veins, is 700′ completed.

Equipment: includes 60 h. p. steam boiler and steam compressor.

BURRO MOUNTAIN COPPER CO. **NEW MEXICO**

Out of existence. Property originally acquired from the Southwestern Copper & Iron Co., now a part of **Phelps Dodge Corp.** (q. v.) and operated as **Burro Mtn. Branch.**

BURROS DEVELOPMENT CO. **NEW MEXICO**

Probably dead. Fully described Vol. XIV.

B. V. N. MINING CO. **NEW MEXICO**

Probably defunct. **Last address:** Pinos Altos, Grant county, N. M. Fully described Vol. XIV.

CALUMET-NEW MEXICO MINING CO. **NEW MEXICO**

Office: 154 W. Randolph St., Chicago, Ill. **Mine office:** Silver City, New Mexico.

Officers: Alex. McCallum, pres.; Alpheus McCallum, v. p.-treas.; J. A. Pement, sec.; A. W. McCallum, asst. sec.; J. A. McCallum, supt., with Jacob Ehrenberg, directors.

Inc. in New Mexico. **Cap.** $1,000,000; increased to $1,350,000 common and $150,000 8% cumulative pfd.; $1 par; 1,024,770 outstanding.

Property: three groups in Magdalena district, 12 claims, 10 patented, 240 acres, 2 miles from a railroad and 5 miles from Magdalena reported to show ore assaying 3 to 21% copper, 3 to 97 oz. silver, 0.06 to 0.96 oz. gold, and a lead maximum of ?4%.

In Pinos Altos district company has 3 deeded claims, and 3 claims under option, 120 acres; 7 shipments from there assayed between 0.20-1.26 oz. gold, 7 to 19 oz. silver, 9 to 43% lead and 3 to 38% zinc.

Development: by tunnels with 3,000′ of openings at Magdalena; by 2 shafts and 3,000′-4,000′ of drifts and stopes at Pinos Altos.

Equipment: includes hoisting plants, blacksmith and machine shops, dwellings and a concentration and a flotation mill near Pinos Altos with a capacity of 1,500-3,000 tons per month.

Shipments made to El Paso smelter in 1920. Management awaiting better metal prices before resuming work on an extensive scale.

C. & O. MINING & MILLING CO. **NEW MEXICO**

Mail returned from former address: Pinos Altos, Grant county, N. M. Probably dead. Fully described in Vol. XIII.

CARIBEL MINING & MILLING CO. **NEW MEXICO**

Address: H. L. Pratt, mgr., Red River, N. M.

Company was said to be operating a mine near Red River, Taos county, in 1918.

CARLISLE MINING CO. **NEW MEXICO**

Out of business. Fully described in Vol. XIV.

In February, 1918, company filed petition in bankruptcy, giving liabilities as $116,473 and assets as $43,829.

Property: the Carlisle group at Steeplerock, N. M., was turned back to owner, G. H. Utter and is described under that name.

CHAMPION COPPER CO. **NEW MEXICO**

Offices: 7 Government St., Kittery, Me. **Mine address:** Copper Hill Box, Dixon, Taos county, N. M.

Officers: R. J. Burton, pres.; Benj. B. Earl, v. p.; Arthur M. Cripps, sec.-treas.; preceding, with E. J. Quiry, directors. Jas. A. Burton, gen. mgr., Dixon, N. M.

Inc. July 7, 1911, in Maine. **Cap.** $400,000; increased March, 1919, from $200,000; shares $1 par; changed in 1918 from 2,000,000 shares, 10c par. Listed on Boston Curb. Annual meeting first Tuesday in March. Commonwealth Trust Co., Boston, transfer agent.

Report issued March 1, 1918, shows assets of $20,336 cash, $2,742 in accounts receivable, $26,913 as equipment and development, and $150,008 as mining property. No later report.

Property: 468 acres, made up of 15 claims, on Copper Hill, in the Copper Mountain district of Taos county, 9 miles east of Embudo, the nearest railroad station, and 25 miles N. E. of Taos, 2 potash claims of about 40 acres, a mile from the mine, and 85 acres in the Big Bug mining district of Arizona. The potash claims, the Arizona property, and ten claims of about 200 acres, were purchased in 1917. The remainder of the property was acquired at foreclosure sale 1914, for $15,499. Mine is said to have 8 practically parallel veins of 18" to 20' width, between a schist footwall and quartzite hanging wall, the ore carrying cuprite, malachite and chrysocolla, succeeded at depth by chalcocite and gray copper: ore carries silver and gold, with chalcopyrite beginning to show in lower workings, all in a quartz gangue.

Development: includes shallow shafts and surface cuts on several claims, a 250' shaft on the Champion, a 180' shaft sunk on a 4' vein in the Oxide mine, and a 500' tunnel, which has stoping ore and cuts a 45° blanket vein. Report for 1917 showed 200' of stoping and drifting, 930 tons hoisted and a yield of 67 lb. per ton milled.

Equipment: includes 2 horizontal boilers 54"x14", two engines, one 80-h. p. the other 40-h. p. gasoline hoist, 2 compressors and several drills. A 1,000' ground tram leads from the mouth of the Champion tunnel to orebins. A 15,300' gravity pipe line of 7" spiral steel riveted pipe conveys water from spring to reservoir at mill.

In May, 1918, company tried the Greenawalt process of leaching and electrolysis, thus saving, it was reported, 98% of all ore values. A plant capable of 60 tons per day was installed early in 1919.

About 40 men were working on the potash claims (1921), pending final decision in suit over ownership.

CHICAGO COPPER MINING CO. **NEW MEXICO**

Dead; formerly operated near Oscuro, Lincoln county, N. M. Property described in Vol. XIII.

CHINO COPPER CO. **NEW MEXICO**

Office: 25 Broad St., New York. **Mine office:** Hurley, Grant county, N. M.

Officers: Charles M. MacNeill, pres.; Daniel C. Jackling, v. p. and managing dir.; Charles Hayden, v. p.; C. P. Jenkins, treas.; with A. Chester Beatty, Sherwood Aldrich, W. Hinckle Smith, R. A. F. Penrose, Jr., John M. Sully, (gen. mgr.), directors; A. J. Ronaghan, sec.; John Ridgway, asst. sec.; Chadbourne, Rabbit & Wallace, gen. counsel. R. C. Gemmell, and H. G. S. Anderson, asst. gen. mgrs.; Horace Moses, mines supt.; O. F. Riser, mill supt.; G. L. Webster, cashier; D. D. Moffat, cons. engr. for mills. Guaranty Trust Co. of New York and Old Colony Trust Co., Boston, registrars; Bankers Trust Co., New York, and American Trust Co., Boston, transfer agents.

Inc. June 9, 1909, in Maine. **Cap.** $3,500,000; $5 par; increased to $4,000,000, June 30, 1911; and again increased to $4,500,000. April 2, 1912; 869,980 issued. Bond issues have been retired. Annual meeting, third Friday in April. Listed on New York and Boston stock exchanges. Range of shares during 1920 was $41⅝ high and $16⅜ low; a total of 448,500 changed hands in New York. Price range in 1921, up to June 15, $27¼—$19½.

With the A. S. & R. Co. and Ray Consolidated, Chino Copper owns the Gallup American Coal Co., capitalized at $4,000,000, and operating at Gallup, New Mexico.

In fall of 1920, company took a 3.68% interest, $1,464,000 total amount, in the Copper Export Associations $40,000,000 8% note issue; the associate companies agreeing to transfer 400,000,000 lb. of copper to the Association.

Financial Statement, years ending December 31:

Assets.

	1920	1919	1918	1917
Property	$2,146,950	$2,138,309	$2,134,817	$1,954,811
Expended on equipment.	7,798,844	7,917,784	7,874,936	7,011,797
Expended on development	1,179,987	1,167,939	1,149,534	1,060,979
Investments	1,251,236	1,077,300	579,840	475,640
Deferred charges to Stripping	4,897,207	4,148,531	3,135,663	2,910,197
Materials and supplies...	1,744,854	1,645,125	1,989,990	1,782,130
Accounts and notes receivable	179,951	60,694	508,621	339,144
Copper and ore	5,365,777	5,684,448	4,094,875	5,324,011
Marketable securities....	150	5,309	1,939,921	1,054,898
Cash and cash due for copper	534,401	1,796,825	2,155,012	2,428,794
Total	$25,099,357	$25,642,264	$25,563,210	$24,342,401

Liabilities.

	1920	1919	1918	1917
Capital stock	$4,349,900	$4,349,900	$4,349,900	$4,349,900
Accounts payable	232,529	238,519	723,825	324,176
Accrued taxes, insurance.	1,565,774	1,549,756	1,794,212	1,232,403
Treatment, refining and delivery—not due	315,929	390,091	842,782	576,742
Bills payable	1,750,064	2,569,650	.....	.....
Surplus from sale of securities	2,995,253	2,995,253	2,995,253	2,995,253
Surplus from operations..	13,889,908	13,549,095	14,857,238	14,863,926
Total	$25,099,357	$25,642,264	$25,563,210	$24,342,401

Current Assets and Liabilities:

Assets

	1920	1919	1918	1917
Copper	$4,727,845	$5,279,905	$3,886,176	$5,106,240
Ore	637,932	404,543	208,708	217,771
Accounts receivable, etc..	179,950	60,694	113,621	139,144
Notes receivable	.....	.....	395,000	200,000
Materials and supplies...	1,744,854	1,645,124	1,989,990	1,782,130
Marketable securities....	150	5,308	1,939,921	1,054,898
Cash	385,786	1,320,088	1,000,050	533,525
Cash due for copper.....	148,615	476,737	1,154,962	1,895,269
Total	$7,825,132	$9,192,399	$10,688,420	$10,928,976

Liabilities.

	1920	1919	1918	1917
Current accounts	$232,529	$238,518	$723,825	$324,177
Accrued taxes, insurance, etc	1,565,774	1,549,756	1,794,211	1,232,403
Treatment, refining, and delivery charges—not due	315,929	390,091	842,782	576,742
Bills payable	1,750,064	2,569,650	.....	.....
Total	$3,864,296	$4,748,015	$3,360,818	$2,133,322
Surplus of quick assets	$3,960,836	$4,444,384	$7,327,602	$8,795,656

Income Account:

Years	Metals sold, etc.	Operating expense	Other charges net	Profit	Dividends Paid	Profit or loss
1920	$7,915,981	$6,596,441	.....	$1,319,540	$978,727	$340,813
1919	7,589,414	6,287,617	.....	1,301,797	2,609,940	*1,308,143
1918	17,132,364	13,079,040	145,102	3,908,222	3,914,910	—6,688
1917	19,571,741	9,434,690	624,198	9,512,854	8,612,802	+900,052
1916	19,545,053	6,701,891	315,213	12,527,949	7,177,335	+5,350,614

* Deficit.

Reports for first half of 1921 showed income account, $85,801; plant shut-down expenses, $200,478; operating loss, $357,745.

Dividends: initial in June, 1913, $2.25 being paid in that year; since when $2.50 per share in 1914; $3 in 1915; $8.25 in 1916; $9.90 in 1917; $4.50 in 1918; $3 in 1919, and $1,125 in 1920. Dividends were passed in last quarter of 1920 and first of 1921. The total is $29,991,709.

Property: 214 mining claims (3,604 acres) at Santa Rita, of which 183 claims (3,151 acres) are patented. Also 120 acres of agricultural land adjacent to the mining claims. The mill-site at Hurley, including water-rights and residue-disposal area, totals 10,891 acres.

The property is the old Santa Rita del Cobre mine, which is the oldest copper mine in New Mexico, and the second oldest in the United States, having been opened, 1804, by Spaniards. The property was worked by an American named Pattie, in 1822 and to 1827. It was in possession of a Frenchman from 1828 to 1834, when an American called McKnight, began operations which ceased in 1836. From 1840 to the late fifties, it was in possession of a Spaniard. In 1851 Santa Rita was the headquarters of the American Commissioners of the Boundary Survey. Some time before 1860 four Americans attempted to operate the property. In 1862 Gen. Sibley, of the Texas Confederate force, held the mine. In 1873 M. B. Hayes, acting on behalf of Denver people, succeeded in purchasing the claims, attempting to perfect the title by obtaining U. S. patents, although patents had been refused by the Commissioner of the Land Office in 1870. Hayes' application was turned down in April, 1873. Between that date and the final decision of the Secretary of the Interior in November, 1873, title was obtained by Hayes from the surviving heirs of the original Spanish estate and final U. S. Patent was obtained to the claims covering the Santa Rita del Cobre Grant. Title was acquired by the Chino Copper Co. from the Santa Rita Mining Co., since dissolved.

Geology: Santa Rita is situated in the Central mining district, Grant county, New Mexico, on a branch of the Santa Fe system which connects at Whitewater with the Deming-Rincon division of the same railroad. The orebody and town of Santa Rita are located in a distinct basin and the rocks exposed in the district may be roughly divided as follows: 1, sedimentary; 2, intrusive; 3, extrusive. The sedimentary formation, of which there is a large area in comparison with the intrusive exposures, consists of limestones of more or less purity, and belonging to the sub-carboniferous and carboniferous series, there also being some isolated exposures of Devonian rocks. These beds vary from nearly pure limestones, through cherty limes and shaly limes, to shales. A considerable area of Cretaceous sandstones and shales is exposed through faulting, the former converted into quartzite in the immediate neighborhood of the intrusives. The principal intrusive rocks in the Santa Rita basin are grano-diorite, a quartz-monzonite porphyry, and another of distinct porphyritic texture which may be classed as andesite. This latter rock intrudes the two general types as also the sedimentaries, in sills, lacoliths and dikes. The boundary forming the S. E. side of the Santa Rita basin is composed of two flows,

the principal one being rhyolite and rhyolite tuff overlaying an older flow which is of an andesite nature.

The grano-diorite is intrusive into and across the edges of the sedimentary series, which form a syncline dipping to the south from the northerly bordering ridges toward the lowest point of the basin. The area within the basin has been strongly faulted in wide zones and in two general directions. The intersections of the numerous faults have resulted in a roughly circular shear zone that has a diameter of ¾ of a mile. This zone has been the depository of the valuable copper minerals, chalcocite, cuprite and native copper. Bornite, chalcopyrite and cupriferous pyrites are also found, but to a much lesser extent than the previously named. There also occurs in small restricted areas, malachite and azurite with a very limited amount of chrysocolla.

Development: the old workings, which were very extensive, have been practically eliminated by the steam-shovel operations.

Recent work:

Year	Churn-drilling feet	Overburden moved cu. yd.	Ore mined tons	Ore reserves tons	Copper content per cent	Cost of mining p. t.
1920...	.....	2,522,135	2,332,730	105,689,247	1.530	94.73¢
1919...	924	3,161,381	2,243,346	94,781,525	1.620	92.26
1918...	15,020	3,264,556	3,749,238	96,552,026	1.630	92.81
1917..	22,425	3,712,414	3,607,825	.....	.....	62.93
1916...	13,161	3,564,623	3,216,065	95,555,843	1.656	50.04

Some portion of ore mined is sent to stock piles; a very small amount is shipped direct to smelter.

Equipment: consists of 10 steam-shovels, 27 locomotives, 155 dump cars, of 6 to 20 cu. yd. capacity. Company operates about 24 miles of track, giving access to the pits. There is also a primary crushing plant, equipped with 48"x60" jaw crusher, together with bins for handling and breaking up coarse material loaded by shovels.

Mill: the concentrating plant at Hurley, 9 miles from the mine on the Santa Rita branch of the Santa Fe railway, with original capacity of 5,000 tons per day, was started in October, 1911, but is now equal to 11,000 tons daily, due to improved metallurgical methods, and addition of 2 units, making 7.

The mine has a coarse-crushing plant, consisting of gyratory crushers, 72"x20" Garfield rolls, producing a maximum size of ¾". The mill is equipped with 16"x42" rolls for preliminary grinding and Garfield Chilean mills for final grinding. Roughing treatment consists of Garfield tables, followed by Wilfleys and Richards-Janney classifiers and Isbell vanners. Part of the enlarged mill was set aside for treating 500 tons of partly oxidized ore daily . A 5,000-ton tailing retreatment plant will start as soon as preliminary tests are satisfactory. There are several million tons of material awaiting treatment.

Graphic metallurgical control at the works is described by H. M. Merry in Bull. 153, September, 1919, of A. I. M. & M. E. By means of large wall-charts a daily record of essential data is kept, such as weight of ore milled, assays of headings, tailings, and concentrates, screen analyses, costs, and price of copper. Such presentation is necessary at any plant, or mine, so results may be seen at a glance.

Power plant includes twelve 445-h. p. Heine boilers, three 1,250 k. w. generators, direct-driven by Nordberg Corliss engines, and one 2,000 k. w. Allis-Chalmers turbo-generator set. Primary water is secured from the Apache Tejo Spring, 3½ miles south of Hurley, from underflow of Whitewater draw, Cameron Creek draw and Whiskey Creek draw. There is also

in use a storage reservoir below the mill, the dam forming this reservoir having been built out of mill tailings and having storage area of nearly 3,000 acre feet. Coal is obtained from the mine in the Gallup field of New Mexico.

Settlement at Hurley includes in addition to mill and accessory buildings, office building, store, school, shops and dwellings, town having population of about 3,500 people. Town of Santa Rita, on company ground, has population of over 4,000.

Production:

Year	Tons Treated	Cost per ton in cents Ore	Waste	Mill	%Cu.	%Rec.	Ratio conc.	Lb.Cu.Rec. %Cu. conc.	per t. ore.	lb.Cu. net prod.	Cost per lb. cts.	R'e'd per lb cts.
1912..	1,120,375	.....	.....	.....	2.077	61.63	16.6:1	21.20	24.79	27,776,088	7.69	15.64
1913..	1,942,700	23.13	16.	61.08	2.033	67.31	10.6:1	14.52	27.37	50,511,661	8,787	15.489
1914..	1,907,300	22.13	16.12	55.01	2.115	67.86	12.9:1	18.50	28.70	53,999,928	7.60	13.345
1915..	2,379,800	19.47	16.51	54.19	2.155	66.59	15.0:1	21.55	28.70	64,887,788	7.12	17.420
1916..	3,094,400	20.04	30.00	64.00	1.833	66.59	12.0:1	14.82	24.42	72,319,508	8.7	26.465
1917..	3,608,100	32.93	30.00	103.00	1.640	69.32	13.6:1	15.50	22.70	79,636,235	11.39	24.116
1918..	3,836,400	55.29	37.52	137.00	1.630	63.27	13.4:1	14.25	20.67	75,635,641	14.02	22.536
1919..	1,765,200	47.26	45.00	156.00	1.82	65.67	13.7:1	16.50	23.97	40,488,706	15.31	18.050
1920..	7,838,140	49.73	45.00	143.00	1.76	70.67	12.9:1	16.09	24.93	44,051,849	14.40	17.397

Operations suspended on April 1, 1921, to await improved market conditions. Figures for first quarter of 1921 are: 330,607 tons of ore mined, assaying 1.536% copper; 345,660 tons of 1.69% copper ore treated; net production 8,570,034 lb. of copper at cost of 14.56c.; net operating loss, $53,136. Net production for 2nd quarter of 1921 after smelter deductions was 567,248 lb. with an operating loss of $120,119. Copper is marketed through the new agency of Guggenheim Brothers.

Both property and management are regarded as exceptionally good, and the stock as a very high-grade investment.

CHINO DEL NORTE COPPER CO. **NEW MEXICO**

Address: C. W. Hoyt & Co., 79 Milk St., Boston, Mass. **Mine address:** Geo. E. Coxe, gen. mgr., Hanover, N. M.

Officers: Wm. A. Ulman, pres., 233 Broadway, New York City; with Elmer E. Fox, Mesheck Frost, H. O. Bursom, Geo. E. Coxe, Clarence W. Hoyt, F. Greer Dodd, directors. John H. Leddy, sec.-treas. Wm. H. Janney, cons. engr.

Inc. in Delaware. **Cap.** $3,000,000; $1 par. Stock offered at 50c in 1920.

Owns its properties through ownership of capital stock of El Norte Copper Co., of New Mexico, the operating company. Properties were paid for partly by 110,000 shares, $1 par, of preferred stock of the El Norte Copper Co.

El Norte Copper Co.

All the common stock and all but 11,000 shares of preferred stock of this company, held by Chino Del Norte Copper. The El Norte owns the New Mexico holdings.

Property: 4 separate tracts, 29 claims, 600 acres, and 17 more claims under option near Fierro and Hanover in the Central mining district, Grant county. Tracts cover contact deposits, in part covered by gossan, extensively mined for iron ore.

Development: by 130' Mockley shaft, showing 12' vein with 8 to 12% copper ore; also the Rattler tunnel and workings and several shallow shafts mostly sunk by former owners to get out very high grade oxidized ores, and not carried below water level. Examined by D. C. Sutton.

Idle, 1921.

CLEVELAND & WEATHERHEAD CO. **NEW MEXICO**

See under **Deadwood Mining & Milling Co.** Described in Vol. XIII

CLEVELAND MINE **NEW MEXICO**

Owned by **Empire Zinc Co.**, of Colorado, which see.

Closed down permanently, 1919.

C. O. D. LEASING CO. **NEW MEXICO**

Idle for many years. Probably out of business.

Mine: at Lordsburg. Hidalgo county, N. M. Described in Vol. XII, 1916.

CO-OPERATIVE MINING CO. **NEW MEXICO**

Office: Lordsburg, N. M.

Officers: E. H. Taber, pres.-gen. mgr.; C. A. Ball, sec.-treas.; D. W. Taylor, asst. sec; H. C. Walter, v. p.-mgr.

Inc. 1919, in New Mexico. **Cap.** $250,000; $1 par; increased to $500,000, June, 1921.

Property: a lease and option on 8 claims, 160 acres,(in Gold Hill district, Grant county, said to show argentiferous lead sulphide in 4' fissure vein in monzonite. A body of native silver ore, found 150' from the surface, was said to assay $1,000 per ton. The Yankee Girl claim, purchased 1919, has 3 feet of 15 oz. ore which is being developed.

Development: by 200' incline shaft and 250' of workings. Company estimates reserves at 5,000 tons.

Equipment: 10-h. p. hoist and an 80-ton mill with flotation unit reported in operation, May, 1921, and making a recovery of 91%.

Shipments made during 1921 to El Paso smelters totaled 600 tons and returned $34,200, or an average of $57 per ton. One shipment ran 68.5 oz. silver, 9% lead and $1.75 gold, or $169 per ton. Reported to have shipped 100 tons in November, 1921.

COPPER BELT SILVER & COPPER MNG CO. **NEW MEXICO**

Office: 108 W. 1st St., Magdalena, N. M.

Officers: Hoy Bonnett, pres.-mgr.; J. A. Houghton, v. p.; S. G. Pollack, sec.; W. H. Johnson, treas.

Inc. in Colorado. **Cap.** $175,000; 5c par; selling at 8 cents, May, 1921.

Property: 13 claims, unpatented, 245 acres, 2½ miles N. W. of Magdalena, Socorro county, said to show silver-copper ore with some gold.

Development: mainly assessment work consists of open-cuts with several crosscuts, 200' in length and a 295' double compartment shaft. Equipped with hoist and blacksmith shop.

Reported on, December, 1920, by Paul B. Moore, who recommends a thorough diamond drill exploratory campaign.

CORONA LEAD & SILVER MINING CO. **NEW MEXICO**

Address: Santa Fe, New Mex. **Mine address:** Corona, N. M.

Officers: Ashley Pond, pres.; R. L. Stevens, v. p.; Jas. A. French, sec.-treas., with G. H. McMillan, Francis C. Wilson, Geo. Z. Mellen and L. A. Atkinson, directors. Geo. Z. Mellen, supt.

Inc. April, 1919. **Cap.** $250,000; 25¢ par; 600,000 shares issued, averaging 9¢ per share.

Property: 11 claims, 2 patented, 170 acres in Gallinas Mtns., Red Cloud mining district, Lincoln county ,held partly under lease and bond and partly by location. Ore occurs as lead carbonates and massive galena in fissure veins, 1-8' wide in quartzite, ore averaging 28% lead, 3% copper and 4 oz .silver.

Development: by 210' shaft and about 500' of workings said to block out 160 tons of ore, averaging 35% lead.

Equipment: includes 150 cu. ft. compressor, gas hoist, drills, 3-ton truck and 5 buildings.

Production: in 1920 was 400 tons, containing 15,745 lb. copper, 196,120 lb. lead and 1,348 oz. silver.

Management planned 1,500' of drifting on 200' level and installing larger hoist in 1921.

COSSACK MINING CO. **NEW MEXICO**

Dead. Formerly operated near Bland, N. M. Described in Vol. XIV.

CUCHILLA COMPANY **NEW MEXICO**

Idle. **Address:** c/o Stephen B. Davis, Jr., East Las Vegas, N. M.

Property: 1,500 acres of mineral land between the towns of Lucero and

Guadalupita, Mora county, N. M., slightly developed by tunnels and shafts. Company has been inactive since 1916.

DEADWOOD MINING & MILLING CO. NEW MEXICO

Address: Mogollon, Socorro county, N. M. Earl C. Cleaveland, gen. mgr., P. O. Box 1098, El Paso, Texas.

Inc. in New Mexico.

Property: the Deadwood and Sunburst mines and mill, near Mogollon, showing the Queen, Deadwood and Confidence-Last Chance veins which average 8-10′ in width, extend for 2,500′ through the claims and carry gold-silver ore.

Development: by 500′ shaft and about 500′ of workings.

Equipment: includes 60-ton mill with concentration and cyanide equipment, oil engine, electric hoist, etc.

Production: 44,000 tons of ore since 1905, yielding $325,000.

Property is under option to the **MoGollon Mines Co.**

DIVIDEND MINING & MILLING CO. NEW MEXICO

Defunct and stock valueless. Mine near Estey, Socorro county, N. M. See Vol. XIII.

DONNA DORA MINING CO. NEW MEXICO

Organ, Dona Ana county, N. M. Reorganized as Mineral Hill Mining Co., described in Vol. XIII.

DUNCAN MINING & MILLING CO. NEW MEXICO

Defunct.

Address: C. C. Royall, receiver, Silver City, N. M.

Erected an 80-ton cyanide mill, 1919, but plant closed down December, 1920, and sold at public auction, July 2, 1921. Indebtedness of company given as $142,706. Fully described in Vol. XIV.

ECLIPSE MINING & MILLING CO. NEW MEXICO

Dead or dormant. Last address: Duncan, Ariz., and Steeplerock, N. M.

Officers: Geo. W. Trimble, pres.; Ben. F. Barbour, sec.-treas. and mgr., with W. C. Downey, Wm. O. Olsen, Chas H. Lee, Morgan M. Wilson and C. R. Meyer, directors.

Inc. in Arizona. **Cap.** $1,000,000; shares $5 par; 106,000 shares issued. Annual meeting, first Wednesday in January Is the successor to the Shamrock Mining & Milling Co., described in Vol. XII.

Property: 24 claims, 480 acres in Steeplerock mining district, Grant county, said to show a fissure vein in andesite, from 6-8′ wide with S. E.-N. W. course. Ore is silicious and reported to assay 1.16 oz. gold, 15.1 oz. silver and 6.84% copper.

Development: by several tunnels and shafts.

ECONOMIC MINING & MILLING CO. NEW MEXICO

Dead. Fully described in Vol. XIII.

EDISON MINING & MILLING CO. NEW MEXICO

Probably dead. Mail returned unclaimed from former address, Red River, Taos county, N. M.

EIGHTY-FIVE EXTENSION COPPER CO. NEW MEXICO

Mines at Lordsburg, N. M.

Officers at last accounts: Lester B. Doane, pres.; L. D. McClure, v. p. and gen. mgr.; De Witt Murray, sec.; C. C. Faires, treas., with E. K. Davis, directors.

Inc. in Arizona. **Cap.** $5,000,000; $1 par; 2,000,000 shares paid for property are being held in escrow; 400,000 shares offered the public at 50c each, April, 1917.

Property: 600 acres adjoining the 85 Mining Co.'s ground at Lordsburg, shows several veins along a dike reported to be 75′ wide and traceable for 600′. Ore is silicious and carries gold, silver and copper values.

Development: by 310′ vertical shaft, 265′ air shaft and the Hart shaft 125′ deep, with about 1,700′ of openings. The management (or perhaps we should say the promoters) claimed to have 463,460 tons of ore in sight aver-

aging $13.50 per ton, giving the property a valuation of $6,284,517. This estimate is based on a report by J. L. Wells.

Production: to date 149 cars of ore shipped in former years from the Atwood mine, which netted leasers $40,965.

Property may have merit, but the statements above are in our opinion, not warranted by facts.

EIGHTY-FIVE MINING CO. **NEW MEXICO**

Company dissolved. Fully described in Vol. XIV. Property sold to **Calumet & Arizona Mng. Co.**, which see.

EL CENTRO MINING & MILLING CO. **NEW MEXICO**

Address: Lordsburg, Hidalgo county, N. M.

Officers: E. S. Eno, pres.; Geo. M. Peck, v. p.; R. F. Fitz, sec.-treas., P. O. Box 275 Los Angeles, Cal., with Henry Muntz, Alfred Cole, D. D. Culver and J. A. Rovelstad, directors.

Inc. Nov., 1914, in Arizona. **Cap.** $200,000; $1 par; outstanding 100,000. Company in 1915, bought the Last Chance mine, owned by the Sutton Consolidated Mining Co., and claimed to have produced $135,000 in the past.

Property: 4 claims, 2 patented, 68 acres, in the Pyramid mining district, 8 miles south of Lordsburg, said to show shoots 9-30′ wide of silver-copper ore in a fissure vein in andesite.

Ore reserves: claimed to be 10,000 tons of ore, assaying $4 to $12 per ton.

Development: 275′ vertical shaft with 2,000′ of workings. Mine idle in 1915-1916, but present management resumed operations, 1917. During 1919-'20 mine was operated under lease by **Pyramid Mlg. Co.** In July, 1921, new interests were reported operating the mine.

EL CLIFF MINING CO. **NEW MEXICO**

Probably dead. Mine at Hermosa, N. M. See Vol. XI, Copper Handbook.

EL NORTE COPPER CO. **NEW MEXICO**

George E. Coxe, mgr., Fierro, N. M.

Is the operating company for **Chino del Norte Copper Co.**, which see.

EL PASO MINING & MILLING CO. **NEW MEXICO**

Dead. Formerly operated near Pinos Altos, N. M. Described in Vol. XIV.

EMPIRE ZINC CO. **NEW MEXICO**

Described in Colorado section of this book.

ERNESTINE MINING CO. **NEW MEXICO**

Absorbed, June, 1915, by **Mogollon Mines Co.**, which see.

EXCELSIOR MINING & DEVELOPMENT CO. **NEW MEXICO**

Probably dead. See Vol. X.

FLAG TUNNEL MINING CO. **NEW MEXICO**

Idle and probably dead. **Former address:** Taos, N. M.

Officers: Jose Montanar, pres.; R. F. Oakley, sec.; W. T. Hinde, treas.; L. C. Haberstich, supt.

Inc. March, 1919. **Cap.** $1,000,000; $5 par; 7,000 shares outstanding.

Property: 4 claims, about 80 acres and a tunnel site, 200 acres in the Keystone mining district, Taos county, said to show gold tellurides in several veins.

GARNET COPPER CO. **NEW MEXICO**

Idle several years.

Address. Ohaysi, N. M.

Officers: James H. Parker, pres., and C. Jungk, sec.

Inc. in New Mexico, in 1916. **Cap.** $60,000; shares $1 par.

Company operated the Garnet, Mae Belle, James Fisk and Shoo Fly mines at Ohaysi, Otero county, N. M.

Development: deepest shaft is down 450′. The deposit occurs in garnet-lime zone of altered sedimentaries at porphyry contact, and ore con-

tains copper and gold. Ore was sent to the El Paso smelter. No recent returns received.

GIANT COPPER CO. NEW MEXICO

Officers: F. R. Jones, pres., El Paso; J. L. Burnside, v. p.; D. C. Crowell, sec.-treas.; F. P. Jones, T. L. Lowe, J. Agee, T. W. Carter D. C. Crowell and D. T. White, directors, at last accounts.

Inc. 1917, in New Mexico. **Cap.** $3,500,000; $1 par; 620,000 issued.

Property: 61 claims in the Burro Mountain district, N. M. including those of National Copper Co.

GOLD BELL MINING CO. NEW MEXICO

Dead. See Vol. XIV.

GOLD BUTTES MINING & MILLING CO. NEW MEXICO

Office: Duncan, Ariz.

Officers: G. F. Fraser, pres.; Daniel Fraser, v. p.; John Evans, sec.-treas.; A. Fraser, mgr., with W. Hutchins and M. C. Tilletson, directors.

Inc. Dec., 1915, in Arizona. **Cap.** 750,000 shares; par $1.

Property: 920 acres, divided into 3 groups in the vicinity of Twin Peaks, Steeplerock district, Grant county, N. M., about 20 miles N. E. of Duncan, Ariz. The properties are (1) the Rival Extension group of 9 claims, located on the Rival lode, showing a low grade gold ore; (2) the Twin Peaks group of 26 claims, said to contain gold sulphides; (3) the Dark Thunder group of 120 acres reported to have shipped 30% copper with some silver and gold. Company also owns 50,000 shares of the Rival Mining Co.

Development: at the Rival Extension and Twin Peaks, by a 265′ shaft and 4,000′ of workings; the Dark Thunder has been prospected in several places.

GOLD & COPPER DEEP TUNNEL M. & M. CO. NEW MEXICO

Office: Beaver Falls, Beaver county, Pa. **Mine office:** Elizabethtown, Colfax county, N. M.

Officers: A. T. McIntyre, pres.; G. E. Dachtler, v. p.; W. H. Martin, sec.-treas.; W. P. McIntyre, gen mgr. and supt., with J. M. Richards, directors.

Inc. Oct. 10, 1900, in New Mexico. **Cap.** $500,000; increased 1912 from $200,000, shares $1 par; 282,894 issued. Annual meeting third Tuesday in July.

Property: in the heart of Cimarron range, on the west slope of Baldy mountain, 12,500′ high, comprises 12 claims, 260 acres, in the Moreno district, 18 miles from the St. L. R. M. & P. R. R. at Ute Park. Orebody a contact between slate and monzonite, is developed by 2 shallow shafts and a 2,300′ crosscut tunnel, planned to penetrate the mountain with a final length of 3,500′, cutting 2 bodies of low-grade copper ore. Also said to carry a deposit of molybdenite. Total underground work, 4,400′.

Equipment: includes a 12-h. p. gasoline air compressor and 10 buildings; 20-ton stamp-mill. See U. S. Geol. Survey Prof. Paper, 68 p. 95, for geology of this district.

GOLDEN LINK CO. NEW MEXICO

Dead. Property sold. See Vol. XII and XIII.

GOLDEN LINK MINE NEW MEXICO

Address: Leach & Leach, owners, Cliff, N. M.

Property: 8 claims, about 8 miles S. E. of Mogollon, N. M. Contains gold bearing fissure vein in rhyolite with ore shoot 500′ long and 3′ wide, opened for 400′ high. Ore is free milling and has averaged 1.5 oz. gold and 6 oz. silver per ton.

Development: by 3 tunnels, of 120, 65 and 100′ in length and by 25′ shaft.

Equipment: 50 h. p. hydraulic power plant running 5-ton mill.

GRANT COUNTY COPPER CO. NEW MEXICO

Address: H. T. Link, mgr., Las Cruces, N. M.

Company said to be developing a body of zinc ore, 1½ miles north of

Santa Rita. Mining is by tunnels. A 50-ton mill was constructed in 1919, and was producing a good grade of zinc concentrate at last account.

GREAT EAGLE FLUORSPAR CO. **NEW MEXICO**

Address: Lordsburg, N. M.

Officers: Merton Wentworth, pres.; Alford Roos, v. p.-mgr.; Cyrus Goodrich, sec.-treas. J. Hibbs, supt.

Inc. Sept., 1920, in New Mexico. **Cap.** $100,000; all issued.

Property: the Great Eagle mine on the banks of the Gila river, 31 miles N. of Lordsburg, reported to be the largest fluorspar mine in the west. Ore occurs in a fault breccia in granite with streaks 25 by 1,000′ long and 20′ wide.

Development: by 300′ tunnel to depth of 175′.

Equipment: includes 500′ compressor, 150 h. p. engine, pump, hoist, and 150-ton concentrator. Reserves reported as 60,000 tons averaging 60% fluorspar.

GREAT EAGLE MINING CO. **NEW MEXICO**

Fully described in Vol. XIV. Holdings taken over in 1920 by **Great Eagle Fluorspar Co.**, which see.

GROUNDHOG MINE **NEW MEXICO**

Mine in Grant county, produced 3,169 tons of silver-lead-copper ore in 1918 and 518 tons in 1919. Closed down in 1920.

HANOVER BESSEMER IRON & COPPER CO. **NEW MEXICO**

Fully described under its own title in Vol. XIV. Substantial stock interest owned by the **U. S. Smelting, Refining & Mining Co.** (q. v.), which is in charge, also, of mining operations.

Shipments in 1920 amounted to 244,240 tons, netting the company $36,106.

HANOVER COPPER CO. **NEW MEXICO**

Address: Hanover, Grant county, N .M. Geo. A. St. Clair, pres., Duluth, Minn.; F. T. Walker, mgr.

Inc. 1909. **Cap.** $50,000; shares $10 par.

Property: 18 claims, north of the Chino Copper property. Mine has shafts 70′, 100′ and 150′ deep and tunnels 40′ and 60′ long, showing copper and zinc ores. Equipped with hoist and compressor.

Shipped zinc carbonate ore during 1919.

HANOVER MINES **NEW MEXICO**

Owned by **Empire Zinc Co.** of Colorado, which see.

HARDSCRABBLE MINING CO. **NEW MEXICO**

Company defunct; holdings taken over by the U. S. Copper Co., which see. See Vol. XIII.

HECLA DIVIDE MINING CO. **NEW MEXICO**

Office: 85 Devonshire St., Boston Mass. **Nevada Address:** 321 State Bank and Trust Bldg., Tonopah. **Mine office:** Silver City, N. M.

Officers: Luke B. Colbert, pres.; Frank A. Cashman, v. p.; Harold C. Pratt, sec.-treas.; with Geo. W. Allen and Wm. Forman, directors. P. R. Whytock, mine engr.; F. H. Davis, supt.

Inc. April 3, 1919, in Nevada. **Cap.** $150,000; 10¢ par; assessable; outstanding, $72,504. Two assessments levied up to March, 1921. Transfer agt., Metropolitan Trust Co., Boston; registrar, Old South Trust Co., Boston.

Financial statement: Dec. 31, 1920, shows: assets; cash, $23,147; property, $182,117; administration, $13,467; development, $28,314; total, $249,523. Liabilities; capital stock, $72,504, capital receipts, $105,245; surplus is $71,435.

Property: (1) control of a property near Pinos Altos, N. M. (2) ownership of 4 claims in Divide section, near Tonopah, Nevada.

New Mexico Property: 27 claims, about 500 acres, covers course of proposed Boston tunnel and embraces several old developed mines, including (a) Langston-Silver Hill mine, held by lease from Mexarko Mng. Co. q. v.; (b) Arizona claim; (c) Manhattan group, 10 claims, (d) Boston group. These contiguous claims extend for a distance of about 2½ miles

along the line of the proposed tunnel. The tract shows diorite rocks cut by quartz monzonite, traversed by 10 fissure veins, containing complex lead-zinc-copper ores with gold and silver values. In the Langston vein the ore varies from 16" to 6' wide and is said to average $10.20 gold and 5.66 oz. silver per ton with 1% copper, 7.15% lead and 11.2% zinc. Ore mined, it is said, has averaged $30 per ton.

Development: about 16,000' of old underground work, mostly from shafts on rough mountain sides. The new tunnel will be beneath the Silver Hill mine at 2,900' from the portal and at 800' in depth.

Equipment: adequate and to be supplemented by 150-ton K. & K. flotation mill in 1922.

According to J. H. Shockley, this new Boston tunnel, to be driven beneath the old workings, will open up 675,000 tons of $30 ore with 1,250,000 tons possible ore 1,000' beneath tunnel.

The **Nevada** property was drilled in 1919, but work suspended 1920, as the New Mexico property was already developed.

The **New Mexico** property has merit and when tunnel is completed should become a good producer of milling ore.

HECLA MINING CO., THE **NEW MEXICO**

Office: 652 South Spring St., Los Angeles, Calif. **Mine address:** Lordsburg, N. M.

Officers: R. E. Vandruff, pres.; John W. Wilson, v. p.; W. G. Wilbern, sec.-treas.; O. H. Reinholt, cons. engr.; Franklin W. Smith, of Bisbee, Ariz. geologist; E. K. Davis, gen mgr.

Inc. Oct. 17, 1916, in Nevada. **Cap.** $850,000; shares $1 par; treasury reserve, $200,000; balance used, partly to pay for property and equipment and partly for development. No indebtedness.

Property: 9 claims fully paid for and another, the Bonnie Jean, under option, about 140 acres lying between the 85 and the Octo mines, 3 miles S. W. of Lordsburg, in Hidalgo county, and 2 miles from the S. P. R. R.

Geology: similar to that of the 85 and Octo mines. Country rock is diorite-porphyry. General geology fully described by Lindgren in Prof. Paper 68, U. S. Geological Survey. Outcrops conspicuous and form landmarks, such as Lee's Peak, 500' from the Hecla, frequently mentioned by Lindgren. Gangue very silicious and ore is therefore in demand, for fluxing the basic ores from Bisbee. Sulphides found near the surface. Many mineral varieties occur, but main values lie in copper, gold and silver contents, said to average over $30 a ton before the rise in metal prices.

Development: includes two 300' and several shallow shafts. One of the deeper shafts was to be enlarged, retimbered and deepened. The topography does not lend itself to successful tunnelling.

Equipment: includes 250-h. p. boiler plant, 40-h. p. hoist, 700 cu ft. air-compressor, pumps, etc. No returns received. Presumably idle.

HEMBRILLO COPPER MINING CO. **NEW MEXICO**

Dead; formerly held property in Socorro county, N. M. See Vol. XIII, for full description.

HERMOSA COPPER CO. **NEW MEXICO**

Property sold in 1919, and company out of business.

HILLSBORO DEVELOPMENT CO. **NEW MEXICO**

Operating the Bonanza mine in Hillsboro, or Las Animas district Sierra county. Has 20-stamp flotation mill. Shipped some gold-silver bearing copper ore to El Paso in 1919.

HOP CANYON MINING & SMELTING CO. **NEW MEXICO**

Office: 154 West Randolph St., Chicago, Ill. **Mine address:** Magdalena, Socorro county, N. M. **Registered office:** Oscuro, N. M.

Officers: Alpheus McCallum, pres.; A. Bement, v. p.; E. G. Rafferty, treas.; A. B. Wilson, sec., with A. W. McCallum and Alexander McCallum, directors. J. A. McCallum, supt.

Inc. April, 1906, in New Mexico. **Cap.** $1,000,000; shares $100 par; 8,852 shares oustanding.

Property: 11 claims, 220 acres, 3 miles from Santa Fe R. R., in the Magdalena mining district, shows a shear zone in rhyolite running N. 25° W., with steep dip N. E. Surface shows thin seams of oxidized ore, developed by 1,550′ crosscut tunnel together with shafts and open pits of about 4,000′. Company has expended almost $71,000 on development work. Ore claimed to range from 2.50-47.35% copper, 1.2-219.7 oz. silver and 0.02 oz. to 1.15 oz. gold per ton.

ILLINOIS & SARATOGA MINES — **NEW MEXICO**

Address: C. T. Brown, Socorro, N. M. Mine at Kingston, Sierra county, N. M. Idle many years.

JACK MINING & MILLING CO. — **NEW MEXICO**

Idle and probably dead. The property was known as the Roosevelt group, a former gold mine in Gold gulch, Santa Rita mountains, near Bayard, a few miles S W. of Santa Rita. The ore deposit was said to show both silver-lead and molydenum.

JACKS PEAK TRAMWAY & MNG. CO. — **NEW MEXICO**

Office: Dalhart, Tex. **Mine address:** Ancho, N. M. H. E. McMullan, pres.-gen. mgr.; A. C. Johnson, sec.; Max K. Smith, supt.

Cap. $300,000; no bonded debt.

Company has iron ore properties and operates an 8-mile 36″ tramway, to connect with the E. P. & S. W. R. R., completed Nov., 1920. Earnings are put back into development and construction work.

JARILLA CONSOLIDATED COPPER CO. — **NEW MEXICO**

Dead. Reorganized under name of **Boston & Brice Copper Co.**, which see.

JARILLA COPPER SYNDICATE, INC. — **NEW MEXICO**

Address: Brice, via Oro Grande, Otero county, N. M. Fully described in Vol. XIII.

JOHNNY BULL MINE — **NEW MEXICO**

Property: 3 patented claims, south of Steins Pass, between S. P. and E. P. & S. W. R. R., on western slope of Peloncillo range, shows a contact deposit between limestone and a N.-S. monzonite dike. The ore is said to average 5% copper and to run high in lime and iron.

Development: includes 2 old shafts, 100′ and 150′ deep, with 1,000′ of work, exposing 2 parallel veins, each 20′ wide. Property was formerly owned by the Johnny Bull Copper Mining Co., whose charter was forfeited in 1902.

Production: about 225 tons of 5% ore has been mined to date yielding gold and silver also.

Idle since the death of the owner, W. H. Henry, in 1919.

JUMBO MINING CO. — **NEW MEXICO**

Probably dead.

Office: Deming, N. M. C. W. Lininger supt.

Officers: J. J. Hvatt, pres.; C. J. Kelly, v. p.; E. L. Foulks, sec.-treas.

Inc. 1917. **Cap.** $250,000; shares $1 par; 50,000 treasury shares offered, October, 1917.

Property: in Cook mining district, 25 miles north of Deming and near the Graphic and the Cook Peak mines. Claims show four strong parallel fissure veins in andesite porphyry.

Development: by 250′ shaft showing 2′ vein said to carry high-grade silver-lead ore.

Equipment: 50-h. p. boiler, compressor, 50-h. p. oil engine and 8x10″ steam hoist. No recent returns.

KELLY MINE — **NEW MEXICO**

Owned by **Empire Zinc Co.** of Colorado, which see.

KING & QUEEN COPPER CO. NEW MEXICO

Office: 111 S. Second St., Albuquerque, N. M.; also Trust Bldg., El Paso, Texas.

Officers: J. O. Hamilton, pres.; J. R. Fisk, v. p.; W. K. Ramsey, sec.-treas.; H. F. Perry, supt.

Inc. 1907, in New Mexico. **Cap.** $1,000,000; shares $1 par. El Paso Title Co., El Paso, Texas, registrar.

Property: 14 claims, about 260 acres, 8 miles S. W. of Steins Pass, near the King Kendall and Johnny Bull mines, shows limestone cut by a large N.-S. dike of monzonite porphyry with ore occurring in contact metamorphic deposit of altered garnetiferous limestone. Ore carries a little bornite, chalcopyrite, pyrite, and on the Queen claim, some chrysocolla. It is low-grade, carries zinc and lead, and is hard to concentrate.

Development: by shallow workings showing ore said to average 3½% copper. Property has been worked by lessees for 5 or 6 years. Shipments made to El Paso smelter, 1920.

KING COPPER CO. NEW MEXICO

See same title under Arizona.

LA LUZ COPPER CO. NEW MEXICO

Dead. See Vol. XII.

LAKE VALLEY SILVER MINES CO. NEW MEXICO

Address: Lake Valley, New Mexico. Stauber & Wright, lessees.

Property: a group of 2 claims, at Lake Valley, Sierra county, credited with production of 5,000,000 oz. of silver prior to 1893. Ore occurs in pockets, or chambers in a bed of limestone overlain by shale. The manganese oxides occur as manganite, pyrolusite and wad.

Development: by several shafts to water level, or 150' depth. The mine was reopened in 1917 and to end of 1920 produced 4,676 tons of manganese ore and 94,495 oz. silver, with gross value of $121,379. Deficit for same period was $1,824.

LAS ANIMAS PEAK GOLD MINES CO. NEW MEXICO

Mail returned from former office: 1516 No. American Bldg., Chicago, Ill. **Mine office:** Hillsboro, N. M.

Officers: Hon. E. W. Kirkpatrick, pres.; R. Liebman, v. p.; C. B. Van Deman, sec.-mgr.; W. A. Nason, treas., with L. E. Marvin, W. McCarty Moore and J. H. Palmer, directors. E. B. Van Deman, supt.

Inc. 1914, in Arizona. **Cap.** $1,000,000; shares $1 par; 450,000 issued Annual meeting, third Wednesday in January.

Property: 12 claims, unpatented, 240 acres, 4 miles N. of Hillsboro, Sierra county, shows gold-silver ore in a fissure vein, said to be 3-12' wide, striking N. and dipping 70°. Developed by several shafts to depth of 435'.

Equipment: includes 50-h. p. steam hoist, pump, compressor and mill.

Property was a good producer under former owners, the Philadelphia M. & M. Co., which went into bankruptcy in 1907. Litigation followed and mine remained idle until acquired by present company in 1914. Probably dead.

LAST CHANCE MINE NEW MEXICO

See **El Centro Mining & Milling Co.**

LAWRENCE MINING CO. NEW MEXICO

Dead. See Vol. XIV.

LITTLE HATCHET MINING CO. NEW MEXICO

Address: Hachita, N. M.

Officers: F. W. Lincoln, pres.; J. M. Bader, v. p.; A. E. Bader, sec.-treas.

Cap. $150,000; stock offered at 25¢.

Property: about 399 acres, 11 miles S. W. of Hachita, Grant county, includes the Monte Cristo, Liberty and Vindicator mines, containing copper, gold, and silver. Sinking of 3 shafts is in progress, showing good ore. Equipment installed, 1921.

LONE MOUNTAIN SILVER MINES CO. NEW MEXICO

Address: D. A. Richardson, First Natl. Bank Bldg., El Paso, Tex.

Dead. Formerly owned claims near Silver City. See Volume XIV.

LUCKY GROUP **NEW MEXICO**

Presumably idle. Property fully described in Vol. XIII.

MAMMOTH MINING & MILLING CO. **NEW MEXICO**

Probably dead; formerly at Pinos Altos, Grant county, N. M. See Volume XIV.

MANGAS DEVELOPMENT CO. **NEW MEXICO**

Office: Silver City, N. M. **Mine office:** Tyrone, Grant Co., N. M.

Officers: J. E. Saint, pres.; G. A. Kaseman, v. p.; M. W. Porterfield, sec.-treas., with W. C. Porterfield and R. P. Barnes, directors.

Property: 37 patented claims, in the Burro Mtn. district, adjoining holdings of the Phelps Dodge Corp., and fully described in Vol. XIII.

Drilling operations to be resumed as soon as conditions justify.

MEMPHIS MINING CO. **NEW MEXICO**

Office: 204 Mills Bldg., El Paso, Texas. **Mine office:** Organ, Dona Ana county, N. M.

Officers: J. I. McCullough, pres.; W. N. Small, v. p.; Jas. C. White, sec.-treas. with T. S. Semple and Chas. E. Head, directors.

Inc. 1911, in Arizona. **Cap.** $1,000,000; shares $1 par; 650,000 shares outstanding.

Property: 5 claims, 100 acres, consisting of the Old Memphis mine, Contention and Copper Bow group.

Development: by 4 shafts with about 2,000' of workings. Past shipments said to have averaged 10% copper, 6 oz. silver, and $3 gold per ton.

Property was under lease to Phelps Dodge Corp. at last account.

MEMPHIS RED RIVER MINING CO. **NEW MEXICO**

Address: Box 487, Raton, N. M.

Officers: H. B. Pooler, pres.; W. D. Kershner, v. p.; W. G. Hughes, sec.-treas. J. M. Clarke, F. B. Evans, F. T. Divers, Chas. Frazer, Thos. Gable and J. Kastura, directors.

Inc. June, 1914, in New Mexico. **Cap.** $300,000; $1 par.

Property: 4 claims, patented, 70 acres, in Red River mining district, Taos county, showing a quartz vein 3-6' wide containing gold and silver sulphides surrounded by porphyry.

Development: by tunnels 300', 225' and 175' long. Underground workings total 1,100'. Reserves estimated at 5,200 tons of $12 ore.

Equipment: includes 25-ton mill, with a flotation unit, 6 miles from mine. Management expected to erect mill at mine early in 1921, and to resume development work.

Production: 300 tons of $17 ore up to 1917, when operations were suspended.

MERRY WIDOW MINE **NEW MEXICO**

Operated under lease by Radium Treatment & Sanatorium Co., Silver City, N. M. Owned by Otto Forster and Jack Grissom, Silver City, N. M.

Property: 32 claims, about 640 acres, in White Signal district, Grant county. Ore occurs in a fissure vein in granite porphyry carrying gold, bismuth, copper and tobernite. Developed by shafts to depth of 200'.

MEXARKO MINING CO. **NEW MEXICO**

Is a subsidiary of the **Albany Divide Mining Co.**, which owns 51% of the stock.

Office: Merchant's Bank Bldg., Ft. Smith, Ark. **Mine office:** Silver City, N. M.

Officers: W. E. Clark, pres.; H. C. Pratt, sec., J. I. Groves, treas., with J. L. Adams, O. O. Clark, Geo. Sengol and W. H. Emrick, directors.

Cap. $1,000,000.

Property: the Langston mine in Pinos Altos district, 7 miles from Silver City, Grant county, said to cover the Langston vein for a length of 1680'. The vein carries gold, silver, lead, zinc and copper, samples averaging $30 per ton. Mine is leased on a graduated royalty of 15% to 50% of net returns, by the **Hecla Divide Mining Co.**, which see.

Development: by 200′ shaft, with levels at 100′ and 200′, and drifts on the 200′ level north for 500′ and south for 950′. Mine will be opened by a deep tunnel.

Equipment: hoist, compressor, air drills and flotation plant to be installed according to the plans of the operating company.

MINERAL HILL MINING CO. NEW MEXICO

Dead. See Vol. XIII.

MINERAL MNG. & MLG. CO. NEW MEXICO

J. O. Seth, agent, Santa Fe, N. M. Jas. B. Johnston, supt.

Cap. $50,000. Reported operating in Taos county.

MISER'S CHEST SYNDICATE NEW MEXICO

Idle. Organized by Silver City men to operate the Miser's Chest mine adjoining the Bonney ground at Lordsburg. Developed to depth of 450′, opening up a vein of copper sulphide ore. Twelve carload shipments reported made to El Paso smelter in 1920.

MOFFETT CONS. MINES CO. NEW MEXICO

Property: Virginia mine, in Kingston mining district, Sierra county, said to show a vein 6′ wide, containing ruby and hornsilver. A 400′ adit was being driven (1921) and equipment installed.

MOGOLLON MINES CO. NEW MEXICO

Address: Sidney J. Kidder, gen. mgr.; C. A. Botsford, supt., Mogollon, Socorro county, N. M.

Officers: Frank H. Hitchcock, pres.; O. F. Weber, v. p.; Alfred Levinger, sec.; J. W. Hoban, treas., all of New York City, with J. U. Sebinius, and F. W. Vellacott, directors.

Inc. Dec. 6, 1912, in Maine. **Cap.** $3,000,000; $5 par; $1,778,410 outstanding. New York Trust Co., New York, registrar. Annual meeting, second Monday in October.

Operations for six years (1915-1920), showed a profit of $105,974 of which $77,771 was distributed in dividends. Last dividend distributed in 1915.

Operating loss for 1920 was $8,279. Balance of quick assets, Dec. 31, 1920, was $136,115 and working assets (supplies) $92,260.

Property: 16 claims, 12 patented 216 acres, at Mogollon. In 1915, management absorbed the Ernestine Mining Co., which was organized November, 1902. During 1918, company acquired options on both the Confidence and Deadwood mine, adjoining properties in Mogollon.

Ore: gold and silver sulphide, in quartz veins in andesite and rhyolite, said to average $12 to $15 per ton. Main vein, known as the Last Chance, strikes S. E.-N.-W.; dips 60 to 70° and is 10 to 26′ wide.

Development: incline shaft 980′ below main tunnel, which is 2,972′ long; greatest depth of workings, 1,780′; workings total 34,465′. Shrinkage stoping is used. Main workings are on Last Chance and Top claims.

Equipment: includes electric hoist, compressor, oil engines, electric power, 40-stamp mill and cyanide plant, capacity 160 tons daily.

Production:

	Ore treated, tons	Yield—Gold, oz.	Yield—Silver, oz.
1920	41,895	6,094	324,968
1919	42,756	5,962	301,874
1918	38,566	4,312	203,560
1917	52,222	6,460	344,691
1916	44,904	7,171	371,350

During 1918 plant operated at only part capacity due to water shortage and influenza epidemic; during 1919 and 1920, normal operations were maintained. Property now (1922) operating at full capacity, producing 150 tons daily, and reported making good profits.

MOLYBDENUM CORPORATION OF AMERICA NEW MEXICO

Address: 212 Empire Bldg., Pittsburg, Pa.

Officers: Dr. Geo. Wm. Sargent, pres.; Jos. Weitzenkorn, v. p.-gen.

mgr.; M. B. Rapp, v. p.; Wm. H. Weis, treas.; J. S. Crawford, sec., with Marx Hirsch, C. W. Savery and E. A. Howell, directors.

Inc. 1920 in Delaware, to take over holdings of the R &. S. Molybdenum Mines Co. **Cap.** $5,000,000; $5 par.

Property: about 250 acres near Questa, Taos county. Ore is found as veinlets in altered limestone and monzonite-porphyry. The property is described in E. & M. Journal, Dec. 13, 1919 and in Economic Geology for Nov., 1920.

Development: by 600′ of tunnel work, claimed to have proved a considerable amount of 1% ore. **Equipment:** includes the old Trinidad concentrator with flotation unit, making an 85% concentrate, which is shipped to the company's ferro-molybdenum plant at Washington, Pa. Output for 1919 and 1920 amounted to 3,889 tons of ore, with a recovery of 196,647 lb. of concentrate, running 80% molybdenum sulphide. Receipts for same period were $145,553; expenditures, $153,625; deficit, $8,071.

MONITOR SILVER, LEAD & ZINC M. & M. CO. **NEW MEXICO**

Dead. Former office, McLaughlin Bldg., Santa Fe, N. M. Described in Vol. XIV.

MONTCLAIR MINING CO. **NEW MEXICO**

Address: C. W. Mitchell, agent, Silver City, N. M. J. E. Moss, supt.

Inc. 1920 in Delaware. **Cap.** $200,000.

Property: Cora Miller mine, 16 miles W. of Tyrone, reopened in 1920 and reported under development.

A 35-ton cyanide mill installed and 3 shifts employed, April, 1921.

Produced 2,877 oz. silver from 122 tons of ore in 1920, at a loss of $23,525.

MONTE RICO MINING & MILLING CO. **NEW MEXICO**

Office: 428 Washington Trust Bldg., Washington, Pa. **Mine office:** Lordsburg, Hidalgo county, N. M.

Officers: Lawrence R. Boyd, pres.; F. B. Theakson, v. p.; James V. Boyd, sec.-treas.

Inc. in Arizona. **Cap.** $500,000; $1 par.

Property: 9 claims, 120 acres, in Virginia district, 4 miles S. W. of Lordsburg. Said to show diorite cut by andesite with a mineralized dike, carrying azurite and malachite, succeeded at depth by chalcopyrite. Developed by 840′ tunnel.

Mine was closed in 1916 due to litigation, which was settled in 1921 when work was resumed. Fully described in Vol. XIII.

NATIONAL COPPER CO. **NEW MEXICO**

Dead. Fully described in Vol. XIII.

NATIONAL GOLD & SILVER MINING CO. **NEW MEXICO**

Offices: Unity Bldg., Chicago, Ill.

Officers: M. R. Sherman, pres.; S. W. Winn, sec. Is a close corporation. **Cap.** $3,000,000.

Property: 10 claims, including the Beck mine, 2 miles from Steins, Hidalgo county, developed by 2 miles of workings with a 300′ shaft, showing a 12-18″ vein of gold-silver ore. Vein strikes N. 70° E. and dips steeply northwest.

Equipment: includes 5-drill compressor, hoist, 50-ton mill, blacksmith shop, offices and dwellings.

Mine was worked steadily for several years, and shipments are made at various times to the El Paso smelter.

NEVADA HILLS MINING CO. **NEW MEXICO**

In liquidation. Former address: Gage, Luna county, N. M.

Property: 8 claims, purchased in 1916 for $15,000, in Victoria mining district, near Gage, said to show a vein 20′ wide of tungsten ore in lime formation with quartz gangue, opened on the 40′ level. Developed by 2 shafts, 130′ and 90′ deep. The property was formerly worked for silver

NEW MEXICO TIN & METALS CO. NEW MEXICO

Property: near Cave City and on Taylor Creek, Socorro county, embraces placer and lode claims. Developed by 250′ tunnel in altered rhyolite showing small veins of hematite and cassiterite.

Geologic features described by Hill in Bull. 725-G, p. 353, of the U. S. Geol. Survey, 1921.

NEW MEXICO ZINC & COPPER CO. NEW MEXICO

Address: J. L. Terry, mgr., Hanover, N. M.

Officers: Judge W. H. Winter, pres.; H. O. Bursum, v. p.; J. A. MacDonald, sec.-treas.

Property: 1,200 acres, includes the Mountain Home zinc mines, 11 patented claims, 211 acres, and the Copper Flat group, 52 unpatented claims, covering the extension of the first named group. Holdings are West of Phelps Dodge and Empire Zinc lands, near Hanover.

Geology: contact deposits, shear zones and fissure veins in contact metamorphic areas of altered limestone near monzonite dikes and granitic intrusives masses.

No recent returns received. Probably idle.

NOVEMBER MINING CO. NEW MEXICO

Dead. Formerly operated 12 miles south of Steins Pass.

OAKS CO., THE NEW MEXICO

Address: Alma, Socorro county, N. M. W. J. Weatherby, pres.-gen. mgr.; H. A. Hoover, sec.

Dividends: four 1% dividends were paid on pfd. stock, Dec. 1, 1916; Jan. 1, Feb. 1, March 1, 1917. On April 1, 1917, a 1¼% dividend was declared, payable quarterly on preferred stock.

Operations for 5 years (1915-1920) show a loss of $36,285.

Property: the Pacific, Hub and a portion of the Johnson groups, 500 acres, in the Cooney, or Mogollon district, about 80 miles from Silver City, the nearest railway point. Also has a bond on 300 acres additional, including the Eberle, Deep Down, Maud S., Deadwood and McKinley groups. Company installed a compressor at the Deep Down mine in 1918.

The Maud S. has produced silver-gold ore worth $800,000. The Pacific mine has yielded silver-gold ore to value of $200,000, mostly from above the 250′ level.

The company owns the Oaks tunnel, which starts at Mineral creek and will crosscut the Gray Hawk, Socorro, Pacific and other veins in its 9,800′ length. It will be used as a main drainage and haulage tunnel for the district. Shipments made to the Socorro mill.

OCTO MINING CO. NEW MEXICO

Mine at Lordsburg, Hidalgo county, N. M.

Officers: E. W. Smith, pres.; W. T. Bill, v. p.; F. E. Sanford, sec.; J. W. Wilson, treas.; O. H. Reinholt, cons. engr., with G. W. Foreman, managing director.

Inc. Nov. 15, 1912, in Calif. **Cap.** $500,000; $1 par; issued, 430,000.

Property: 25 claims, 125 acres, 3½ miles S. W. of Lordsburg, N. M., and 2 miles from the S. P. Ry. Geology is similar to that of the Eighty-Five and Hecla mine adjoining and is fully described in U. S. Geo. Survey, Prof. Paper.

Ore: contains copper, silver, and lead. Shipments were said to have netted $28 per ton.

Development: by several old and a 3-compartment shaft, which was deepened to 310′ in 1920.

Equipment: includes 40-h. p. hoist, 6-drill compressor, 200-h. p. boiler plant, etc.

The **Anita Copper Co.**, organized in May, 1921, to absorb the Octo Mining Co., secured a judgment by default for $28,000 against the Octo in December, 1921.

ORGAN MOUNTAIN MINING CO. NEW MEXICO

Office: 204 Mills Bldg., El Paso Tex. **Mine office:** Organ, N. M.

The property, consisting of 340 acres, is located 12 miles N. E. of Las Cruces. N. M., and was owned by the **Bennett Stephenson M. & M. Co.** The mine is credited with a production of about $1,000,000, mainly in lead, zinc, silver and copper. Shipped 2 cars of ore 1919.

The American S. & R. Co. had a lease, which was given up. The Phelps Dodge Corporation took a 5 year lease, which expired in 1921. The Company is fully described in Vol. XIII.

ORGAN ORE CO. **NEW MEXICO**

Address: Organ, N. M.

Officers: W. W. Cox, pres.; J. D. Isaacks, v. p.; L. B. Bentley, sec.-mgr.; Gus. Manasse, treas., with C. T. Seale, directors. L. B. Bentley, mgr.

Inc. April, 1919, in New Mexico. **Cap.** $50,000; $10 par; $30,000 outstanding. Annual meeting July 8th.

Property: the Torpedo mine, about 96 acres, near Organ, Dona Ana county, N. M. Ore occurs in quartz filled fissures from 10-40′ wide, following the porphyry dikes and as contact replacement deposits in limestone and dolomite along a monzonite contact. Assays said to average 8% copper and 3 oz. silver.

Development: includes steam hoist and pump; a 150-ton mill under construction in 1921.

Production: for 1919 and 1920 amounted to 433,520 lb. copper and 1,844 oz. silver. Operating loss was $1,960. Company reports ore reserves at 600,000 tons averaging 4-5% copper per ton.

ORO IRON CO. **NEW MEXICO**

Idle.

Address: Ohaysi, Otero county, N. M.

Officers: Winchester Cooley, pres.; T. M. Wingo, sec.; J. H. Parker, gen. mgr.; Edward Salveson, supt.

Cap. $20,000; shares $1 par.

Property: the Cinco de Mayo, Iron Duke, Iron King, Iron Queen Iron Mask and Laura claims at Ohaysi, developed by surface workings showing hematite and magnetite iron ores.

Equipment: compressor and 5 drills. No recent returns received.

OTERO COPPER CO. **NEW MEXICO**

Dead. Formerly held property near Brice, Otero county, N. M. See Vol. XIII.

OZARK SMELTING & MINING CO. **NEW MEXICO**

Office: 601 Canal Road, Cleveland, Ohio. **Mine office:** Magdalena, Socorro county, N. M. Philip Argall & Sons, of Denver Colo., cons. engrs. Smelter: Coffeyville, Montgomery county, Kans.

Officers: Geo. A. Martin, pres. and gen. mgr.; P. H. Argall, mgr.; L. P. Pressler, supt.; W. S. Stevens, mill supt.; W. E. Corts, smelter supt. The company is a subsidiary of the Sherwin-Williams Paint Co.

Property: includes the Graphic mine, 30 claims, 227 acres, with total holdings of 800 acres in the Magdalena district, showing limestone, shale and quartz, carrying contact ore deposits between limestone and schist, of about 50′ proven width, 500′ length, and known depth of 500′. The upper workings show large quantities of lead and zinc carbonates, ores being mainly smithsonite and sphalerite, with some cerrusite and argentiferous galena, and occasional cuprite and native copper. Ores are mainly low in grade, with principal values in zinc. The ore-shoot, of about 500′ length on the 7th, 8th and 9th levels, is about 100′ wide on the 9th level.

Development: is by a 300′ shaft, and two 1,500′ crosscut tunnels, with about 8 miles of workings, the lower levels showing a slightly argentiferous sulphide complex of zinc, lead and copper.

Equipment: 150-ton mill treats low-grade complex zinc-lead-iron sulphide ore by froth flotation process, using it as an adjunct to older methods of concentration. A 50-ton mill does dry concentration on ores above 20-mesh, and wet concentration on ores below that size. Electric power is used.

Production: mainly zinc ore, is shipped to the works at Coffeyville for the manufacture of lead and zinc oxides, as the base for pigments, of which the Sherwin-Williams Co., in control of this corporation, is one of the largest American manufacturers.

Mill produced a considerable amount of zinc concentrates and lead-zinc sulphide and carbonate, also shipping zinc carbonate ores direct to smelters from the mine, 1920-'21.

PECOS COPPER CO. NEW MEXICO

In liquidation. Fully described in Vol. XIV. Holdings purchased in 1918 by **Pecos Mines Co.**, which see.

PECOS MINES CO. NEW MEXICO

Address: Goodrich, Lockhart & Co., 17 East 42nd St., New York City.

Company in 1918 purchased holdings of Pecos Copper Co., which in 1904 had succeeded the Pecos River Mng. Co.

Property: 15 claims, 573 acres, all patented and 238 acres including valuable coal veins and placer ground, in the Hamilton district, 12 miles from Santa Fe. Holdings include water rights to the Pecos river for 2½ miles, with 2,000 h. p. available for development.

Lands show lower carboniferous limestone. The property carries a contact "vein," vertical, 200′ wide, outcropping for 750′ and lying alongside an altered schistose diorite. The band of shipping ore is 9′ wide with further width of concentrating material. The ore, being complex, is difficult of treatment.

Development: includes 370′ Evangeline shaft. Report by W. E. Burlingame, in 1907, claims 168,304 tons blocked out on four levels. Lessees accomplished much new development and in 1917, ore reserves were reported to be more than double those of 1907, the pay streak having averaged 50′ in width.

Equipment: includes a 165-h. p. steam plant, with 2 hoists, 1 good for 600′ depth; and a 3-drill compressor.

Operations suspended, May, 1921.

PERCHA MINING CO. NEW MEXICO

Mine in Kingston district, Sierra county, was developing with small force steadily in 1919. Produced several cars of lead-copper-silver ore.

PHILADELPHIA M. & M. CO. NEW MEXICO

Dead. See **Las Animas Peak Gold Mines Co.**

PINOS ALTOS M. & M. CO. NEW MEXICO

Dead. Fully described in Vol. XII.

PINTADO CONSOLIDATED COPPER CO. NEW MEXICO

Dead. See Vol. XIII.

PROGRESS MINING CO. NEW MEXICO

Address: L. A. Hohstadt, Douglas, Ariz.

Officers: L. A. Hohstadt, pres.-treas.; John F. Hohstadt, v. p.; Albert Sames, sec., with C. F. Hanson, directors.

Inc. May, 1916, in Arizona. **Cap.** $1,000,000; $1 par; 785,325 shares issued. Stock transferred at company office. Annual meeting 2nd Monday in May.

Property: 8 claims, 152 acres, in process of patent, at Steeplerock, New Mexico, adjoining the Carlisle mine on the N. W., shows quartz monzonite with chalcopyrite stringers and veins. Ore contains copper, gold, silver, lead and zinc.

Development: by 105′ shaft. Closed down since 1918.

PYRAMID MILLING CO. NEW MEXICO

Described in Vol. XIV. Operated a lease on the Last Chance mine of the **El Centro M. & M. Co.**, which see.

RADIUM TREATMENT & SANATORIUM CO. NEW MEXICO

Operates the **Merry Widow** mine, which see.

R. & S. MOLYBDENUM MINES CO. NEW MEXICO

Fully described in Vol. XIV. Company succeeded the Western Molyb-

denum Co. in 1918 and was itself succeeded, 1920, by the Molybdenum Corp'n of America, which see.

RED PEAKS COPPER CO. NEW MEXICO

Mail returned marked "Out of business," in 1921. Former address, Norton, N. M. Fully described in Vol. XIV.

REPUBLIC MINES CO. NEW MEXICO

Mail returned unclaimed from former office: 526 Exchange Bldg., Denver, Colo.

Mine is located at Lucero, Mora county, N. M. Property and operations are fully described in Volume XII and XIII.

REPUBLIC MINING & MILLING CO. NEW MEXICO

Out of business. Fully described in Vol. XIV. Property sold early in 1920 to the **Empire Zinc Co. of Colorado**, which see.

RIVAL MINING CO. NEW MEXICO

Office: Bisbee, Ariz.

Officers: J. M. Ross, pres.; Arthur Notman, v. p.; R. A. Ziesemer, sec.-treas., with E. E. Elinwood, J. F. Frazer, L. R. Budrow, M. J. Cunningham and Robert Rae, directors.

Inc. March 13, 1917, in Arizona. **Cap.** $500,000; $1 par; 275,000 issued. Annual meeting first Monday in March. 25,000 shares sold for $70 the lot in New York on Dec. 8, 1920.

Property: 1 claim, 20 acres, in Steeplerock district, Grant county, N. M.

Geology: quartz vein in andesite, with 70° dip and N. W.-S. E. course.

Ore: carries gold and silver.

Development: by 500′ shaft, and about 2,000′ of workings, which gave encouraging showings.

Equipment: includes hoist, 50 cu. ft. compressor and 100 h. p. gas engine.

Idle since 1919.

ROCKY MOUNTAIN MINES CO. NEW MEXICO

Office: care G. L. Brooks, pres., Albuquerque, N. M. Mine at Cerrillos, Santa Fe county, N. M. H. O. Brooks, sec. and mill supt., and E. L. Grose, directors.

Inc. April 4, 1913, in N. M., to work the Tom Payne mine and other properties. **Cap.** $1,000,000; $1 par; 470,000 issued.

Property: 9 claims, 100 acres, in the Cerrillos district held under lease and bond. Claims show orebodies in zone of crushed monzonite and andesite, averaging 2-5′ in width. Vein said to be continuous for 700′.

Development: by former companies, includes 3 shafts, 60 to 175′ deep, and 3 drift tunnels, 317, 450 and 550′ long, said to show ore carrying 0.30% copper, 8% lead, 14% zinc, 3 oz. silver and $0.03 gold per ton.

Equipment: includes a 12-h. p. hoist, several buildings and concentrator with crusher, 4 Wilfley tables, 2 slime tables. Smelter, 6 miles from the mine, has not been operated by present company. Lead concentrate is shipped to Illinois smelters and zinc concentrate to Kansas and Oklahoma plants. Temporarily closed down.

ROMAHO MINING CO. NEW MEXICO

Address: J. P. Mack, gen mgr., Columbus, N. M.

Property: 8 claims, including the Waterloo mine, in Tres Hermanos district, N. W. of Columbus, developed by 90′ shaft and said to show gold-silver-copper bearing ore.

Equipment: includes 50 h. p. hoist and 500 cu. ft. compressor. Reported developing, 1920-'21.

ROMERO MINING CO. NEW MEXICO

Address: H. C. DeBaca, Las Vegas, N. M.

Company is out of business. Fully described in Vol. XIII.

ROPER GROUP MINING CO. NEW MEXICO

Address: Room 306, 20 Broad St., New York. B. Labows, mgr., Lake Valley, N. M.

Officers: Stephen Thurber, pres.; S. Bendheim, v. p.; Bernard Labows, sec.-treas.-mgr.; with Joseph Heilig, B. Garr, C. H. Harris, R. H. Holley, T. P. Fisher, C. C. Carmany and J. G. Millbourn, directors.

Inc. in Delaware. **Cap.** $1,000,000; $1 par; 150,000 shares in treasury. Security Transfer and Registrar Co., New York, registrar and transfer agent. Stricken from listing on New York Curb, March, 1921.

Property: 14 claims, 225 acres, in Lake Valley mining district, Sierra county, about 7 miles from Lake Valley, said to contain silver and lead ore in a vein 2½-7′ wide in andesite and extending 6,000′ on surface. The district is located between two old producers, the Bridal Chamber and the Graphic mines, which are 25 miles apart.

Development: 2 shafts, 175′ apart, one 525′, and the other 200′ deep, with some lateral workings. Some diamond-drilling has been done. Extensive development was being done 1919-'21.

Equipment: includes 2 boilers, one 40 h. p., the other 100-h. p. a hoist with 800′ of cable, compressors, 5 pumps and necessary buildings. Over $400,000 is said to have been spent on the mine.

Company reported to have taken over the Bully Boy and Webster mines in Bullion canyon, Piute county, Utah, in 1920.

RUBY SILVER MINING CO. **NEW MEXICO**

Address: Lordsburg, N. M.

Officers: L. P. McHalffey, pres.; R. L. McGaugh, of Brownwood, Texas, v. p.; H. B. Elfe, sec.-treas., with L. A. Kimbrough, directors.

Inc. 1920 in New Mexico. **Cap.** $500,000; $1 par; 200,000 shares outstanding.

Property: 9 claims, 160 acres, 13 miles N. E. of Lordsburg, N. M., in the Gold Hill mining district, said to show sulphide ore in quartz veins, 4"-2½′ wide, averaging $8 gold, 90 oz. silver and 20% lead. Adjoins Co-Operative Company's holdings.

Development: by 3 shafts and 800′ of workings to depth of 230′. A 60-h. p. hoist and compressor were to be installed and development carried down to 600′ level in 1921.

SACRAMENTO COPPER CO. **NEW MEXICO**

Address: 310 Two Republics Bldg., El Paso, Texas. **Mine office:** D. C. Sutton, mgr., Tularosa, N. M.

Officers: Ed. Mechem, pres.; Eli Knight, v. p.; R. B. Rawlings, sec.-treas., with W. P. Stiles, T. J. Stafford and J. M. Gale, directors

Inc. March 28, 1916, in New Mexico. **Cap.** $750,000; 50c par; 250,000 issued.

Property: 54 claims, 1,080 acres, 6 miles N. E. of Tularosa, N. M., covering Copper Basin, at head of Coyote creek, at base of White Mtns.

Development: by 200′ incline shaft and various test pits and cuts. The whole area is to be explored by drilling before mine equipment is ordered. It is said that at a depth of 100′ copper ore was cut and 34′ of ore passed through, assaying 1 to 7%; at 400′ there was 10′ of 2 to 9% ore.

SAN LAZARUS MINES CO. **NEW MEXICO**

Idle, or dead. Former address: 2837 Henepin Ave., Minneapolis, Minn. Mine near San Pedro, Santa Fe county, N. M. Property is fully described in Vol. XIII.

SANTA FE GOLD & COPPER MINING CO. **NEW MEXICO**

Office: 11 Broadway, New York City. **Mine office:** San Pedro, N. M.

Property: 279 acres of patented mining claims in Santa Fe county and 31,594 acres of miscellaneous grazing lands comprising the San Pedro grant in Santa Fe, Sandoval and Bernalillo counties and in addition 300 acres of grazing lands comprising the Canon del Agua grant in Santa Fe county.

Is a Lewisohn company, operated while high metal prices prevailed, but whose diminished reserves probably do not warrant working under present operating costs. Fully described in Vol. XIII.

SANTA RITA DEVELOPMENT CO. **NEW MEXICO**

Address: W. W. Lawhon, Commercial Hotel Block, Douglas, Ariz.

Officers: in 1916-17 were W. W. Lawhon, pres.; who with Elmer Morton of San Francisco, D. A. Richardson, El Paso, Tex., and E. C. Bradford of Douglas, were the incorporators. Jas. E. Suits, sec.

Inc. 1916, in New Mexico. **Cap.** $1,000,000; par $1; 900,000 issued.

Property: the Doran group, 3 claims, the Ruddle group, 5 claims and a group of 35 claims located in 1916, on the outskirts of the Chino Copper Co. holdings. Company held the Ruddle group under bond and lease, presumably relinquished, and put up a number of buildings on that tract which holds a vein containing copper ore, 21 cars shipped to El Paso smelter by former operators averaging about 6% copper. The Doran group and adjacent claims cover a belt of disseminated copper ore partially explored by churn drilling, 1916-'17.

Company ran out of funds in 1917 and promoters held most of the stock; no work has been done since and company dormant. Present status unknown. Ground considered worthy of further churn drill exploration.

SAVANNA COPPER CO. **NEW MEXICO**

Address: Henry Hovland, Lonsdale Bldg., Duluth, Minn. Mine near Pinos Altos, N. M. I. J. Stauber and I. L. Wright, lessees.

Inc. September 16, 1908, in Arizona. **Cap.** $2,000,000; $10 par. The company was a merger of the **Copper Gulf Mining Co.** and **Comanche** Mining & Smelting Co and holding all but 320 shares, or 99.36% of the **Co.**, owning in fee simple all property formerly owned by the Comanche Mining & Smelting Co. and holding all but 320 shares, or 99.36% of the stock issue of the Copper Gulf Mining Co. In January, 1919, the company had 149,000 shares of full-paid stock outstanding. Cash balance, February 1, 1919, was about $10,000.

Property: 17 claims 16 patented in the Pinos Altos district, 4 patented claims in the Anderson district, and 1 patented claim in the White Signal district. The claims in the Burro Mountain group sold January, 1916, to Phelps, Dodge & Co., for $700,000, constituted the principal and most valuable holdings. The Comanche group comprised 43 claims. The Copper Gulf group consisted of 1,440 acres. The Jenne group of 4 claims, patented 1910, on the Gila river, 35 miles N. W. of Silver City, is not worked owing to its inaccessibility, and development on the Chloride Flat property has been confined to assessment work.

SENORITO COPPER CORPORATION **NEW MEXICO**

Office: 34 Pine St., New York. **Mine office:** Senorito, Sandoval Co., New Mexico.

Officers: H. B. Walmsley, pres.; W. E. Greenawalt, v. p.; J. A. Kern, sec.; H. W. Webb, treas. J. T. McLaughlin, supt.; with Francis Wilson, directors.

Inc. November, 1916, in New Mexico. **Cap.** $1,250,000, in $1,000,000 common shares at $1 par, and $250,000 cumulative 8% pfd. shares at $10 par, convertible on call at par to common. All common shares are outstanding and 4,100 shares of pfd. are outstanding. Common listed on New York Curb. Empire Trust Co., New York, transfer agent. Annual meeting in November at Santa Fe.

Property: 22 claims, 400 acres, in the Naciemento district, Jemez mountains, 2½ miles from Senorito, N. M. The most important mines are the Eureka mine, consisting of Conglomerate No. 1 and Conglomerate No. 2 beds, and the Copper Glance mine.

Development: considerable tunnelling, etc., exposing a large deposit of low-grade ore. A U. S. Geological Survey report in 1910 said that the ore of the Copper Glance claims consisted of sulphides, carbonates and silicate of copper in white to reddish sandstone or grit. The orebeds aggregate about 100' thick. The average ore will probably be low grade, which also applies to the Conglomerate claims. Management reports about 800,-

000 tons of ore in place and several thousand tons on dump running up to 6% copper in the carbonate ore, also, high grade sulphide ore.

Equipment: includes, a sintering plant, a 50-ton smelter, sawmill, power-plant and necessary buildings.

Leaching trials were made on the ore in 1915 by W. E. Greenawalt of Denver, producing copper at under 5c per lb. including mining and milling Company does not claim to be able, under existing costs, to attain this result. The property was sampled in Oct., 1916, by R. S. Ransford for J. G. White & Co. Late in 1917, a group of strong interests agreed to drill and explore the entire ore beds in consideration of their being granted an option on 501,000 shares, representing control of the company. Exploration commenced in April, 1918, and later it was announced that property contained approximately 3,300,000 tons of ore. Property apparently has considerable merit.

SHERIFF MINING CO. NEW MEXICO

Dead. Formerly mined manganese ore near Rincon. See Vol. XIV

SIERRA CONSOLIDATED MINING CO. NEW MEXICO

Out of business. Property taken over by **Statehood Mines Co.**, both of which companies were reported forced into bankruptcy through incompetent management and spectacular get-rich-quick financing. Mine then operated by the Snake and Opportunity Mines Co., which see.

SILVER GLANCE GROUP. NEW MEXICO

Address: Joseph Oliver, owner, Box 112, Fairview, N. M.

Property: 200 acres, at Mineral Creek, Apache mining district, Sierra county, said to show veins containing 10% copper, and 20 oz. silver per ton. Property is developed by 150′ shaft and about 400′ of tunnelling.

SILVER SPOT MINES CO. NEW MEXICO

Address: Silver City, N. M. R. I. Kirchman, pres.; Frank Light, sec.-treas.

Inc. 1919 in New Mexico.

Property: on Boston Hill, developed by shafts to depth of 150′. Work discontinued December, 1920, owing to large flow of water and lack of funds.

SNAKE AND OPPORTUNITY MINES CO. NEW MEXICO

Address: Jones & Baker, 50 Broad St., New York City, N. Y. **Mine office:** Hillsboro, N. Mex.

Officers: E. F. Carlson, v. p.; E. L. Kerstetter, sec.-treas.; N. C. Sheridan, mgr.

Inc. June, 1919, in Delaware. **Cap.** $1,000,000; $1 par; 1,000,000 shares outstanding. Company is controlled by the Mines Holding and Operating Corporation of New York, through ownership of 650,000 shares of stock.

Property: 28 claims, 5 patented, about 400 acres, near Hillsboro, Sierra county.

Operated 1918-19 and shipped one car of gold ore. Mine closed down in 1920 and equipment moved to the Midnight mine in Idaho, owned by the same interests.

SOCORRO MINING & MILLING CO. NEW MEXICO

Property acquired, 1920, by **American Silver Corp'n**, which see.

STATEHOOD MINES CO. NEW MEXICO

Preceded by the Sierra Consolidated Mining Co. and then taken over by the **Snake and Opportunity Mines Co.**, which see.

STEEPLE ROCK DEVELOPMENT CO. NEW MEXICO

Out of business. Formerly at Steeple Rock, N. M.

Property: the Carlisle and Jim Crow groups, 33 claims, sold to George H. Utter, in 1914, who sold it 1915 to H. K. Welch and S. McKeever, of New York, who organized the Carlisle Mining Co. which went into bankrupty 1918. See Utter, Geo. H.

SUNSET COPPER CO. NEW MEXICO

Probably dead. See Vol. XIII. Former address, care L. M. Stiles, pres., Box 393, El Paso, Texas.

SUSQUEHANNA MINING CO. **NEW MEXICO**

Address: C. J. Plankenhorn, sec., Williamsport, Pa. Company succeeded **North American Copper Co.**, described in Copper Handbook, Vol. XI.

Property: 9 claims, patented, in the Pryamid and Virginia districts, near Lordsburg, containing copper, silver and iron. Part of property has been worked by lessees in recent years, but no reports received. Fully described in Vol. XIII.

TAOS MINING CO. **NEW MEXICO**

Dead. Former address: Twining, N. M. See Vol. XIV.

TEXAS CANYON MINING & MILLING CO. **NEW MEXICO**

Office: C. S. Cleaver, 5427 University Ave., Chicago, Ill. **Mine office:** J. S. Dodd, supt., Organ, N. M.

Officers: E. H. Bickford, pres.; C. S. Cleaver, sec.; H. R. Gottman, treas.; also directors.

Inc. January, 1917, in New Mexico. **Cap.** $100,000; $100 par.

Property: 8 claims in Texas canyon, Organ mountains, 7 miles E. of Organ, Dona Ana county, N. M. Examined by C. M. Becker.

Development: by short tunnels. Ore averages 0.43 oz. gold, 14.05 oz. silver, and 2.3% copper. Faulting is evident through the property. Not enough work done to place any value on mine. No returns securable.

TORPEDO MINE **NEW MEXICO**

Owned and operated by **Organ Ore Co.**, which see.

TRI-BULLION SM. & DEV. CO. **NEW MEXICO**

Office: 45 William St., New York. **Mine office:** Kelly, Socorro county, N. Mex.

Officers: J. O. Wall, pres.; S. W. Traylor, v. p.; with G. C. Van Tuyl, Jr., W. B. Nash, H. V. M. Dennis, Jr., J. M. Henderson, A. S. Somers, S. F. Dominick, Gustavus Taylor and Frank Coenen, directors; D. O. Deyer, sec.-treas.

Inc. 1903, in Arizona. **Cap.** $5,250,000; shares $5 par; in 50,000 participating cumulative 4% stock with 1,000,000 common; issued 6,700 shares preferred and 999,900 shares common. Empire Trust Co., New York, tarnsfer office. Bankers Trust Co., registrar. Stricken from listing on N. Y. Curb January, 1921.

Property: about 115 acres, at Kelly, N. M., including the Nit and Silver Bell groups acquired in 1912. The Nit mine adjoining the Graphic, has an underground connection with the Waldo mine of the Ozark Smelting & Milling Co. The workings of this mine disclose a 50′ vein of 4.7 to 6% copper ore, 454′ E. of the 215′ shaft, in a crosscut from the bottom of a 45′ winze sunk from the bottom level. Company owns also 2 copper and lead claims about 150 acres, known as the Starlight group, in the Stanley Butte district, Ariz.

Income in 1919 from royalty on 808 tons of ore shipped by lessees was $6,066.

The Tri-Bullion Co., suffered a loss of over $32,000 from embezzlement by its former treasurer in 1913-15.

TULAROSA COPPER CO. **NEW MEXICO**

Office: Tularosa, N. M. **Mine office:** Bent, Otero county, N. M.

Officers: E. P. Kern, pres.; H. E. Forrester, v. p.; G. B. Kent, sec. and gen. mgr.; W. F. Drake, treas., with J. A. Thatcher, A. J. Merrill and P. M. Linch, directors.

Inc. March 5, 1905, in New Mexico as successor of Tularosa Mining & Milling Co. **Cap.** $5,000,000; shares $5 par; issued, $3,500,000. Stock listed on New York Curb. Registrar & Transfer Co., New York, transfer office.

Property: 807 acres, 307 acres patented, at Bent, on the Tularosa river. Mine is 12 miles N. E. of Tularosa on the E. P. & S. W. R. R., about 100 miles N. E. of El Paso, Texas.

Geology: the property is underlain by a flat sheet of diorite resting on quartzite and covered in general by the basal sandstone of the Red Beds of the region. This diorite outcrops at the Virginia mine, as the company's workings are called and dips gently in every direction away from this point. The ore is found in the uppermost part of the diorite which is much altered to a depth of 35 to 55' below its surface. This ore bed shows lenses of glance, 2 to 18" wide, running in all directions, which together with stringers and veinlets of ore, make a stockwerk proved to be ore-bearing over an area 200' wide and about 1,200' long. The altered rock between the lenses also carries disseminated copper glance and the ore as a whole averages 2½% copper; 30 to 55' below the diorite surface, the rock is fresh except along fractures; stringers of ore occur, however, at depths of several hundred feet.

Development: at the Virginia mine there is an open pit 60 to 120' across and 35' deep which is opened on the richest part of the deposit. The first level corresponds to the bottom of the pit; the 2nd level is 25' deeper. These workings are said to block out 85,398 tons of ore in an area of 105x 180' in extent. Twelve diamond-drill holes from 88 to 400' deep prospect the ground, and the results form the basis for an estimate of 800,000 tons of indicated ore of an average value of 2½% copper.

Property was to be drilled in 100' squares and the limits of the orebody fully determined. One drill-hole encountered 136' of ore at a depth of 300'.

Equipment: includes a 12,000' ditch, hydro-electric plant, and concentrator of 300 tons capacity.

In a circular published by New York brokers it is stated that Tularosa has all the potent essentials to make just as great and valuable a property as Chino, Ray, Inspiration and Miami and is today practically the one big undeveloped porphyry copper area that shows the existence of a wonderful orebody that needs only development, which was being aggressively pushed.

Compared with other deposits of similar character, this one is, in our opinion, small and the ore bed thin, averaging perhaps 35', while the ore reserves are not large enough to compare with those of any of the copper porphyries. The property does not warrant a large mill.

The orebody may, however extend over a greater area, and a drilling campaign should be made. The new parties in control have had wide experience in mining and possess ample means to test the property thoroughly.

Idle since 1917.

TULLOCH GOLD & COPPER CO. **NEW MEXICO**

Company dissolved and property fully described in Vol. XIII. D. H. Tulloch, owner, Deming, Grant Co., N. M. Developing and reported to have struck radium bearing ore.

TUSA PEAK GOLD & COPPER MINING CO. **NEW MEXICO**

Office: Portage, Wis. Mine and mill at Tusa, Rio Arriba county, N. M. R. H. Owen, pres.; R. J. Rosenfeld, sec.-treas.

Mine has been closed down since 1910. See Vol. XIII for full description.

TYNDALE COPPER MINING CO. **NEW MEXICO**

Inactive or dead. Described in Volume XIII.

Property operated by the Bonney Consolidated Copper Co., which see.

TYRONE-EL PASO COPPER CO. **NEW MEXICO**

Address: 1115 N. Kansas St., El Paso, Texas. **Mine office:** Tyrone, N. M.

Officers: R. M. Dudley, pres.; T. Lia, v. p.; N. F. Work, sec.-treas.; with J. F. Ross, J. H. Maxey, R. K. Bell, H. L. Watson, J. B. DuBase and P. J. Mortinez, directors.

Inc. Nov. 31, 1917, in New Mexico. **Cap.** $1,500,000; $1 par.

Property: 23 claims, 400 acres, 2 miles S. of Tyrone, N. M., said to

show disseminated copper-silver-sulphide ore in porphyry, assaying 3.4% copper and 2 to 6 oz. silver per ton.

Development: by 260′ shaft. No recent returns received.

UNITED STATES COPPER CO. **NEW MEXICO**

Address: Jas. W. McAlpine, Altos, N. M. Jos. T. Janes, supt., Pinos Altos; Wm. P. Fletcher, supt., Hanover, N. M.

Officers: J. W. McAlpine, pres.-treas.; Jos. T. Janes, 1st v. p.; Chas. D. Rones, v. p.; Wm. P. Fletcher, sec.; with N. A. Karsten, directors.

Inc. April, 1911, in New Mexico, as a reorganization of the **Philadelphia Copper Mines Co. Cap.** $1,500,000; $1 par; all outstanding. El Paso B. & Tr. Co., registrar and transfer agent.

Property: totals about 417 acres divided into 2 groups, the first at Hanover, in the Central mining district, consisting of about 79 acres, 7 claims, 2 of which are the townsite of Hanover, the remainder known as the Philadelphia mine; the second group, 9 miles distant, 21 claims, 338 acres at Pinos Altos known as the Hardscrabble mine. Company also owns the Russel Davidson sawmill near the Pinos Altos property.

Development: at Hanover, by 2 main shafts, north, No. 1, and south, No. 2, 200′ and 712′ deep, respectively, together with some minor shafts, and about 4,625′ of workings. Developing with a small force.

Equipment: includes 2 hoists, each capable of reaching 2,500′ depth, steam plant, compressor, pump and sawmill.

Production: from both mines about $201,000 from development and from upper levels by previous operations. Management has made progress in mine development so that the future seems to promise success.

UTTER, GEO. H. **NEW MEXICO**

Office: 1834 E. 2nd St., Long Beach, Calif. **Mine office:** Steeplerock, N. M.

Property: the Carlisle, East Camp, Jim Crow, and Summit group of mines in Steeplerock district, N. M. acquired from the Steeplerock Development Co., which is out of existence.

The Carlisle Group.

Consists of 3 patented claims and millsite, in the Steeplerock Mining district, Grant county, N. M. 15 miles N. E. of Duncan, Ariz. The ore is free-milling gold and silver down to 300′, where it changes, to base ore carrying galena, sphalerite and chalcopyrite with small amounts of gold and silver.

Development: by 500′ shaft with winze to 600′ level, showing a hanging wall vein of concentrating ore, for 200′ in length and 25′ in width.

Equipment: includes a 75-ton concentrator and flotation mill.

Production: in 1918, totaled 2,500 tons yielding 50% lead, 10% zinc, 4% copper, 80c to $2 gold, and 13 oz. silver per ton. Also produced 175 tons of complex zinc-copper ores. Not operated in 1919, but kept unwatered, and part leased to Eastland and others, who opened some good ore. Output in 1920 amounted to 467 oz. gold, 1,284 oz. silver, 1,400 lb lead and 300 lb. copper. Pumps pulled January 1, 1921 and mine workings allowed to fill with water.

East Camp Group.

Consists of 8 claims, patented, 118 acres, Grant county, 18 miles N. E. of Duncan, Ariz. On one of the claims two quartz veins join. The Nugget mine, of this group was operated in 1918.

Development: by shafts, 200 and 300′ deep and some tunnels. Veins from 3-12′ wide contain gold and silver. Property was worked in the 70s, but most of the old workings are now caved.

Jim Crow-Imperial Mines.

Consists of 8 claims, patented, 123 acres, 11 miles N. E. of Duncan, Ariz., but in the Steeplerock mining district, Grant county, N. M. The mine contains a fissure vein with many branches, in eruptive rock. The

vein, about 4' wide carries ore said to assay 0.65 oz. gold and 10 oz. silver per ton.

Development: by four shafts, two of which are 100' deep, the third 200' deep and the last 300' deep, and 2,000' of drifts. **Equipment:** includes 25 h. p. hoist, compressor, 2 gas engines of about 50 h. p., etc.

Production: mine was idle from 1896 to 1914; previous production estimated at $50,000 in gold and silver. Ore shipped in 1915, averaged 0.9 oz. gold and 45 oz. silver per ton.

Summit Group.

Consists of 10 claims, patented, 180 acres, 16 miles N. E. of Duncan, Ariz., in Steeplerock mining district, Grant Co., N. M. Mine shows 2 fissure veins running through the property N. E.-S. W.

Development: by 2 tunnels, 120' and 470' long, a 264' shaft and total workings of 2,000'. Owner reports 2 oreshoots 12'-50' in width, assaying $7 to $8 gold and silver per ton.

The Apex and Ballali gold-silver mines, the former 1½ miles N. W. of the Carlisle, and the Norman King mine, are operated under 2-year lease by Geo. F. Utter. The Minneapolis mine in Gold Hill mining district, developed by 100' shaft, is under option to Thos. A. Lister Lordsburg, N. Mex. The Huedo mine, 18 patented acres, 500' from Fierro R. R. station, developed by 50' shaft in magnetite, containing 5% copper, is not operating.

by 50' shaft in magnetite, containing 5% copper, is not operating.

VICTORIA MINING AND SMELTING CO. **NEW MEXICO**

Bankrupt. Holdings bought by C. J. Boyd of Los Angeles at sheriff's sale, December, 1915.

VICTOR SMELTING & MINING CO. **NEW MEXICO**

Address: Gage, N. M. Company is a close corporation.

Officers: J. T. Duryea, 437 E. 162nd St., New York, pres. N. J. Welsh, manager.

Property: 9 claims, 8 patented, 136 acres, in Victorio mining district, Luna county, 3½ miles south of Gage. Mine was operated by the Hearst-Haggin interests in 1880-1890, and purchased by present company in 1907; worked intermittenly since by leasers. Management describes property as having two veins systems, the primary system being fissures in limestone, paralleling and dipping toward a N. E.-S. W. fault fracture; these are connected with the fault fracture and with one another, irregularly, by a secondary system of veins which strikes N.-S. and dips east. Ore assays 20-25% silica, 20-25% iron and 7-10% lime.

Development: by 300' vertical shaft, 100' incline shaft, and about 4,000' of workings. Company plans to sink a new vertical shaft 500' or 400' below present deepest workings. **Equipment:** includes 2 hoists and compressor.

Production: 452 tons in 1919 and 833 tons in 1920, having gross value of $27,840. Operating loss for 1920 was $4,500.

VOLCANO MINES CO., THE **NEW MEXICO**

Office: Silver City, N. M.

Officers: C. W. Mitchell, pres.; C. C. Royall, v. p.; Jackson Agee, treas.; T. C. McSherry, sec.; with Edw. F. Potter, directors.

Inc. 1921, in New Mexico. **Cap.** $2,000,000; $1 par; 750,000 shares issued for property and services; of 1,250,000 treasury shares, the sale of 750,000 has been authorized. Transfer agent, New York Trust Co., registrar Bankers Trust Co.

Cash and assets on hand, Feb. 15, 1922, total $71,216, with no debts. Stock listed on N. Y. Curb. Sales, April, 1922, at 50c.

Property: 27 claims plus 12 under option in Kimball district, Grant county, 4 miles N. of Steins on S. P. R. R. The main vein is a fault fissure between diorite porphyry and rhyolite; it is reported to be 10' to 50' wide and to outcrop for 7,500'. The ore consists of quartz, and included wall rock, and the rich pay shoot recently opened (1922) is on the footwall side. The value is entirely in silver. A second parallel vein, 1,000' E. of the Volcano, also shows commercial ore.

Development: by 300′ shaft, with 3 levels opening an ore shoot 100′ and 400′ long on the 100 and 300′ levels, respectively. Official estimates of ore reserves give 112,900 tons positive and 316,000 tons probable ore.

Equipment: includes gasoline hoist, etc., installed April, 1922. Electric power is transmitted from Steins, and a 100-ton cyanide plant is contemplated, to handle the large amount of lower grade ore. **Production:** five cars shipped early in 1922 averaged 38.57 oz. silver and $2.58 gold per ton, or $41.15 p. t.

Discovered in 1882, the old Volcano mine is said to have produced several hundred thousand dollars worth of silver, treating oxidized ore in a 10-stamp mill with pans.

WELCH GROUP — **NEW MEXICO**

Owned by **Empire Zinc Co.** of Colorado, which see.

WESTERN MINING & DEVELOPMENT CO. — **NEW MEXICO**

Probably out of business. See Vol. XIII.

WESTERN MOLYBDENUM CO. — **NEW MEXICO**

Property acquired in Nev., 1918, by the R. & S. Molybdenum Mines Co., which was succeeded in 1920 by the Molybdenum Corporation of America.

WHITE OAKS MINES CONSOLIDATED, INC. — **NEW MEXICO**

Mine office: White Oaks, N. M.

Company's officials reported some years ago that "internal dissension arose in the White Oaks Co.'s management, and rather elaborate plans for reopening the mines have apparently been abandoned." Fully described Vol. XIII.

ZORO GOLD & COPPER CO. — **NEW MEXICO**

Address: G. E. Moffett, supt., Alamogordo, N. M.; E. M. McClintock, pres., El Paso, Texas.

Inc. 1916, in New Mexico. **Cap.** $250,000; shares $1; par; non-assessable; 140,000 issued.

Property: 3 claims, 55 acres, in Silver Hill district, Jarilla mountains, Otero county, N. M., said to show a contact deposit in limestone. Ore carries 2.5% copper, 0.1 oz. gold and 1 oz. silver.

Development: about 1,200′ of tunnels.

Production: lessees in 1916 mined ore which contained 120,000 lb. copper. No later returns available.

NEW YORK

Among the states of the Union, **New York** ranks higher in value of mineral products than in area. Iron mining is its chief metal mining industry, seven companies having 1811 employees, producing ore valued at $5,264,443 in 1919. Iron ore production was 871,495 tons in 1919 and 920,009 tons in 1920.

CANOPUS IRON CORPORATION — **NEW YORK**

Offices: Garrison, N. Y., and Phillipstown, Putnam county, N. Y. J. G. Pearse, supt.; E. Maltby Shipp, cons. eng.

Inc. in New York. **Cap.** 100,000 shares; $10 par. Listed on New York Curb, but stricken from list on October 21, 1919. U. S. Corporation Co., transfer agents.

Property: corporation owns in fee the minerals under 140 acres, with the surface in fee of 40 acres, at Phillipstown, Putnam county, N. Y., 3 miles from the Hudson river and from rail, and 49 miles from New York. Examined by G. O. Angell, who endorsed reports of the above named officials.

The ore is magnetite, and deposit outcrops for 2,200′, varying from 40 to 180′ in width. A 2,000-ton shipment averaged 64% iron, 3.27% silica, 0.27% sulphur, and 0.11% phosphorus. Concentrates from low-grade ore contain from 66.01 to 68.95% iron, 2.12 to 4.75% silica, 0.138 to 0.16% sulphur, and 0.025 to 0.037% phosphorus.

Development: in shaft at depth of 165' the orebody is 25' wide, but a thickness of at least 75 to 100', is expected, as magnetic needle readings indicate 180 to 190' in width. Company assumes an average width of 50' at 400' depth, with reserves estimated at 6,000,000 tons. The Forest of Dean mine, due west, has been mined to 1,100' in depth and has shipped ore for over 100 years. Equipment and houses are being erected.

With iron ore at 12c per unit 60% shipping ore is said to be worth $7.20 per ton. Freight to eastern Pennsylvania furnaces is given as $2.25 per ton, while mining and placing ore on cars or boat is $1.70, making total cost of $3.95. On this basis a profit of $292,500 per annum (300 days) is calculated, or a return of 29.25% on capital. The company's shares were extensively traded in on the New York Curb, and the property well advertised, but thus far the share market seems to have received more attention than the mine.

CHATEAUGAY ORE & IRON CO. NEW YORK

Address: Lyon Mountain, Clinton county, N. Y. Jos. R. Linney, mgr.; Chas. W. Carpenter, purch. agent.

Property: at Lyon Mountain, Clinton county, in the Adirondack Mtns. Ore is a standard low phosphorus, assaying 28% iron, .007% phosphorus, .09% manganese. Open pit and under ground methods used.

Equipment: includes magnetic concentration mill.

Production: was 78,597 tons in 1919 and 93,842 tons in 1920.

DOUGLAS, LACEY & CO. NEW YORK

Company was notorious promoter of numerous mining and oil ventures and was in hands of a liquidating organization, known as the Amalgamated Properties, Inc., at last accounts. Mr. Stevens' opinion of this firm and their clever scheme for obtaining money from small investors is fully described in Vol. X, under the title given above and that of the Amalgamated Gold & Copper Co. of Arizona.

GRANT MINE NEW YORK

Mine near Carmel, Putnam county, N. Y. The orebody consists of a complex of arsenical sulphides, carrying copper, quicksilver, gold and iron. The crude ore is estimated to have a gross value of about $25 per ton, but, on account of its refractory nature, has no present commercial value, and cannot be utilized without special metallurgical treatment. Closed down for several years.

HYATT ORE CORPORATION NEW YORK

Address: Hyatt, St. Lawrence Co., N. Y.

Property: 3 miles W. of Edwards, near the holdings of the Northern Ore Co. A 320' shaft said to have opened 15 to 20% zinc ore, carrying pyrite.

Equipment: a 100-ton concentrator was erected in 1920 and operated to end of October.

MATHESON LEAD CO. NEW YORK

A subsidiary of **National Lead Co.**, which see.

NEW YORK PYRITES CO., INC. NEW YORK

Address: Fred T. Rubidge, mgr., 41 Broad St., New York City. O. F. Pattberg, supt., Gouverneur, N. Y.

Inc. 1917, in New York. **Cap.** $100,000; $100 par; all outstanding.

Property: near Gouverneur, St. Lawrence county, contains iron sulphide averaging 25% sulphur.

Development: by 125' shaft and 1,500' of workings. Equipped with electric power 2-ton hoist, 800' compressor, pump, 250-ton mill using wet concentration method and producing a 44% sulphur concentrate. Company began operations in 1919, and treated 47,000 tons of ore in 1920.

NICHOLS COPPER CO. NEW YORK

Office 25 Broad St., New York. **Works office:** Laurel Hill, Queens county, N. Y. Employs about 1,500 men.

Officers: C. W. Nichols, pres.; J. B. F. Herreshoff, v. p.; J. A. Church, Jr., sec.; Walter C. Bennett, treas.; M. E. Harris, auditor.

Inc. May, 1905, in New York. **Cap.** $10,000,000; reduced 1912 to $7,000,000; $1,000,000 preferred stock issued 1914: shares $100 par; bonds authorized, $3,000,000 20-yr. 6% gold debentures, dated Sept. 1, 1912; $2,970,900 outstanding. Is the successor of Nichols Chemical Co.

Dividends: to Oct., 1914, at rate of 6% per annum, paid quarterly on common stock; then a break of 2 years, with a disbursement of 4% in December, 1916.

Works: the Laurel Hill plant includes a smelter and electrolytic refinery with steam and electric power.

The smelter has a Herreshoff water-jacket blast furnace of 600 tons rated daily capacity.

The electrolytic plant is operated on the series system, and has 550 tanks. Anodes are cast. The final product is cast mainly into wire bars. This company enjoys a deservedly high reputation for the purity of its product and the efficiency of its metallurgical practice. Is the second largest electrolytic refinery plant in the world; capacity about 45,000,000 lb. of copper per month.

The works do a very extensive custom refining business, treating mainly ore and matte from outside producers in the smelter, and Western blister copper in the electrolytic plant. The works handle all the bessemer copper from the Phelps-Dodge properties, and from the Old Dominion, Calumet & Arizona, Granby and Ducktown companies, and others. The mining properties at Capelton, Quebec, were taken over by the Albert Copper Co.

NORTHERN ORE CO. **NEW YORK**

Address: Edwards, St. Lawrence county, N. Y.

Officers: T. I. Crange, pres.; W. R. Wade, mgr.; S. A. Brown, mine supt.; O. Cozzens, mill supt.

Inc. in New York and operated as a close corporation.

Property: Brown mine, 650 acres near Edwards, located along a belt of limestone at the contact with gneiss. The formation is cut by various veins and lenses of zinc-pyrite ore. Four of these orebodies, being developed and worked, carry 15 to 20% zinc.

Development: by 900′ vertical shaft and 800′ incline (dip 50°), connected on the 400′ level.

Equipment: includes hydro-elec. power with auxiliary steam-elec. generating plant of 500 h. p. Each shaft is equipped with hoisting plant and ore bins. Surface tramming to the concentrator is done with a gasoline locomotive. A central electrically driven compressor supplies air for both mines. The concentrating mill consists of standard crushing and tabling machinery. The mixed zinc-pyrite concentrate made on the tables is separated into a high-grade zinc blende concentrate and pyrite, both of which products are shipped. The table concentrates assay 32% zinc, and the electric machines' product 49% zinc. The pyrite concentrate contains 43% sulphur.

Production: about 12,000,000 lb. zinc annually, with total output to date of 80,000 tons zinc concentrate and 30,000 tons pyrite.

RAMAPO ORE CO. **NEW YORK**

Address: Sterlington, N. Y.

Property: formerly owned by Sterling Iron & Ry. Co., includes the Scott and Lake mines near Sterling Lake, Orange county, developed by 400′ vertical shaft and crosscuts.

ST. LAWRENCE PYRITES CO. **NEW YORK**

Offices: 41 Broad St., New York, and DeKalb Junction, St Lawrence county, N. Y.

Officers: Rudolf Metz, pres.; F. T. Rubidge, v. p. and gen.mgr.; W. J. Kingsbury, sec.; R. M. Atwater, Jr., treas.; O. F. Pattberg, supt.

Property: located in DeKalb Twp., St. Lawrence county, includes the Stella mines, and is one of the four largest pyrite mines in the U. S.

Ore: pyrite, occurring in lenses or veins in gneiss and schist. The orebodies strike and dip in the same general direction as the gneisses, strike N. E., and dip 20° to 30° N. W. The walls are not sharply defined; the average assay is about 21% sulphur.

Development: by 2 shafts 1,600′ apart on parallel deposits. The north shaft, the Stella, is idle; here the orebody extends 400′ along the strike, averages 10′ in thickness and has been worked to a depth of 900′ on the dip. The operating shaft, the Anna, opened by levels 50′ apart vertically, has an orebody opened for 1,500′ on the strike, and average thickness of 20′. The ore is put through a crusher at the shaft before sending to the mill.

Equipment: includes a 700-ton mill with gyratory crushers, trommels, rolls, jigs, and tables. In cold weather the concentrates, to prevent freezing, are dried in a Ruggles-Coles cylindrical dryer. Concentrate assaying 44% sulphur, is sold to sulphuric-acid manufacturers and to paper mills. Power is electrical, obtained from a hydro-electric company for about $30 per h. p. per year. The property was thoroughly described in E. & M. Journal, April, 1913, p. 689.

Production: approximately 150,000 tons ore per year, yielding about 60,000 tons concentrates.

ST. NICHOLAS ZINC CO. NEW YORK

Practically dead. **Former office:** 37 Wall St., New York City.

Inc. in Delaware. **Cap.** $1,000,000; $1 par. Stockholders authorized the issuance of $70,000 five year 1st. mortgage 6% bonds, June, 1918. The company came to grief in 1918 and the president, W. J. Pierce, leased the holdings to the **Summitville Ore Concentrating Co., Inc.**, presumably without consulting the wishes or interests of the stockholders. The Summitville company of which Pierce was an officer, filed an execution for $44,616 against the Nicholas property with the Sheriff of Sullivan county on March 14, 1918, and despite the efforts of a Stockholders Protective Committee, with offices at 2711 Grand Central Terminal Bldg., New York City, the Leasing company seems to have retained ownership of the mine.

Property: owned 1,050 acres between Summitville and Mamakating, Sullivan county, 90 miles N. W. of New York City.

Geology: fissure vein in sandstone or "grit" beds, which have been tilted to form the Shawangunk range. Fissure dips with slope of hill and bedding of the grits to N. W. about 45°. Ore is chiefly lead and zinc sulphides, with a little copper.

Development: upper workings opened vein 300′ below its outcrop and lower tunnel 800′ lower, a total of 1,100′. Vein is from 1 to 8′ thick and ore 8″ to several feet, averaging 2′ in upper workings.

Kirby Thomas, who reported on the mine in 1916, estimated 8,000 tons of developed ore, 10,000 tons of probable ore and 58,000 tons of prospective ore.

Equipment: 100-ton concentrating mill erected April, 1917.

SUMMITVILLE ORE CONCENTRATING CO., LTD. NEW YORK

Address: Samuel Droshnicop, pres., 530 McDonough St., Brooklyn, N. Y.

Property: owns the former holdings of the St. Nicholas Zinc Co., at Summitville, Sullivan county, originally taken over early in 1918 under a leasing agreement.

Through clever manipulation the minority stockholders of the old company were eventually deprived of their property. No report issued and presumably no work being done. No shipments of silver-bearing lead ore made in 1919, according to the U. S. Geological Survey. See St. Nicholas **Zinc Co.**

TOTTENVILLE COPPER CO., INC. **NEW YORK**

Leo Lowenstein, pres.

Works at Tottenville, Staten Island, N. Y. Has an extensive copper refinery for the production of ingot copper, brass, and bronze alloys, and white metal.

Annual capacity, 200,000,000 lb. Brand is known as "C. T. C." copper.

WILLIAMS HARVEY CORP. **NEW YORK**

Subsidiary of Williams Harvey & Co., Ltd., of England.

Works address: Mill Basin, Jamaica Bay, Brooklyn, N. Y.

Office: 111 Broadway, New York .

Officers: Edward J. Cornish, pres.

Incorporated in U. S. about 1916. National Lead Co. and Simon I. Patino, of Bolivia, each own ⅓ of the capital stock. By this arrangement, National Lead, which had been buying $10,000,000 worth of tin per year, acquires "the best smelting talent in Europe and also an immediate connection with the tin producers on the west coast of So. America."

Company operates a tin smelter in Brooklyn, erected 1917-18, with a capacity of 10 tons of tin per day. Smelting began November, 1918.

WITHERBEE, SHERMAN & CO. **NEW YORK**

Offices: Port Henry, N. Y., and 2 Rector St., New York City. **Mine office:** Mineville, N. Y.

Officers: Lewis W. Francis, pres.; Moses Taylor, v .p.; Geo. C. Foote, v. p.-mgr., with W. C. Witherbee, E. S. Peasley, C. H.McCullough, directors. R. E. Rogers, sec.-treas.; A. M. Cummings, supt.

Founded: 1849. **Inc.** 1901. **Cap** $3,000,000; $100 par; all outstanding; no funded debt. 9,990 shares owned by Lackawanna Steel Co. Regular dividends paid. Annual meeting, 1st Wednesday in March.

Property: magnetite mines in Essex and Clinton counties, and 4 mills (dry magnetic concentration) with a total annual capacity of 1,000,000 to 1,250,000 tons per year, the concentrates averaging 64-66% iron.

Company also owns 7,500 acres of ore land on the north shore of Cuba, which are not being operated (1919).

NORTH CAROLINA

ASHBORO COPPER MINING CO. **NORTH CAROLINA**

Dead. Formerly operated the **Scarlett mine,** N. of Ashboro, Randolph county, N. C., which see. Described in Vol. XII.

BLUE WING MINING CO. **NORTH CAROLINA**

D. M. Hill, sec., 60 Federal St., Boston, Mass.

Company voted to sell all its assets and go out of business, 1917. Fully described in Vol. XII.

CAROLINA CHROME CO. **NORTH CAROLINA**

Company operated chrome deposits at Webster, Jackson county, during 1917-'18.

CAROLINA COPPER CO. **NORTH CAROLINA**

Office: 15 Atwater St., West Detroit, Mich. Mine near Cullowhee, Jackson county, N. C.

Officers: at last accounts, Lewis C. Waldo, pres. and treas.; S. H. Knight, v. p.; Geo. E. Berriman, sec., with S. H. Knight, Geo. W. Clark and F. W Olds, directors.

Inc. Oct. 12, 1901, in Michigan. **Cap.** $2,500,000; $25 par; issued, $1,585,000.

Property: 1,450 acres, freehold, including the Wayehutte mine, shows 4 veins, 27' estimated average width, carrying mainly chalcopyrite, with estimated average values of 3% copper, 4 oz. silver and $1 gold per ton, opened by a 55' shaft and a 200' tunnel. Lands also include an undeveloped water power. Regarded as promising if worked under proper direction.

CAROLINA MINERALS CO. **NORTH CAROLINA**

Operated the old Iola mine near Candor, Montgomery county in 1920.

COPPER KNOB MINE NORTH CAROLINA

Owned by **Monaton Mining Co.** which see.

CULLOWHEE MINING & REDUCTION CO. NORTH CAROLINA

Idle. Cullowhee, Jackson county, N. C.

Officers: at last accounts, S. B. Ezell, pres.; D. D. Davies, v. p.; Thos. A. Cox, sec. and managing director; Chas. Davies smelter supt.

Inc. 1905, as successor of Cullowhee Copper Co.

Property: 1,300 acres, 12 miles from Sylvia, nearest rail point, shows a considerable body of sulphide ore, claimed to average about 5% copper and $4 gold per ton, probably correct for small lots of ore, but cannot be realized from a large tonnage.

Equipment: includes hoists and air compressor, with steam and water power, latter with a plant 3 miles from works. The 30-ton smelter, near Sylvia, blown in January, 1909, with semi-pyritic smelting, suspended operations late 1910, and probably will remain idle until rail connections are secured.

Lessees reported an output of 17 tons of matte from the old slag dump in 1919, yielding 3,334 lb. copper, $20 gold and 19 oz. silver.

GARDNER-HILL MINING CO. NORTH CAROLINA

Company's gold-copper property, 9 miles from Greenboro, N. C., reported sold May, 1919, to H. K. English, of Knoxville.

GOLD HILL CONSOLIDATED CO. NORTH CAROLINA

Office: Room 309, No. 42 Broadway, New York. Mine at Gold Hill Rowan county, N. C.

Inc. as successor of Gold Hill Copper Co., a notorious promotion of the late Walter George Newman known to have caught many Wall Street operators. New company, under same management, became bankrupt and property sold at auction, January 27, 1910, for $45,000. Company does not own the adjacent Union Copper mine.

Property: consisted of 1,050 acres in Rowan and Stanley counties, the Gold Hill mine, where gold was discovered in 1799. Gold quartz veins were discovered 1831, and in 1845 this mine was the largest gold producer in the United States.

Development: by 2 shafts of 615′ and 830′, and 2 lesser shafts. The mine was operated in 1913 and part of 1914. Shipments to the Perth Amboy smelter returned 1.5% copper and about $3 gold per ton, with small silver values. Copper occurs in minute particles of chalcopyrite in hard quartz schist and recovery by wet concentration is not commercially profitable.

Equipment: includes ten 100-h. p. boilers and a 10-stamp mill.

This company and its companion, the Union Copper Mining Co., enjoyed decidedly checkered careers. Operations conducted on a considerable scale, 1901-1903, were unsatisfactory and failed to show up the much advertised orebodies. A receivership ensued which was ended early 1906, but a receiver was again appointed, August, 1906, for the old company, on the application of Newman, on claims aggregating $352.000. In June, 1915, the Court again appointed a receiver for the property, which has been shut down and apparently abandoned by the company.

Mr. Newman evidently used this property solely for stock-jobbing purposes. The mine is considered worked out and low grade, but worthy of some drilling in depth. At best the company could never have paid honest dividends on its capitalization, and under the late management was not regarded as worthy of any confidence whatever.

MOGUL MINING CO. NORTH CAROLINA

Dead. See same title under Nevada.

Property: had a 10-year lease on the Mint Hill mines, Union county, 18 miles from Charlotte, N. C., which was relinquished, 1917. Also controlled the Proskey-Regent mine at Rawhide, Nev., by ownership of the Proskey-Regent Mines Co. See **Seminole-Regent Mining Co., Nevada.**

MONATON MINING CO. **NORTH CAROLINA**

Hopkins, Ashe county, N. C. D. W. Lloyd, mgr., Garren, N. C.

Owns the old Copper Knob mine, 160 acres, freehold, also 90 acres miscellaneous lands, said to show a 30" fissure vein in hornblende slate, carrying carbonate and sulphide ores, mainly bornite. Carload shipments to A. S. & R. Co. of N. J. said to have averaged $15 per ton in gold, silver and copper. The slate wall rock also carries metal. Property was opened 1880. Has steam power, hoist, 2-drill air compressor and a 5-stamp mill.

NORTH CAROLINA TIN CO. **NORTH CAROLINA**

Address: Lincolnton, N. C.

Inc. 1918, to develop property of the U. S. Tin Co., near Lincolnton.

RICH COG MINING CO. **NORTH CAROLINA**

Property: a gold quartz mine, at Eldorado, Montgomery county, under development since 1919.

SALISBURY COPPER CO. **NORTH CAROLINA**

Former address, Gold Hill, Rowan Co., N. C. Mr. T. B. Brown, pres., writes us regarding company. "Dead, buried, all funeral expenses fully paid. No flowers."

SCARLETT COPPER MINE **NORTH CAROLINA**

Address: Frederick R. Thorns, owner, 112 Duane St., New York City, R. I. Dickens, supt., Ashboro, N. C.

Property: at Ashboro, Randolph county, N. C., formerly operated by the Ashboro Copper Mining Co.

Ore: is a sulphide, carrying principally copper and zinc, with iron, alumina, a trace of silver and gold, and occurs in contact and fissure veins, running N. 40° E., with dip of 35°. Pay shoot reported to be from 2 to 5' wide.

Development: by 120' vertical shaft and several tunnels, longest 220'.

Equipment: includes 25-h. p. hoist, compressor, pump and steam power. Prospecting and development work only done since 1917.

TWIN-EDWARDS COPPER MINE CO. **NORTH CAROLINA**

Greensboro, Guilford county, N. C. **Inc.** Sept., 1912. **Cap.** $100,000; shares $100 par.

Owns sundry old properties, including the Twin mine, with an 18' vein, which was worked previous to the Civil War. Property shut down many years,but company understood to be only dormant, not dead.

UNION COPPER MINE **NORTH CAROLINA**

Office: care Alfred Rossiter, administrator, 60 Broadway, New York. **Mine address:** Gold Hill, Rowan county, N. C.

Lands: 550 acres, freehold, about 15 miles from Salisbury, in Rowan and Cabarrus counties, well watered and timbered. The property has schist, carrying 5 veins with average strike of N. 20° E. and practically vertical dip, and 2' to 20' width. Three veins carry copper ores, the other 2, reported to carry silver and gold ores, respectively, are but slightly developed. The copper veins are mineralized zones carrying lenticular shoots of ore, longest about 100' in length.

In 1916, No. 7 and 12 shafts were unwatered to 140' and work started on a shoot of 3% copper ore, which is 5' wide and exposed for 250'. From December, 1916, to April, 1917, ore was shipped from shaft and dumps. Three drill holes near the Big Cut and No. 5 shafts cut 4% sulphide ore.

Development: is on the Big Cut copper vein, trenched at intervals for a distance of about 1 mile, and having 10 shafts, deepest 650'; these shafts show a vein 20' in width. The Big Cut vein shows oxidized ores and a little native copper in the upper workings, succeeded by chalcopyrite, with quartz gangue. Sampling by Dr. A. R. Ledoux, many years ago gave average of 4.40% copper, 4 oz. silver and 40c to $1.20 gold per ton. No. 7 shaft, of 200' depth, shows a vein 4" wide at surface and 3 to 4' wide on the bottom level, where the ore is claimed to average 4.5% copper. There are 14 shafts all

told, and about 5,000′ of workings. The property has been claimed, in the press, to have produced about $1,000,000 worth of gold in early days.

One vein is said to carry zinc ore of low value, but is little developed.

Equipment: machinery plant is extensive and includes a small experimental flotation plant.

Buildings include a machine shop, smithy, engine-house, boiler houses, office buildings, 50-room hotel, dwellings and stable.

OREGON

Oregon is not a great metal-producing State, possibly because its mining districts are as yet but slightly developed, owing largely to inadequate transportation facilities. Most of the mines are in Baker county, whose ore deposits yield 90% of the gold and most of the other metals mined in the state.

There are only about a hundred producing metal mines in Oregon; six of these produce 80 per cent. and one of them 25 per cent. of the total value of the metals produced. These six mines are those of the Baker Mines Co., Cornucopia Mines Co., Homestead-Iron Dyke Co., and the Commercial Mining Co., all in Baker county, and the Queen of Bronze Mining Co., in Josephine county. The only placer mine in this group is the Power River Gold Dredging Co.

In 1921, the mines of the State yielded $775,194 in gold, 43,120 ounces silver, 274,000 lb. copper, and 350 lb. lead, the total value being $852,614, as compared with $1,502,465 in 1920. The companies are described in alphabetical sequence.

ALICE MINE — OREGON

Owner: Gustav Pinson, Prairie City, Ore.

Property: 2 claims near Prairie City, Grant county, said to show irregular deposits of soft gold-silver ore in fissure vein. Orebody dips 50° E.

Development: by 180′ tunnel.

ALMEDA MINES CO. — OREGON

Offices: 1014 Board of Trade, Portland, Ore., and Opera House Block, Grants Pass, Ore. Harry Sordy, supt., Merlin, Josephine county, Oregon.

Officers: S. C. Spencer, pres.; L. E. Crouch, 1st v. p.; Nat P. Ellis, 2nd v. p.; H. E. Thurman, sec.; C. M. Huddle, treas.

Inc. July 28, 1916, in Oregon. **Cap.** $3,500,000; shares $1 par; 3,000,000 shares common, 500,000 shares preferred. Successor to Almeda Consolidated Mines Co. Annual meeting, second Tuesday in April.

Property: 17 lode claims, 340 acres, also 500 acres placer ground, in Josephine county, about 26 miles from Grants Pass, and 17 miles from Merlin, nearest railway station on the Southern Pacific, with daily stage line to Almeda. Lands include a 200-acre town site.

The quartz claims are in three groups known as the Almeda on the north side of the river and the Rocky Gulch and Rand groups on the south side of the river.

The Almeda group consists of 3 claims developed by 5 tunnels and a 535′ shaft, with about 2 miles of underground workings. Orebody estimated by the management to show approximately 2,000,000 tons blocked out for production.

Considerable development work has been done on the Rocky Gulch and Rand groups by tunnels and crosscuts. The main vein is said to be 10′ to 20′ wide on the slate hanging wall, ore being strongly auriferous and slightly argentiferous chalcopyrite. Paralleling the main vein is a body of low-grade ore 20 to 30′ wide, highly silicious, mainly chalcopyrite with occasional bornite, giving promise of greater values at increased depth.

Equipment: consists of a 100-ton blast furnace for matting, distillate engines to develop 225 h. p., compressors, motors, boilers, complete laboratory and all necessary buildings. The 17-mile mountain road from Merlin to

the mine is in good condition and motor trucks operate over it the entire year.

Owing to litigation between factions of the stockholders and the directorate, only a limited amount of development work has been done since 1916.

AMALGAMATED MINES CO. **OREGON**

Office: Baker, Ore.

Officers: W. F .Downie, pres.; W. Burnham, sec.; G. J. Burnham, treas.

Cap. $1,500,000; $1 par; all issued.

Property: 21 quartz claims in Eagle Creek district, Baker county.

AMERICAN ALMADEN QUICKSILVER & GOLD MNG. CO. ORE.

Mail returned from last address: 100½ Fourth St., Portland, Ore.

Officers: W. B. McKinney, pres., E. N. Wheeler, sec.-treas.

Cap. $1,500,000; $1 par; all issued.

Property: 3 claims, 11 miles from Howard, in the Ochoco district, Crook county, developed by tunnels. Ore contains cinnabar in altered andesite.

AMERICAN EXPLORATION CO. **OREGON**

Company dissolved, 1918, and holdings taken over by the **John Hampshire Co.** See Vol. XIV.

ANCIENT RIVER GOLD MNG. CO. **OREGON**

Address: J. S. Taylor, mgr., Rogue River, Oregon.

Property: J. I. Wade, pres.; J. S. Taylor, v. p.-treas.; F. J. Neff, sec., with Edw. Clausen and F. M. Cummings, directors.

Inc. April, 1920, in Oregon. **Cap.** $50,000; $1 par; 34,000 outstanding.

Property: 28 acres placer ground, freehold, in Rogue River Valley, Jackson county. The old Rogue River channel is reported to be 350-500′ wide, with 18-20′ of gravel running $3-$20 per cu. yd. in platinum arsenide and iridium.

Equipment: includes electric line, 75 h. p. pump, motor giant and piping. Developing.

BAKER MINES CO. **OREGON**

Described in Vol. XIII. Consolidated with Cornucopia Mines Co., which see.

BALD MOUNTAIN MINING CO. **OREGON**

Property sold to **Ibex Co.** and company dissolved in 1916.

BEN HARRISON MINE **OREGON**

Address: W. O. Fellows, Sumpter, Ore.

Property: 10 claims, 7,000′ above sea level, in Grant county, 23 miles by road west of Whitney, and 28 miles by road from Sumpter, the nearest railroad stations. Ore occurs in the Ben Harrison vein, strike N. 3° E., dip 67° E., which varies in width from 18″ to 21′, with an average stoping width, where opened, of 77″. The vein is a brecciated replacement in granodiorite. Ore minerals are pyrite, stibnite, chalcopyrite, sphalerite, pyrargyrite, and stephanite, with gold of about equal value to the silver in the ore.

Development: by adits, the lowest at the 600′ level. Several hundred feet of drifting has been done on the various levels and in 1915 there was said to be above the 500′ level, 87,000 tons of ore blocked out on 3 sides, with an average value of $10 per ton.

Equipment: includes 100-ton flotation mill, tube mill, classifier, elevators and settling tanks.

See Mineral Res. of Ore. Vol. 1, No. 4, p. 29. Production figures not available. Operated one shift daily to October, 1920, when labor trouble caused shut-down.

BLACK BUTTE QUICKSILVER MINING CO. **OREGON**

Defunct. Described in Vol. XIV.

BLUE BIRD MINING CO. **OREGON**

Office: 67 N. Third St., Portland. Ore.

Officers: at last accounts, S. M. Carter, Blue River, Ore., pres.; F. W. Brooke, sec.; C. Mareo, treas.

Cap. $100,000; $1 par; fully issued.

Property: Blue Bird mine, 7 unpatented claims, in Sec. 28, T. 15 S., R. 4. E., 6 miles from Blue River. Linn county, said to carry a deposit of oxidized ore, containing gold and silver values and some iron pyrite. Developed by 500′ and 220′ tunnels and several crosscuts. Is a prospect.

BLUE MOUNTAIN MINES CO. **OREGON**

Address: Baker City, Ore. **Mine address:** Bourne, Ore.

Property: the E. & E. mine, long owned by Bourne Mng. Co., transferred, 1919, to the E. & E. Mng. Co. and full control taken over by present company in June, 1921. Mine is on the same line as the Columbia, Taber Fraction, Golconda and North and South Pole. Operated continuously in 1921.

Equipment: installed 1919-'21 is complete and includes a new mill.

BLUE MOUNTAIN MINING CO. **OREGON**

Office: C. L. Arzeno, pres., gen. mgr., 9 E. Fifth St., Covington, Ky **Mine office:** Sumpter, Baker county, Ore.

Inc. in Arizona. **Cap.** $2,000,000; $1 par; 1,373,999 issued. Authorized $50,000 6% bonds; $47,500 outstanding. Annual meeting fourth Friday in April. In May, 1919, the **Imperial Eagle M. Co.** was organized to liquidate the outstanding bonds and other indebtedness of the Blue Mountain company and will eventually take over its holdings.

Fully described in Volume XIII.

BLUE RIBBON MINES GROUP **OREGON**

Y. B. Tardiff owner, Pendleton, Ore.

Property: 4 unpatented claims, 1 mile E. of the Buffalo-Monitor group in Granite district, Grant county, said to carry 4′ quartz vein in slate and granite, the ore assaying $18 per ton in gold and silver.

Development: by 1,030′ tunnel and 1,635′ of drifts with 500 tons of ore reported blocked out. Expended $1,200 in 1918.

BOLEN CREEK MINING CO. **OREGON**

Address: P. J. Neff, Medford, Ore.

Inc. Nov., 1919, in Arizona. **Cap.** $150,000.

Property: a gold placer on Sucker creek, in Holland district of Josephine county, 30 miles W. of Medford. Mine is fully equipped.

BOSWELL MINING CO. **OREGON**

Geo. S. Barton, sec.-treas.

Inc. 1921 in Oregon.

Property: the Boswell mine, 108 acres, on Sucker creek, Holland district, Josephine county, 45 miles S. of Grants Pass, credited with gold production of $46,000 from shallow workings. The purchase price was $150,000. Ore occurs in a quartz vein, 2-4′ wide, with well defined walls of greenstone. The vein is opened to depth of 76′, strikes E.-W. with dip of 75-80° N.

Equipment: includes 3½′ Huntington mill and cyanide plant, 7x9" crusher and 8,008′ tramway.

Production: mill started April, 1921, and to July had shipped 2,500 oz. gold bullion. Tailings are being treated with a reported 95% recovery.

BOULDER CREEK GOLD MINING CO. **OREGON**

Mail returned from former office: 80 Sixtieth St., Portland, Ore.

Officers: R. D. Hewitt, pres., Agness, Ore.; John Gardner, sec.-treas.

Cap. $25,000; $100 par; $21,076 outstanding.

Property: an extensive bar known as the Star group of mining claims, about 240 acres, in Sec.. 25, T. 34, R. 13 W., Ophir district, Curry county, on which $4,800 has been spent in the following improvements: 4,800′ ditch, saw-mill, dam, 1,000′ of piping and 800′ pipe giant. Results of operations not reported.

BRADEN MINE **OREGON**

Operated by C. R. Ray, of Medford, Ore., at last accounts.

Property: S. E. ¼ section 27, T. 36 S., R. 3 W., 3 miles from Gold Hill

Jackson county, opened up about 30 years ago. Largest production for any one year was $30,000 in 1907.

Ore: gold in 2′ vein, N. 30° E., dip 25° S. E. Vein filling is quartz and sulphides Ore assays about $9 gold per ton.

Development: several thousand feet of drift tunnels, longest over 1,200′. For geology, see U. S. G. S., Bull. 546, p. 39.

BRIGHT CARBONATE MINING CO. **OREGON**

Office: 118 East Webb St., Pendleton, Ore. Geo. Darveau, pres.; John Seibert, sec.-treas.

Cap. $60,000; par $1; all outstanding.

Property: 3 claims in the Greenhorn range, Grant county, at an elevation of 7,250′, is reported to carry a quartz vein in granodiorite, containing mainly gold and silver values. Mine but slightly developed and still in the prospect stage.

BUFFALO MONITOR MINE **OREGON**

Operated under lease by Buffalo Development Co., Granite, Ore., at last accounts.

Property: about 5 miles from Granite, in Grant county, reported to have 3 veins, carrying pyrite, chalcopyrite, tetrahedrite, galena and stibnite; the main or Monitor vein is said to be 50′ wide.

Equipment: includes compressor and air drills.

Has been a steady producer.

BURNT RIVER DREDGING CO. **OREGON**

Mail returned from former address: 506 Oregonian Bldg., Portland, Ore. O. E. Tisch, pres.; D. D. Wallace, sec.-treas.

Cap. $250,000; par $1; 39,125 outstanding.

Property: 680 acres, known as the Pomeroy dredging ground 8 miles S. of Durkee in Baker county.

CALIFORNIA MINE **OREGON**

Operated by A. Walker and H. P. Campbell.

Property: 18 miles from Glendale, said to show a vein 4′ in width and averaging $23 in free gold. The ore is white quartz with some pyrite.

Development: by 651′ crosscut at depth of 300′, with 230′ of drifts.

Equipment: 2-stamp sampling mill.

CANYON MOUNTAIN MINING CO. **OREGON**

Address: Jackson Chambers, pres., Canyon City, Ore.

Cap. $1,000,000; $1 par; 876,392 issued.

Property: Mountain View mine, 1¼ miles S. E. of Canyon City, Josephine county, said to carry free milling gold. Developed by 500′ tunnel. Inactive since 1914.

CHETKO COPPER CO. **OREGON**

Idle and probably dead. Mine near Kerby, Josephine county, Ore.

Officers: C. W. Evans, pres. and gen. mgr.; C. C. Hicks, v. p. and supt.; A. E. Shepard, sec.-treas.; Theo. R. Heintz, mgr.

Inc. Aug. 10, 1905, in Arizona. **Cap.** $1,000,000; $1 par; issued 730,516.

Property: 36 claims, 720 acres, fairly timbered, and 2 water rights, in Curry county about 70 miles from Grants Pass, the nearest railroad point Said to show 8 orebodies, one reported by company as of 240′ average width, traceable 1¼ miles, carrying native copper in schist, also covellite, bornite and chalcopyrite, of 9% average copper tenor, with $4.75 gold per ton.

Development: by shafts of 45′, 34′ and 80′, and by 6 tunnels, of 30 to 230′ length, with 969′ of workings, estimated by company to show 600,000 tons of ore, with 115,000 tons blocked out for stoping, which figures are reparded as excessive. Closed down, 1918.

COLUMBIA GOLD MINING CO. **OREGON**

Operated the Columbia gold mine, near Sumpter. Company sold its entire property 1917. Fully described in Min, Resources of Oregon, Vol. 2, No. 4.

COMMERCIAL MINING CO. **OREGON**

Mail returned from former address: 214 Chamber of Commerce Bldg., Portland, Ore.

Cap. $1,750,000; $1 par; 1,666,000 issued.

Property: the Rainbow mine covering the Rainbow vein, a brecciated zone, 5'-50' wide, made of rock fragments cemented by quartz.

Development: by 400' shaft with 1,700' of drifting on vein, on 200' level.

Equipment: 15-stamp mill, with tube mill, Dorr classifier and thickener, etc. The mill is reported to make a recovery of 95%. (See Min. Resources of Oregon, December, 1916, Vol. 2, No. 4, p. 66.)

Production: previous to 1911, the mine produced $242,000. During 32 months ending December 1, 1915, the U. S. Sm. M. & R. Co extracted 95,747 tons of ore averaging $12 per ton and representing $1,083,360 in bullion. The mine was productive until closed down and dismantled in 1918.

CONTINENTAL MINING CO. **OREGON**

W. W. Robbins, pres.; E. J. River, sec.-treas., 1308 Sixteenth St., Spokane, Wash.

Property: 23 miles from Sumpter, Baker county, said to show a vein 18-36" wide with 4-16" of high-grade gold-silver ore.

Developed to depth of 400'.

Equipment: includes 20-ton flotation plant and air-compressor. Developing.

COPPER DYKE MINING CO. **OREGON**

Office: Homestead, Ore.

Officers: Wm. S. Kuhn, pres., Amer. Nat'l Bank Bldg., San Francisco, Cal.; A. S. Humphreys, sec.-treas. Herbert Stone, mgr.

Inc. Oct. 13, 1917, in Washington. **Cap.** $100,000; par 10c; none issued.

Property: MacDougal group, 80 claims 19 patented, 1,600 acres on Snake river, 5 miles N. of Homestead, Baker county, said to show a fissure vein in porphyry, with strike N. 20° W., dip 75° E., containing copper, silver and some gold. Copper occurs as chalcocite and bornite. Mill ore runs 3 to 6% copper, shipping ore 20 to 50% copper.

Development: by 200' incline shaft and 6 tunnels having a total length of 3,340'. **Equipment:** includes steam power, air compressor, etc.

Geology fully described in Min. Res. of Oregon, Vol. 2, No. 4, p. 146.

Shipments made to Tacoma smelter in 1919.

COPPER KING MINING CO. **OREGON**

H. W. Webber, mgr., Placer, Ore.

Property: 8 claims, near Placer, Josephine county, under development, 1918-19, and shipments made to Tacoma smelter.

COPPER SYNDICATE, THE **OREGON**

Address: Geo. Handy, Spokane, Wash.

Property: 6 claims, and a bond on 7 others adjoining the Iron Dyke mine in the Iron Dyke district, Baker county. A branch of the Oregon Short Line runs 400' from the tunnel. Ore carries silver, copper, and a little gold.

Development: by 1,500' of tunnel, crosscuts, and winzes. The crosscuts passed through a large lens of ore in three places in a distance of 800'. It is 20' wide, assaying $27 per ton. A winze is being sunk on this body at 400' from the tunnel portal, at a depth of 200'.

CORNUCOPIA MINES CO. **OREGON**

Officers: Robt. M. Betts, pres.-mgr., Cornucopia, Ore.; J. P. Walsh, v. p.; W. H. Richardson, sec.-supt.; Jos. B. Thomas, treas., 132 E. 19th St., New York City.

Cap. $1,000,000; $10 par; all outstanding.

Property: the Union-Companion mine at Cornucopia, Baker county, Ore., 25 miles from a railroad. Gold was discovered in this district in 1880 and in 1895 the Union-Companion claims, although but slightly developed, were sold for $60,000, and a 20-stamp mill built.

The vein is said to be traceable on surface for 6,800′ with strike of N. 20° E., dip of 45° W., and 2-5′ wide, maximum width 20′. Wall rock is granodiorite and schist. Vein material is massive white quartz containing 3 to 5% of pyrite, which carries the gold. There is some silver sulphide present also appreciable quantities of chalcopyrite, arsenopyrite, and blende. Ore ranges in value from $10 to $20 per ton. Company also owns the Last Chance mine at Cornucopia, formerly operated by the Baker Mines Co.

Development: by incline shafts, with the 800′ the lowest level, said to show 4 ore-shoots having an average width of 3′ and an aggregate length of 1,200′.

Mill: 20 stamps, weight 850-lb. each, making 98 drops per minute through 7″. Ore is crushed in a 4-lb. KCN solution. Stamp duty is 4½ tons per stamp. Fine grinding is done in two 5′x22′ tube mills, each driven by a 75-h. p. motor. The cyanide plant is equipped with Dorr thickeners, 3 Pachuca tanks, and 2 continuous revolving drum filters. An extraction of 87 to 89% of gold and silver is obtained. Average consumption of supplies per ton of ore is cyanide, 1.4 lbs.; lime, 3 lbs.; zinc dust, 0.9lb. Power is furnished by the company's hydro-electric plant, 2 miles from the plant. Current is transmitted at 6,600 volts and transformed to 2,200 volts for use. Cost of treatment is said to be $2 per ton. Company did extensive experimental work on its low grade ores, and erected an additional 20-stamp mill with 125-ton cyanide plant. Both mills are operated 12 hours daily.

Production: estimated at 41,000,000 oz. in gold annually up to time of the war. Operations have since been curtailed. See Min, Res. of Oregon, Vol. II, 4, p. 74.

DOROTHEA GOLD MINES CO. **OREGON**

Address: 122 Oregon Terrace, Medford, Ore.; and J. F. Reddy, Grants Pass, Ore.

Officers: J. F. Reddy, pres.; Lincoln McCormick, sec.; Mary F. Reddy, treas.

Inc. 1916, in Oregon. **Cap.** $50,000; $1 par; all issued.

Property: 200 acres, 120 patented on Coyote creek, Josephine county, Ore. Claims show a contact deposit between serpentine and diorite; the mineralized zone is 2 to 12′ wide dipping 20°, with N.-S. course, the ore containing 30% chromic oxide. Ore shoot is said to be 200′ long and 5′ wide, and to average $5 per ton.

Development: by 500′ crosscut tunnel and 300′ drift on vein, workings amounting to 1,000′ to depth of 170′. Reserves given by company as 8,000 to 10,000 tons.

Equipment: includes a 5-stamp mill and concentrator, expected to make a 65% concentrate. Concentration of low-grade chrome ores is increasing, as less than 40% grade has a narrow market.

ELDORADO COPPER MINING CO. **OREGON**

Address: Andrew Laidlaw, Columbia Bldg., Spokane, Wash.

Incorporators: Andrew Laidlaw, S. W. Miller, C. P. Ritter, F. W. Beyer and Henry Banfield.

Inc. 1916, in Washington. **Cap.** $2,000,000; $1 par. Company organized to take over the Banfield mine, 32 miles east of Riddle, Ore., on the S. P. railway. The price is said to have been $300,000 partly in stock.

Property: 9 claims, formerly owned by the Douglas-Umpqua Mng. Co., said to show nine veins, 3 of which have been developed. Ore estimated to average 4% copper with slight gold and silver values.

Development: by 6 tunnels, lowest 900′ below surface, with about one mile of workings, estimated by management to block out 300,000 tons of ore. This is an old mine which has been under development for 16 years.

EMPIRE GOLD DREDGING & MINING CO. **OREGON**

Office: 250½ Third St., Portland, Ore.

Officers: W. F. Burrell, pres.-mgr.; O. L. Kennedy, sec.-treas.; Chas. H. Timms, supt.

Cap. $100,000; $100 par; $72,000 issued.

Incorporated to rework placer ground in John Day Valley and Canyon Creek, Grant county, credited with past production of $15,000,000 in gold.

Equipment: 6 cu. ft. bucket dredge. Is a small producer that operated throughout 1920.

EQUITY COPPER & GOLD MINING CO. **OREGON**

Mine P. O.: Prairie City, Ore.

Officers: Rev. W. J. Hughes, pres.-treas.-gen mgr.; C. F. Godwin, v p.; Mrs. Kate Palmer, sec., with E. T. Johns, E. J. Hughes, August J. Smith and H. J. Smith, directors.

Inc. 1901, in Oregon. **Cap.** $150,000; 10c par. Paid one dividend of $3,000.

Property: 6 claims, unpatented, 88½ acres, with a 5-acre millsite in the Quartzburg district, 7 miles N. of Prairie City, Grant county. Reported to show several veins, 3 of which are developed by tunnels and are traceable ½ mile. The sulphide ore is estimated by company to average 1.5 to 3% copper with lead, zinc and silver values.

Development: by 3,000′ of tunnels to depth of 375′. **Equipment:** includes 5-stamp amalgamating and concentrating mill, crusher, tables and 3 slime tables.

Total output to date $125,000. Mine worked in a small way by lessees from 1903-1914. Greater depth and more adequate equipment necessary.

EUREKA MINING, SMELTING & POWER CO. **OREGON**

Idle. **Address:** W. E. Howard, sec., 1708 Cedar St., Spokane, Wash.

Property: 40 claims, patented, at Imnaha, Wallowa county, Ore. Secretary reports, property idle for many years, awaiting railway facilities.

FLAGSTAFF MINE **OREGON**

J. H. Sullivan, supt. Baker, Ore., at last account.

Property: in Virtue district, 6 miles N. E. of Baker, Baker county. **Ore:** occurs in quartz fissure veins, with values in small high-grade shoots. The main or Big Ledge vein, 5-8′ wide, runs N. 15° W. with dip of 60° E., and is said to average $16 per ton in gold.

Development: 5,000′ of workings with 760′ three-compartment shaft.

Equipment: 20-stamp mill, cyanide plant, steam power.

Property controlled in Boston, operated intermittently by lessees.

FREELAND CONS. MINING CO. **OREGON**

Dissolved, March 25, 1914. Fully described in Vol. XII. Property reported taken over by **Cons. Copper M. & P. Co.**, also defunct.

GIRAFFE MNG. & MLG. CO. **OREGON**

Officers: at last account, G. Cartright, pres.; A. O. Weatherman, sec.; Grace Nichols, treas.

Cap. $150,000; $1 par; 75,000 issued.

Property: 7 gold claims in Mormon Basin, Baker county, said to show ore occurring in a narrow mineralized porphyry dike cutting argillite, with intrusive bodies of serpentine and dikes of basalt. At 85′ depth, gold bearing ore assaying about $4 per ton was reported cut.

Development: by shaft and tunnel.

GOLCONDA MINE **OREGON**

R. J. Rowan, lessee.

Property: 2 chrome claims, 6 miles N. E. of Takilma, Josephine county.

Ore: occurs in lens shaped masses in serpentine, 33′ thick with N. 15° E. course and dip of 65° E. As usual, with chrome deposits, they are irregular in shape and variable in quantity, but geologic conditions are considered favorable.

In 1918, property was equipped for extensive development, and a production of 5,000 tons of concentrates annually was contracted for with the Atlantic Ore & Alloys Co. of Philadelphia.

Production: 2,000 tons of ore averaging 40% chrome oxide in 1916. In

1918 shipments amounted to 450 tons in May; 1,035 tons in June, and 1,500 tons in July. No recent returns.

GOLD & PLATINUM MINES CO. OREGON

Office: Grants Pass, Ore. I. F. Peck, pres.

Inc. 1916. **Cap.** $1,000,000; $1 par.

Property: 1,280 acres of placer claims on Cave creek, Josephine county, for which dam, flume, sluice-boxes, etc., have been constructed.

GOLD BAR MINE OREGON

Property: placer claims in the Agness district, Illahe, Curry county. Worked intermittently since 1856. Reported sold 1918, to Seattle, Wash. people, who were said to be operating 3 giants and a steam-shovel. Bedrock is black shale; gravel is 9′ thick with 4′ of overburden. Yields have been fair. Property has plenty of water for washing.

GOLD CREEK MINING & MILLING CO. OREGON

Address: Salem, Ore.

Officers: Otto Hansen, pres.; W. I. Staley, sec.-treas.

Inc. in 1902. **Cap.** 3,500,000 shares: $1 par.

Property: 17 claims, 16 miles N. E. of Gates, on S. P. R. R., N. Santiam district, Marion county, said to show massive pyrite, chalcopyrite, galena, and sphalerite, in a vein in andesite.

Development: 1,500′ crosscut tunnel and 1,000′ of drifting on orebodies.

GOLDEN CHARIOT MINING & MILLING CO. OREGON

Mail returned from former address: Sumpter, Ore.

Officers: Chas. Weidemann, pres.; O. E. Conner, Jr., mgr.; Rose Rennekamp, sec.

Inc. in Oregon. **Cap.** $350,000; $1 par.

Property: 400 acres at 4,500′ elevation, 2½ miles from Sumpter, is said to show a fissure vein in limestone. The gold-bearing ore is reported to occur in shoots, 6′ wide on the 210′ level.

Development: to 300′ by vertical shaft, to be sunk another 200′. Core drilling to 500′ below 210′ level; winze below reported in free milling ore.

Equipment: includes 50-h. p. friction hoist, steam-driven compressor, and pumps.

GOLDEN EAGLE MINING CO. OREGON

Office: The Dallas, Ore., J. S. Fish pres.; J. C. Hostetler, sec.-treas.

Cap. $441,000; $1 par.

Property: 8 claims in Greenhorn district, Baker county, Ore. Past production, $75,000. Claims said to show a number of non-persistent fissures; only three of them ore-bearing. No. 2 vein has been followed to depth of 200′, and besides free gold, the ore contains some galena and copper.

Develpoment: by tunnels aggregating 2,600′, to depth of 175′; also shaft 75′ below lowest tunnel . Work to be resumed.

GOLDEN GATE MINING CO. OREGON

In 1917 mine was closed down and equipment sold. Described in Vol. XIV.

GOLDEN RULE CONSOLIDATED M. & M. CO. OREGON

Office: W. C. Winslow, attorney, Salem, Ore. **Cap.** $500,000; shares 5c par.

Property: 26 claims, 15 miles S. E. of Disston, Bohemia district, Lane county, Ore. Idle.

GOLDEN STANDARD MINING CO. OREGON

Probably dead. Described in Volume XIV.

GOLD HILL MANGANESE CO. OREGON

Last address: Grants Pass, Ore.

Out of business. Described in Volume XIV.

GOLD HILL QUARTZ MINING CO. OREGON

Officers: C. R. Ray, pres.-treas.; E. W. Liljegran, sec., at last report.

Cap. $60,000; $100 par.

Property: some claims, 2 miles S. E. of Gold Hill, Jackson county, Ore. Little has been done, save assessment work.

GOLD QUARTZ & PLACER ASSOCIATION OREGON

Address: Jacksonville, Oregon.

Property: the Gold Coin quartz mine and the Pearce and Bowden placer tract. A lower drift was to be extended 800' early in 1922 and a steam shovel added to present "grant" equipment at the placer field.

GOLD REEF MINING CO. OREGON

Office: 957 Stuart Bldg., Seattle, Wash. Mine address Cornucopia, Ore.

Officers: R. H. Parsons, pres.-treas.; Henry C. Field, v. p.; W. H. Habernal, sec.; R. G. Amidon, gen. mgr.

Inc. in Oregon to take over holdings of Queen of the West Mines Co. under bond and lease. **Cap.** $100,000.

Property: 11 claims in the Cornucopia district, Baker county, developed by 2 tunnels cutting the Queen of the West vein on the 50 and 600' levels. The main tunnel is being continued 800' to cut the Red Cross vein. Geology described in Min. Res. of Oregon, 1916, Vol. 2, No. 4, p. 186.

Equipment: 10-stamp mill and concentrator, with 60-ton cyanide plant. Mine and mill are connected by 3,600' aerial tramway.

GOLD RIDGE MINING CO. OREGON

Address: Medford, Oregon.

Property: 8 claims and 120 acres patented ground, 2½ miles from Gold Hill station, on the Southern Pacific R. R.

Development: about 1,100' on three tunnels, opening a small vein of blue quartz carrying pyrite and calcite. The vein runs N. E.-S. W. and dips 75° N. It lies between slate and porphyry and is broken by small faults. The values run from $1 to $9 per ton, for a length of 90' along the lower or No. 4 tunnel, but specimen ore carries high values.

GOLD STANDARD MINING CO. OREGON

Office: Ashland, Ore.

Officers: P. S. Casey, pres.; F. G. McWilliams, sec., at last report.

Cap. $82,000; par $1.

Property: 30 acres, 2½ miles W. of Jacksonville, Jackson county, Ore. Vein supposed to be extension of adjoining Opp mine. No recent returns.

GREENBACK GOLD MINING & MILLING CO. OREGON

Address: Placer, Josephine county, Ore. Mr. Childers, mgr. Owned by R. C. Robinson, Parish, N. Y.; and leased to W. L. Holmes of Buffalo, and H. L. Holmes of Geneva, N. Y., at last account.

Property: 1½ miles N. of Placer, which is 8 miles from Leland (nearest railroad), in Greenback district, said to show a vein of quartz, calcite, and pyrite in greenstone, cut off by serpentine to the east. Ore averages 20" in width, assaying $8 per ton in upper levels.

Development: since 1897 opened by 12 levels to 500' vertical depth. Above No. 9 most of the ore has been stoped. A winze opened the ore below No. 9.

Equipment: largest plant in southern Oregon, consisting of 40 stamps (motor driven), 3 crushers, 12 concentrators, cyanide annex, 7,000' aerial tram, and compressor.

GREYBACK COPPER MINES OREGON

Address: Selma, Ore. John Hampshire, mgr.

Property: 20 claims, 13 miles E. of Selma, in the Waldo district, Josephine county, Ore., purchased in June, 1917, by Twohy Bros. Co., railroad contractors of California and Oregon.

Development: 700' of tunneling has, it is said proved existence of a large copper deposit.

HAMILTON MAMMOTH MINES, INC. OREGON

Reported to have purchased the Belle of Baker & Red Fox properties near Sumpter, in July, 1921.

HECLA CONS. MINING CO. **OREGON**

Former address, Baker, Ore. Probably dead. Described in Volume XIV.

HEPPNER MINING CO. **OREGON**

Office: Heppner, Ore. **Officers:** D B. Stalter, pres.; J. O. Hager, sec.; S. A. Wright, treas.

Cap. $1,000,000; 10c par; $97,458 issued.

Property: 13 claims, in New Eldorado district, Grant county, about 18 miles from Austin, the nearest shipping point. Claims show over a dozen quartz veins from 1-20′ wide, that carry free gold and some pyrite near the surface. No recent returns.

HIDDEN TREASURE GOLD MINING CO. **OREGON**

Officers: F. T. Kelly, pres.; N. M. Kelly, sec.

Cap. $1,250,000; $1 par; 1,090,600 issued.

Property: known locally as I. X. L. mine, 11 claims, near Greenhorn, Grant county, reported to show 3 veins carrying gold ore. Developed by 2 shafts. Idle since 1915.

HIGHLAND MINE **OREGON**

See **National Mines Co.**

HOMESTEAD-IRON DYKE MINES CO., INC. **OREGON**

J. R. Buchanan, gen. mgr., care of Goodrich, Lockhart Co., No. 60 Broadway, New York. D. M. Goodrich, pres.; Charles C. Goodrich, sec.-treas.

Cap. 1,000 shares, all issued.

Operates property of **Iron Dyke Copper Co.**, which see.

HYDRO SIXES MINES CO. **OREGON**

Office: 57 Post St., San Francisco, Cal.

Officers: W. J. Bell, pres.; G. W. Root, sec.; C. J. Pease, treas.

Cap. $70,000; $1 par; all issued.

Property: 1,200 acres placer ground between Otter and Elephant Rock Creek, just below the forks of Sixes River, Curry county. Company uses water under 150′ head, from Big Otter Creek.

Employed 50 men at last accounts. Company spent $100,000 improving and equipping property. Probably idle.

IBEX COMPANY **OREGON**

Address: Sumpter, Ore.

Property: the Ibex and Bald Mountain properties near Granite Creek, Cracker Creek district, Baker county, 8 miles N. W. of Sumpter, Ore.

Development: the work done in the past 15 years consists of about 8,000′ of tunnels, etc., with 3,000′ of it on the gold bearing vein. The vein averages 5′ in width, but has a maximum of 25′. It occurs entirely in argillite, contains sulphides, and is generally low-grade.

IMNAHA MINE **OREGON**

Property: 25 miles N. of Homestead and 40 miles E. of Joseph, the Railroad terminus. Developed by 4,000′ of tunnels, etc. Vein said to be 3½′ wide. Reserves estimated at 50,000 tons of gold ore.

Equipment: 10-ton mill driven by water-power. No recent returns.

IMPERIAL EAGLE MINING CO. **OREGON**

Address: 9 E. 5th St., Covington, Ky. **Mine office:** Sumpter, Ore.

Officers: C. L. Arzeno, pres.-mgr.; Fred B. Salmar, v. p.; Alvin Davidson, sec.-treas., with B. Moeller, Chas. J. Summers, John Arzeno, Robt. Voigt and J. J. Luckey, directors. Alfred Heisler, supt.

Inc. May 8, 1919, in Oregon to take over the holdings of the Blue Mountain Mining Co. and the Imperial Mining Co. **Cap.** $500,000; 2,000 7% pfd. shares, par $100 and 300,000 com. shares, par $1, increased May, 1920, to $250,000, 7% pfd., $100 par and $500,000 common, $1 par; $478,400 subscribed to, $191,100 pfd. and $274,788 com. issued. Company reported $179,225 accts. and bills receivable and $6,271 accts. payable, March 1, 1921. Annual meeting, second Tuesday in March.

Property: a lease on the Imperial Eagle group, 23 patented claims, 225

acres, and Blue Mountain group, 450 acres, in Cable Cove district, Baker county, 10½ miles N .W. of Sumpter.

Ore: occurs in fissure veins in diorite, running E.-W. and dipping in opposite directions. Values are mainly gold, silver, and lead, with a little copper and zinc. Mill ore said to average $9, and shipping ore $30 to $80 per ton. Reserves were estimated by management at $67,364 tons opened up, valued at $670,000.

Development: by 16 tunnels to depth of 690′ with about 15,000′ of workings.

Equipment: amalgamating-concentrating mill of 125 tons daily capacity, steam power, 6-drill compressor being installed.

Shipped to Tacoma smelter in 1919. Mine was closed down during 1920, but operations were resumed in summer of 1921. Company will eventually absorb the Blue Mountain M. Co.

IMPERIAL MINING CO. **OREGON**

Described in Volume XIII. Reorganized 1919, as **Imperial Eagle Mining Co.**, which see.

IRON DYKE COPPER CO. **OREGON**

Office: Homestead, Baker county, Ore.

Officers: F. F. Curtze, pres.; F. A. Brevelier, sec.; A. A. Claus, treas.; J. R. Buchanan, mgr.; Thayer Lindsley, cons. engr.

Inc. in Pennsylvania. **Cap.** $500,000; par $1; 380,000 issued. Erie Trust Co. holds title by trust deed and bond. Worked by Homestead-Iron Dyke Mines Co., Inc., a Goodrich-Lockhart subsidiary.

Property: a copper deposit discovered 1897, about 2,000′ from railroad at Homestead. Lower tunnel, 300′ above town, is about 1,300′ long, cutting the orebody at 800′ in and connected by raise with 3 tunnels above. The mine has several thousand feet of workings. The lower tunnel shows massive chalcopyrite and pyrite ore about 6′ wide, said to extend upward to the upper tunnel. Ore said to contain $2 to $3 gold, 3 oz. silver and 4% copper per ton. Reserves said to be proven by diamond drilling, are estimated to amount to 500,000 tons of a gross value of $10,000,000.

Reopened 1915, after years of idleness, and is largest copper producer of the State. A wide body of 4% ore, with good precious metal content, w opened at a depth of 850′. Late in 1920, it was reported that a large body of 5% copper and $6 gold ore had been opened.

Equipment: includes a 125-ton concentrating plant erected in 1916, using flotation with 93% recovery. Concentrates aggregate about 800 tons a month. About 90 men employed.

Mine is a steady producer and apparently has a promising future. Shipments were discontinued, January, 1921, owing to low price of copper and the closing down of the smelters, but development work is to be continued.

JOHN HAMPSHIRE COMPANY **OREGON**

Address: John Hampshire, Grants Pass, Ore. **Mine address:** Waters Creek, Oregon.

Inc. 1918. Succeeds the American Exploration Co. and owns holdings of the Waldo Sm. & Ref. Co. and the Takilma Sm. Co.

Property: Queen of Bronze mine and Waldo mine, near Takilma. Waldo district, Josephine county. Geology fully described in Min. Res. of Oregon. Bull. 2, No. 4, 1916, pp. 184-230.

Equipment: includes smelter with 125-ton water jacket blast furnace and 50-ton waldo mill. Both properties are old and regular producers Shipments made to the Tacoma smelter in 1919, said to average 8½% copper in 1919.

KOEHLER MINE **OREGON**

Address: A. Koehler, Baker, Ore.

Property: in the Virtue district, 4½ miles from Baker, was a producer of high-grade antimony ore in 1915. Has a well-defined vein, up to 10′ in width, carrying massive and disseminated stibnite, together with gold values.

Output to date is said to be $15,000, and mine still contains considerable ore.

LA BELLEVUE MINE — **OREGON**

Address: T. S. Kennerly, mgr., Prairie City, via Granite, Ore.

Is an old mine, reopened 1921, with a large body of low grade gold ore milled in new plant, under construction late in 1921.

LAST CHANCE MINE — **OREGON**

Owned by **Cornucopia Mines Co.**, which see.

LEWIS & CLARK M. & M. CO. — **OREGON**

Officers: Mann Palmer, pres., Silverton, Ore.; Geo. Cusiter, sec.; Thos. Skaife, treas.

Cap. $100,000; shares 10c par; 710,000 issued.

Property: 5 claims in North Santiam district, Marion county, about 18 miles N. E. of Gates, on a branch of the S. R. Ry. Developed by tunnel said to show veins 1-5′ wide in andesite. Ore contains copper and iron sulphides, gold and silver in zinc.

Working on a small scale.

LINCOLN MINES CO. — **OREGON**

Office: Albany, Ore.

Officers: A. M. Hammer, pres.; J. D. McLain, sec.; J. McChesney, treas., all of Albany.

Cap. $250,000; $25 par; all issued. Is the successor of the Albany M. & M. Co.

Property: 8 claims, known as the Albany mine, in Quartzville district. Linn county, about 23 miles from Gates. **Ore:** lead-zinc sulphides with gold values occur near the surface in veins in andesite. Veins are said to be shear zones up to 50′ wide with lenses of sulphides on the foot or hanging walls and distributed through the zone.

LISTEN LAKE GOLD MNG. CO. — **OREGON**

Officers: F. W. Thomas, pres, Fargo, N. D.; C. I. Flynn, sec.

Cap. $500,000; $10 par; all issued.

Property: 4 quartz claims and the McNamee placer about 6 miles from Austin on the Sumpter Valley railroad, in Greenhorn mining district, Baker county, Ore.

Development: by 120′ shaft, under water below 10′ from surface.

LLANO DE ORO MINES — **OREGON**

Address: Geo. M. Esterly, owner, Waldo, Ore.

Company purchased the holdings of the Waldo Corporation, January, 1921, representing an investment of $406,901, which includes original purchase price of property, $140,000 development work and equipment installed.

Property: includes the Cameron, Simmons and Logan placer mines covering 4,200 acres in Waldo district, Josephine county, which carries auriferous gravel 10′ to 25′ deep that lies on a bed rock of conglomerate and sandstone with some serpentine. Gravel worked thus far is reported to have yielded 12½c. per cu. yd.

Equip.ment: consists of 3 ditches, delivering 12,996″ of water, 25 miles in length, 6 giants and hydraulic plant. A tail-race, 9,200′ long, connecting tunnel with present workings is nearly completed and is expected to allow the handling of 20,000 yds. per day at a cost of ½¢ per cu. yd.

Annual output averages $45,000 in gold dust and $10,000 in platinum. The gravel handled in 1920 averaged 84½¢ per cu. yd. Considered a valuable property.

LOTZ-LARSEN MNG. CO. — **OREGON**

Anderson Bros., Vancouver, Wash., fiscal agents.

Officers: Wm. La Force, pres.; H. H. Lotz, sec.; A. C. Larsen, treas.

Property: 25 claims, 550 acres, in Santiam district, Marion county, 15 miles from Gates on the C. & E. R. R.

Development: by tunnels, longest 700′, said to expose an orebody 12′

wide, assaying 2% copper and 12 oz. silver per ton. A 4-mile road has been completed and milling machinery installed.

LUCKY BART GROUP OREGON

J. H. Beeman, Gold Hill, Jackson county, Ore., owner and mgr.

Property: 11 claims, partly patented, 220 acres in Sardina mining district, near Gold Hill, said to carry veins averaging 2' in width. Ore is free milling, running from $5-$100 and said to average $50 per ton. Developed by 2,000' tunnel to depth of 190'.

Equipment: includes 40-h. p. steam plant, 10-stamp concentrating mill. Concentrates said to average from 3-5 oz. gold and silver. Mine has been operated more or less regularly for many years.

MANGANESE METALS CO. OREGON

Inc. October, 1917.

Property: Tyrrell mine on Lost Creek, 5 miles S. E. of Lake creek. P. O., Jackson county. Exploratory work reported to have exposed a face of ore averaging 20% manganese for 10' in height and 150' in length. Ore occurs as manganite and psilomelane disseminated through a bed of volcanic tuff breccia from 3-100' thick, lying between flows of basalt.

Equipment: includes 20-ton concentrating mill, concentrates produced said to average 45% Mn. The shipping point is Eagle Point, 17 miles distant.

Early in 1918 Victor Rakowsky took a lease on the Tyrrell and adjoining prospects, but extensive churn-drilling failed to prove sufficient ore of commercial grade to warrant erection of the proposed 500-ton mill.

MANGANESE ORE MINING CO. OREGON

Address: Terre Haute, Indiana.

Has built and operates an electrically driven gold dredge of drag type, near Gold Hill, on Rogue river.

MEDFORD MINING & MILLING ASSOCIATION OREGON

Address: Medford, Oregon.

Officers: C. C. Clark, pres.; M. P. Schmitt, sec.-treas., with Etha Wall, directors, all of Medford.

Property: the Norling gold mine on Jackson creek, 3 miles west of Jacksonville, shows free gold and pyrite in quartz vein in andesite, the orebody assaying $9 to $18 per ton.

Development: by adit tunnel, started 1905 and only recently reopened.

MILLIONAIRE MINING CO. OREGON

Address: 327 N. Oakdale St., Medford, Ore.

Officers & trustees: Chas. Knight, pres.-treas.-mgr.; S. E. Heberling, v. p.-sec. Robt. Lightbody, supt.

Inc. under common law. **Cap.** $1,500,000; $1 par; 300,000 in treasury. Operating expenses for 1920 amounted to $4,000 per month.

Property: 807 acres, in Blackwell Hill district, 11 miles N. W. of Medford. The mine is an old gold producer. Sulphide ore occurs in a fissure vein in slate, 1-4' wide with dip of 85°, averaging $20 per ton in gold.

Development: by 400' shaft and 6,000' of workings. Management estimates ore reserves at 400,000 tons.

Equipment: includes electric hoist and compressor. A 60-ton mill was in steady operation, 1921. Management plans doubling capacity of the mill and further development at depth, in 1922.

MOUNTAIN GEM MINING & DEVELOPMENT CO. OREGON

Address: Joseph, Ore.

Officers: Harry Dawson, pres.; T. F. Tomkins, sec.-treas.

Cap. $200,000; 10c par; $124,211 issued.

Property: the Gem mine, 11 claims in Wallowa district, 10 miles from Joseph, Wallowa county. Ore occurs in contact zone between grano-diorite and limestone with calcareous schists, the values being in pyrite, chalcopyrite and molybdenite.

Development: by crosscut tunnel.

MYRTLE GOLD MINE **OREGON**

Address: Frank Hobart and B. W. Fowler, owners, Selma, Josephine Co., Ore.

Mine, 9 miles below Selma, has a 3′ vein opened by 400′ drift and shows $50 ore with 100 tons on the dump. New equipment planned for 1922.

NATIONAL MINES CO. **OREGON**

Address: Baker, Ore. Formerly owned by Highland Gold Mines Co. and worked by Highland Dev. Co.; latter company dissolved January, 1917. Mine sold to National Mines Co. in February, 1920.

Property: 6 claims, in Rock Creek district, Baker county, Ore., 14 miles from Haines, the shipping point. Claims show 4 ore shoots carrying lead-silver-gold values.

Development: by 6 tunnels with about 5,000′ of work.

Equipment: 100-ton mill, including flotation plant, in which average recovery has been 2 oz. silver and 0.25 oz. gold per ton. Tailings reported to contain $1.80 to $2.20 per ton in gold and silver.

Production from 1905 to Apr., 1914, was 6,322 tons of ore and concentrates, yielding $311,552. Reported shipping ore and concentrates.

NEW ELDORADO MINING & REDUCTION CO. **OREGON**

Office: Austin, Ore.

Officers: E. B. Reed, pres.; E. H. Saxe, sec.-treas.

Cap. $100,000; $1 par: 1,750 issued.

Property: known as the Pioneer, on the south slope of Greenhorn range, New Eldorado district, Grant county, said to show grandiorite cut by coarse-grained dikes of grano-diorite porphyry. The altered zone carries veins of bluish quartz from a few inches to 5′ wide, containing gold, a little antimony, blende, and low silver-gold values.

NORTH FAIRVIEW MINING CO. **OREGON**

Address: Herbert Leigh, 38 E. 6th St., Eugene, Ore.

Officers: G. W. McQueen, pres.; Herbert Leigh, sec.; Darwin Bristow, treas.

Cap. $300,000; par 10c; all issued.

Property: 15 claims N. of Fairview mountain, ½ mile from Bohemia, Lane county.

Geology: a mineralized fracture zone in andesite, 12′ wide, said to have been traced for over a mile.

Development: 2 tunnels, one 300′ long, 100′ below outcrop; the other 150′ long with depth of 450′. No recent returns.

OAK MINE **OREGON**

Address: G. A. Baker and Geo. Buell, owners, Grants Pass, Josephine county, Ore. Mine is 6 miles E. of Hugo, in Grants Pass district. **Ore:** main vein is gold-bearing; also several small copper veins.

Development: by tunnel with total of 800′ of workings. Equipped with 20-h. p. gas engine and compressor.

OGLE MOUNTAIN MINING CO. **OREGON**

Office: 1003 Main St., Oregon City, Ore.

Officers: J. B. Fairlough, pres.; W. J. Wilson, sec.-treas.

Cap. $1,000,000; $1 par; all issued.

Property: 22 claims, 14 miles from Gates on the S. P. R'y, in the Ogle Creek mining district, Clackamas county. Ore is low-grade and occurs in a well-defined fissure vein about 5′ in width. The average value is $5 per ton.

Development: by 1,460′ tunnel driven 560′ below the two old tunnels to cut the downward extension of the vein. Several small veins have been cut, but contain only low-grade ore.

Production reported for 1919.

OLD GLORY GOLD MINING CO. **OREGON**

Cap. $1,000,000; shares $1 par; 604,200 issued.

Property: the Old Glory mine, 4 lode and 2 placer claims, on Silver

creek in western Josephine county, said to show a large lode of low-grade copper ore carrying gold and silver values. Probably idle.

OLIVE CREEK MINING CO. OREGON

Idle. **Office:** Baker, Ore.

Officers: Thos. M. Tobin, pres., 9332 So. Chicago Ave., Chicago, Ills.; S. A. Tobin, sec.; A. J. Weckler, treas.

Cap. $1,000,000; $1 par; all issued.

Owns the Olive Creek and Quartz gulch placers in Greenhorn mining district, Grant county, Ore.

OPHIR MAYFLOWER MINE OREGON

Idle. **Address:** A. J. Champion, Howard, Ore.

Property: 8 miles from Howard, in Ochoco district, Crook county, Ore., 41 miles from railroad at Redmond.

Geology: the rocks are andesite, occurring as flows interbedded with tuffs and breccias. Mineralization is in wide fracture zones of altered rock.

Development: by 1,400′ crosscut tunnel, and one 200′ above. Drifts follow the fracture zones. Ore is 1 to 6′ wide and 70′ long; shipments averaged $70 gold. A second shoot, 20′ long and 4′ wide, averaged $125 per ton. The values in the lower tunnel only carry about $3 per ton.

Equipment: includes a small amalgamating-concentrating stamp-mill.

OPP MINE OREGON

Address: J. W. Opp. Jacksonville, Ore.

Property: 373 acres, situated 1½ miles W. of Jacksonville, Jackson county, Ore. There are 3 main veins from 2 to 4′ wide, occurring in shale and andesite. Two ore shoots, one 300′, the other 150′ long, carry free gold with pyrite, the ore averaging $5 per ton.

Development: by 18 adits, with 7,000′ of workings. One crosscut is 850′, another 550′ long.

Equipment: 3,600′ tram, 6-drill compressor, 20-stamp mill, 125-ton cyanide plant, etc., credited with past production of $100,000.

Mine reopened July, 1921.

OREGON GOLD MINES CO. OREGON

Last address: 1208 W. Monroe St., Chicago, Ill.

Inc. in Arizona. **Cap.** $2,000,000; $1 par; 1,657,436 issued. Is a reorganization of the American Gold Fields Co.

Property: the Granite Hill mine, 9 miles N. E. of Grants Pass, Josephine county, active from 1902 to 1907 and credited with a production of $75,000.

Ore: quartz carrying chalcopyrite, galena and pyrite with gold values, occurs in veins in tonalite and greenstone. Main vein said to average 5′ in width and ore treated in 1907 averaged $5 per ton.

Development: by 430′ vertical shaft with total of 12,000′ of workings now under water.

Equipment: includes 20-stamp mill, compressor, steam hoist, 5 machine drills and 150-h. p. electric motor. Idle since 1907.

OREGON-IDAHO INVESTMENT CO. OREGON

Mail returned from Baker, Ore., and company presumably out of business. See Volume XIV.

OREGON PITTSBURGH MINING CO. OREGON

Address: 307 Bessemer Bldg., Pittsburg, Pa. **Mine address:** L. H. Van Horn, mgr., Gold Hill, Ore.

Officers: W. H. Stroup, pres.; I. C. Palmer, sec.-treas., with J. C. Rimingler, A. J. Gould, and F. N. Callback of Pittsburg, Samuel Stone and Herbert Shear, directors.

Cap. $3,000,000.

Property: the Sylvanite, Cheney, Simmons and other groups, covering the Sylvanite and Cox Lyman veins, first-named formerly owned by **Sylvanite Mining Co.** The Sylvanite vein runs N. 22° E., dips at 65° E.

and has an average width of 40'. It lies between a fissile porphyry and limestone, and contains gold and tungsten.

Development: at the Sylvanite mine by 3 tunnels. The Haff crosscut tunnel cuts the Big, or Sylvanite vein, at 630' from portal and a drift run for 375' on this vein shows it to average 40' in width, much of it of low grade ore but including bunches of high grade. A 120' crosscut from the Haff tunnel also opens the "Blind" and "Scheelite" veins. The 1,330' Doan tunnel is 64' lower and 350' below the apex of the vein.

Described in Eng. & Mng. Jour., Oct. 21st, 1921.

OSCAR CREEK CONS. MINING CO. — OREGON

Office: 1st Nat'l Bank Bldg., Grants Pass, Ore. **Officers:** Chas. Burkhalter, pres.-treas.; A. H. Gunnell, sec.

Cap. $250,000; $1 par; all issued.

Property: the Jewell & Moore group of 5 placer claims, 3 patented, also 3 additional unpatented claims and 92 acres of dump ground, 2 miles E. of Murphy and 10 miles S. of Grants Pass, Josephine county. Credited with past production of $40,000.

Equipment: includes 3 miles of ditches and 300' flume line.

PACIFIC MOLYBDENUM MINES, INC. — OREGON

Address: J. B. Philips, mgr., Greenhorn, Baker county. Mine reported to show an 8' vein of molybdenum, running from 20 to 25%.

PEARL MINING CO. — OREGON

Office: Central Point, Ore.

Officers: W. C. Leever, pres.; J. W. Merritt, sec.-treas.

Cap. $4,400; $20 par; all issued.

Property: the Buzzard mine, 10 quartz claims, in Elk Creek mining district, 27 miles N. E. of Trail, Jackson county. The ore deposit occurs in a N. W.-S. E. shear zone in andesite; the ore contains complex sulphides and is handjigged before shipment, 4 tons returning $2,100.

Development: by 1,600' crosscut tunnel, total work 3,000', to depth of 400'.

POWDER RIVER GOLD DREDGING CO. — OREGON

Office: 433 California St., San Francisco, Cal. **Operating office:** O. E. Coombs, supt., Sumpter, Ore. Hammon Eng. Co., managers, San Francisco.

Officers: W. P. Hammon, pres.; R. K. Barrows, v. p.; F. J. Mott, v. p.; A. E. Boynton, sec.-treas., with A. L. Dahl, directors.

Inc. Oct. 18, 1911, in California. **Cap.** $500,000; $1 par; all issued. Annual meeting, fourth Monday in October.

For year ending Sept. 30, 1920, gross revenue was $174,251, of which $92,003 was net profit, over dredging cost of $82,248.

Dividends: aggregate $1.55 per share, or $755,000 to Dec. 30, 1920. A liquidating dividend of 2¢ per share is paid monthly.

Property: about 1,500 acres placer ground, near Sumpter, Ore., half of which is considered payable. The gravel channel is from 300 to 2,000' wide; it will average 1,000' wide, 18 to 20' deep, and the pay gravel rests on a soft, decomposed rock called "clay webfoot." Dredge digging may be termed tough, and as a result, the bucket-lips wear out in 5 months' use.

Equipment: consists of a dredge in Oregon that has yet from two to three years' work. A boat in Colorado, after digging 864,375 yds. of 7.69 cent gravel in 1919, at a loss of 3.18 c., was sold to Benjamin Griffith for $160,000, plus $24,000 for supplies and was later resold to Mark G. Evans. The dredge was idle during the winter of 1919-'20 to May 15, due to shortage of electric power.

Production: from Oregon properties, yielded $2,748,791 to Dec. 31, 1920. Results for the past 3 years, ending September 30, are:

Year	Yards	Yield per yd., c.	Cost per yd., c.	Daily yardage	Daily hours
1919-'20.....	1,472,319	11.84	5.59	5,729	20.35
1918-'19.....	1,805,582	12.90	6.73	4,960	19.38
1917-'18.....	1,783,180	13.06	7.97	4,885	19.28

QUEEN OF BRONZE MINE OREGON

Described in Volume XIII. Owned by John Hampshire Co., which see.

QUEEN OF THE WEST MINES CO. OREGON

Company dissolved in 1918. Fully described in Vol. XIV. Holdings acquired under bond and lease by **Gold Reef Mining Co.**, which see.

RAINBOW MINE OREGON

See **Commercial Mining Co.**

RAINIER MERCURY CO. OREGON

Inc. 1918, and reorganized 1919 as **War Eagle M. Co.**, which see.

RED BOY MINES CO. OREGON

Stock worthless as property was sold for $34,500 at sheriff's sale in 1916 and bid in by bondholders.

Reorganized June, 1916, as **Red Boy Mng. & Dev. Co.**, which see.

RED BOY MNG. & DEV. CO. OREGON

Idle. **Address:** Fremont, Neb.

Officers: Ray Nye, pres.; L. A. Peckham, sec.; Paul Colson, treas.

Inc. June, 1916. **Cap.** $250,000; $1 par; all issued. Is a reorganization of the Red Boy Mines Co.

Property: the Red Boy mine in Granite district, Grant county, credited with past production of $800,000. (The geology is fully described in Mineral Resources of Oregon, Vol. 2, No. 4, pp. 188-191.)

RED, WHITE AND BLUE MINE OREGON

Owned by Geo. H. Bodfish, Malheur, Oregon. Property at Malheur said to show a quartz vein, 8 to 10" wide carrying gold values that average $5 to $8 per ton. Developed by 134' vertical shaft and equipped with steam hoist, pump and 6-stamp concentrating mill.

SAMPSON CO., LTD. OREGON

Promoted 1910 by F. Wallace White, 115 Broadway, New York, who is under indictment (since December, 1918) for misuse of the U. S. mails, charged with misappropriation of $120,248 received from the sale of the valueless stock of the Sampson Co., Ltd.

Cap. $2,000,000 in bonds and $7,000,000 in stock .

Property: reported that company owned the Cracker-Oregon and Sampson groups on the North Pole Columbia Lode, Baker county, which are slightly developed prospects of doubtful value.

It is said that White bought control of the practically defunct Sampson Gold M. Co. for $5,000 and later sold the property to the Sampson Co., Ltd., for 200,000 shares of stock and a $100,000 cash compensation in the form of a promissory note, which he subsequently paid to himself out of the proceeds of stock sales. He repeatedly organized companies with valueless or mythical holdings and sold them to the Sampson So., Ltd., for large sums, payable to himself in cash and stock, thus keeping control of the Sampson Co.

According to report, White is one of the most dangerous and brazen "fleecers of innocent investors" known, who worked his game openly and undisturbed under various names for eight years from a New York office. At last report he was under indictment and a fugitive from justice. The widely distributed stocks and bonds are valueless.

SANGER GOLD MINES CO. OREGON

Idle. **Office:** J. K. Romig, sec., Baker, Ore. F. W. Paine, pres., at last report.

Inc. in Oregon. **Cap.** $2,000,000; $1 par; 1,295,146 issued.

Property: 600 acres of quartz and placer claims on W. side of Eagle

Creek, in an area which has produced about $1,500,000, but where since 1900 there has been little work done.

Geology: quartz veins in a black clay slate. Ore contains 3% sulphides and is considered to be similar to many California gold quartz veins. Owing to older slates being fractured, cut by dikes, etc., prospecting is difficult.

Development: by tunnels and an incline shaft 400′ deep. In upper workings the vein shows ore 15″ wide, worth $20 to $25 per ton; in the lower, below the zone of oxidation the ore is 24″ to 48″ wide, and assays $12 per ton. In 1916 several open cuts and short tunnels were driven to pick up the extension of the vein. Idle since that year.

SHORTY HOPE M. & M. CO. — **OREGON**

Address: H. S. Sanford, pres., Ashland, Ore.

Cap. $1,000,000; par $1; 784,498 issued.

Property: 4 miles up Wagner creek from Talent, in Ashland district, Jackson county.

Development: by 1,480′ tunnel. **Equipment:** 10-stamp mill driven by water power.

Work appears to have been spasmodic, but results were not without promise.

SILVER KING MINING CO. — **OREGON**

Address: Albany, Ore., or J. J. Langmack, Gerlinger Bldg., Portland, Oregon.

Officers: J. J. Langmack, pres.; E. E. Williams, v. p.; Wm. S. Risley, sec.-treas.

Inc. March, 1909. Reorganized and capital reduced under Oregon Blue Sky Law, June, 1914. Present capital, $500,000; $1 par.

Property: 12 claims covering 4 veins on Little North Santiam river, near Elkhorn, Oregon, in the Cascade Mts., 75 miles from Portland, and 17 miles from railroad. The veins occur in and follow shearing zones, and carry ore with gold, silver, lead, and zinc.

Development: by 2 shafts, 2 prospect tunnels, and a number of open-cuts on veins. The main working tunnel, over 1,000′ long, will be driven to cut the principal vein of the group at about 1,050′ from portal, at depth of over 900′ on vein below the prospect tunnels. Tunnel will drain mine and permit extraction of ore by gravity system. Average of samples from prospect tunnels show; gold, $1.20; silver, 15 oz.; lead 3 to 4%; and zinc 3 to 4%.

Equipment: a water power plant of 200 h. p. capacity, was installed early in 1921.

SIXES MINING CO. — **OREGON**

Office: 625 Market St., San Francisco, Cal.

Officers: L. R. Eccles, pres.; C. B. Edington, sec.; John Pingree, treas.; W. A. Bechtel, S. F. mining agent.

Inc. in Utah. **Cap.** $1,125,000; $5 par; 157,900 issued; assessable. Assessment of 20c. per share levied March, 1918.

Property: an option on placer claims, 300 acres, owned by the Divelbiss family, on the Sixes River, Curry county, 11 miles from Port Orford. Ground contains considerable black sand which holds both gold and platinum, about 10% of the gravel value said to be in the platinum. Three distinct gravel channels are known, one of which is to be dredged, the others hydraulicked. For sluicing a 4½ mile flume is available.

SNOW CREEK MINING CO. — **OREGON**

Officers: Fred D. Smith, v. p.; Bath, N. Y.; C. H. McColloch, sec.; R. J. Davison, treas.-gen. mgr.; with J. H. Bowlby, directors.

Inc. June 25, 1914. **Cap.** $200,000; $1 par; outstanding, 132,000 shares.

Property: 5 claims, 85 acres, including the Snow Creek mine, formerly owned by Oregon Mines Exploration Co., near Greenhorn, Baker county. Ore carries gold, silver, lead in contact deposit, 3′ to 8′ wide; country rock is diorite and slate. Ore extracted in the past is said to have assayed $12 per ton in gold and silver and 5% lead.

Development: 225′ vertical shaft and tunnels, aggregating 1,315′. The shaft is being drained and an 800′ tunnel driven to cut the orebody. Claims to have 9,400 tons of ore blocked out.

Equipment: includes 10-stamp mill. Total output to date about $40,000.

Title was obtained by present company under foreclosure of mortgage.

SUMPTER GOLD DREDGING CO. **OREGON**

Address: Sumpter, Baker county, Ore.

In November, 1919, company purchased a boat from the Powder River Gold Dredging Co. for $160,000, arranged for electric power, and started dredging in the spring of 1920.

SUMPTER VALLEY SMELTER CO. **OREGON**

Address: 412 Symons Bldg., Spokane, Wash. **Works office:** Sumpter, Ore.

Officers: J. A. Gyllenberg, pres.; J. L. Magney, v. p.; Geo. P. Larsen, sec., with R. W Street, directors.

Inc. Feb. 10, 1920, in Wash. **Cap.** $500,000; $10 par; 30,000 issued. Bonds authorized, $150,000; outstanding, $55,000.

Property: the old Sumpter smelter, owned free and clear of all indebtedness. The smelter has been equipped with electric power and management expects to commence operations by September, 1921.

Also the Monumental mine, 3 miles from Granite, a property operated and equipped with 20-stamp mill in 1878; reopended 1899 by an English syndicate; acquired 1900 by Portland Reduction & Mng. Co., and now controlled by Sumpter Valley Smelter Co.

Development: 5,000′ of tunnel work and raises, said to block out 16,570 tons of ore on 4 veins. On No. 3 vein, deepest level is said to block out 6,800 tons of $40 ore, 900 tons of $80 ore and 20,742 tons of $10 ore.

SYLVANITE MINING CO. **OREGON**

See **Oregon Pittsburgh Mining Co.**

Property: a group of claims, 2 miles N. of Gold Hill, known as gold producers for many years. Silver-gold bearing ore, running $20-$50 per ton, was reported opened up on the 600′ level in 1920 and a small concentrator was to be erected.

TAKILMA SMELTING CO. **OREGON**

Office: 301 Mining Exchange Bldg., Colorado Springs, Colo.

Inc. in Colorado. **Cap.** $250,000; $10 par. Owned a controlling interest in the Waldo Smelting & Mining Co. Fully described in Vol. XIII. Holdings sold to **John Hampshire Co.**, which see.

THREELODES MINING CO. **OREGON**

Officers: C. E. Wickstrum, pres.; N. L. Townsend, sec., George Lindley, treas.

Cap. $350,000; 35c par; all issued.

Property: 9 claims, and 9 others bonded, 2 miles W. of Gallice, Josephine county, said to have been exploited in recent years for tin, tungsten molybdenum and platinum.

Probably dead.

TRI-STATE CHROME CO. **OREGON**

Dead. Was controlled by Walter J. Nicholls, Sherwood Bldg., Spokane, Wash.

Acquired Jupiter mill between Canyon City and Prairie City, Grant county, early in 1918 and reported to have produced 40% chromium concentrate.

Company ceased operating at end of the war.

TROUT CREEK M. & M. CO. **OREGON**

Office: Canyon City, Ore.

Officers: O. J. Darst, pres.; F. S. Slater, sec.-treas.

Cap. $100,000; $1 par; all issued and paid up.

Property: the Bullion Quartz mine near Burns, Harney district, said to show granite cut by large porphyry dikes. The ore carries gold, silver, lead and zinc.

Development: by tunnels and shaft. Shipments were made to Utah, in 1916, by way of Crane, 32 miles from the mine. Idle several years.

UNITED COPPER CO. **OREGON**

Office: 418 New York Bldg., Seattle, Wash.

Officers: Wm. Reinecke, pres.; H. H. Startzman, sec.; W. M. Cowley, treas. **Cap.** $2,000,000.

Property: the Copper King mine, 18 miles east of Leland, Greenback district, Jackson county, said to show a fissure vein in andesite. Ore contains chalcopyrite reported to average 4% copper. A concentration mill was erected in 1916, and work continued until war conditions stopped operations.

UNITED COPPER GOLD MINES CO. **OREGON**

Idle: Office: Murphy Blk., Salem, Ore. Mine at Selma, Ore.

Officers: W. S. Low, pres. and gen. mgr.; E. O. Moll, v. p.; Daniel Webster, sec.; C. E. Lebold, treas., with W. C. Buckner, James Greig and H. Neugabauer, directors.

Cap $500,000; $1 par; issued 219,654.

Property: 11 claims, in Illinois district, about 12 miles N. W. of Selma, Josephine county.

Geology: ore occurs in serpentine near porphyry and diorite contacts. A dark gossan sometimes stained with copper is underlain at 15′ depth by ore carrying 18% copper and 5 to 10 oz. silver and upwards of $1 gold, according to management.

Development: amounts to 1,000′, with a 500′ tunnel and 200′ crosscut, exposing 1,000 tons of ore. Property is 34 miles from S. P. R. R. Is regarded as a prospect which might be worked on a large scale were railroad transportation nearer.

UNITED GOLD MINING CO. **OREGON**

Office: 505 Hyde Block, Spokane, Wash. A. B. Lee, pres.

Inc. in Washington. **Cap.** $1,000,000; $1 par; 568,050 issued.

Property: the Cougar mine, 3 miles N. of Granite, Grant county, formerly owned by the Cougar Gold M. & M. Co.; also the Independence mine, 17 miles from Sumpter, Baker county.

Geology: at Cougar mine country rock is a black, silicious, and semi-slaty argillite. Gold occurs in pyrite and ore is not easily amenable to treatment. Three shoots of ore have been exposed.

Development: at Independence, by tunnels. The Cougar has been a small producer.

UNITED STATES METALS CO. **OREGON**

Address: 412 Symons Bldg., Spokane, Wash. **Mine address:** P. H. Miller, supt., Huntington, Ore.

Officers: Geo. Kienzle, pres.; W. B. Diehl, v. p.; K. H. Blaesser, sec.-treas., with C. N. Newton, P. H. Miller, Arthur King and Alphonse Thibault, directors.

Inc. March, 1920 in Wash. **Cap.** $150,000; 5¢ par; 483,000 shares issued. Annual meeting last Saturday in February.

Property: the Bay Horse mine, 5 claims, 3 patented, 100 acres in Snake River canyon, at Bayhorse on the Huntington-Homestead branch of the Oregon Short Line, held under 4-year lease and bond from 1920, on a 15% royalty basis.

Ore occurs as a copper and lead sulphide in a fissure vein in andesite, 10-40′ wide, with E.-W. course and dip of 70°; metallic value is practically all silver, averaging $36 per ton with copper 1% and lead 1%. Ore is mined for width of 20′. The upper drift is 240′ long with 250′ back.

Management plans installing electric power and compressor and driving tunnel another 1,500′. Company also controls the Blue Ribbon silver-gold mine in the Sumpter district and expects to resume shipments from both mines to the Tacoma and Sumpter smelters in 1922.

UTAH QUICKSILVER CO. **OREGON**

Described in Volume XIII. Succeeded 1918, by Rainier Mercury Co., which was reorganized 1919, as **War Eagle Mng. Co.**, which see.

VANGUARD GOLD-COPPER CO. **OREGON**

Probably dead. Mine near Kerby, Josephine county, Ore. C. E. Phillips, mgr.

Inc. 1910. **Cap.** $1,000,000; shares $1 par.

Property: 7 miles W. of Kerby, said to carry gold-copper ore. Idle

VESUVIUS MINES CO. **OREGON**

Office: Eugene, Ore. **Mine office:** Bohemia, Ore.

Officers: W. E. Powell, pres.; F. J. Hard, sec.-treas.-mgr.

Inc. in Oregon. **Cap.** $6,000,000; $1 par; 2,000,000 shares in treasury March, 1921.

Property: 50 claims, including the Vesuvius, Oregon, Colorado, Riverside and Utopian mines, 50 miles S. E. of Eugene, Bohemia district, Lane county.

Geology: andesite flows interbedded with andesite tuffs, traversed by a fracture zone in which the ore occurs. Gold, silver, galena and chalcopyrite, are the ore minerals.

Development: by 20,000′ of workings with 3 tunnels, the main one 2,000′ long, said to disclose 18″ to 36″ of ore which assays from $7.50 to $20.64 per ton.

Equipment: includes a 10-stamp mill with tables for treatment of gold ores, steam plant, saw mill, electric light plant, store and hotel. Concentrating plant for copper bearing ores to be installed.

VINCENT CREEK GOLD & COPPER CO. **OREGON**

Probably dead. **Former address:** Austin, Grant county, Ore.

Officers: Burton Miller, pres.-gen. mgr.; Ernest Blackwell, v. p.; Nellie H. Miller, sec.-treas., and J. S. Edwards, directors.

Inc. Dec. 5, 1907, in Oregon. **Cap.** $200,000; $1 par; issued 100,002 shares.

Property: 6 claims, 100 acres, in the Greenhorn district, 5 miles N. W. of Austin, on the S. V. R. R., shows a strong vein, traceable 1,500′, said to average 15′ in width and 3.5% copper. The country rock is greenstone and copper mineral chalcopyrite.

Development: by a 25′ shaft and 215′ tunnel being driven 600′ with back of 400′. In February, 1916, a 20′ vein of copper ore was opened in this tunnel. There are 3 buildings. Mine has no power equipment.

VIRTURE MINES DEVELOPMENT CO. **OREGON**

Address: Baker, Ore.

Officers: J. K. Romig, pres.; M. Boswell, sec.-treas. at last report.

Cap. $1,500,000; $1 par; 1,384,075 issued.

Property: 16 claims and placer ground, a total of 400 acres in the Virtue district, Baker county. From 1878 to 1898 the gold yield was about $2,189,000, the largest production being $259,000 in 1898. Mine was idle for nearly 15 years, but in 1917 it was reported working and electric power was installed. In 1920 the mine was worked by lessees.

Claims said to show quartz veins in serpentine striking N. W., dipping 45° to 80° S. W. and averaging 14″ in width. Ore carries gold and a little pyrite and chalcopyrite.

Equipment: includes hoist, boilers, 20 stamps, vanners, cyanide plant and electric power.

WALDO CORPORATION **OREGON**

Described in Vol. XIV. Holdings purchased by Geo. M. Easterly, January, 1921, and name changed to **Llano de Oro Mines**, which see.

WALDO MINE **OREGON**

Described in Volume XIII. See **John Hampshire Co.**

WALDO SMELTING & REFINING CO. **OREGON**

Office: 301 Mining Exchange Bldg., Colorado Springs, Colo. **Mine office:** Takilma, Josephine county, Ore.

Inc. Dec. 3, 1901, in Colorado. **Cap.** $3,000,000; par $100.

Property now owned by **John Hampshire Co.**, which see.

WALLOWA COUNTY MINING & DEV. CO. **OREGON**

Address: J. A. Burleigh, Enterprise, Ore.

Officers: Jesse Walker, pres.; J. A. Burleigh, sec.; G. W. Williams, treas.

Cap. $200,000; $1 par; all issued.

Property: 14 claims, on Lick Creek, Wallowa county, said to show a 2' vein in greenstone, limestone and argillite, cut by aplite dikes. **Development:** by 125' shaft. Probably idle.

WAR DANCE MINING ASS'N. LTD. **OREGON**

Address: Andrew Prader, mgr., Ontario, Malheur Co., Oregon.

Property: War Dance mine, developed to depth of 500' by 12,000' of workings, said to show galena sulphide ore in a fissure vein in granite, running as high as 65% lead and 100 oz. silver per ton.

Equipment: includes compressor and fuel oil engine. Management reports $30,000 expended in exploration work.

WAR EAGLE MINING CO. **OREGON**

Address: Box 986, Medford, Ore.

Officers: C. M. Kid, pres.; A. L. Hill, sec.-treas.; Sam Bertelson, v. p.

Inc. 1919 in Oregon, to acquire holdings of the **Rainier Mercury Co.** **Cap.** $600,000; $1 par; 305,001 shares outstanding. Ore sales in 1920 amounted to $2,700 and expenses were $5,000.

Property: Bertleson group, 32 claims, 640 acres, formerly owned by the **Utah Quicksilver Co.**, 12 miles N. of Gold Hill, Jackson county. **Ore:** occurs in a fissure vein in serpentine and granite and is generally low grade. A 5' vein averages 1½% cinnabar, with estimated blocked out reserves of 25,000 tons, containing as by-products, arsenic, silver, gold, nickel and cobalt.

Development: by 160' shaft and 2 tunnels, 260' long.

Equipment: includes two 12 pipe retort furnaces, gas-hoist, compressor, pump, crushing mill, 25-ton Scott furnace, 6-ton retorts, etc.

Production: August 1, 1918, to Jan. 15, 1919, amounted to 17,425 lb. of metal. In 1919, output was 60 flasks, with total production to 1921 of 42,375 lb., or 565 flasks.

Management plans further development and installing a new furnace in 1921.

WEST COAST MINES CO. **OREGON**

Officers: W. J. Zimmerman, pres.; W. M. Cake, sec.; W. W. Elmer, mgr.

Cap. $1,500,000; $1 par; 890,000 issued.

Property: the Champion, Helena, and Musick mines, 47 claims, 12 miles S. E. of Disston, Bohemia district, Lane county. Mines under lease to H. C. Mahon, of Portland, at last accounts. The Champion is said to have yielded $1,700,000; the Helena, $150,000, and the Musick, $180,000.

Development: by tunnels: In the Champion the main lode is 3' wide and at 200' in depth and below, the principal ore minerals are pyrite, chalcopyrite, sphalerite, and galena. The other mines contain similar complex ores.

Equipment: includes 3,000' aerial tram, 20 stamps, concentrators and hydro-electric power plant.

WEST SIDE GOLD & SILVER MINING CO. **OREGON**

Address: R. Baird, sec. and mgr., Yamhill, Ore.

Officers: J. A. Simmons, pres.; G. W. Perkins, v. p.; R. Baird, sec.; W. G. Busbee, treas., with C. C. Laughlin, N. H. Perkins, H. C. Gist, directors.

Inc. April, 1900, in Oregon. **Cap.** 1,000,000 shares; 1c par; 814,307 outstanding. Annual meeting, first Monday in January.

Property: 3 patented claims, about 57 acres, at Greenhorn, Baker and Grant counties, under lease and bond to R. Baird, at last accounts. Minerals are gold, silver, copper, lead. A number of veins cutting through greenstone and schist run at right angles, the N. S. veins dipping E., and E. W. veins south.

Alteration and faulting are considerable. Ores contain free gold sulphides in quartz and dolomite; cinnabar is also reported. Shipping ore is said to average about $60 per ton and milling ore $20.

Development: by several shallow shafts, comprises about 1,000' of workings, greatest depth being about 40'.

Equipment: includes a small steam pump. About $10,000 spent in development to 1917. No recent returns.

WHITED MINING CO. OREGON

Address: Alfred Whited, Unity, Ore.

Inc. Nov., 1916, in Oregon. **Cap.** $15,000; $1 par.

Property: 8 claims situated 5½ miles south of Unity, Baker county. Two veins show shoots of gold-bearing quartz, the largest one along the hanging wall of a porphyry dike.

Development: includes 2 crosscut tunnels with drifts on the veins.

Equipment: 10-stamp mill with amalgamating plates and Wilfley tables. Was a small producer in 1919.

PENNSYLVANIA

The state had five iron ore producers and but one lead-zinc mine operating in 1920. Iron ore production was 627,167 tons in 1919 and 734,383 tons in 1920.

AMERICAN VANADIUM CO. PENNSYLVANIA

Described in Volume XIII.

Merged 1919 into the **Vanadium Co. of America,** which see.

AMERICAN ZINC & CHEMICAL CO. PENNSYLVANIA

Subsidiary of **American Metal Co.,** Ltd., 61 Broadway, New York.

Office: Oliver Bldg., Pittsburgh, Pa.

Officers: C. M. Loeb, pres.; Otto Sussman and B. N. Zimmer, v. ps.; Julian B. Beaty, sec.-treas.; with L. Vogelstein, B. Hochschild and H. V. Putzel, directors.

Cap. $2,500,000; par; $100; all issued and owned by A. M. Co. Annual meeting, 1st Wednesday in March.

Works: at Langeloth, Pa., includes a zinc smelter with capacity for treatment of 7,000 to 8,000 tons of zinc ores monthly, and production of 3,000 to 4,000 tons of spelter. Company also owns a sulphuric acid plant with a capacity of 7,000 to 8,000 tons monthly. This property represents an investment of over $4,000,000, and may be divided into the following subheads:

1. Zinc smelting plant. This consists of eight blocks of two furnaces each, each block containing 912 retorts, making a total capacity of 7,296 retorts. Each block is equipped with waste-heat boilers: the furnaces are fired by gas-producers, one producer to each block. The smelting plant has complete accessories, such as power-house, two steam-turbine generator units of 2,000-k. w. each, up-to-date machine-shop, carpenter-shop, and pottery plant.

2. Sulphuric-acid works. This department has a chamber-capacity of about 8,000 tons of 60° B. acid monthly, and also has a contact plant for the conversion of about 3,500 tons of 60° acid into 66° acid. The raw material used is zinc-sulphide ore, for the roasting of which four Hegeler kilns are available. The sulphuric acid plant is one of the most modern in the country, and can be expanded for the production of other acid-products whenever desired.

3. Coal mine. The company owns coal-mining rights over an area of 2,450 acres of the Pittsburgh and Rooster veins. It was estimated that there was a coal reserves in this tract of over 18,000,000 tons, from which about 10% has been mined. The mine is equipped to produce about 50,000 tons of coal monthly. The coal mine is subject to a mortgage of $392,000, against which there was on deposit with the Colonial Trust Co., of Pittsburgh, on October 31, 1921, a sinking-fund credit of $9,252.

4. The Langeloth Townsite Co. was incorporated for the purpose of taking over a block of real estate adjacent to the works of the American Zinc & Chemical Co., embracing about 400 acres, with the idea of developing it into a modern industrial town.

5. For the convenience of the workmen, the company operates a general store under the name of Langeloth Mercantile Co.

6. By-products plants. The company owns and operates:

(a) A zinc-oxide plant with a capacity of about 500 tons monthly. (b) A zinc-dust plant which produces from 150 to 200 tons monthly. (c) A zinc-sulphate plant which has been running only intermittently owing to lack of demand for this material.

CORNWALL IRON MINES — **PENNSYLVANIA**

Address: Cornwall, Pa.

These mines in Lebanon county are operated by the **Bethlehem Steel Co.** (q. v.). They yielded several thousand tons of pyritiferous magnetite in 1921, which was concentrated, the pyritic concentrate containing 2.96% copper and 32.87% sulphur.

DONORA ZINC CO. — **PENNSYLVANIA**

Is a part of the American Steel & Wire Co., a subsidiary of the United States Steel Corp'n.

Works: at Donora, near Pittsburgh, Pa. Plant includes bins of 20,000 ton capacity, crushing plant for ore that requires reduction, 6 Hegeler 7-hearth roasting furnaces, mixing house, 10 Hegeler furnaces, each containing 912 distillation retorts, pottery, power plant, sulphuric acid, muriatic and zinc oxide plants. Furnaces are fired by producer gas. In 1920, additions were made to the zinc refinery and erection of a sintering plant was begun.

E. & G. BROOKE IRON CO. — **PENNSYLVANIA**

Address: Birdsboro, Pa. **Mine address:** St. Peters, Pa.

Operating staff: M. T. Hoster, supt.; J. Burke, engr.

Property: the French Creek mine opened 1725, reopened 1914. Orebody is a replacement of pre-Cambrian limestone near a dike of hornblende diorite or French Creek granite, magnetite occurs in chimney or lens dipping 43° and 600′ long.

Development: 1,200′ incline shaft to vertical depth of 830′, with seven levels. Average assay of 35,000 tons ore, is iron 56.98%, phosphorus 0.027, sulphur 2.82, silica 7.46, alumina 1.36, lime 3.32, magnesia 1.26, manganese 0.1, copper 0.18. Ore is sintered on Dwight Lloyd machine removing sulphur, before going to furnace at Birdsboro, 15 miles from mine. **Reserves:** 400,000 tons.

EAGLE METALLIC COPPER CO. — **PENNSYLVANIA**

Inactive. **Address:** care H. D. Deshler, Belvedere, N. J. **Branch office:** 208 Haas Bldg., Allentown, Pa. **Mine office:** R. F. D. 3, Fairfield, Adams county, Pa.

Officers: at last accounts, F. H. Cuyle, pres.; Dr. P. A. Stem, v. p.; A. L. Wickert, sec.; Thos. Zellner, treas.; Owen H. Nagle, gen. mgr., with A. V. Diefenderfer, directors.

Inc. 1903, in New Jersey. **Cap.** $500,000; $1 par, and reinc. Dec. 9, 1910, in Pennsylvania; $150,000 in treasury after raising $60,000 to build a smelter in 1911.

Property: 500 acres in Jacks Hollow, on the Maryland border, one-half mile from and crossed by the Western Maryland railroad, near Charmian.

Development: by open-quarry work from pit 200′ across, connected with smelter by 750′ aerial rope tram. The mine is apparently a large open-cut filled with water. Careful examination of exposed rock and surface material said to show no indication of copper whatever. It is also reported that a pile of crushed ore in smelter bins, 1915, did not contain the minutest particle of mineral. Samples of matte from furnace said to run 2% copper, which evidently came from the pyrite used for flux.

Equipment: includes a 250-h. p. steam plant, 150-h. p. engine and a 2⅛" core drill, with office and laboratory. Smelter built in 1911

EASTERN MINING & MILLING CO. **PENNSYLVANIA**

Address: Phoenixville, Chester Co., Pa.

Property: an old lead mine, reopened in 1919, and on which a 100-ton concentrator was erected. Galena concentrate averages 80.2% lead and 8 oz. silver and sphalerite concentrate, 60% zinc and 3.6 oz. silver. Only development work done in 1920-21.

KEYSTONE METALS REDUCTION CO. **PENNSYLVANIA**

Office: Farmers Bank Bldg., Pittsburgh, Pa. I. N. Goff, gen. mgr. Reduction plant at Cheswick, Pa.

Inc. 1920 in Delaware.

Company's reduction works treat carnotite, vanadium, radium and uranium ores from their own claims at Polar Mesa, Utah, and from other properties.

NATIONAL COPPER MNG. & DEVEL CO. **PENNSYLVANIA**

Out of business. See **Eagle Metallic Copper Co.** Property, described in Vol. XII, is now owned by H. D. Deshler.

NEW JERSEY ZINC CO. (OF PA.) **PENNSYLVANIA**

Subsidiary of New Jersey Zinc Co.

Works addresses: Palmerton and Freemansburgh, Pa.

Company operates a zinc smelter at Palmerton. Mining property described under New Jersey.

PENNSYLVANIA SMELTING CO. **PENNSYLVANIA**

Works address: Carnegie, Pa. Controlled by **Hercules Mining Co.**, Idaho.

Company operates a lead smelter, containing two furnaces, with annual capacity of 60,000 tons. The refinery treats lead bullion from the smelter at Northport, Wash., owned by the Hercules Company, through its subsidiary the Northport S. & R. Co.

UNITED M. M. & COPPER SM. CO. **PENNSYLVANIA**

See description under Maryland.

VIRGIN COPPER CO. **PENNSYLVANIA**

Last address: 12 West Bldg., York, Pa. **Mine office:** Charmian, Franklin county, Pa.

Officers: John H. Dechert, pres.; Chas. E. Wills, v. p.; Clarence A. Wills, sec.; Harry S. Wiest treas.

Property: about 1 mile N. of Charmian, in the Blue Ridge mountains, near the Maryland state line, shows ore carrying native copper, with silver and gold values said to give assays of $25 to $600 per ton.

Development: by 215′ shaft sunk at 47°. Four diamond drill-holes, of 165 to 800′, were bored, 1907.

Equipment: includes small hoist and compressor. Is considered an unpromising venture. Idle.

SOUTH CAROLINA

HAILE GOLD MNG CO. **SOUTH CAROLINA**

Property under lease to Kershaw Mng. Co., which see for description.

KERSHAW MINING CO. **SOUTH CAROLINA**

Lessee of Haile Gold Mng. Co.

Address: R. L. Pellet, mgr., Kershaw, S. C., or J. H. Watkins, 200 Fifth Ave., New York City.

Inc. 1917.

Property: the old Haile gold mine, in Lancaster county, near Kershaw, worked steady for many years for its gold ores, and operated 1915-18 for pyrite.

Geology: rocks of the region are sericite and quartz-schists, formed from old volcanic tuffs and porphyry. Pyritization is widespread and deep-seated, the whole series of schists being more or less impregnated with

pyrite, but along certain zones this mineralization is highly intensified, the schists in some bands holding so much pyrite that the rock runs 25 to 30% suphur; wide belts carry 15 to 20% sulphur, and in a few spots pyrite occurs in lenses around which the schists are folded. The gold values vary with pyrite content.

Development: by extensive workings, open-pits, a 100′ shaft and 28 drill-holes, which prove the existence of a large quantity of ore carrying 25% sulphur.

Equipment: complete mining plant and 300-ton mill with crushers, rolls and jigs, producing a concentrate containing 47% sulphur.

SOUTH DAKOTA

Metal mining in the State is practically restricted to the gold mines of the Black Hills, in which silver and tungsten are important by-products. A little lead, tin, and various rare minerals of chemical importance are also mined.

According to the U. S. Geol. Survey, the gold mines of South Dakota produced 1,572,989 tons yielding $5,712,853 in 1921, compared with $4,339,000 in 1920 and $4,862,586 in 1919; $6,563,337 in 1918; and 68,000 oz. of silver, compared with 115,500 in 1919 and 159,202 oz. in 1918. The ores shipped to smelters contained only nominal quantities of lead and copper.

The Homestake and Trojan companies were the only large operators in 1919 and 1920.

Our thanks are due to Mr. Otto Ellerman, State Inspector of mines, for information concerning the mines described herein.

AMERICAN MINERALS CO. — SOUTH DAKOTA

Address: Chas. L. Cabrera, gen. mgr., Keystone, S. D. Wm. Friedman pres., 111 W. Monroe St., Chicago, Ill.

Inc. as a Common Law company, operating under a Deed of Trust.

Property: 116 claims covering 2,376 acres in the Black Hills district, partly owned in fee simple, by location, or held under lease and said to contain mica, lithia, tin, tungsten, with a possibility of gold, silver and copper. Company also reported to own mills at Hill City, Custer and Keystone and a mica factory at Lead, S. D.

Preferred stock was offered for sale at $10 per share with a bonus of 10 shares of common stock, par $1, in Nov., 1920, by Sutt & Darbyshire, Inc., brokers, 139 S. Third St., Philadelphia.

AMERICAN MINING CORPORATION — SOUTH DAKOTA

Mail returned from Deadwood, S. D. Owns the Bismark mine at Flat-iron, a gold-silver-tungsten producer. Mill and cyanide plant on the ground. Idle.

AMERICAN TIN & TUNGSTEN CO. — SOUTH DAKOTA

Address: 50 Broadway, New York City.

Officers: Simon Lederer, pres.; Samuel Lederer, v. p.; Robt. S. Williams, sec.; Chas P. Bland, treas.

Inc. Jan., 1917, in Delaware. **Cap.** $1,500,000; par $1; 1,200,000 issued Listed on New York Curb.

Property: the old Harney Peak tin mines and claims, in Pennington county, under lease to National Tin Corporation, this company to get 25% of net profits as royalty.

Stockholders were offered new stock at the rate of 5 shares of American Tin and a cash payment of $1.25 for one share of Natl. Tin, the old stock to be turned in and the new stock issued a year later. Management does not report to what extent this offer was accepted by old stockholders.

ANACONDA GOLD MINING CO. — SOUTH DAKOTA

Address: 837 Plymouth Bldg., Minneapolis, Minn. **Mine office:** Roubaix, S. D.

Officers: Martin H. Brede, pres.-mgr.; Daniel Lynch, v. p.; D. H. Dressen, treas., with Adolph Carlson, G. G. Gustafson, Andrew Erickson, Thos. Mahn, O. H. Carlson and G. A. Matison, directors. C. D. Applin, sec.

Inc. in South Dakota. **Cap.** $1,500,000; $1 par; half common and half preferred stock; 512,541 shares issued.

Property: 34 claims, patented 600 acres, in Roubaix district, near Deadwood, carries gold-quartz ore in 4 fissure veins running N. W.-S. E. and dip of 50° N. and said to average $8 per ton.

Development: 340′ shaft and a 3-compartment shaft, down 153′, to be sunk to 700′ depth.

Equipment: steampower, hoist, compressor, pump, sawmill, etc. Work was resumed in February, 1822,, sinking shaft No. 2; buildings erected.

ANCHOR MTN. MNG. CO. SOUTH DAKOTA

Address: Thos. Bolger, mgr., Galena, So. Dakota.

Property: near Galena, Lawrence county, said to show 3 large veins of gold bearing ore of $8 to $14 grade. Development by tunnels.

Company recently added to its holdings and plans erecting a 150-ton ball mill with cyanide plant, in place of its old 10- stamp mill. The new mill will be on Butcher gulch, near its confluence with Bear creek. Operated only part of time during 1921.

BISMARCK MINING CO. SOUTH DAKOTA

Ed. Manion, supt., Deadwood, S. D.

A gold mine at Flatiron, adjoining Wasp No. 2 mine, near Deadwood, Lawrence county. Operated intermittently by lessees. Treated 5,120 tons of gold-silver ore, valued at $18,864 in 1918 and shipped 30 tons of tungsten ore worth $2,282. Ore treated in Bismarck mill of 50-ton daily capacity in 1918, but idle since.

BLACK HILLS COPPER CO. SOUTH DAKOTA

Idle. **Office:** Rochford, Pennington county, S. D.

Officers: E. A. Hoffman, pres.; George M. Thresher, sec.; John H. Kerr, treas.

Inc. June 2, 1900, in South Dakota. **Cap.** $2,000,000; shares $1 par.

Property: 27 claims 510 acres, in the Hornblende district, shows fissure veins in slate, with gossan capping, carrying carbonate and oxide ores. Orebody is said by company to average 20′ width, and to be more than a mile in length, opened by incline shafts and crosscut tunnels, giving a total of about 1,200′ of underground openings. Ores average, 1.5 to 3% copper, with small values in gold, silver and nickel. Has steam power, with 60-h. p. hoist, good for 1,500, and 4 power drills. Property considered of doubtful value.

BLACK HILLS MILLING CO. SOUTH DAKOTA

Address: 412 Tabor Opera House Bldg., Denver, Colo. **Mine address:** Hill City, S. D.

Organized 1921 by Denver capitalists.

Property: 16 claims, in Black Hills mining district, 4 miles south of Hill City, contains vertical lode 16′ wide, proven for 2,500′. **Development:** by shafts and drifts, said to show 300,000 tons of possible ore. Samples show $9.19 per ton in gold and tests show 91.4% recovery.

Equipment: 10 stamp mill, 100 h. p. boiler, hoist, compressor and all necessary buildings.

BLACK HILLS TUNGSTEN M. & M. CO. SOUTH DAKOTA

Dead. Property sold at sheriff's sale, August, 1917, to **Elkhorn Tungsten Co.**, which see.

BLAND COPPER MINES SOUTH DAKOTA

Address: Custer, So. Dakota.

Under development 1919. Idle since.

CAPITAL GOLD MINING & MILLING CO. SOUTH DAKOTA

Address: R. M. Harrop, pres.-gen. mgr., Omaha, Neb. **Mine:** at Deadwood, S. D.

Reorganized 1917 in S. D. **Cap.** $1,500,000.

Property: 60 acres, in Deadwood Gulch, adjoining the Trojan mine and 1½ miles west of the Homestake said to carry ore assaying from $3 to $12 per ton for 110′ in width. Diamond drill work is planned.

CALABOGA MINE — **SOUTH DAKOTA**

Address: Merritt, So. Dakota.

Is a lead-silver mine equipped with a concentration mill operated 1917. Only development work done since.

CLOVER LEAF MINING CO. — **SOUTH DAKOTA**

Address: Mrs. Wibaux, owner, Roubaix, S. D.

Mine under option, 1922, to E. W. Talbot and associates of Deadwood, S. D. **Property:** 800 acres on Elk Creek, 8 miles S. E. of the Homestake, was idle for 17 years, but is credited with production of several million dollars in gold up to 1904. Diamond drilling underway and workings being unwatered.

COLUMBIA MINING CO. — **SOUTH DAKOTA**

Idle. **Address:** care Richard Blackstone, Keystone, S. D.

Inc. in South Dakota. **Cap.** $500,000; 300,900 shares issued.

Property: a group of claims at Keystone, Pennington county. Gold silver ore worth $65 per ton said to have been shipped, from a quartz vein in diorite and schist, strike N. 56° E. dip 80°.

Development: 225′ shaft and 300′ drifts. Produced in 1917. Idle since.

CUMBERLAND MINES CO. — **SOUTH DAKOTA**

Address: W. Goff Black, or E. B. Miller.

Property: the May Day and Cumberland mines, the former closed down several years before purchase by present owners, early in 1921. Shipments in August were 200 tons and 4 drills at work Sept., 1921.

CUSTER PEAK COPPER CO. — **SOUTH DAKOTA**

Office: Roubaix, S. D. Burt Rogers, sec., Black Hills Trust & Sav. Bank Bldg., Deadwood, S. D. D. Grupe, pres.; John O'Brien, v. p.-supt.; with John Plunkett, directors.

Cap. $1,500,000; $1 par; assessable; 100,400 shares outstanding.

Property: the Jungle mine at the southeast base of Custer Peak, showing a porphyry dike cutting schist with 5′ of copper ore on both walls. The Jungle mine was acquired in 1918.

Development: includes 65′, 90′ and 300′ shafts, showing a 12′ vein of 4% copper ore. The older holdings of the company, 1½ miles from the Jungle mine and S. W. of Deadwood, are said to carry average values of $6 per ton in oxidized ore to depth of 100′, changing below to pyrite and chalcopyrite, showing on the 200′ level, a vein of 85′ width, assaying about 1% copper with $1.60 in gold.

Equipment: includes hoist, 50-ton dry concentrator, air compressor, pump and steam power. Developing since 1919.

CUTTING MINING CO. — **SOUTH DAKOTA**

Address: Deadwood, S. D.

Officers: Burt Rogers, pres.; J. M. McDonough, sec.

Property: adjoins the Homestake on the W., near Central, Lawrence county. Several veins have been opened by tunnels and a 500′ two-compartment shaft.

Equipment: includes electric power, single-drum hoist, pumps and compressor.

Company did some development work in 1921, but suspended work in August owing to heavy inflow of water. Property to be reopened, 1922.

CUYAHAGO MINING CO. — **SOUTH DAKOTA**

Address: Keystone, S. D.; J. H. Snyder, v. p.

Property: the Spokane Pyrite mine. In 1917 the shaft was sunk to 200′. Ore containing 43% sulphur and some copper was shipped to Cleveland, Ohio for chemical purposes. Good gold ore was opened and a hoist and additional boilers installed. Presumably idle since 1918.

DAKOTA CONTINENTAL COPPER CO. **SOUTH DAKOTA**

Idle. **Mine address:** Hill City, So. Dakota. **Office:** 300 Commonwealth Trust Bldg., Harrisburg, Pa. Company is a reorganization of the Continental Copper Mining & Smelting Co.

Property: near Sheridan, Pennington county, S. D., in the Black Hills, known as the Dakota-Calumet, or Lillian property, 52 claims, patented, 179 acres.

Claims show quartz schist with a pyrrhotized zone, from 50′ to 200′ wide, traceable one-half mile. The mineralized zone shows bands of nearly pure pyrrhotite, with occasional traces of copper. At boundary between oxidized and unaltered material, a little copper is occasionally found, as a secondary concentration. Small amounts of rich ore were found at the surface and down to 25-30′, but property is valueless as a copper mine. Extensive diamond drilling and exploration work prove a large amount of pyrrhotite available for acid making. A body of gold quartz ore of commercial grade was cut in diamond drilling and one shipment was made in 1918.

Development: includes an 850′ shaft, 1,170′ crosscut tunnel and 9 drift tunnels.

Equipment: includes 300-h. p. steam plant, with hoist good for 1,200′, 7-drill compressor, all necessary shops and an old smelter of no present value.

Company had a bond on the Golden Summit gold mine, 4 miles E. of Hill City and diamond drilled property in 1918.

DEADWOOD-HEIDELBERG DEV. CO. **SOUTH DAKOTA**

Address: Deadwood, S. D.

Officers: John Treber, pres.; H. S. Vincent, v. p.; Jacob Goldberg, treas., A. T. Roos, mgr., with B. Stewart, Jim Hogarth and Geo. Porter, directors. A. T. Roos, sec.

Inc. June, 1914, in South Dakota, by the Deadwood Business Club, in an attempt to promote the mining interest of the section. **Cap.** $125,000; 25c par; 295,000 issued. Annual meeting in June.

Property: 9 claims, unpatented, 185 acres, on Two Bit Creek, Lawrence county, shows gold ore in contact deposit between shale and porphyry. The orebody is reported to be 20′ thick, 6 to 15′ wide, 200 to 300′ long, with N. E. course and dipping W. Milling ore averages $5 per ton Ore reserves said to be 5,000 tons.

Development: 7 tunnels, 65-380′ long, with deepest workings at 193′ from surface; total development, 2,000′.

Production: 180 tons, averaging $20 per ton. Management plans sinking to the contact of the shale and underlying quartzite. Inactive and no production since 1918.

DEADWOOD LEAD & ZINC CO. **SOUTH DAKOTA**

Address: Deadwood, S. D.

Property: in Spruce gulch, near Deadwood Lawrence county, under development by tunnels.

Ore: complex sulphide carrying gold-silver-lead-zinc values. A 10-stamp concentrator will be supplemented by flotation machines used on tailings. Concentrates showed $25 p. t. in gold, $15 in silver, 22% lead and 8% zinc.

Was the only producer of lead-silver ore in South Dakota during 1919.

EAGLE BIRD MINING CO. **SOUTH DAKOTA**

Address: Deadwood, S. D.

Property: on Squaw Creek below the Trojan mill. A 1,500′ tunnel was being driven at creek level in 1921 which will give a depth of 400′ beneath the orebody that outcrops on the claims. Has electric power and compressor.

ECHO MINING CO. **SOUTH DAKOTA**

Address: Deadwood, So. Dakota, or W. L. Mason, gen.-mgr., Manchester, N. H.

Officers: Dr. Henry H. Jewell, pres.; Dr. Andrew J. Pitman, v. p.; L. B. Snelling, sec.; Judge Geo. A. Wagner, treas., with Herbert W. Lake, Dr. John J. Gailey, John S. Rand and Burt Rogers, directors.

Inc. 1892, in South Dakota.

Property: 62 acres, in the Maitland district, 4 miles N. W. of Deadwood, Lawrence county.

Development: by 400′ vertical shaft, and several tunnels. About 100′ E. of the shaft a pyrite vein was cut showing 4′ of lead-silver-gold bearing ore.

Equipment: includes a special electric power line to shaft house, 25-h. p. electric hoist, air compressor and sinking pump.

Operations were suspended in 1920.

ELKHORN TUNGSTEN CO. — **SOUTH DAKOTA**

Address: care C. W. Crosby, sec.-mgr., 3310 Harrison Ave., Kansas City, Mo. **Office:** Hill City, S. D.

Officers: Arthur G. Wiedmann, pres.; Dr. E. R. Curry, 1st v. p.; Dr. W. J. James, 2nd v. p.; A. A. Anderson, supt.

Inc. Feb., 1917, in Arizona. **Cap.** $2,000,000; $1 par; all outstanding. Company purchased the property of the old Black Hills Tungsten Mining & Milling Co. at sheriff's sale, August, 1917.

Property: 361 acres near Hill City, Pennington county, shows quartz vein dipping 70°, said to contain tungsten as wolframite. Developed by shaft and equipped with electric and steam power and a concentrator.

Idle since 1918, but plans to sink shaft and recommence operations, 1922.

ELK MOUNTAIN M. & M. CO. — **SOUTH DAKOTA**

Probably idle. **Address:** Lead, S. D.

Operated the Slavonian group near Crown Hill and treated the ore in the Deadwood Standard mill during part of 1917; estimated production 3,120 tons of ore valued at $9,215.

FIRST NATIONAL GOLD MINING CO. — **SOUTH DAKOTA**

Address: Hill City, S. D.

Property: the Summit mine, operated under lease 1920-21.

FREMONT FRACTION — **SOUTH DAKOTA**

Address: Jas. T. Street & Sons, 822 W. Main St., Lead, S. D.

Property: 1 claim in Whitewood mining district, near Lead, Lawrence county. Vein runs S. E.-N. W. dips 80°, and averages 3′ in width. Assays average 49.6 Mn., 1.82% Fe., 3.76% Silica, 0.0039% Phos.

Development: by 160′ shaft and 145′ tunnel. The ore is hand-sorted. Produced 31.2 tons of ore in 1918, at a cost of $1,500 and valued at $1,670. No shipments made.

Mine examined by State Mine Inspector Ellerman.

GLENDALE MINING & MILLING CO. — **SOUTH DAKOTA**

Formerly the Otho Development and Power Co.

Succeeded by **King Mica Co.**, which see.

GOLD DOLLAR MINE — **SOUTH DAKOTA**

Address: Trojan, S. D.

Mine is in Crown Hill district, Black Hills, S. D. Leased to Coleman, Madill, and others at last accounts.

Property has been a gold producer, whose ore was treated in the Mogul mill near Deadwood. Idle since 1918, but is to be reopened in 1922.

GOLDEN CREST CONS. MINING CO. — **SOUTH DAKOTA**

Address: Jas. D. Hardin, Deadwood, S. D.

Inc. 1921 in S. D., to succeed the Golden Crest Mng. Co. **Cap.** $1,000,000.

Property: 12 patented and 8 unpatented claims, 275 acres, in Two Bit district, Lawrence county, 5 miles E. of Deadwood. **Ore:** occurs in fissure veins in porphyry, varying in size up to 15′ and carries gold, silver, lead. Mine worked about 1902; reopened and sampled in 1917, and some development work done in 1918.

Development: by 9 shafts, greatest depth 335', with about 6,000' of drifts.
Equipment: includes electric double-drum hoist, 10-drill compressor, pumps, 40 stamps, 200- ton cyanide mill, Moore filter, etc.

Under development 1921, and completely re-equipped with mining and milling machinery.

GOLDEN CREST MINING CO. SOUTH DAKOTA

Banbrupt. Property bought in by Jas. D. Hardin and associates in 1921 and fully described under Golden Chest Cons, Mng. Co.

GOLDEN FEATHER GOLD MNG. & MLG. CO. SOUTH DAKOTA

Address: Deadwood, S. D.

Property: in the Two Bit district, adjoining Monarch mine. Company has a new 10-stamp mill that will be ready for operation, 1922. Development work done in 1921.

GOLDEN REWARD CONSOLIDATED GOLD M. & M. CO. S. D.

Office: 475 Fifth Ave.', New York. **Mine office:** Deadwood, Lawrence county, S. D.

Officers: C. T. Tegethoff, pres.; Harris Franklin, v. p.; with R. W. Goelet, Henry de Forest, W. B. Devereaux, Walter Luttgen, Ed. de Witt and W. A. Harriman, all of New York, directors. W. J. Johnson, sec.; N. E. Franklin, asst. sec., Deadwood; Henry Schnitzel, gen. mgr.; F. R. Baldwin, gen. supt.

Inc. June 25, 1896, in South Dakota. **Cap.** 1,000,000 shares; $10 par; 841,793 shares issued to June, 1916. Stock transferred at company's office. Annual meeting 1st Tuesday in August at Deadwood, S. D.

Property: 442 patented claims, 3,391 acres at Terry in. Whitewood and Bear Butte mining districts, near Deadwood, includes the Union and Astoria mines. Ore occurs as contact deposit in shale, carrying gold-silver values and 75% silica. Pay ore occurs in shoots from 5-100' long, said to give average assays of $5 per ton.

Development: by several tunnels and vertical shafts from 100-350' deep, with about 15 miles of workings.

Equipment: includes electric power, electric double-drum hoist, compressor, 150-ton cyanide plant, 100-ton filter and 75-ton roaster. The furnace was stopped in July, 1916, for further investigation of the blue ore, which does not give high recovery. Average gold extraction is 75-55%. Experiments failed to show a higher extraction and practically all work was stopped in April, 1918, owing to high costs and low grade ore.

Ore reserves: estimated by management June, 1916, at 2,000,000 tons.

Production: in 1911-12, $323,846 from 52,583 tons; in 1913, $423,840 from 53,712 tons; in 1914, $369,182 from 51,355 tons; in 1915, $484,995 from 58,837 tons; in 1916, $311,204 from 52,204 tons; in 1917, $198,040 from 33,328 tons; in 1918, $36,589 from 6,542 tons.

Operations suspended since April 1918. Company is inactive and non-productive.

GOLD KING MINING CO. SOUTH DAKOTA

Developing, at last account a gold-silver property on Silver creek, near Rochford, Pennington county.

Equipment: includes boilers, hoist and compressor, installed in 1918.

HIDDEN TREASURE MINING CO. SOUTH DAKOTA

Trojan, Lawrence county, S. D. Described, Vol. XIII.

HILL CITY MINING & DEVELOPMENT CO SOUTH DAKOTA

Letters returned from former address; Hill City, Pennington county, South Dakota.

Officers: John Wise, pres. and gen. mgr.; with J. W. Stoner, and Albert Booth, directors; E. A. Schilliman, sec.-treas.

Inc. 1911, in South Dakota. **Cap.** $500,000; $1 par; 300,000 issued. Annual meeting, March 9.

Property: 11 claims, 6 patented, 220 acres in Burnt Fork gulch, 3 miles

north of Hill City. **Ore:** gold, in fissure vein, in schist; strike N. S., dip 80°. Said to have an average width of 16'.

Development: by shafts, deepest 200'. **Equipment:** includes double-drum hoist, compressor and a 10-stamp mill. No recent returns and probably dead.

HILL CITY TUNGSTEN PRODUCERS CO. SOUTH DAKOTA

Formerly at Hill City, S. D. Described Vol. XIII.

HOMELODE MINING & MILLING CO. SOUTH DAKOTA

Formerly at Silver City, Pennington county, S. Dak. L. A. Richards, gen. mgr.; L. L. Farnam, supt.

Property: shows quartz veins ,1' to 2' wide, opened up by 200' adit and 50' winze. Ore varies from 12" to 18" and is 150' in length; values are mainly in gold and antimony. Another vein ¼ mile E. and 24" wide, contains more zinc than No. 1. At camp No. 2, a 4 to 6' quartz vein carrying gold-silver values is developed by 300' shaft with 500' of drifting.

Equipment: includes three 100-h. p. boilers and an amalgamating mill, equipped with crusher, slow-speed Lane mill, tables and classifiers. Concentrate shipped reported to carry 2-4 oz. gold, and 6-10 oz. silver, principally as arsenopyrite. No production since 1917.

HOMESTAKE MINING CO. SOUTH DAKOTA

Main office: 910 American National Bank Bldg., San Francisco. **Eastern office:** 15 Broad St., New York. **Mine office:** Lead, South Dakota.

Officers: Edward H. Clark, pres.; Frank G. Drum, v. p.; Fred Clark, sec.; Louis T. Haggin, treas.; preceding, with Harry L. Tevis, Thos. Turner and Richard A. Clark, directors. B. C. Yates, supt.; R. G. Wayland, asst. supt.; C. W. Merrill and Allan J. Clark, cons. metallurgists.

Inc. Nov. 5, 1877, in California. **Cap.** $21,840,000; increased March 25, 1913, to $25,116,000 by payment of 15% stock dividend; shares $100 par. Columbia Trust Co., New York, transfer agent; Union Trust Co., New York, registrar. Annual meeting, third Tuesday in March, in San Francisco. Listed on New York Stock Exchange since 1879.

Sales on N. Y. Stock Exchange during 1920 totaled 9,154 shares; the range was $71 high in January and $45 low in October. In 1921, sales totaled 18,600 shares, with range between $61 and $49.50.

Balance Sheet, years ending December 31

Assets

Year	Mines and works	Cash balances and Liberty loans	Bullion in transit	Supplies	Total
1920....	$27,816,610	$ 589,778	$282,537	$681,064	$30,351,509
1919*...	27,355,435	570,326	16,885	665,444	29,275,642
1918....	27,105,865	1,184,947	214,382	671,316	29,176,511
1917....	26,713,219	1,077,354	309,594	553,241	28,653,408
1916....	25,116,000	1,332,006	325,569	383,635	27,157,210
1915....	25,116,000	1,222,812	302,097	.....	26,640,909

*Profit and loss account for year 1919 was $667,551; and in 1920 was $981,519.

Liabilities.

Year	Capital stock	Outstanding drafts	Sundries	Profit and loss account	Reserve for depreciation	Total
1920	$25,116,000	$266,469	$105,100	$	$4,863,940	$30,351,509
1919	25,116,000	239,492	5,101	.....	3,915,048	29,275,642
1918	25,116,000	273,608	18,508	380,532	3,387,863	29,176,511
1917	25,116,000	371,749	5,126	1,189,403	1,971,130	28,653,408
1916	25,116,000	522,353	5,224	949,934	563,600	27,157,210
1915	25,116,000	486,640	5,336	1,032,933	.....	26,640,909

Income.

Year	Receipts mng. oper.	Other income	Balance brought forward	Total
1920.....	$4,410,193	$ 19,040	**$ 313,968	$4,743,202
1919.....	4,352,631	37,908	1,048,083**	5,438,622
1917.....	6,846,108	30,865	949,933	8,830,042
1918.....	5,916,890	204,457	1,189,403	.....
1916.....	6,531,003	586,505	1,032,933	8,150,442
1915.....	6,448,024	77,758	897,596	7,423,378
1914.....	6,160,160	148,562	1,428,248	7,736,970
1913.....	6,186,652	132,716	1,455,958	7,775,326

**Includes profit and loss account.

Expenditure.

Year	Oper. expenses (a)	Dividends	Balance Dec. 31	Total
1920.....	$4,743,202	.....	.....	$4,743,202
1919.....	3,781,217	$1,130,220	$667,551(b)	5,438,622
1918.....	4,006,526	1,506,960	380,532	.....
1917.....	4,868,145	1,959,048	1,189,403	8,830,042
1916.....	4,990,300	2,210,208	949,934	$8,150,442
1915.....	4,180,238	2,210,208	1,032,932	7,423,378
1914.....	4,629,166	2,210,208	897,596	7,736,970
1913.....	4,200,853	2,146,225	1,428,248	7,775,326

(a) Including salaries, legal, general, etc.; bills payable; taxes; property purchased; interest. (b) profit and loss account.

Taxes are high; in 1914 amounting to 16c per ton of ore milled; 15c in 1915; 16c in 1916; 18c in 1917; 21c in 1918; 34c in 1919.

Dividends: have been paid monthly almost continuously since Jan., 1879; were suspended in May, 1907, as result of a fire in the mines, and resumed January 25, 1908; continued to December, 1909 inclusive, when they were suspended owing to labor troubles at the mines; resumed in March, 1910. Paid 50c per share per month to September, 1919, a total of $41,927,559. Monthly dividend payments were resumed in 1921 with a first payment of 25c per share, May 25. Total disbursements to Aug., 1921, amount to $42,178,719, or $190.28 per share.

Property: 468 claims, about 3,723 acres in the Whitewood mining district, Lawrence county. The towns of Lead and Deadwood and the settlements of Blacktail, Terraville and Central City have grown up around the mines and mills.

The first claims acquired by the company were the Grant and Old Abe, located by J. B. Pearson, December 11, 1875. In the Fall of 1876, representatives of Haggin and Hearst bought these claims, and the Homestake Mining Co. was incorporated. In July, 1878, the first and only assessment was levied, $1 per share; it furnished the $200,000 required to build the 80-stamp Homestake mill. In 1899, company acquired the **Highland Mining Co.**, an adjoining property of about 73 acres; also the Black Hills Canal & Water Co., owning 40 miles of ditches, flumes and pipe-lines, with reservoirs, improvements and water rights covering the water supply of Deadwood and Lead districts.

According to Wright & Hosted the rocks in and near the Homestake mine may be classed under three broad groups: (1) Tertiary intrusives and extrusives: (2) Cambrian conglomerate, quartzite, and dolomite, or "flat formation." (3) pre Cambrian (Huronian) slates, schists, quartzites, limestones, and intrusives. This last group is locally termed the "vertical formation." The pre-Cambrian rocks have been uplifted and dynamically

metamorphosed, making the group a series of plunging, tilted folds. The axes of the folds strike N. 60 deg. W. to N. 35 deg. E., and axial planes dip steeply to the east with few local exceptions. The relation of the other groups to the pre-Cambrain is best shown by the accompanying section.

The ore has been found to be associated with the folding, so that the problem in the district has resolved itself into one of working out the location and exact structure of the major folds and then the location and structure of the minor or drag folds.

The ore varies considerably in composition in different portions of the deposit, but that of the deeper levels, the unoxidized ore, usually contains either chlorite or ferruginous hornblende (cummingtonite), with quartz, carbonates of lime, magnesia, iron, arsenopyrite, pyrite and pyrrhotite. Ferrous minerals predominated and this has been an important factor in determining the metallurgical treatment. In the upper oxidized parts of the deposits the ore is dark red, but deeper, in the sulphide zone, is greenish-blue to blue-black. Sulphides vary in amount from 3 to 5%, and even as high as 10% or more of the ore. In the sulphide zone the distribution of gold is uniform and averages $4 to $4.50 per ton. Over 60% of the ore is free milling. Secondary enrichment has not resulted in the formation of any particularly rich zones.

Development: 6 shafts; 4 in the footwall, one in the hanging, and one in the lode; depths January 1, 1917, were:

Ellison	B. & M.	Golden Prospect	Golden Star	Old Brig	Golden Gate
2,195′	1,700′	1,100′	1,400′	800′	800′

The 1,850′ and 2,000′ levels of the Ellison shaft will eventually be connected with the B. & M. shaft, through which outlet the bulk of the ore will be hoisted to surface. The B. & M. shaft is equipped with loading pockets at 800, 1,000, and 1,550′, a hoist and skips, which will dump into N. 8 Gates crushers, and their product carried by a belt-conveyor system to smaller gyratories. Total cost of sinking at the Ellison shaft is said to have averaged $60.64 per ft. There are in all about 130 miles of workings. Underground work during 1916 amounted to 24,381′; 19,320′ in 1917; 7,354′ in 1918; 5,770′ in 1919; 7,737′ in 1920. The Ellison shaft is being electrically equipped.

Ore Reserves: are large and sufficient to supply the reduction plants for many years. Broken ore in stopes at end of 1920 was 1,935,965 tons compared with 1,537,965 tons at end of 1919.

Ore treatment: the metallurgical equipment at the Homestake is one of the most modern and efficient in the country, and has been fully described in the technical press. The treatment problem is simple, the ore crushers well, averaging 4.7 tons per stamp daily. Amalgamation in battery and on plates is followed by cyanidation of sands and slimes separately. There are 1,020 stamps employed in six different mills, the pre-war cost being 26c per ton. During 1920 a total of 920 stamps were in operation treating 4,200 tons per day.

Mills: at the south side—3 stamp-mills (660 stamps) with 36,356 sq. ft. of amalgam plates; 1 regrinding plant, with independent cone system, and 540 sq. ft. of amalgam plates; 4 batteries of cones for classification; 3 clarifying tank houses; 1 sand plant. The mills are the Amicus, Golden Star, Homestake and Pocahontas. In 1915 the Pocahontas mill was completely rebuilt. The Amicus mill was remodeled in 1917.

At the north side—2 stamp-mills (300 stamps), the Monroe mill and Mineral Point mill; 2 tank-houses; 2 cone-houses; 1 sand plant. Ore supplied to these mills is usually drawn from the upper levels of the mine, and is partly oxidized.

A 5-stamp crushing and concentrating mill was built, 1916, for treating tungsten ores. It contains an amalgamation plate, cone classifiers, two Deis-

ter and one Wilfley tables for cone products, two small ball-mills for grinding middlings, and another Deister table to concentrate the ground product. Tailing passes to the cyanide plants. This mill has operated continuously on ore averaging 2% WO_3, yielding concentrate carrying 54% Net sales of wolframite were $229,916 in 1916; $226,535 in 1917, $167,408 in 1918; $6,515 in 1919.

At **Deadwood**—A slime plant, treats the slime from both south and north side mills. At all the mills the stamps weigh 1,000 lb and drop 10", making 88 drops per minute; Homestake order of drop is 1-3-5-2-4 or 1-4-2-5-3. A 25-h. p. back-geared motor drives each 10 stamps. Ratio of water to ore is large being 10 or 12 tons of water to one of ore. A minimum of about 50,000 tons of water per day is used, most of it from Spearfish Creek and its tributaries, being conveyed over 20 miles in ditches and wirefield pipe, and costing 10¢ per ton of ore stamped.

Inside amalgamation is practiced, quicksilver being fed to the mortar. Chuck-blocks are cleaned in rotation, at intervals of about 2 weeks; outside plates, except those of the fourth row, are cleaned and dressed daily. Fourth row plates are dressed at 2-day intervals. Amalgam is retorted three times each month. Oil-fired retorts are used, the resulting bullion being melted in coke-fired furnaces.

A 250-ton ball-mill was put into operation in 1920.

Regrinding is done in tube-mills. In cyaniding the usual methods are closely conformed to. A recovery is made of about 94% of the value in the ore: 72% by amalgamation and 22% by cyanidation.

A new 2,000-ton mill known as the South mill, is under construction at East Lead, east of the Ellison hoist, on the south side of the slope above the No. 1 cyanide plant. The general dimensions of the main building of the South mill, are 150x160', the classification annex will be 70x70' and the slime settling annex 100x40'. The general metallurgical scheme involves stage reduction, amalgamation after each reduction and the separation of sand from slime, with cyanide treatment of each product in existing plants.

Preliminary to treatment, the ore will be run through the crushers and over a tramway to the mill bins. It will be crushed by 120 stamps weighing 1,550 lb. each and then discharged through 2-mesh screens. The oversize from the stamps will then pass to six 5x10' Allis Chalmers rod mills with individual motor drive and in closed circuit with Dorr classifiers. The fine sand and slime from the stamps will by-pass these machines and unite with the classifier overflow.

At this stage the ore will go through an amalgamation process, four 4½x12' silver-plated copper plates being provided for each grinding unit. Suitable classifiers and two 5x14' tube mills will be used to control the final sizing of the tailings passing from the plant.

Power and equipment: company has hydro-electric plants at Spearfish and Englewood. Power equipment includes a steam-driven electric generating station at Lead, maximum capacity 4,000 k. v. a. The company operates its own machine shops, carpenter shops and foundry. Power used is about 1.15 k. w. hr. per ton of ore treated.

The Homestake Mining Co., has long been known for the way in which it has looked after the welfare of its 1864 employees. In 1914, it completed a recreation building containing a theatre with seating capacity of 1,000, library, swimming pool gymnasium bowling alleys, billiard and amusement rooms. Wages are from $4 to $5 per day underground and from $3.75 on the surface.

Production: to Jan. 1, 1920, $164,023,965, exclusive of wolframite. Recent production has been:

Year	Ore milled tons	Recovered per ton	Total cost per ton
1920	1,274,944	$3.4591	.....
1919	1,192,588	3.6443	$3.330
1918	1,628,630	3.633	2.700
1917	1,677,623	3.946	2.900
1916	1,600,220	4.0813	3.110
1915	1,573,822	4.0848	2.6561
1914	1,587,774	3.8797	2.9155
1913	1,540,961	4.0148	2.7258

Costs for 1920 were high owing to flooding of the mine, (done to put out fire) and to consequent shut down. Costs for 1921 were about $2.60 per ton.

At the end of 1918 the mines and mills were operated at only 77 per cent capacity. Production continued steadily during 1919, until September 25, when a fire was discovered on the 800′ level, and it was found necessary to flood the mine to the 600′ level. During October and November operations were necessarily curtailed, but they were resumed December 1.

IMPERIAL COPPER CO. **SOUTH DAKOTA**

Idle. Property in Custer Peak district. Described in Vol. XIII.

IRON HILL MINING CO. **SOUTH DAKOTA**

Property: the old Iron Hill silver mine, in Carbonate district, Lawrence county, A 1,300′ drainage adit, called the Elder tunnel, was completed in 1920, cutting the lode at 300′ in depth and the entire mine unwatered and development work begun.

IRONSIDES MINING CO. **SOUTH DAKOTA**

Address: Central City, S. D.

Property: a gold-silver mine under development in 1919, but idle since.

KING MICA CO. **SOUTH DAKOTA**

Address: Keystone, S. D.

Is successor of Otho Development Co., which succeeded Glendale Mng. & Mlg. So.

Property: a gold-silver mine and 700 acres of mineral land, situated 3 miles from Keystone.

Reopened 1921 and being worked 1922 for mica.

LAUREL GROUP **SOUTH DAKOTA**

Owners: August Peterson, Nemo, S. D. E. A. Skalinder, Joe Kellar, Deadwood, S. D.

Property: 4 unpatented claims, 60 acres, in Greenwood mining district, Lawrence county, developed by 495′ tunnel and 90′ shaft, said to contain free milling gold and silver, assaying $2.40 to $10 per ton. Expended $12,000 during 1918. No record of latter work.

MALONEY-BLUE LEAD COPPER M. & S. CO. **SOUTH DAKOTA**

Mail returned from former addresses: 215 Ry. Exchange Bldg., Chicago, Ill., and Hill City, S. D.

Officers: M. T. McCaskey, pres.-mgr.; F. A. Poor, v. p.; J. G. Thomas, sec.; R. N. Baylies, treas.

Inc. 1899, in South Dakota. **Cap.** $750,000; $1 par; 670,000 outstanding.

Property: 23 patented claims, 340 acres, near Keystone, Pennington county, shows copper ore in limited amount.

Worked by lessees in 1918, who are reported to have shipped 580 tons to the Omaha smelter, averaging 4.46% copper and 1.38 oz. silver, valued at $8,202.

Probably dead.

MOGUL MINING CO. **SOUTH DAKOTA**

Address: Terry, S. D.

Inc. 1905, to take over holdings of the Horseshoe Mining Co. Union Trust Co., Pittsburgh, transfer agt.

Company treated ore from its own mine and other companies, and

operated the mine of the **Ofer Mng. Co.** at Trojan, Lawrence county. A 1,200′ tunnel on the Ofer mine was completed in 1918 and 33,750 tons of ore shipped to the Mogul plant returned $169,974.

Equipment: includes 1,600′ aerial tramway and a complete cyanide mill.

Production: treated 59,384 tons in 1912, valued at $242,567; 5,393 tons in 1913, valued at $44,117; 21,770 tons, in 1914, valued at $141,298; 37,419 tons in 1915, valued at $161,605; 38,671 tons in 1916, valued at $189,935; 35,980 tons in 1917, valued at $187,317 and 33,750 tons in 1918, valued at $169,975. All work was suspended October, 1919.

MONTEZUMA & THE WHIZZERS MINE **SOUTH DAKOTA**

Idle since 1918. **Address:** John Tait Milliken, Natl, Bank of Commerce, St. Louis, Mo.

Property: 150 acres, on the divide between Deadwood and Whitewood Canon, and on Deadwood Creek and West Gold Run, near Lead City, S. D. Property shows Algonkian schists, slates and quartzite, and carries a strong gossan, of 45′ estimated average width, traceable 3,000′. Spiegel No. 1 formerly the Whizzers, and Brownie No. 5, carry 2 parallel quartzite reefs with chalcopyrite in a gangue of hornblende schist, ores assaying 1 oz. silver and $1-$2 gold per ton.

Development: by 2 tunnels, one 650′ long, which have produced about 50,000 tons of low-grade fluxing ore, sent to smelters at Deadwood and Rapid City. A 22′ winze, below the water-level, gave picked samples, assaying $16.80 gold per ton.

The Montezuma claim, near West Gold Run, has 2 short tunnels, showing ore assaying up to 1 oz. silver and $53.70 gold per ton. Though low in average grade, the property has an enormous tonnage, but needs big capital to develop. Examined and reported favorably on by Geo. Huston, of Mullan, Idaho, and Nicholas Treweek, of Salt Lake City.

Property acquired in 1917 by J. T. Milliken, of St. Louis, Mo., who also developed the Oro Hondo nearby.

NATIONAL TIN CORPORATION **SOUTH DAKOTA**

Address: 50 Broadway, New York City.

Officers: Simon Lederer, pres.; Henry E. Vaughan, v. p.; Fred A. Travis, treas.

Inc. March, 1919, in Delaware. **Cap.** $1,000,000; 50c par; amount outstanding not divulged. Stock listed on New York Curb and quoted at $7.50 in October, 1919; at $13 in January, 1920 and at 50c in 1921. Security Transfer & Registrar Co., registrar and transfer agents. Company has a 20-year lease on the mines and mill of the American Tin & Tungsten Co., the latter company to receive 25% of the net profits.

Property: a 20-year lease on mines and mills of the American Tin and Tungsten Co., the old Harney Peak Tin Co. property, 41 claims and a mill-site on the Keystone branch of the C. B. & Quincy R. R. at Keystone, Pennington county.

Ore: occurs as scattered grains of mineral in quartz veins and pegmatite dikes, the tungsten as wolframite and ferberite, the tin as cassiterite. In the Cowboy mine the cassiterite occurs in lenticular quartz mica veins, 12″-2′ wide, with strike N. 54° W. and dip of 67° N. E. Stoping operations between the 200 and 250′ levels claimed to have broken 6,000 tons of 1.98% ore. The Mohawk mine is developed by a 100′ shaft, said to show a 3′ lense of 2% ore at 40′ depth.

Development: by vertical shaft being sunk to depth of 500′.

Company expected to start shipments in 1921, when adequate shipping facilities had been arranged for. The mine has been worked intermittently, possibly due to lack of enthusiasm on the part of American T. & T. stockholders to take up Natl. stock and supply necessary working capital. High grade ore said to average $100 to $500 per ton; medium grade $9 to $30 and low grade ore $3 to $6 per ton.

Operations resumed in first part of year and then suspended; at the

Boon mine, operations were resumed late in the year. The 250-ton concentrator was not operated.

Is regarded as of doubtful merit and stock selling appears to take precedence over mining.

NEW GOLDEN WEST MINES CO. SOUTH DAKOTA

Mine near Rochford, Pennington county, S. D. Described in Vol. XIII.

NEW PURITAN MINING CO. SOUTH DAKOTA

Address: Lead, South Dakota.

Officers: Wm. J. McGoffin, pres, and mgr.; L. Herseth, v. p.; P. A. Gushurst, sec.; W. C. Nissen, treas., with S. Ruud, W. Worth, and A. Randall, directors.

Inc. 1915, as a reorganization of the Puritan Mining Co. **Cap.** $1,500,000 shares; $1 par; non-assessable; 200,000 shares issued. Annual meeting in June.

Property: 60 patented acres, in Whitewood mining district, Lawrence county, shows an orebody, 28' thick in quartzite, carrying gold ore said to assay $3.60 per ton. Developed by several shafts to depth of 190'.

Equipment: includes a steam hoist, 6-drill compressor, pump, and a 250-ton concentrating mill with cyanide unit.

Property has been idle for several years, owing to litigation.

NEW SILVER QUEEN MINING CO. SOUTH DAKOTA

Address: Robt. Scholt, mgr., Galena, S. D.

Property: in Galena district, Lawrence county, in operation since 1917.

Development: by 3,800' tunnel. Shipped 144 tons of lead-silver ore valued at $1,995 in 1917, and 57 tons, valued at $2,093 in 1918. Some ore shipped in 1920, but none in 1921, awaiting erection of a mill.

Electric power and equipment installed in 1921, and development continued.

NORTH HOMESTAKE MINING CO. SOUTH DAKOTA

Address: A. Maitland, Negaumee, Mich., pres. and controlling owner; A. F. Maitland, v. p.; T. C. Jates, sec.

Inc. in South Dakota. **Cap.** $6,000,000; $5 par; 1,000,370 shares outstanding.

Property: 77 patented claims, 1,100 acres at Maitland, Lawrence county, shows veins of quartz and sulphide ore, carrying gold and silver values.

Development: by 750' vertical shaft and 600' drift on the 600' level with crosscuts E. and W. for 200' and 100', respectively.

Equipment: includes 125-ton cyanide mill, electric power, 4 electric pumps, 2 compressors and hoist. Mine is credited with a production of $1,500,000 under former management. Development work carried on intermittently during past 5 years has so far failed to disclose new orebodies of commercial grade.

Work suspended in September, 1916.

OFER MINING CO. SOUTH DAKOTA

Dead, or inactive. **Address:** Deadwood, S. D.

Property: in Bald Mtn. district, near Trojan, Lawrence county, operated until October, 1919, by Mogul Mining Co., was purchased in 1920, by Trojan Mining Co.

OLAF SEIM MINE SOUTH DAKOTA

Idle. **Address:** Olaf Seim, owner, Deadwood, So. Dakota.

Property: 1 mile from Deadwood, Lawrence county, adjoining the Montezuma and the Whizzers on the north, carries pyritic ore high in sulphur. Operated during part of 1918.

Production 1,150 tons averaging 38% sulphur. During 1918, 916 tons shipped returned $7,200.

ORO HONDO MINE SOUTH DAKOTA

Address: Estate, John T. Milliken, care Natl. Bank of Commerce, St. Louis, Mo. John Tait Milliken, cons. engr., Colorado Springs, Colo.

Property: at Deadwood, So. Dakota, is said to show replacement deposits in schist.

Development: by 2,200′ vertical shaft. Did about 2 miles of diamond drilling, 1916, presumably in search of southerly extension of the Homestake orebodies. Idle since 1917.

PURITAN MINING CO. **SOUTH DAKOTA**

Address: Deadwood, So. Dakota. Described in Volume XIII

See **New Puritan Mining Co.**

RARE METALS CO. **SOUTH DAKOTA**

Address: Custer, S. D.

Officers: Frank Hitch, pres.; W. N. Hunter, v. p.; Chas. Eastman, sec.-treas. ; Jos. R. Bland, chief engr.

Operated a small concentrating mill at Custer, Custer county, equipped for treatment of tin, tungsten and vanadium-bearing ores and the refining of mica ore. Idle since 1919.

RATTLESNAKE JACK MINING & MILLING CO. **SOUTH DAKOTA**

Address: Galena, Lawrence county, S. D. Owned by C. B. Harris of Galena, and William Sansome of New York.

Property: several claims, including the Rattlesnake Jack mine near Galena, said to show gold ore assaying $15 to $20 per ton.

Development: 200′ shaft and tunnels. A 10-stamp mill and cyanide plant, completed in August, 1915, ran for several months, when a shutdown was made to build a tailing dam; resumed operations in January, 1916, only to close down in April, due to disagreement between the owners.

Reported that 1,670 tons of silver-gold ore treated in 1916, yielded $14,270. Daily tonnage treated averaged 60 tons when the mill was running. Idle since 1916.

SPOKANE LEAD CO. **SOUTH DAKOTA**

Address: Hermosa, S. D.

Property: at Hermosa, Custer county, 7½ miles S. of Keystone, developed to depth of 200′ with levels at 60′, 100′ and 200′.

Ore: silver-lead. **Equipment:** includes 100-ton concentrator, installed 1918.

Productnon: in 1918, 102 tons of concentrate, containing 13.25 oz. silver and 35.74% lead per ton and valued at $4,428. Several carload shipments of concentrate made in 1919.

TIN BOOM MINE **SOUTH DAKOTA**

Address: Mills Bros., Hill City, S. D.

Property: located ½ mile W. of Hill City, produced 400 lb. of concentrate, carrying 60% tin from 4 tons of ore, in 1918. Assessment work only being done.

TITANIC GOLD MINING CO. **SOUTH DAKOTA**

Probably dead. No operations since 1914. Formerly worked mine near Deadwood.

TROJAN MINING CO. **SOUTH DAKOTA**

Office: Deadwood, S. D. **Mine office:** Trojan, S. D.

Officers H. W. Seaman, pres.; G .M. Curtis, v. p.; A. G. Smith, treas., all of Clinton, Iowa. F. M. Clark, sec.; H. S. Vincent, mgr.; above are the directors. C. E. Dawson, asst. mgr. and purch. agt. H. Slaughter, mine supt.; N. P. Goodrich, mill supt.

Inc. 1911, in South Dakota. **Cap.** $3,000,000; par $1; outstanding 1,000,000. Annual meeting in June.

The company publishes no financial reports.

Property: 220 patented claims, 2,100 acres in Bald Mtn. district, Lawrence county. Ore-bodies are flat deposits and vertical between porphyry shale and quartzite, carrying refractory values in gold and silver. Company acquired the Ofer Mining Co. property in 1920.

Development: by 308′ Foley shaft and Portland, Decorah, Empire and Eagle adits, the Portland being main outlet.

Equipment: 7 electric hoists, 370 h. p., three compressors, 1,100 cu. ft. capacity, and 2 gasoline locomotives. Mill equipment is for cyaniding. Capacity 400 tons daily. Crushing is by Chilian and tube mills, filtration by Oliver machines.

Production: total to Jan. 1, 1921, 823,166 tons ore mined, 13,515 tons custom ore; also 13,648 tons shipped to smelter; total value $3,620,672.

WASP No. 2 MINING CO. **SOUTH DAKOTA**

Out of business. Mill wrecked, 1918. Fully described in Vol. XIV.

TENNESSEE

Tennessee produced 283,792 tons of iron ore in 1919 and 375,538 tons of iron ore in 1920. The state contains the important Ducktown district whose mines yielded 16,727,803 lb. copper, $5,830 gold and 110,719 oz. silver in 1920. Most of the output of 3,957,000 lb. lead and 38,434,000 lb. zinc produced in 1920 came from the Embree & Mascot Mines.

The Union Zinc, Tennessee Zinc and Grasselli Zinc properties were idle in 1920.

AMERICAN BALLAST CO. **TENNESSEE**

A subsidiary of the **Amer. Z. L. & Sm. Co.**, and described under that title in the U. S. section of this book.

AMERICAN ZINC CO. OF TENNESSEE **TENNESSEE**

Address: Mascot mine, Mascot, Jefferson Co., Tenn. A subsidiary of the **American Z., L. & Sm. Co.** and described under that title, in U. S. section of this book.

Address: O. C. Burrell, mgr., Mascot, Tenn.

Inc: Feb. 24, 1911, in Maine. **Cap.** $10,000; $1 par, all owned and issued by A. Z. L. & S. Co.

Principal mining operations of the Tennessee Co. are at Mascot, Knox county, where the company owns 2,400 acres, and in Jefferson county, adjoining Knox on the east, where company owns 400 acres of land.

Mining methods at the Mascot mine are described by H. A. Coy and H. B. Henegar in the Sept., 1917, Bulletin of American Institute of Mining Engineers. Costs totaled 70¢ per ton.

From the east to west the ore development as now shown is 7,900′ in length. There has been blocked out 4,000,000 to 5,000,000 tons of ore, which will average 4% zinc.

CHATTANOOGA COPPER CO. **TENNESSEE**

Reorganized as the **Ocoee Copper Co.**, which see.

COPPER PYRITES CORPORATION **TENNESSEE**

Office: 522 Fifth Ave., New York City. **Mine office:** Isabella, Tennessee.

Officers: Wm. Young Westervelt, pres.; Roger L. Wensley, v. p.; J. N. Bailey, sec.-treas., with F. M. Kirby, S. W. Mudd, C. W. Wilhelm and M. G. Taylor, directors.

Inc. March 17, 1919, in New York. **Cap.** $203,000, in 20,000 preferred and 300 common shares; par $10; all outstanding. To end of June, 1919, company had spent over $200,000 for a 25-year lease from June 29, 1916, and development of its property.

Property Sec. 16, comprising 640 acres of School land, in Ducktown mining district, Polk county, showing ¾ of a mile of gossan outcrop. Diamond-drilling of the southern end gives assurance of approximately 1,500,000 tons of ore averaging over 45% iron, 29% sulphur and 1% copper. Management anticipates 12,000,000 to 13,000,000 tons of this grade ore.

Development: shaft A had been sunk 250′, to October, 1919, and 1,200′ of work done on two levels.

Equipment: includes steam hoist, air-compressor and ½ mile broad-gauge railway, connecting with the L. & N. R. R. at McHarg Siding. Com-

pany plans erecting a differential flotation mill to make 18% copper concentrate and a de-coppered pyrrhotite concentrate. Tests show latter will contain between 90 and 95% sulphide of iron, which can be used in the production of sulphuric acid, and a high-grade, low phosphorous iron ore.

Property was under lease to the Tennessee C. and C. Corp., for 6 months ended March, 1921, during which time 19,818 tons ore were mined, and 3,17 of extensions were made on the two levels.

DUCKTOWN SULPHUR, COPPER & IRON CO., LTD. TENNESSEE

Office: 1 Gresham House, Old Broad St., London, E. C., Eng. **Mine office:** Isabella, Polk county, Tenn.

Officers: J. G. Gordon, chairman and managing director; L. G. Mortimer, managing director preceding, with H. G. Palmer, Edward Dexter and Col. H. B. Mortimer, directors; J. W. Felstead, sec.; William Young Westervelt, 522 Fifth Ave., New York, cons. engr. Executives at the mine: W. F Lamoreaux, gen. mgr.; J. H. Taylor, asst. gen. mgr.

Inc. in Great Britain, Feb. 16, 1891. **Cap.** £75,000; shares £1 par; in £74,800 ordinary shares and 200 founders' shares. Increased 1907, to £200,000 shares, increase subscribed to by the old stockholders at par, except £48,799 ordinary shares sold to the public at 25s. Stock is fully issued and fully paid. Profits are divisible on the basis of 7% plus one-half of the net remaining profits, to ordinary shares, balance of profits going to founders' shares. £83,900 first mortgage, 6½%, debentures outstanding, July 1, 1919, against which a general reserve fund of £55,000 has been accumulated.

Recent Dividends:

	Ordinary Shares	Founders' Shares £ s d		Ordinary Shares	Founders' Shares £ s d
1907	82½%	249 3	1912	10%	29 19 5
1908	55%	108 18	1913	12½%	54 18 11
1909	10%	16 0 8	1914	12½%	54 18 11
1910	10%	21 17	1915	13¾%	9 9 10
1911	10%	28 4 5	1916	20%	129 17 3

Total dividends paid to all classes of shares, £558,063. Of this, £363,547, amounting to 375 5/6% on shares outstanding at the times of payment, was paid to the ordinary shares, and £194,506, amounting to 97,253% was paid to the founders' shares; the latter constituting the world's record for profitable copper mining investment. On the 74,800 ordinary shares, from 1895 to 1907, inclusive, 293%, or £229,636, was paid.

Property: nearly 7,000 acres, bought for £68,057, includes the Mary, East Tennessee and Isabella mines, which are active, and the Calloway and Cherokee mines, which are idle. Country rocks consist largely of very tough highly metamorphosed, silicified mica schists, of ancient origin. The ores are exclusively sulphide, averaging about 2½% copper and containing minute quantities of gold and silver, sufficient, however, to be appreciable in the matte.

The **Mary** mine, which is the principal producer, has three shafts, the Gordon 1,180' deep being now the main working shaft. The richest ore in the mine is on the lower levels. The workings blocked out 1,500,000 tons, averaging 1.8% copper and 16% sulphur with an additional amount of indicated ore of similar grade making a total of 3,000,000 tons.

The **East Tennessee** mine did not commence to produce until 1910. The Thomas, or operating shaft, 700' deep, has 2 compartments and yields about 30 tons per diem of ore containing 3% to 5% copper and 8% sulphur. Reserves scattered through old mine, between 5,000 and 10,000 tons contain at least 2.5% copper and 8% sulphur, and there are prospects of considerable further developments of rich ore.

The **Calloway** mine, now idle, contains between 10,000 and 20,000 tons of further developments of rich ore.

The **Calloway** mine, now idle, contains between 10,000 and 20,000 tons of 2% copper ore immediately below the third level, with possibility of further developments in depth.

The **Cherokee** mine shows extensive outcrop on the continuation of the orebody of the School property and it is anticipated that it will yield four million to five million tons of ore averaging 1% copper, 29% sulphur and 45% iron.

The **Isabella** mine has thus far yielded but a few thousand tons of ore a year. The ore, averaging about 0.8% copper and 29% sulphur, has as yet been used for little else than experimental purposes. 5,600' of systematic diamond-drilling, however, has already revealed over 2,500,000 tons of average ore with like amount anticipated making 5,000,000 tons in all, so that doubtless the property will, eventually, be worked on a considerable scale for acid and iron manufacture.

Smelter: the company's smelter, and headquarters are located at Isabella, on the company's private standard-gauge railway, about 2½ miles from the Mary mine. The plant contains two 500-ton, sectional water-jacket blast furnaces, operated by induction motor Connersville blowers of 300 cu. ft. per revolution aggregate capacity, charged by a Freeland patent electrical charger and served by an electrical traveling crane for the matte and belt bucket elevators for the granulated slag. Since 1902, when heap-roasting was abandoned, semi-pyritic smelting, introduced into this country from Tasmania by this company, has been employed. A small percentage of coke and cold blast of from 20 to 30 ozs. is used. The product of the fusion is a matte containing 12 to 15% copper, and disposes of the non-metallic matter in the ore in a slag containing 0.2 to 0.3% copper. The matte is treated in a basic lined convertor together with the concentrates from the flotation plant mentioned below. Blister copper is produced which is refined by the Nichols Copper Co., New Jersey.

A 300-ton differential flotation plant finished 1921, produces an 18% copper concentrate and a nearly pure pyrrhotite by-product.

In 1905, investigations were undertaken to determine the possibility of making sulphuric acid from the smelter fumes. In 1906, an experimental contact plant was erected, but proved unsuccessful, and in 1908, work on the present chamber acid plant was commenced. This plant, which cost over $600,000, was put into operation in less than a year from the time of breaking the ground for its erection, and has since been producing from 40 to 50 thousand tons per annum of 60° Beaume sulphuric acid. It was the first acid plant to successfully convert sulphuric gases from pyritic smelting into concentrated acid.

The credit for the successful development of the company is due primarily to the chairman and managing director, Mr. Gordon, himself a technical man, to the consulting mining engineer, Mr. Westervelt, who developed the mines, and to the former manager, Mr. W. H. Freeland, who developed the pyritic smelting process employed.

Production:

Year	Pounds Copper	Tons 60° B. Sulphuric Acid
1920	6,210,823	37,490
1919	5,290,000	20,735
1918	5,252,000	35,000
1917	5,593,000	32,900
1916	5,129,000	†41,000
1915	5,500,000	41,000
1914	5,862,000	46,900
1913	5,811,000	48,800
1912	5,213,000	48,100
1911	5,040,000	45,600
1910	4,409,000	46,800

† 11,000 tons contained 95% to 97% acid:

Copper production for first half of 1921 was 3,453,885 l.

Company is managed with commendable financial prudence, technical ability of a high order, and is heartily endorsed as worthy of confidence and investment.

EAST TENNESSEE MINING & DEVELOPMENT CO. **TENNESSEE**

See Southern Zinc & Mng. Co., Inc.

EAST TENNESSEE ZINC CO. **TENNESSEE**

Address: M. Casewell Heine, atty., 140 Nassau St., New York

Inc. in New Jersey, and registered in Tennessee. All stock owned by M. C. Heine.

Property: 173 acres, 2 miles from Newmarket, on the Southern railway, reported to show zinc blende ore occurring in joint planes and fractures in limestone beds.

Development: by drilling claimed to have proven about 6,722,000 tons of ore. Work on the property includes an open quarry pit 75' deep with 5 tunnels running from it.

Equipment: includes 100-ton concentrator, 540' cable tram and 25-h. p. hoist.

ELENOR MANGANESE CO. **TENNESSEE**

Address: R. B. Hayes, pres., Masontown, Pa.

Inc. 1919. **Cap.** $15,000.

Property: bought in 1919 from A. H. McQuenn, is near Butler, Johnson county.

EMBREE IRON CO. **TENNESSEE**

Property: the Embree lead-zinc mine in Washington county. The ore is concentrated at the mine, the concentrates averaging 41.31% zinc and 62% lead. A producer since 1919.

KALBFLEISCH CORPORATION **TENNESSEE**

Property: near East Chattanooga, Hamilton county, was the only producer of bauxite in Tennessee during the year 1920.

MASCOT MINE **TENNESSEE**

Address: Mascot, Jefferson county, Tennessee. See American Zinc Co. also under Tennessee.

MAX MINING CO. **TENNESSEE**

Braemer, Tenn.

Prospecting for manganese on Little mountain, Carter county, where 15% ore is found that shows manganese minerals in grains and lumps in a clay bed.

OCOEE COPPER CO. **TENNESSEE**

Address: J. I. Carter, gen. mgr., Volunteer Bldg., Chattanooga, Tenn.

Officers: J. I. Carter, pres.; John Stagmaier, 1st v. p.; G. H. Miller, 2nd v. p.; S. E. Whitaker, sec., P. B. Carter, treas., with R. B. Davenport, W. S. Palmer, J. C. Vance and W. H. Weatherford, directors. L. W. Hope, supt., Ducktown, Tenn.

Inc. 1917, in Tennessee. **Cap.** $1,250,000; shares $10 par; 70,000 shares in treasury to be sold to secure capital for development; 55,000 shares paid to Chattanooga Copper Co. for its holdings. Practically a reorganization of that company, the officers and directors remaining the same.

Property: 120 acres in northern part of Ducktown copper district, Polk Co., surrounded on 3 sides by the holdings of the Tennessee Copper Co., and the Ducktown Copper, Sulphur & Iron Co., adjoins the East Tennessee mine on the east, owned by the last named company. Several diamond-drill holes prove that the ore deposits of that mine extend downward on their dip beneath the land of the Ocoee Copper Co., and that the ore is identical in character, mineral association and occurrence with that of the East Tennessee mine. Ore was found in the drill holes at depths of 685 to 1,085'. Ownership of surface carries ownership of all beneath the surface, as Tennessee does not have an apex law. Diamond drill records said to indicate an orebody assaying 4.53% copper, that is 290' long, 415' in depth and 55' thick, equal to

about 340,000 tons, allowing ⅓ for waste. Development will add to this figure.

Development: by 7 x 15′ shaft, 1,200′ deep. A 200′ crosscut reaches orebody previously cut by diamond-drilling.

Equipment: includes two 150 h. p. boilers, hoist, and compressor. A 300-ton differential flotation plant and installation of electric power planned.

The property has attractive possibilities and is under conservative management.

SCHOOL MINE — **TENNESSEE**

Operated under lease by **Copper Pyrites Corporation**, which see.

SOUTHERN AGRICULTURAL CHEMICAL CORP'N — **TENNESSEE**

Subsidiary of **Tennessee Copper and Chemical Corp'n.** and described thereunder.

SOUTHERN MANGANESE CORP'N — **TENNESSEE**

See description under Alabama. Operates several manganese mines and is the largest producer of manganese ore in Eastern Tennessee.

SOUTHERN ZINC & MINING CO., INC. — **TENNESSEE-VIRGINIA**

John H. Caldwell, receiver, Bristol, Tenn.

Officers: E. L. Patton, pres.; Geo. F. Reynolds, v. p.; J. E. Kingsland, sec.-treas., with S. V. Fulkerson, Horace D. Fry, Kirby Thomas and H. G. Peters, directors.

Inc. in Delaware. **Cap.** $1,600,000, in $600,000 7% cum. pfd., and $1,000,000 common stock; shares $10 par; full paid; non-assessable.

Property: mineral rights of Fall Branch and Arcadia mines, 1,125 acres; the Fall Branch property, 225 acres, is in the S. W. corner of Sullivan county, Tenn., 7 miles S. W. of Fordtown; the Arcadia property is in Sullivan county, Tenn., and Scott county, Va., about 12 miles N. of the Fall branch property.

Ore carries zinc in Knox dolomitic limestone; said to be in the same ore-bearing zone as the Mascot and Bertha mines. Prospecting has shown 4 parallel veins. No. 1 vein is opened by a system of open cuts and a 127′ incline shaft that has exposed the ore for 300′ along the strike. The greater part of this work was done under lease by the East Tennessee Min. & Dev. Co., which built a mill prematurely and exhausted its funds. A rough estimate of ore in No. 1 vein gives 188,000 tons of 4% zinc ore above the 100′ level. Veins 4, 5 and 6 parallel No. 1, but have had no systematic development.

Mill: 100-ton capacity, equipped with "Clifford" dry process system. J. H. Banks states: "I consider this a very promising zinc property and can unhesitatingly recommend its further development." No work done in recent years owing to litigation with general creditors.

TENNESSEE COPPER AND CHEMICAL CORP'N — **TENNESSEE**

General office: 61 Broadway, New York. **Corporate office:** Millbrook, New York.

Officers: Adolph Lewisohn, pres.; Sam A. Lewisohn, v. p.; E. H. Westlake, v. p.-treas.; F. M. Loper, sec.

Directors: Jules S. Bache, J. Parke Channing, Wm. B. Joyce, H. M. Kilborn, Adolph Lewisohn, Sam A. Lewisohn, F. M. Loper, J. H. Susmann, Richard Sutro, Martin Vogel and E. H. Westlake. Annual meeting, fourth Thursday in April.

Inc. Oct. 11, 1916, in New York, to re-finance and take over control of Tennessee Copper Co. (see below), through stock ownership. Stockholders of old company were given privilege of converting stock share for share, and of subscribing for an equal additional amount of the new stock at $16 per share.

In August, 1919, company organized the Southern Agricultural Chemical Corp., capitalized at $1,000,000, to handle a fertilizer business and thus afford an output for a large part of acid and in 1920 organized the Southern Agricultural Tank Line, with $1,000,000 capital, to provide cars for acid, acid phosphate, etc.; entire share capital of each subsidiary is issued and held by mother company.

Capital: 800,000 shares; no par value; increased May 29, 1919, from 400,000 to provide funds for the fertilizer manufacturing business. Holders of voting-trust certificates were given right to subscribe for 100% of their holdings at rate of $12.50 per share, the stock subscribed for to be issued to the voting trustees, who will issue additional certificates under the agreement of October 30, 1916. The issue was underwritten by J. S. Bache & Co. and Adolph Lewisohn & Sons at $1.50 a share. By this issue about $4,400,000 additional capital was secured. Trust expired Oct. 30, 1921 and the 800,000 shares were listed on the N. Y. Stock Exchange. Sales were $7.75, Oct. 1921, compared with $13.25 in 1920.

Columbia Trust Co., N. Y., transfer agent; Empire Trust Co., N. Y., registrar.

A report of operations for 1920 states that 10,358,237 lb. of copper, 333,629 tons of sulphuric acid, 55,586 oz. of silver, and 237 oz. of gold were produced, and that a deficit of $285,889 was incurred, compared with a deficit of $675,379 in 1919. In balance sheet of T. C. and C. Corp'n the Tenn. C. Co. and So. Ag. Chem. Co. are included from 1919 on and the So. Ag. Tank Line in 1920; years end with Dec. 31st.

Consolidated Income Account:

	1920	1919	Changes	
Sales	$5,782,998	$3,889,623	Inc.	$1,893,375
Miscellaneous income	296,701	346,657	Dec.	49,956
Total income	$6,079,699	$4,236,280	Inc.	$1,843,419
Operating and misc. expense	5,917,049	4,307,047	Inc.	1,610,002
Interest on bonds, etc	81,175	254,612	Dec.	173,437
Reserve for depreciation	367,364	350,000	Inc.	17,364
Deficit	285,889	675,379	Dec.	389,490

Consolidated balance sheet:

Assets

	1920	1919
Mining property, plant equipment	$11,084,862	$9,380,945
Cash	461,970	275,494
Investments	3,257,535	1,429,835
Call loans and accrued interest	150,311	.....
Liberty bonds, etc	1,463,479	3,793,679
Tennessee Copper bonds	175,000	.....
War Finance Corp'n 5% gold bonds	.....	658,329
Copper inventories	872,432	689,185
Other inventories	864,217	694,052
Accounts receivable	398,273	169,043
Railroad freight claims	50,899	55,316
Deferred charges	1,070,752	1,191,117
Total	$19,849,730	$18,256,995

Liabilities

Tennessee C. and Chem. Corp'n stock (794,065 shares)	$4,000,000	$4,000,000
Tennessee Copper Co. stock	5,000,000	5,000,000
Tennessee Copper Co. 1st. mtge. bonds	2,326,000	2,487,500
So. Ag. Chem. Corp'n	1,000,000	150,000
First mortgage notes	449,000	.....
Acc., bills and vouchers payable	448,357	730,420
So. Ag. Tank L. stock	970,700	.....
Sinking fund accrued	176,891	156,874
Accrued expenses, taxes, interest, etc	153,964	135,105
Deferred credit	60,979	47,368
Surplus	5,263,839	5,549,728
Totals	$19,849,730	$18,256,995

According to the Boston News Bureau:

"Through a steady increase in the production of sulphuric acid in the past half dozen years, Tennessee Copper and Chemical Corp'n has become more of a manufacturing enterprise than a straight copper mining company. The company has capacity for 20,000,000 lb. of copper and 330,000 to 335,000 tons of sulphuric acid a year. It has always been a relatively high cost copper producer, its cost in 1914 being 12c per lb.; 1913, 10.53c; 1916, 14.36c and in 1920, 19.14c.

In the current year Tennessee Copper will produce 8,130,000 lb. of copper and 236,707 tons of sulphuric acid. In the eight months ended Aug. 31, 1921, the company earned net profits of $41,489, or 5c per share on the 794,224 shares outstanding.

This, of course, was a period when copper operations did not return a new dollar for an old and the profit came from the sulphuric acid end of the business.

Tennessee Copper has no direct funded obligations, but a subsidiary has $1,141,500 first mortgage 6% bonds outstanding, due 1925. No dividends have been paid on the stock since May, 1918, and it is rather more speculative than the average run of copper shares."

Tennessee Copper Co., Tennessee.

Subsidiary of Tenn. Copper & Chemical Corp. Same directorate.

Office: 61 Broadway, N. Y. Mine at Copperhill, Polk county, Tenn.

Operating officials: J. N. Houser, gen. mgr.; M. A. Caine, asst. mgr.

Inc. April 24, 1899, in New Jersey. **Cap.** $6,875,000; shares $25 par; $5,000,000 issued. State Street Trust Co., Boston, and Equitable Trust Co., New York, registrars; Old Colony Trust Co., Boston, and National City Bank of New York, transfer agents. Annual meeting, fourth Thursday in April.

Authorized bond issue, 1915, $3,000,000; first mortgage 6% 10-year convertible sinking fund gold bonds; $1,326,000 outstanding, and $1,000,000 pledged to Tennessee Chemical as collateral. This issue enabled the company to retire the 800,000 oustanding bonds of the first issue, December 1, 1915.

Financial results:

	Profit	Dividends	Surplus		Profit	Dividends
1920	$35,864*	.....	$663,557	1911	$367,049	.....
1919	390,843*	.....	1,130,591	1910	445,387	$300,000
1918	356,571	$400,000	1,905,409	1909	339,406	250,000
1917	911,150	.....	1,895,402	1908	324,768	500,000
1916	387,657	150,000	1,717,883	1907	800,634	650,000
1915	1,242,693	600,000	.....	1906	824,231	250,000
1914	751,892	600,000	.....	1905	452,106	218,750
1913	1,087,503	750,000	.....	1904	186,966	218,750
1912	1,095,875	500,000	.....	1903	417,565	218,750

* Loss.

Property: 12,640 acres of mineral and timber lands, in the Ducktown district. Ore was discovered and mining first begun in 1850, and the mines were operated regularly by a New York company previous to the Civil War, and during the earlier part of the war, under compulsion by the Confederate Government to supply copper for munitions. Company owns the Burra Burra, London, and the Eureka mines. Company also holds under lease 270 acres, including the Polk County mine. The Eureka was formerly operated under lease for iron ore by the Virginia Iron, Coal & Coke Co.

Near Bartow, Florida, company has acquired a phosphate rock property.

Geology: property shows pre-Cambrian metamorphosed mica-schist, carrying several lines of mineralization with lenticular orebodies. Four deposits under development, show extensive gossans, originally having a little rich sooty glance ore under the gossan, which was mined out many years ago.

The lenses range 30 to 150′ in width, 500 to 2,000′ in length, and are of unknown depth. The ore consists of a massive mixture of pyrite and pyrrhotite, with a little chalcopyrite, in a gangue of various metamorphic minerals and quartz, ore ranging from 1.2 to 3% copper, 40% iron, 27% sulphur and 15% silica, with minute quantities of gold and silver. The ore is excellently adapted to smelting, giving very clean slags.

Development: recent work is summarized in the following table:

Year	All Mines	Dev. Cost *	Drilling	Cost p. ft.	Ore Reserves
1920....	7,650′	$0.400	2,079′	$3.50	3,533,134 tons
1919....	4,775′	0.314	2,708′	3.33	3,512,550
1918....	2,858′	0.202	3,579′	2.54	3,480,911
1917....	3,107′	0.139	3,351′	2.31	3,485,713
1916....	2,991′	0.187	4,090′	2.00	3,372,305

* Per ton mined.

The Burra Burra mine, which is the largest mine and main source of ore, is operated through a 1,768′ main central shaft, sunk at 75′ in the footwall, having its first level 170′ below the collar, with succeeding levels at 100′ intervals.

The main orebody of the Burra Burra is 1,200′ long and averages 60′ wide on the third level. The McPherson orebody farther north is developed by a drift from the third level of the main shaft, connecting with the McPherson shaft, now down to the eighth level. This shaft is 2,200′ N. E. of the main shaft and facilitates working the McPherson orebody which is about 900′ long with an average width of 25′. The Hiwassee shaft, 900′ S. W. of the main Burra Burra shaft, is sunk to the third level, showing a comparatively small orebody, of about 200′ length and 12′ average width. Haulage underground is by electric locomotives, and loading of skips in shafts is done from two pockets.

Both in 1919 and 1920, development was pushed to the utmost and totaled 9,790′ in the Burra, including 177′ in the main and 471′ in the McPherson shaft; the latter has reached the 14th level and connections will be made with the main and London shafts. The grade of ore on 10 and 12 levels is said to be better than expected. Broken ore reserves in the Burra were 170,000 tons on Jan. 1, 1921; production was 266,128 tons of ore in 1919 and 322,603 in 1920; a large portion of the 1920 output was handled by mechanical loaders, which proved a success.

The **London mine** has an 850′ shaft, sunk at an incline of 75°, with 7 levels opened, developing an orebody of 25 to 75′ width and about 600′ length, ranging 2 to 4% in copper tenor. **Development:** in the London was curtailed in 1919, but pushed in 1920; total for 2 years was 2,345′. Production in 1919 was 81,126 tons of ore and in 1920, 82,693 tons at total cost of $2.4831 p. t. Ore reserves on Jan. 1, 1921, were 9,100 tons of ore.

The **Polk County mine** has a 485′ vertical shaft, with 5 levels opened, developing an orebody of very irregular shape, up to 120′ maximum width, of about 2% average copper tenor. Development in Polk county mine was 230′ in 1920 and production 21,374 tons of ore at cost of $2.59 per ton for mining and 12c. per ton for development.

The **Eureka mine,** idle since 1912, has a shaft 165′ deep, at which point the first level will be opened. Diamond-drill borings have shown an ore-body of 20 to 165′ width, about 1,000′ length, and it is estimated that this mine has 2,500,000 tons to ore developed that average 44% iron, 30% sulphur and about 1% copper. Because of ore shortage, company leased property of Copper Pyrites Corp'n for 6 months beginning August, 1920, and extracted 19,818 tons of ore high in sulphur.

Smelter: at Copperhill, 1 to 5 miles from the mines of the company, was designed and built by J. Parke Channing. The ore bins have storage capacity for 10,000 tons of ore, 800 tons of coke, and necessary fluxes and

furnace products requiring re-treatment. Charges are drawn from the bins into cars of 44 cu. ft. capacity, hauled by electric locomotives over 4 tracks that run under the bins and circle around the furnaces, so that a train loaded on any track may go to any furnace and return to the bins.

The furnace building of steel has space for 7 blast-furnaces, but only 5 are in use each having an oval settler lined with firebrick. Slags skin into pots of 105 cu. ft. capacity which are hauled by the electric locomotives. Coal dust pulverizing and firing equipment was erected in 1918.

The converter department has two 40-ton electric traveling cranes taking matte from the settlers to the converters. Two 12′ basic lined converters of the Great Falls type were installed in 1916 to replace the old ones, also a copper-casting machine.

Hot converter slag is poured into the blast furnace settlers, by reason of which the only converter slags requiring re-smelting are the skulls forming in the ladles. Converter bars average 99.4% copper. Copper is cast in 210-lb. pigs and sent to the Baltimore Copper Smelting & Rolling Co. for electrolytic refining, which affects the saving of the very small gold and silver values contained. The finished electrolytic copper is marketed through Adolph Lewisohn & Sons, Inc.

Leaching of flue-dust is being tried, mainly with the idea of securing data for subsequent treatment of ore in the Eureka mine. Slag granulation was adopted in 1919.

The company operated a quartz quarry at Austral, Tenn., 35 miles N. of Copperhill, on the Louisville & Nashville railway. Equipment of the quarry consists of a boiler, air-compressor and rock drills. Beginning with 1919, the use of Austral quartz was abandoned and a better grade from elsewhere substituted.

The smoke damage situation is complicated by the location of the works, which are in the extreme S. E. corner of Tennessee, winds carrying the bulk of the fumes into the State of Georgia, by reason of which the State authorities of Georgia brought suit against the Tennessee Copper Co. and the Ducktown Sulphur Copper & Iron Co. in the Federal courts, and the latter decided that the smelters must cease operations or stop the fumes by using them for a sulphuric acid plant. This undertaking proved much more difficult than was anticipated by reason of the intermittent and varying nature of gas supply from the blast furnace tops.

The No. 1 acid plant cost about $1,600,000 and was put into full operation early in 1908,with a rated capacity of 120,000 tons yearly of 60° Beaumé chamber acid. With the completion of the No. 2 acid plant in July, 1916, the company had 2 large lead chamber plants for the manufacture of 60% acid, with an estimated capacity of 300,000 tons per year. No. 1 was overhauled by July, 1917, while considerable improvements were made in 1918. There are also plants for concentration of sulphuric acid to 66° and 97½%, and for manufacture of nitric acid.

As the furnace gases contain sulphur dioxide, sulphur trioxide, carbon dioxide, oxygen and nitrogen in considerably varying percentages, new methods of control were found necessary to maintain the volume of sulphurous gases suitable for making sulphuric acid by the chamber process. After some experimentation the problem was solved by equipping one of the smaller and three of the large blast furnaces with tight tops, above the charge floor, to exclude atmospheric air, these being connected with a dust chamber, where most of the solid matter is precipitated from the gas, the dust chamber being so constructed as to conserve the heat of the gases sufficiently to concentrate the acid in the Glover towers. There are 2 octagonal Glover towers of 30′ diameter and 50′ height with suitable nitre plants at the foot of each. After passing through the towers the gases are conducted through very large lead flues of 200 sq. ft. sectional area, which deliver the fumes to the chamber system containing 4,600,000 cu. ft. of chamber space. In a general way the chamber plant is of conventional

design, yet the enormous quantities of fume received and acid produced have brought about developments that were new to the industry, among the most notable being the size of gas connections, acid lines, acid coolers and fans, which are all on a scale never before known. The discharge from the chamber plant is conducted into 11 Gay-Lussac towers, which are of a gigantic size, the three latest and largest being octagonal of 36' diameter and 65' height. In 1919, one Gay-Lussac tower in plant No. 1 was replaced by one of modern design. This acid plant is the largest and most complete in existence.

A 10 year contract for the sale of its entire sulphuric acid output to the International Agricultural Corp. expired on Dec. 31, 1920 and a portion of the production was released the previous year. New 3-year contracts with this and other fertilizer companies have been made at much higher prices.

In part agreement with company's statement of May 29, 1919, it has undertaken the manufacture of acid phosphate and other fertilizers through the medium of the **Southern Agricultural Chemical Corp.** A 100,000-ton acid phosphate plant was erected at Atlanta, Ga., and placed in operation November, 1920.

Production:

Year	Ore smelted, tons	Copper, per ton ore lb.	Oper. cost per ton	Production Acid, tons	Copper, lbs.	Cost p. lb., c	Received per lb., c
1920.....	404,060	25.64	$4.88	333,629	10,474,881	20.80	.....
1919.....	413,877	25.15	4.75	266,627	10,414,815	20.20	.....
1918.....	402,071	24.25	4.50	283,092	9,750,008	20.59	24.800
1917.....	457,902	23.04	3.43	262,858	10,547,708	16.59	26.238
1916.....	385,188	24.41	3.51	181,637	9,404,295	14.36	23.663
1915.....	475,301	26.83	2.82	210,666	12,750,418	10.53	16.274
1914.....	485,051	26.54	3.14	210,163	12,871,113	11.84	13.706
1913.....	470,135	28.70	3.25	197,713	13,493,140	11.34	15.748
1912.....	444,289	29.80	3.27	192,084	13,252,634	11.00	.....
1911.....	436,285	31.65	3.44	.....	13,808,940	10.88	.....

Copper per ton refers to Tennessee ore only; total copper figures include copper from a small tonnage of custom ores.

Low-grade copper ores are treated profitably at other points, but in nearly all other cases, they contain considerable gold and silver, which are lacking in the case of the Tennessee. This company has shown both courage and ability in the installation of its acid plant, by virture of which a very serious handicap has been turned into a permanent source of large revenue.

TENNESSEE MANGANESE CO. TENNESSEE

Address: D. C. Campbell, pres., Knoxville, Tenn.

Cap. $20,000; increased 1918 to $200,000.

Property: mines at Sevierville, Sevier county, and Knoxville, Knox county. A 10-ton electric furnace erected 1920 is in operation at Cleveland, Tenn.

TEXAS

Apart from the great sulphur and oil deposits, the mineral production of the State is small; silver is the principal metal produced and nearly all comes from the Presidio mine. Some of the copper deposits (red beds) are said to be worth exploitation. Production for 1920 was 520,000 oz. of silver, about normal. Small shipments of copper, gold, lead and zinc ore are made intermittently to the El Paso smelter, from the Van Horn and Sierra Blanca districts, but there are only 2 regularly producing metal mines, viz., the Shafter mine of the Presidio Co. and the Chisos a quicksilver mine.

AMERICAN SULPHUR ROYALTY CO. TEXAS

Address: Houston, Texas.

Has a royalty share in the production of the **Freeport Sulphur Co.**, which see.

BIG BEND MINING CO. TEXAS

Idle. Is a quicksilver property, near Terlingua, Tex., operated in 1918-19, under lease by the Study Butte Mng. Co., which see.

CHISOS MINING CO. TEXAS

Howard E. Perry, pres.-gen. mgr., Terlingua, Brewster county, Texas. Property is at Terlingua, 108 miles S. E. of Marfa on the S. P. R. R. Cinnabar ore occurs as replacement deposits in limestone and shale. In the lower limestones the ores are generally in nearly vertical calcite veins, or in lodes of friction breccia. For geology, see Texas Bull. 405, 1909.

Development: by shafts. The mine, which is the biggest producer in the district, had a record-breaking year in 1915, producing 1,200 flasks of mercury in November and December. Yearly output not available. Produced 500 flasks per month in 1918, with a smaller output in 1919 and 1920.

Equipment: includes an 18-ton shaft furnace.

COLQUITT-TIGNER QUICKSILVER MINE TEXAS

Located in Brewster county. Idle several years.

CONSOLIDATED KANSAS CITY SM. & REF. CO. TEXAS

Subsidiary of the American Smelting & Refining Co.

Owns the El Paso smelter at El Paso, Texas, described under that title

ELLIS MINE 34 TEXAS

Now owned by **Mariscal Mining Co.**, which see.

EL PASO SMELTER TEXAS

Owned by the Cons. Kansas City Sm. & Ref. Co.

Is a subsidiary of the American Smelting & Refining Co.

Address: Kuno Doerr, gen. mgr.; N. A. Ferguson, bus. mgr.; J. Heggie, supt., El Paso, Texas.

The smelter proper occupies 43 acres out of an 1,100-acre tract of land which is traversed by the Sante Fe, El Paso & Southwestern and the Southern Pacific railways.

The monthly average of cars of ore that is brought to the smelter from the surrounding mines has never been less than 1,600. Often it has run as high as 2,300 cars per month and in a few instances even larger amounts of ore have been handled in a month.

Three Godfrey lead roasters and 12 mechanical roasters average from 1,200 to 1,500 tons daily. There are 6 lead furnaces with an annual capacity of 380,000 tons of ore and 8 copper furnaces, of which 4 are reverberatories, with an aggregate capacity of 1,200,000 tons of ore per annum. Four converters, having a total annual capacity of 88,000 tons, treat the blister copper.

An interesting mechanical feature is the 90′ craneway span over which two 60-ton cranes are operated. The new converter stack is 300′ in height, is 16′ in diameter and was built of concrete. The smoke and escaping gases reach this stack through a steel "Balloon type" flue 4,400′ long.

The El Paso smelter is a city within itself, with stores, fire station, church, an electric light plant that could light a city of 50,000; parks, water works and office buildings. A portion of the grounds were used in 1916-17 by United States troops as a military post. The hospital has a number of ever-ready beds and a resident physician. The smelter owns and operates a complete railway system, and more than 7,000 people who live in El Paso look to it for support.

FREEPORT SULPHUR CO. TEXAS

Address: 61 Broadway, New York City, and Freeport, Tex.

Inc. 1912 in Texas. Is a subsidiary of the Freeport Texas Co., a holding company owning the entire capital stock, $200,000.

Property: 8,677 acres of real estate, including 500 acres of sulphur deposits, near the mouth of Brazos river, Brazoria county.

Geology: sulphur occurs in pockets, cavities, and as streaks impregnating gypsum, or a formation in which gypsum predominates. The bed is about 1,000' from the surface.

Development: by wells drilled to the sulphur bearing formation. **Process:** the sulphur is extracted from the rock by the well-known Frasch process. Steam is made in boilers and used in water-heaters each capable of heating 1,000 gals. of water a minute and from 60 to 336° F. under a pressure of 100 lbs. This superheated water is forced down in the wells to the formation, the sulphur melts, and rises to surface, where it cools. Sulphur is pure and is mostly used in the paper pulp industry, the remainder being used for sulphuric acid manufacture.

Equipment: includes 4 plants aggregating 23,800 h. p., complete with oil storage, 4½ mile oil pipe line canal from river, pumping plant, water purification plant, compressors, and large battery of boilers. Company also operates an asphalt plant at Freeport.

Production: 420,484 tons in 1918; 103,275 tons in 1919 (to May 1st).

HAZEL MINING & MILLING CO. **TEXAS**

Officers: at last accounts, John V. Hughes, Dallas, Tex., pres; G. G. Wright, v. p.; C. F. Freeman, Dallas Tex., sec.; R. B. Stichter, treas. **Directors:** J. V. Hughes, T. J. Oliver, G. H. Cox, C. A. Culters, C. F. Freeman, Milton Parks and G. G. Wright.

Property: the Hazel Silver mine, in Diablo mountains, 15 miles N. E. of Van Horn, Culberson county, shows a fissure vein that yields chalcocite ore with barite gangue. Shipping ore said to average 10% copper and 50 oz. silver per ton.

Development: includes 700' shaft and extensive workings at various levels. Mine was worked for 10 years by H. G. Clifford, of El Paso, and A. C. Schriver, of San Antonio, producing $500,000, but was shut down in 1895. A dry concentrator was erected to treat the old dumps, said to contain about 100,000 tons of $15 copper-silver ore, but was unsatisfactory and has been converted into a wet concentrator.

Reported that the Sutton Steele & Steele Co., of Dallas, had taken over the mine and would install a cyanide mill. O. W. Steele, mgr. Idle 1920-21.

MARIPOSA MINING CO. **TEXAS**

Terlingua, Tex.

F. M. Dancy, pres., Philadelphia, Pa.

Property: adjoins the Terlingua mine. **Ore:** occurs in fissure veins outcropping over a wide area. The mine, at one time the largest producer in the country, is being developed at depth. In 1919, production was practically from surface workings.

Equipment: two 10-ton Scott furnaces, with a capacity of 100 flasks quicksilver per month and the 50-ton Terlingua furnace held under lease. Dumps said to have 32,000 tons containing $241,000 in mercury. Idle 1921.

MARISCAL MINING CO. **TEXAS**

Address: W. R. Wyatt, supt., McKinney Springs, Tex.

Property: the Ellis mine, 5 patented quicksilver claims, 103 acres, in Brewster county, developed by 250' shaft and 200' tunnel.

Production: 41,400 lb. quicksilver in 1918.

Mine purchased by present company in 1919 and erection of 50-ton furnace is planned when development indicates sufficient ore reserves.

PECOS MINING CO. **TEXAS**

Idle. James Dougherty, of Van Horn, Tex., principal shareholder.

Property: the Pecos mine, 3 miles N. E. of the Hazel silver mine in Culberson county, 19 miles from Van Horn, shows a N. E.-S. W. vein in brown igneous tuffs, traceable 2 miles across the mountains to the Red Maverick mine.

Development: by a 105' shaft with a level at 90', showing seams a few inches thick of copper-silver ore, said to assay 70% copper; the seams in

places aggregate 2' in thickness. The mine was first operated in 1888, abandoned after working and relocated 1903, by George Briggs and T. R. Owen, forfeited by technicality of Land Commission and located by J. Y. Canon.

PRESIDIO MINING CO. **TEXAS**

Office: 406 Balboa Bldg., San Francisco, Cal. **Mine office:** Shafter, Tex.

Officers: W. S. Noyes, pres. and gen. mgr.; L. M. Doherty, sec.; F. C. Handy, supt.

Inc. 1883 in California. **Cap.** $150,000; shares $1 par; all issued. Last div. 1905.

Property: the Shafter or Presidio mine, 1417-28 acres at Shafter, Presidio county, has a production record of over $7,500,000 since 1883. **Ore:** carries silver mainly as chloride. The mine was once known as the Bullis, and has an interesting history.

Development: by about 20 miles of workings.

Equipment: includes 1 mile aerial tram, a 15-stamp 100-ton mill and a cyanide plant.

The cyanide mill is equipped with 2 tube mills, filter, Pachuca tanks, Dorr thickener and 250-h. p. oil engine.

Production: 500,000 fine oz. in 1920. Is practically the only silver producer in Texas.

Little information is available concerning operations.

The sixth rehearing in litigation with Wm. S. Noyes, et. al, over alleged wrongful conversion of money, etc., which has been going on for 20 years, was ordered in 1920.

RAINBOW MINING CO. **TEXAS**

Address: Terlingua, Tex.

Property: a prospect adjoining the Chisos mine, under development at last account.

SHAFTER SILVER MINE **TEXAS**

Owned by the **Presidio Mining Co.**, which see.

SHERIDAN MINING CO. **TEXAS**

Idle. Mine near Burnet. **Address:** Dr. O. F. Gober, Temple, Tex.

Inc. in Texas. **Cap.** $200,000.

Owns a copper-molybdenite property in the Llano district, Burnet county, on which about $40,000 had been spent prior to 1917.

STUDY BUTTE MINING CO. **TEXAS**

W. D. Burcham, mgr., Terlingua, Texas.

Property: a lease on the Big Bend quicksilver mine, 5 miles E. of Terlingua, Brewster county. Ore occurs in fissures filled with calcite and cinnabar and occasional impregnations, in a flat lying rhyolitic intrusion 500' thick covered by 50' of limestone shale.

Equipment: includes power plant, 50-ton furnace and oil-engine. Was a steady producer throughout 1919. Additional depth necessary to maintain past production.

TAMA SILVER MINING CO. **TEXAS**

Was reported developing a group of claims in the Quitman district, El Paso county. The ore is silver-lead and occurs in replacement deposits in limestone.

Idle and probably dead.

TEXAS ALMADEN MINING CO. **TEXAS**

Out of business. Had lease on the Texas Almaden quicksilver mine at Terlingua, unwatered to 150' level and under development, 1918-19. Equipped with 50-ton furnace. The lease was relinqushed at end of 1919.

TEXAS COPPER & REFINING CO. **TEXAS**

Letters returned from former address: 527 Cooper Bldg., Denver, Colo.

Officers: W. P. Dietz, pres.-treas.; Wm. Shubert, Jr., v. p.; K. M. Shubert, sec.

Property: reported to own 1,200 acres of copper-bearing land in Hardman county, at last account.

TEXAS DEVELOPMENT & MINING CO. **TEXAS**

Idle. **Former address:** Nocagdoches, Texas.

Reported to own a copper mine near Ruhle, where a mill was to have been built.

TEXAS GULF SULPHUR CO. **TEXAS**

Office: 41 East 42nd St., New York, and Gulf, Texas.

Officers: W. H. Aldridge, pres.; T. Schulze, v.-p.; with C. F. Ayer, E. C. Bacon, H. B. Baruch, J. A. Black, and T. Cochran, directors. H. F. J. Knobloch, sec-treas.; F. V. Munster, asst. sec.-treas. Charles Biesel, gen mgr., in Texas.

Inc. Dec. 23, 1909, in Texas. **Cap.** $6,350,000, decreased 1920 from $7,600,000. Was originally $3,000,000. Shares $10 par; all issued. No funded debt. Annual meeting, fourth Tuesday in November. Stock listed on New York Curb. Bankers Trust Co., transfer agent.

Financial statement for 6 months ended June 30, 1921 showed gross income, $2,678,328; expenditures, $1,523,926; surplus for period, $1,154,402, total surplus, $5,449,362. Current assets, $7,250,000; current liabilities, $252,960.

Property: 3,000 acres of sulphur-bearing land at Gulf, Matagorda county, Texas. Drilling in 1918 and 1919 revealed over 10,000,000 tons of sulphur-bearing rock.

Equipment: works cost over $3,500,000, including 10-mile railroad spurs and sidings, and 10,000 h. p. steam boiler plant.

Production: since March, 1919, at the rate of over 2,000 ton of sulphur daily.

UTAH

Production: of the State:

Year	Gold	Silver, oz.	Copper, lb.	Lead, lb	Zinc, lb.	Total value
1921	$1,794,000	12,366,000	34,534,000	89,782,000	.....	$22,595,000
1920	2,014,556	13,106,976	116,931,238	140,838,113	8,157,739	49,744,334
1919	2,159,471	11,649,961	124,061,807	123,829,051	4,431,024	45,440,000
1918	2,949,170	13,455,597	227,169,630	167,008,224	18,399,417	86,047,597
1917	3,355,156	13,479,133	246,674,153	178,521,958	21,286,871	99,328,155
1916	3,574,947	13,253,037	240,275,222	201,490,075	29,572,528	89,268,864
1915	3,609,109	12,313,205	187,671,188	199,967,437	24,292,240	55,105,070
1914	3,265,347	11,154,916	152,034,002	171,323,137	15,989,267	37,151,593

Dividends distributed totaled $29,339, 451 in 1917; $19,511,745 in 1918; $11,225,763 in 1919; $11,597,966 in 1920. The total to end of 1920 was $224,449,725.

For a detailed description of the ore deposits of Utah, the reader is advised to secure a copy of Professional Paper 111, published by the U. S. Geological Survey in 1920.

ACME MINING CO. **UTAH**

Officers: Edw. Southwick, pres.; Jacob Evans, v. p.; H. Gardner, sec.-treas.; with John F. Bradshaw, Wm. E. Trinnamen, and Jas. Trinnamen, directors.

Inc. 1919, in Utah. **Cap.** $100,000; par 10c.

Property: located in American Fork canyon.

ADAH COPPER CO. **UTAH**

Address: St. George, Washington county, Utah.

A. H. Dahle, pres., at last accounts.

Inc. 1916, in Utah. **Cap.** 600,000 shares; 2¢ par.

Property: the Burg mine, in Harrisburg district, Washington county, 10 miles E. of St. George.

ADDIE MINING CO. **UTAH**

Address: 333 Judge Bldg., Salt Lake City, Utah.

Officers: G. C. Lambert, pres.; H. B. Cole, sec.

Inc. in Utah. **Cap.** $30,000; 10c par; assessable.

Property: 5 silver-lead claims in Tintic district, Juab county, developed by tunnel and two shafts. When reopened in 1920, it was rumored that control had changed hands.

ALBERTA MINING CO. **UTAH**

Office: American Fork, Utah.

Officers: Ammon Mercer, pres.; S. H. Roundy, v. p.; Jas. L. Mercer, sec., with M. F. Cowley, Nelson McCarty and David Davis, directors.

Inc. May, 1917, in Utah. **Cap.** $30,000; shares 3c par; 500,000 shares held in treasury.

Property: 15 claims in Silver Lake mining district, said to carry good values in gold, silver, copper, lead and molybdenum. Developed by 135' tunnel. A prospect. Operations suspended 1918, pending better general financial conditions.

ALBION CONS. MNG. CO. **UTAH**

Address: 135 So. Main St., Salt Lake City, Utah. **Mine address:** Alta, Utah.

Officers: Geo. H. Watson, pres.-mgr.; Herman Bamberger, v. p.; with Jesse Knight, J. Wm. Knight, R. E. Allen, and Hugh Trenholm, directors. Rob. F. Marvin, sec.-treas.

Company is a consolidation of the **Albion Mng. Co., Alta Germania Mines Co.,** and **Mineral Flat Mng. Co.** Basis of exchange was 3⅓ shares of A. M. Co., 6⅔ shares of A. G. M. Co., or 3⅓ shares of M. F. M. Co for 1 share of Albion Consolidated.

Inc. 1919, in Utah. **Cap.** $100,000; 10c par; assessable; 810,000 shares issued. Listed on Salt Lake Exchange. Quotations: 4c to 22c in 1919. Original companies are fully described in Vol. XIII.

Property: about 581 acres, in Alta-Cottonwood district, adjoining the South Hecla on the S., includes the Wellington mine of the Albion group, formerly owned by the Wellington Mng. Co. and credited with a $1,000,000 production from shallow workings. By the merger the three contiguous properties are brought under one management and apex litigation obviated.

Development: by a 700' shaft and several thousand feet of workings. Also by an 8,000' tunnel driven from the Quincy tunnel of the South Hecla, cutting formation 1,400' deep; reported early in 1921 that a 5 to 20' fissure had been uncovered. Holdings taken over in October, 1921 by **South Hecla Mines Co.,** which see.

Equipment: includes 2 power houses, and a 30-ton concentrator, which produces concentrate running 35% lead and 30% zinc.

ALBION MINING CO. **UTAH**

Fully described in Vol. XIII. Merged 1919 with adjacent companies to form Albion Cons. Mng. Co., which was succeeded by **South Hecla Mines Co.** in October, 1921.

ALPINE GALENA MINING CO. **UTAH**

Owned and operated by Alpine and Provo men.

Property: in Alpine Canyon, near Bingham, contains ferruginous lead ore in bunches in black limestone.

Development: by incline shaft and 312' tunnel.

ALTA CONSOLIDATED MINING CO. **UTAH**

Office: 801 Walker Bank Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers R. S. Lewis, pres.; J. D. Lewis, sec.-treas.-gen. mgr., with John Dorius, directors.

Inc. Aug., 1911. **Cap.** $1,000,000; increased from $600,000, March, 1921, to which it had been increased from $300,000 in 1913; $1 par; $690,000 issued; assessable; last assessment, 2¢ a share, delinquent March 19, 1921.

Transfers made in company office. Stock listed on Salt Lake Exchange. Annual meeting first Tuesday after first Monday in Feb.

Share prices: 10-36¢ in 1918; 8 to 35¢ in 1919; ¾ to 10¢ in 1920; 3¢ highest in 1921, to June 1st.

Financial statement: for 1920 shows: receipts, $47,914, of which $38,724 is assessments; expenditures, $47,691, accounts and notes payable being $29,452. Company practically out of debt.

Property: 17 claims, 120 acres in the Alta mining region, Little Cottonwood district, Salt Lake county, in the heart of Alta's mineralized zone, includes several old mines, yielding argentiferous lead and copper sulphides. Ores occur as bedded tabular replacement deposits adjacent to cross-cutting fissures and are parallel to the bedding and fissure intersections. The Braine fissure, the most important ore-bearing channel of the camp, known for 2 miles, is explored on Alta Consolidated ground for 800'. The existence of crosscut fissures and a porphyry dike are favorable geologic features. Ore occurs at contact between flat dipping quartzite and limestone.

Development: several thousand feet of tunnels and shafts. All 1919-21 work has been driving a drainage tunnel 300' below the Silver King adit. In 1920 the main, or Silver King tunnel, 300' below the Brooklyn tunnel follows the Braine fissure. Drifts east and west from this tunnel have raises to reach the ore.

Work was largely confined to Hoboken fissure, in opening 20' heading of carbonate ore which was not found to be of commercial grade in quantity; total footage about 1,000'.

Reported that Alta Prince (q. v.) brought suit for trespass, Oct., 1920.

ALTA COTTONWOOD MINING CO. UTAH

Address: Salt Lake City, Utah. A. O. Jacobson, pres.; Franklin Webb, v. p.; Val. S. Snow, sec.-treas., with J. C. Wood and R. S. Lewis, directors.

Inc. 1915. **Cap.** $250,000; shares 25c par.

Property: 28 claims, 18 patented, known as the Argenta group, located in the Big Cottonwood district, 7 miles southwest of Park City. Claims adjoin the Maxfield mine on the south and the Cardiff on the north.

ALTA DIVIDE GOLD MINING CO. UTAH

Officers: A. F. Ellgren, pres.; L. H. Hardy, treas.; A. Y. Hardy, sec.; with C. W. Knudsen, and E. M. Tyson, directors.

Inc. April 22, 1916, in Utah. **Cap.** $100,000; shares 10c par; 600,000 shares in treasury.

Property: 34 unpatented claims, in Big and Little Cottonwood districts, near Alta, shows gold values in a vein up to 30' wide in a shale quartzite contact.

ALTA-GERMANIA MINES CO. UTAH

Fully described in Vol. XIII. Merged 1919 into **Albion Cons. Mng Co.**, which see.

ALTA-MICHIGAN MINES CO. UTAH

Office: 135 So. Main St., Salt Lake City, Utah. **Mine office:** Alta Utah.

Officers: same as South Hecla Mines Co.

Inc. in Utah. **Cap.** $100,000; 10¢ par; assessable; outstanding, 25,713. Fourth assessment of 1¢ per share levied April 15, 1921. Listed on Salt Lake Exchange. Share prices 2½¢ to 8¢ in 1918; ½ to 9½¢ in 1919; ¾ to 1¼¢ in 1920; 2½¢ highest in 1921, to June 1st.

Financial statement: to Dec. 31, 1920, shows: resources of $114,302, including treasury stock, $60,070, mines, etc., $16,270, development, $30,371, and cash, $70.

Property: 17 acres, in Little Cottonwood district, said to show silver-lead-copper-gold ore. Development work is carried on through the Quincy tunnel level of the South Hecla mine. Ore shipments were made in 1918.

ALTA MINING & DEVELOPMENT CO. UTAH

Address: 102 Mercantile Annex, Salt Lake City, Utah.

Officers: Chas. A. Walker, pres.-mgr.; J. R. Walker, v. p.; H. M.

Chamberlain, sec.-treas., with Walter C. Lewis and John M. Moore, directors.

Inc. June 29, 1906, in Utah. **Cap.** $600,000; shares $1 par; 326,500 held in treasury. Annual meeting 1st Monday in January. Columbia Trust Co., Salt Lake City, Utah, transfer agent.

Property: about 160 acres in the Alta Cottonwood district, at the head of Little Cottonwood, canyon, includes the townsite at Alta between the Wasatch mines and the South Hecla.

Idle for several years.

ALTA PRINCE MINING CO. **UTAH**

Officers: J. S. Johnson, pres.; T. St. Leger Atkins, sec.-treas., 417 Continental Bank Bldg., Salt Lake City.

Cap. 1,000,000 shares, par 25c; 30,000 shares in treasury.

Property: 2 claims, patented, at Alta, Salt Lake county, between the Michigan-Utah and the Prince of Wales Mining Co.'s property. Development tunnel 1,065′ at 500′ depth. No recent information. In fall of 1920, suit for $360,000 for trespass was brought vs. the Alta Consolidated. Surveys have been made but matter was still pending in July, 1921.

ALTA STAR MNG. CO. **UTAH**

Address: Salt Lake City.

An assessable company doing assessment work on claims. Last assessment ½¢, delinquent Nov. 27, 1921.

ALTA SUPERIOR M. & M. CO. **UTAH**

Office: Provo, Juab county, Utah.

Officers: A. E. Ahlander, pres.; N. A. Nelson, sec.

Inc. March, 1909, in Utah. **Cap.** $50,000; shares 5c par; assessable. Previously known as Mineral Flat Extension M. & M. Co.

Property: 2 miles S. of Alta, Little Cottonwood district, Utah, showed 3′ vein of copper ore, also silver-lead ore.

Development: by tunnel and shaft with drifts on vein.

Reported, June, 1919, to show good ore in the 530′ tunnel.

ALTA TIGER MNG. CO. **UTAH**

Address: 420 Boston Bldg., Salt Lake City. **Mine address:** David Phillips, mgr., Alta, Utah. J. E. Phillips, pres.; Daniel Phillips, v. p.; A. T. Sanford, sec.-treas.

Inc. 1915. **Cap.** $7,000; divided into 700,000 shares; assessable; with 20,000 remaining in the treasury. Last assessment, of ¼c. delinquent, July 9, 1921. Listed on Salt Lake City Exchange. Shares sold ¼ to 1c in 1920.

Property: the Tiger patented claim, 6 acres and an interest in the Highland Chief claim, in the Alta-Cottonwood district, north of the town of Alta. In September, 1921, company cut 10″ of high grade silver-lead ore, in a raise 65′ up on No. 1 fissure between black and gray limestone. Ore runs $3 gold; 20.8 oz. silver, 20% lead. The mines lie between the Emma and Flagstaff.

ALTA TUNNEL & TRANSPORTATION CO. **UTAH**

Office: 602 Newhouse Bldg., Salt Lake City, Utah.

Officers: F. V. Bodfish, E., M., pres.-mgr.; V. E. Lollin, v. p.; John Cain, sec.-treas., Frank B. Cook, v. p.; Herman Johnson, supt.

Inc. Sept., 1911, in Utah. **Cap.** $1,500,000; $1 par; 1,040,000 issued; assessable; last assessment of 1c., delinquent August 1, 1921. Shares varied from 5 to 12½c. in 1918; 5 to 20c. in 1919; 4¼ to 13c. in 1920; 10½c. highest in 1921, to June 1st.

Property: owns or controls under leases, 330 acres, the Lucky Dutchman group of 16 claims and the old Alta tunnel ground. Ore occurs in replacement deposits in limestone with stringers of ore said to assay 9.7% copper, 21% lead, and 13½ oz. silver per ton.

Development: by 3,600′ tunnel from Big Cottonwood creek. This prospects the Prince of Wales fissure zone at depths of 1,000′ to 1,800′; at the 2,650′ point, a shale-limestone contact has been followed for 1,000′, then raising 100′ into an overthrust fault, encountered an orebody 4-8′ thick, on

bedding plane. This new ore body found October, 1921, yielded to Dec. 31, 1921, 500 tons of ore that averaged 37.7 oz. silver per ton, and 23.22% lead, with gross value of $24,860 and net value including mining costs, $13,565. During January, February, 1922, 17 carloads were shipped to smelters.

Equipment: 50 h. p. motor and compressor, drills, a 10' fan for ventilating purposes, a 2-mile power line, boarding house and other buildings.

ALTA-UTAH MINES CO. UTAH

Address: 135 So. Main St., Salt Lake City Utah.

Officers: G. H. Watson, pres. and gen. mgr., Alta, Utah; H. Bamberger, v. p. Robt. F. Marvin, sec.-treas.

Company was reorganized late in 1917.

Financial statement: received March, 1921, shows total resources of $103,065, of which mines and plant is $40,000 and treasury stock $60,000, bills payable were $2,650.

Property: an old mine in the Cottonwood district, near the South Hecla. Developed by tunnels, one in 400', and another 200'. The latter shows high-grade ore. No. 3 tunnel yielded a carload of 3% copper and 15 oz. silver ore.

Holdings taken over in October, 1921 by **South Hecla Mines Co.**

ALUMINUM POTASH CO. OF AMERICA UTAH

Address: 514 Templeton Bldg., Salt Lake City, Utah.

Officers: G. M. Winkelman, pres.; J. Stokes, Jr., v. p.; H. O. Pack, sec.; Homer McCarty, treas., with G. C. Shipp, Geo. H. Blood, and W. P. Hauerbach, directors.

Inc. March 24, 1919. **Cap.** $3,000,000; $100 par. Operating expenses reported as $30,000 for 3 months in 1919.

Property: 15 acres in Marysvale district, Piute county, said to have one of the best alunite deposits in the state. Company claims reserves of 60,000,000 tons of ore assaying 10% potash, and 37% alumina.

AMERICAN CONSOLIDATED COPPER CO. UTAH

Office: Judge Bldg., Salt Lake City, Utah.

Officers: F. W. Spencer, pres.; Tom Morrow, v. p.; A. E. Owen, sec.-treas., with Carl Sanders and Roy Spencer, directors.

Inc. 1907, in Utah. **Cap.** $600,000; $1 par; changed to 1,000,000 shares; 10c par, October, 1917. Stock listed on Salt Lake Stock Exchange. Prices, 3-14c in 1918; 3½-8c in 1919; 1¾ to 4¾c in 1920; high in 1921 to June 1st, 2½c.

Property: 19 claims, 1 patented, in Big Cottonwood district, adjoins the Cardiff and Howell on the west.

Development: several tunnels, longest 2,200', driven to cut Silver King & Garfield fissures, showing heavy mineralization. Samples said to assay 48% zinc, with lead, gold and silver values.

Equipment: includes compressor, drills and mine buildings. Operations resumed December, 1914, after an idleness of several years. Late in 1918, reported, following 2½' of vein matter and some shipments made. During 1919 and 1920, operations have been intermittent. Property reported sold in 1921 to **American Metal Mining Co.**, which see.

AMERICAN CONS. MINES CO. UTAH

Is a merger of the Earl & Eagle and Bog mining companies.

Address: 323 Judge Bldg., Salt Lake City, Utah.

Officers: Geo. H. Wood, pres.; C. D. Ray, v. p.; P. Bowman, sec.; G. J. Field, treas., with Franklin Hardinge, Jos. C. Lynch and Geo. E. Hemphill, directors.

Inc. 1918. **Cap.** $1,500,000; $1 par; outstanding 1,000,000 shares; assessable. Assessment No. 5 called in November, 1920. Listed on Boston Curb.

Property: 22 claims, 400 acres, of merged companies and the Silver Dipper group of 4 claims, acquired in 1920, in American Fork district, Utah county. The veins carry silver-lead and silver-copper ore. Company also

owns 6,000 acres of oil land under lease and some in fee in San Rafael swell, Nequoia, Circle Cliffs and Huntington fields, Utah.

At the I. X. L. mine in the Mt. Baldy district, operations in the Danielson tunnel along lime-quartzite contact, show ore running 57 oz. silver per ton with 21% lead.

Development: mainly by tunnel with total workings of 4,000′ The Earl & Eagle tunnel is over 2,000′ long. The Bog tunnel, 600′ long, yielded some shipping ore in former years. Some shipments made in 1920 of ore averaging 45% lead and 15 oz. silver from a 2′ pay streak.

AMERICAN COPPER MINING & MILLING CO. **UTAH**

Office: Lehi City, Utah. J. N. Butt, pres.; Charles Anderson, v. p.; A. O. Slade, treas.; preceding officers, Howard Murdock and Chas. Herron, directors; William Asher, sec.

Inc. Aug. 1912. **Cap.** $100,000; shares 10c par. An assessment of 1 mill called March, 1914. Property is in Tooele county, but as officers do not reply to letters, no details of the company's holdings are available.

AMERICAN EAGLE COPPER CO. **UTAH**

Officers: F. R. Meadows, American Falls, Idaho, pres.; S. H. Cotterel, v. p.; H. P. Huey, sec., with Henry Miller and Mr. Sparks, directors.

Property: 10 claims, about 200 acres, 2 miles E. of Farmington and 15 miles N. of Salt Lake. The ore carries copper, silver and gold.

Development: by 130′ tunnel.

Although additional information is not forthcoming, it is known that assessment No. 1, of ½¢, was levied on April 7, 1921.

AMERICAN FLAG MINING CO. **UTAH**

Office: 602 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit county, Utah.

Officers: Geo. H. Rathman, pres.

Inc. 1902, in West Virginia. **Cap.** $500,000, increased to $1,000,000 on re-incorporation in Nevada, 1910; shares $1 par; assessable; 650,000 shares issued.

Property: 22 claims, 300 acres, N. of the Ontario and E. of the Silver King Coalition mine, Park City, Summit county. Past production given as $500,000 of gold and silver. Two fissures in quartzite cross the claims.

Development: by 1,100′ shaft and over 5,000′ of workings.

Leases on property held by Park City Mines Co., in 1917, and U. S. S. R. & M. E. Co. in 1920, have lapsed.

AMERICAN FORK EXPLORATION CO. **UTAH**

A merger of the Wild Dutchman M. & M. Co., and the Fissure Expl. Co.

Dead; described in Vol. XIV. Held a lease on mine of the Pacific Gold M. & M. Co. by inheritance from the Fissures Expl. Co., but itself became defunct in 1919.

AMERICAN LEASING CO. **UTAH**

Address: C. B. Ferlin, American Fork, Utah.

Property: by lease, the Live Yankee and Silver Wave groups, and holdings of the Belorophon Mng. Co. (q. v.), in American Fork district, Utah county.

Development: in addition to the Belorophon 800′ tunnel, lessee is driving the Holden tunnel to open properties at depth. Reported mid-1920 that milling ore, 8 to 15′ wide, was uncovered and a year later high grade ore was said to have been found on the Silver Wave. In a drift through the Globe property the Leasing company found 7-8′ of ore.

Equipment: lessee owns a 50-ton concentrating mill from which shipments have been made, since 1918 Concentrate is said to run $70 to $130 per ton in silver and lead. Company is the heaviest shipper of the American Fork district.

AMERICAN METAL MINING CO. **UTAH**

Address: E. W. Coombs, 276 S. 10 E. St., Salt Lake City, Utah. **Office:** Roy Spencer, sec., 359 S. State St., Salt Lake City.

Officers: E. W. Coombs, pres.; W. J. Coombs, v. p.; M. C. Iverson, treas., with Wm. S. Theobald and Lee Lovinger, directors.

Inc. in Utah. **Cap.** $100,000; assessable; ½c levied, May and Nov., 1921. Last delinquent Feb. 3, 1922.

Property: the holdings of the American Cons. Copper Co. and lease and bond on strip 160′ wide of Victor Mines ground. Ground shows strong fissure veins, hitherto explored only in quartzite, whereas this new company will develop these silver-copper veins in limestone, by drift and work from Victor Mines tunnel 550′ from company's line.

AMERICAN MINES SYNDICATE **UTAH**

Office: Houghton, Mich. **Mine office:** Eureka, Juab county, Utah.

Officers: Walter Fitch, pres.; J. H. Rice, v. p.; Wm. P. Seager, treas.; preceding officers, Cecil Fitch and Exilda Fitch, directors.

Inc. 1907, in Arizona. **Cap.** $100,000; shares $100 par; paid in, $80 per share; issued, $86,350. Is a holding company, controlling the Chief Consolidated Mining Co. through ownership of 361,000 shares.

AMERICAN MINING CO. **UTAH**

Mail returned from Salt Lake City.

Officers: A. A. Crome, 1st v. p. and gen. mgr.; Wm. Crome, sec.-treas.

Inc. 1896, in Utah. **Cap.** $50,000; shares 10c par; assessable; all issued; 28 assessments levied to end of 1918. Annual meeting 3rd Monday in May.

Property: 10 patented claims, on Scott Hill, in Big Cottonwood district, 5 miles from a railroad. Ore occurs as sulphides in lime. Orebody is from 2″ to 2′ wide and average assays run from 5-18% copper, 10 oz. silver and $3.50 gold.

Development: about 2,000′ of shafts and tunnels.

Property reported under lease and bond, in 1918, for $100,000.

AMERICAN STAR MINING CO. **UTAH**

Office: 403 Dooly Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah

Officers: Imer Pett, pres. and gen. mgr.; Myron K. Billings, v. p.; J. R. Brain, sec.-treas., with Jas. P. Graves and Thos. P. Billings, directors.

Inc 1909, in Utah. **Cap.** $1,000,000; shares $1 par; issued 704,500 shares.

Property: 2 claims, 15 acres, between the Victoria and Chief Consolidated mines, and touching the Plutus on the east and Eagle & Blue on the west. Mine has about 1,000′ of workings, made from the 900′ level, 1,000′ from the 1,350′ level and about 2,100′ from the 1,875′ level of the Eagle & Blue Bell mine, through which development is being continued. Workings show an ore channel of about 60′ width. Property considered promising.

ANCHOR MINING CO. **UTAH**

Idle several years. **Office:** Calumet, Mich.

Officers: John D. Cuddihy, pres.; F. W. Taylor, sec.-treas., and Henry L. Baer, directors.

Inc. June, 1908, in Michigan. **Cap.** $150,000; shares $25 par; issued, 1,800. Annual meeting, second Tuesday in June.

Lands: 9 claims, patented, 131 acres; in the Snake Creek district, one-half mile south of Daly-Judge mine, Park City. Company is the successor of the Wolverine Mining Co.

ANTELOPE & PRINCE OF WALES MINING CO. **UTAH**

Not incorporated. Controlled by Walker Bros., of Salt Lake City. **Cap.** 1,250,000; shares $1 par; 400,000 shares held in treasury.

Property: 9 claims, patented, in the Alta-Cottonwood district, cover a mile of the Prince of Wales fissure, worked years ago to a depth of 900′, and said to have produced $1,000,000 from one shoot alone being the "bone of contention" in a celebrated lawsuit in the seventies.

Development: 930′ incline shaft and 600′ "Annie" tunnel. In 1915 lessees continued the tunnel several hundred feet, cutting the vein 140′ below bottom of shaft. Vein where cut is said have shown good ore containing silver chloride and galena. Company planned to continue the work of the lessees.

Claims were being tapped (1921) 900′ below the Annie by another tunnel driven by the **Alta T. & T. Co.**, which see.

ANTELOPE STAR CONSOLIDATED MINES UTAH

Inc. March, 1917, in Utah. **Cap.** $300,000; shares 10c par. Is a consolidation of several properties in Mineral Mountain range, 9 miles S. E. of Black Rock, Millard county. Is said to be a reorganization of the Antelope Star Mining Co. (q. v.). A ½c assessment was levied, fall of 1920; others, 1c delinquent March 26, ½c. delinquent, Nov. 23, 1921.

The incorporators are: Leo Neilson, Logan; Darby Crandall, New York; W. R. Hensleigh, V. L. Arnold and Chas. M. Morris.

ANTELOPE STAR MINING CO. UTAH

Office: 618 Newhouse Bldg., Salt Lake City, Utah.

Officers: Chas. M. Norris, pres.; H. L. Parker, v. p. and mgr.; V. L. Arnold, sec.; L. J. Brattager, asst. sec., with W. N. Williams, B. L. Rich, and Leo Nielson, directors.

Inc. in Utah. **Cap.** $250,000; 25c par; 50,000 shares in treasury. Stock listed on Salt Lake Exchange.

Property: 9 claims and a millsite, about 200 acres, 20 miles N. E. of Milford in Millard county, said to have a 5′ fissure vein of milling ore assaying 8-10% lead. The orebody is leached at surface and contains barium, lead, silver, copper and iron.

Development: by 373′ tunnel, 65′ shaft and about 800′ of drifting and raises. Promoted by Woolley Bros., Salt Lake City.

APEX STANDARD MINING CO. UTAH.

Officers: Lewis Merriman, pres.-mgr., Eureka, Utah; Frank Kimball, v. p.; S. S. Pond, sec.-treas., with F. W. Brock and Hugh Hefferman, directors.

Inc. 1917, in Utah. **Cap.** $1,000,000; issued, 500,000 shares. Cash on hand March, 1919, $15,000.

Property: 20 claims, 400 acres, S. of the Tintic Standard, East Tintic district, Juab county.

Development: by 900′ shaft at which depth a 250′ crosscut reached mineralized ground. Reported, February, 1921, that work was being continued on this level. In June, 1921, it was stated that the company had acquired control of the Tintic Zenith and Tintic Union mining companies, and at the same time had taken over other property.

ARGONAUT MINING & SMELTING CO. UTAH

Address: 310 Kearns Bldg., Salt Lake City, Utah.

Officers: Wm. Chipman, pres.; Hugo B. Anderson, v. p.; J. Tracey Wootton, sec.-treas.; J. H. Wootton, mgr., with John Hower, directors.

Inc. February, 1917, in Utah. **Cap.** $50,000; shares 5 cts. par; assessable; 515,000 shares outstanding. Annual meeting, 2nd Tuesday in January.

Property: 7 claims, 140 acres, in American Fork canyon, claimed to carry a fissure vein of lead sulphide and iron carbonate, with a 4″ shoot of lead ore, assaying about $25.

ARROWHEAD MINES CO. UTAH

Officers: H. D. Chase, pres., 76 G St., Salt Lake City, Utah; Chas A. Root, v. p.; G. Alma Gardner, sec.-treas.; A. J. Hoban, managing director, with J. A. Reeder, H. Mann, R. M. Usher, Chas. Anderson and W. J. Allen, directors. J. H. Nelson, supt.

Cap. $10,000; shares 10c par; assessable. Stock listed on Salt Lake Exchange.

Property: the General Connor mine, 9 claims, 1 patented, near Marys-

vale, Piute county, said to show a 15′ fissure vein of free milling ore, with a 16″ streak averaging $18-$20 in gold and silver.

Development: by 95′ shaft, 225′ tunnel, winzes and crosscuts. Ore reserves estimated at $275,000. Five men employed.

No recent information.

AUSTIN MINING CO. UTAH

Address: C. W. Earl, supt., Lehi, Utah. Other officials and stockholders are John F. Bradshaw, Jacob Evans, J. C. Jensen and Edward Southwick. Shares assessable; 1c. a share levied, Dec. 23, 1921.

Property: in Silver Lake district, Utah county, 15 miles E. of American Fork, reported to show both lead and copper ore. Older workings total 700′; present management drove a 300′ drift from the Earl-Eagle tunnel, in 1920.

BANKERS MINES CO. UTAH

Offices: J. A. Maxfield, Maxfield Apts., Salt Lake City, Utah.

Officers: Noble Warrum, pres.; J. A. Maxfield, v. p.-sec.; A. D. Williams, treas., with M. B. Connell, B. Y. Golding and Aquilla Nebeker, directors.

Inc. November, 1916. **Cap.** 1,000,000 shares; 10c par; 500,000 shares in treasury.

Property: 39 claims, about 780 acers, adjoins the Logger mine in Big Cottonwood Canyon, and is near the old Maxfield mine. Developed by a tunnel which is expected to cut the Logger vein at 900′ in.

BAY STATE MNG. & DEV. CO. UTAH

Address: American Fork, Utah county, Utah.

Officers: Geo. B. Tyler, pres. and mgr.; J. H. Wootton, v. p.; J. W. Storrs, sec.-treas., with A. Chipman and E. J. Bennett, directors.

Cap. $1,000,000; shares 5c par; assessable; last assessment. No. 5, of ½c called June 14, 1917. Stock listed on Salt Lake Exchange. Price range ½-1¼c in 1918, ¼-½c in 1919, 1¼-1½c in 1920, 3¾-38½c in 1921. Financial statement from April 26, 1917, to October 12, 1918, shows total receipts of $12,361; of which $392 was from ore sales, and $11,490 from assessments. Cash on hand, Oct. 12, 1918, was $210.

Property: at American Fork canyon, 22 claims, unpatented, 18 miles from the railroad. Company claims to have 1,000 tons of ore on the dump averaging 5 to 8% lead and 8 to 10 oz. silver, and 210 tons of ore averaging $75 per ton.

Development: is by tunnel with about 1,200′ of workings.

No recent report.

BEAVER-BUTTE COPPER CO. UTAH

Office and mine: Beaver, Beaver county, Utah. Sherman McGarry supt.

Inc. 1909, in Utah. **Cap.** $50,000; shares 10c par; assessable. Property idle from 1912-1914, owing to lack of capital, but development work was resumed in summer of 1914, and property reported under lease to Senator A. B. Lewis, representing Eastern capitalists, 1916.

Property: 15 claims, unpatented, in the Newton district, 8 miles from a railroad, show gold-silver ore and are believed to carry the continuation of the Sheep Rock ledge.

Development: by a 150′ two-compartment shaft, crosscuts and drifts. Company claims to have 2′ of $10 ore on surface and 19′ of $8 ore on the 150′ level with 1′ of $18 ore along the footwall side. Planned installing an electric hoist and drifting on the 150′ level. See Beaver Gold Mines Corp. and remember what happened to shareholder of Majestic Mines. No returns, 1917-1921.

BEAVER COMBINATION MINING CO. UTAH

Former address: 312 McCormick Bldg., Salt Lake City; M. B. Johnson, sec. Company merged into **Moscow Silver Mines Co.**, which see.

BEAVER COPPER CO. UTAH

Office: 609 Newhouse Bldg., Salt Lake City, Utah. Mine at Milford, Beaver county, Utah.

Officers: W. J. Dooley, pres.; Blaine Grey, v. p.; S. S. Pond, sec.; A. J. McMullen, mgr., with Chas. A. Weaver, F. J. Baker, and Fred Kuster, directors.

Inc. 1907, in Utah. **Cap.** $100,000; 10c par; assessable; assessment of ¼c., levied Feb. 3, and ½c. Sept. 1921 and Feb. 9, 1922. 173,900 treasury shares. Annual meeting, third Monday in March. Listed on Salt Lake Exchange.

In 1919, the company absorbed the Beaver Lake Metals Co. and the Utah-United Copper Co. All machinery and other equipment has been moved to the Utah United property because the officers believe that group offers the best chance to develop a producing mine with the limited funds on hand.

Property: 31 claims, 600 acres, in the Beaver Lake district, showing fissure veins in monzonite, contact deposits between monzonite and limestone and replacement orebodies in lime. The ore is complex, containing copper, and lead sulphides with gold-silver values.

Company owns oil rights on 2,560 acres and has made a filing on an additional 2,560 acres of oil lands in Emery county.

Development: by a 470′ incline shaft with about 1,600′ of workings, late in 1919 the east drift on 470′ level cut 6″ of ore containing 6% of zinc, 11% of lead, and 19 oz. silver per ton.

Also did 600′ of drifting on the 470′ level and in 1922 started crosscut north to reach Wasatch fissure. Lessees are operating a portion of the ground.

Equipment: includes hoists, compressor, and pump.

Prospecting outcrop of fissure, on shale-monzonite contact disclosed silver-lead ore at several points, on which work is being done, 1922.

BEAVER GOLD MINES CORP. UTAH

Dead. See Vol. XIV. for full description.

BEAVER HORSESHOE GOLD MNG. CO. UTAH

Probably dead. Fully described in Vol. XIV. Formerly operated near Beaver City.

BEAVER LAKE METALS CO. UTAH

Described in Volume XIII. Merged with **Beaver Copper Co.**, which see.

BEAVER MINES CO. UTAH

Office: 222-23 Continental Bank Bldg., Salt Lake City, Utah. **Mine address:** Marysvale, Piute county, Utah.

Officers: A. H. Cutright, pres. and mgr.; Geo. R. Raymond, v. p.; W. E. Kilburn, treas.; A. Maxwell, sec., and Alex. Beckstead, directors.

Inc. Dec. 17, 1910, in Utah. **Cap.** 1,000,000 shares, 1c each; issued 859,000 shares. Annual meeting, second Saturday in January.

Property: 11 claims, 220 acres, in the Ohio district, 5 miles from D. & R. R. R. Claims carry copper-bearing gold-silver ores in fissure veins in andesitic porphyry. There are 7 veins, 2 developed by crosscut tunnels, 725′ and 72′ long. Mine had only a prospecting outfit. No recent report; presumably idle.

BEAVER RANGE MINE CO. UTAH

Address: Black Rock, Millard county, Utah.

Officers: John B. Taylor, pres. and gen. mgr.; W. W. Moody, v. p. and supt.; R. B. Graff, sec.-treas.

Inc. July, 1916, in Utah. **Cap.** $100,000; shares 10c par.

Property: 10 claims, in the Mineral Mountain range, 10 miles S. E. of Black Rock on the Salt Lake R. R. Claims are in limestone near quartzite and said to carry copper and lead ore, in three prominent N. S. fissures.

Development: over 1,500′ of tunnel and shaft work. Main Chicago tunnel in over 300′ and expected to cut the shoots which show lead ore on the surface. No recent report. One of the many companies which appear to be afraid to answer letters of inquiry.

BECK TUNNEL CONSOLIDATED MINING CO. **UTAH**

Merged April, 1916, with the Colorado Mng. Co. and now called the **Colorado Cons. Mines Co.**, which see.

BEE BEE MINING CO. **UTAH**

Office: 409 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Goldstrike, Washington county, Utah.

Officers: H. G. Snyder, pres.; John A. Bryson, v. p.; Robt. L. Judd, sec.-treas., with E. J. Lund and Thos. Marloneaux, directors; S. F. Snyder, supt.

Inc. April 13, 1915. **Cap.** $100,000; shares 10c par, issued $70,000. Assessment of 4/10c per share levied, August, 1916.

Property: 3 claims, unpatented, in the Goldstrike mining district, Washington county, claimed to show 20,000 tons of $10 to $35 free milling ore in fissure vein. No recent report. Probably idle.

BELOROPHON MINING CO. **UTAH**

Address: A. T. Sanford, Boston Bldg., Salt Lake City, Utah. C. B. Ferlin, mgr.

Cap. $100,000; shares 10c par; 960,000 shares issued.

Property: 250 acres adjoining the Live Yankee group on the north in American Fork canyon, Utah. The Live Yankee and other veins are said to cross the claims. **Ore:** occurs in fissures in quartzite and in contact between lime and quartzite, carrying gold, copper, silver and lead.

Development: by 800′ tunnel.

Beginning with 1918, property has been under lease to its manager, operating under name of American Leasing Co., which see.

BEN BOLT MNG. CO. **UTAH**

Delbert B. Hughes, sec.-treas., 339 W. 2nd South St., Salt Lake City. Mining property in the Tintic district.

In March, 1918, company called an assessment of ¼c per share. Assessment No. 3 of same amount levied Aug. 8, 1921.

BIG COTTONWOOD BONANZA MINING CO. **UTAH**

No information about the company obtainable save that essessment of 1/5c. a share became delinquent, Oct. 12, with sale day, Oct. 25, 1921.

BIG COTTONWOOD CONSOLIDATED MINING CO. **UTAH**

Officers: W. G. Romney, pres., 271 4th Ave., Salt Lake City; E. J. Jeremy, v. p.; C. E. Robertson, sec.-treas., 777 7th Ave., Salt Lake City; with Jas. A. Stanley, W. H. Hurd, and H. J. McKean, directors.

Inc. in Utah. **Cap.** $250,000; 25c par; approximately 700,000 shares issued; assessable; last assessment, of 1c., was delinquent April 4, 1921. Listed on Salt Lake City Exchange. Share prices 4-5c in 1919; 1½-1c in 1920; 3¼c to June 1, 1921.

Treasurer's report for 1920 shows total expenditures of $20,487, with a cash balance of $2,499.

Property: 84 claims, including 23 of the Copper King Mining Co., total 1,400 acres, of which control was acquired in 1920, in Big Cottonwood district, Salt Lake County.

Development: 135′ incline shaft with 210′ of workings from which 50 tons of sorted silicious copper ore was shipped before work was stopped. Development is now concentrated on a lower tunnel, driven 926′ in 12 months ending July, 1920, and 3,388′ long. November 1921, with 120′ to go to cut the Copper King fissure. Development has been carried on in a quiet way for about 7 years. Operated in winter 1921-22.

Equipment includes electric driven 6-drill compressor, drills, etc.

BIG COTTONWOOD CONSOLIDATED MINING CO. **UTAH**

Fully described in Vol. XIV. In August, 1920, was consolidated with

the Reed's Peak Mng. Co., with title of **Reed's Peak Cons. Mng. Co.**, which see

BIG COTTONWOOD COPPER & GOLD MINING CO. UTAH

Mail returned, 1919, from former mine office at Brighton, Salt Lake county, Utah.

Officers: Col. Nicholas Treweek, pres. and gen, mgr.; W. Mont Ferry, v. p., 164 E St., Salt Lake City; J. Leonard Burch, sec.-treas., with J. E. Galligher and John S. Bransford, directors, at last accounts.

Inc. in Utah. **Cap.** $1,500,000, increased 1906 to $3,750,000; $5 par. Is operated as a close corporation.

Property: 140 acres, adjoining the Great Western Mining Co., on the southeast, and carrying same ore zone, near the head of Big Cottonwood canyon, and also in the Snake Creek district.

Development: by a shaft, showing ore assaying up to 8% copper, with small gold and silver values, and a long tunnel with about 2,000′ of workings. Mine apparently has considerable bodies of sulphide ore, averaging about 5% copper and $2 per ton in combined gold and silver values.

BIG FOUR EXPLORATION CO. UTAH

Property reported sold early in 1918 for $35,000. No details. Company was described in Vol. XIII.

BIG HILL MINING CO. UTAH

Address: Room 12, Knight Bldg., Provo, Utah.

Officers: O. Raymond Knight, pres.; Harvey Cluff, v. p.; R. E. Allen, sec.-treas., with J. W. Knight, and W. L. Burnhall, directors. R. L. Anderberg, asst. sec.

Inc. June 15, 1899, in Utah. **Cap.** $100,000; 10c par; issued, 565,000 shares; assessable. Annual meeting, 1st Monday in June. Listed on Salt Lake Exchange.

Property: 3 patented claims, 60 acres, in Tintic mining district, is a prospect. Reported, July, 1920, that an assessment of 1c would be levied, company's obligations settled and work indefinitely suspended; shaft then 600′ deep.

BIG INDIAN COPPER CO. UTAH

Office: Provo, Utah. Col. C. E. Loose, pres.-gen. mgr.; J. T. Farrer, v. p.; P. G. Peterson, sec.-treas and supt.; Niels C. Christensen, metallurgist. Col. Loose and Senator Smoot are the principal owners.

Inc. in Utah. **Cap.** $10,000; shares 1c par; 185,000 taken by insiders, 700,000 issued for property; 100,000 shares offered the public in 1917 at $1. Increased 1918, to $750,000; shares, 50c par.

Property: 21 claims, 11 patented, about 350 acres, 38 miles S. E. of Moab and 60 miles from the D. & R. G. railway at Crescent, San Juan county, Utah. Claims are said to show copper ore occurring disseminated through sandstone with sulphides appearing at 100′ depth.

Company started operating a 300-ton leaching plant to use the sulphur dioxide process to treat a large tonnage of 3% ore, in November, 1917. Water is piped from La Sal ranch, 7 miles distant.

Reported, in 1919, that property had been leased for 3 years to the **Buena Vista Co.** (q. v.), but, by June, 1921, lease had been relinquished. Mill has been operated experimentally, but no production is recorded.

BIG KING MINING CO. UTAH

Described in Vol. XIV. Bought by **Cottonwood King Mng. Co.**, which sec. by exchange of stock.

BINGHAM AMALGAMATED COPPER CO. UTAH

Fully described in Volume XIII. Succeeded by **United Bingham Copper Co.**, which see

BINGHAM ANACONDA COPPER CO. UTAH

Mail returned, 1918, from former address, 11 Main St., Salt Lake City, Utah. Mine in Markham Gulch, Bingham, Utah.

Officers: E. McCarrick, pres.; B. B. Gray, v. p.; P. L. Meyers, sec.-treas.; above, with A. Gustaveson and R. E. L. Collier, directors.

Cap. $1,000,000; shares 10c par. Owns a group of claims in Bingham district. Probably idle.

BINGHAM ANNEX MINING CO. **UTAH**

Address: Milando Pratt, sec., 1005 E. 9 S St., Salt Lake City. No information available as to the company, or its property, except that assessment No. 1 of ¼c., was levied Aug. 2, 1920, and the last for same amount, Jan. 29, 1921.

BINGHAM CENTRAL MINING CO. **UTAH**

Idle. At Bingham Canyon, Salt Lake county, Utah. This company and the **Bingham Standard Copper Co.** were controlled by the **Bingham Central Standard Copper Co.**, which sold its stock holdings, 1909, to **Utah Metal Mining Co.**, receiving stock in latter company which is now controlled by **Utah Metal & Tunnel Co.**, which see. Described Vol. X.

BINGHAM CENTRAL STANDARD COPPER CO. **UTAH**

Organized as a holding company controlling, through ownership of practically entire stock issues, the Bingham Central Mining Co. and Bingham Standard Copper Co. Sold these subsidiary stocks, 1909, to the Utah Metal Mining Co. for 300,000 shares of latter, which was escrowed until 1911 and extended upon payment of 10,000 additional shares until November 8, 1912, and subsequently to January 1, 1914, to permit building by Utah Metal Mining Co. of a $150,000 aerial tramway from the western end of the big tunnel to the International smelter at Tooele. On release of escrow, 1914, company was to be wound up, but prevented by minority stockholders, who attempted to recover property, claiming irregular disposition of the company's assets. Stock valueless.

BINGHAM COALITION MINES CO. **UTAH**

Address: 102 Exchange St., Portland, Me. **Mine office:** Bingham Canyon, Utah.

Officers: Geo. F. Fowler, pres., Springfield, Mass.; H. P. Sweetser, treas.; A. T. Hastings, mgr.

Inc. 1916, in Maine. **Cap.** $1,000,000 increased 1916 to $1,500,000; $1 par. Bonds, $150,000. Stock listed on New York and Boston Curbs. State Street Trust Co., Boston, and Registrar & Transfer Co., New York, registrar and transfer agents.

Property: is a merger of the Butler Liberal, Red Wing, and Massasoit properties, about 50 claims in Markham and Freeman gulches. The claims carry the Florence Erie, Julian, Red Wing and other fissures, all of them good producers in the upper levels.

Development: by crosscut tunnels with about 5 miles of workings cutting the above named fissures (veins) containing lead ores with silver, copper, and gold values. **Equipment** includes 200-ton Red Wing mill.

Production: in 1917 was 127 oz. gold, 29,249 oz. silver, 57,684 lb. copper, and 1,625,830 lb. lead.

Some shipments are recorded for 1918, but no recent information available.

BINGHAM COPPER BOY MINING CO. **UTAH**

Out of funds and idle several years, with no sale or market for the stock, so far as known. See Vol. XI, Copper Handbook.

BINGHAM EMPIRE MINES CO. **UTAH**

Officers: O. Raymond Knight, pres.; J. A. Kauffman, v. p.; with Otto E. Parsons, W. Lester Mangum, Knight S. Jordan, Geo. A. Storrs and Amanda M. Knight, directors. R. E. Allen, sec.-treas.

Inc. July 31, 1915, in Utah, for development of property in the Bingham district. **Cap.** $10,000; shares 1c par; 217,000 shares in treasury.

Property: 1,450 acres, includes claim groups formerly owned by Bingham Black Diamond and Bingham Midway mining companies in Midway and Settlement canyons, Tooele county. Acquired in 1919-20, the former

company receiving 120,000 shares of Bingham Empire stock and the latter, 90,000 shares. Bingham Midway ground shows limestone and quartzite cut by porphyry dikes and 3 fissure veins; ore is lead-silver-gold; see Vol. X for description of old company.

Development: by 2 tunnels on Bingham Midway. Tunnel No. 2 gives a back of 1,200′ in one and 1,800′ in another of the veins. Developing early in 1920.

BINGHAM GALENA MINING CO. **UTAH**

Formerly **Silver Shield Mng. & Mlg. Co.**, other acreage added when name was changed.

Mine address: Eugene Grutt, supt., Bingham Canyon, Utah.

Officers: R. E. Miller, pres.; Geo. N. Lawrence, sec.; H. H. Calvin, v. p.; Chas. W. Lawrence, A. C. Christensen, Allen T. Sanford, Isadore Gauchet and J. S. Dixon, directors. O. F. Brinton, cons. engr.

Cap. $1,000,000; par 25c.; changed Oct. 3, 1921, from $1 par; 3,465,000 shares in treasury.

Silver Shield stockholders received 300,000 shares of new company on share for share basis, and 120,000 shares were paid for the other 2 tracts. Bingham Galena assumed entire indebtedness of the Silver Shield company.

Property: 485 acres in West Mountain (Bingham) district, Salt Lake county, includes 320 acres of the Silver Shield, 27 acres of **New York-Bingham Mng. Co.** and the Bully Boy group, adjoining U. S. S. R. & M. Co.'s holdings. The orebodies occur in fissures in limestone, and along limestone contacts; the ore value is mainly in silver-lead, but some gold and zinc are present.

Reported October, 1921, that company would use its new treasury stock to acquire the Lost Packer mine, Custer Co., Idaho. See **Lost Packer Co.** for description.

Development: by shaft and 8,000′ tunnel with 540′ back. Workings total 10,000′, largely in Silver Shield territory, and are connected with Niagara tunnel of U. S. S. R. & M. Co., in which Bingham Galena owns operating rights.

In spite of extensive workings, property is still in development stage as evidenced by repeated assessments of former Silver Shield company, No. 53 of 3c. being levied October, 1920. Silver Shield was a small producer in 1918.

Equipment: said to be complete.

Company contracted with George Graham Rice, of the Fidelity Finance and Funding Co., and of unsavory reputation to underwrite 467,100 shares, at a maximum price of 75c per share. Permit was issued on June 18, 1921, by the Utah State Securities Commission over the protest of the Utah Chapter of the Am. Mining Congress and others. The Commission took the ground that the permit would be revoked in case improper methods were used. That this is somewhat dangerous ground to stand upon is voiced editorially and otherwise by the technical journals.

In July, the Corporations Commission for California began proceedings to prevent Rice and his brokers from selling Bingham Galena stock in that state without a license; his official statement is a scathing indictment of Rice and his ways.

A market letter, June, 1921, announced that 200,000 shares at 25c had been over-subscribed. In October 1921, shares were sold at 6c. after a high of 38c.

BINGHAM MINES CO. **UTAH**

Office: 60 Congress St., Boston, Mass. **Operating office:** 404 Dooly Blk., Salt Lake City, Utah; Joseph Hyland, supt., Lark, Utah.

Officers: Jas. P. Graves, pres.; Henry N. Sweet, v. p.; M. K. Billings, sec.; Thos. S. Woods, treas., with Alfred B. White, Arthur W. Chesterton

and Fred H. Williams, directors. Imer Pett, asst. treas.-gen. mgr.; Thos. P. Billings, gen. supt.; Fred R. Sands, purch. agent.

Inc. April 6, 1908, in Maine. **Cap.** $1,500,000; $10 par; 95,153 shares outstanding. No funded debt.

Is a reorganization of the **Bingham Consolidated Mining & Smelting Co.**, stock being exchanged, share for share, on payment of $3.50. Controls about 97% of the outstanding stock of the **Eagle & Blue Bell Mining Co.**, a dividend payer, of Eureka, Juab county, Utah; also controls the **Yosemite Mines Co.**, of Bingham Canyon, Salt Lake county, Utah. Purchased the entire capital stock of the **Victoria Cons. Mng. Co.** in 1915 and the property was conveyed to the Bingham Mines Co. in November, 1917. The Victoria property consists of 49 acres mineral land at Eureka, adjoining the Eagle and Blue Bell. Controls American Star Mining Co., adjoining Chief Cons. property, Eureka, Utah.

Registrars: First National Bank Boston, and Chase National Bank, New York **Transfer agents:** Federal Trust Co., Boston, and Guaranty Trust Co., New York Stock listed on Boston Stock Exchange and New York Curb. Sales in 1919 at $10¼; $6¼-$10¾ in 1920, $8-$10¼ in 1921, to June 1st. Annual meeting, third Wednesday in April, at 120 Exchange St., Portland, Maine.

Company has liquidated its bonded indebtedness of $1,480,790, besides having paid for the property of the Victoria Cons. Mng. Co.; and in Dec., 1920, repurchased 38,290 of its own shares at $10, in order to reduce its capitalization.

Comparative Balance Sheet:

Assets—

	Real Est. & Mines	Cons. & Equip.	Mining Stocks	Cash & Loans	Accts. Rec.	Supplies Ins., etc.	Total
1920	$1,312,346	$36,680	$617,869	$101.741	$109,000	$ 9,919	$2,187,560
1919	1,312,346	35,253	719,040	56,600	93,299	10,399	2,226,937
1918	1,308,329	41,398	845,366	19,766	89,568	11,949	2,316,376
1917	1,049,714	39,986	861,830	188,203	82,782	16,058	2,238,575
1916	962,280	33,462	663,022	85,158	67,998	12,640	1,824,551

Liabilities—

	Capital Stock	Accts. & Notes Pay.	Reserve Deprec.	Reserve Depletion	Surplus	Total
1920..	$1,117,100	$16,368	$27,884	$505,373	$520,759	$2,187,483
1919..	1,500,000	9,125	22,832	433,749	261,231	2,226,937
1918..	1,500,000	66,370	17,595	366,535	365,877	2,316,376
1917..	1,500,000	2,392	12,248	79,908	644,028	2,238,575
1916..	1,411,000	1,079	12,248	.....	400,224	1,824,551

Comparative Operating Statement:

	1920	1919	1918
Ore shipments, gross value	$471,436	$227,088	$390,821
Deduct smelting, freight, etc	189,298	88,435	137,408
Net receipts from ore	$282,138	$138,653	$253,413
Other revenues (royalties, etc)	67,682	42,793	36,481
Gross earnings at properties	$349,820	$181,446	$289,894
Operating expenses	141,515	111,973	149,290
Net earnings	$208,305	$69,473	$140,604
Mine development	54,975	26,405	59,961
Net operating gain	$153,330	$43,068	$80,643
Dividends on mining stocks	182,872	37,237	83,629
Net gain and income	$336,202	X$80,306	$164,272

X After deducting a $4,961 loss on sale of U. S. bonds.

Dividends: initial dividend of 50c and Red Cross dividend of 25c a share, paid July 2, 1917; 50c paid October 5, 1917; 5 dividends of 50c, or $2.50 in 1918 and 3 dividends to October 1, 1919, or 75c.; none in 1920. Total is $675,000.

The **Bingham Mines Co.** made an excellent showing on its operations in Utah in 1921. In the first eight months, with August estimated, the company's profits and its equity in those of the Eagle & Blue Bell company have been at the annual rate of $228,594, or $2.29 per share, before allowance for depletion, depreciation, and taxes, and $49,975, or 41c. per share, after these charges. The physical condition of both the Eagle and Victoria properties is better than ever before. Recent development at the latter has disclosed an orebody containing high silver content which has been proved to extend continuously from the 1,350′ to the 1,700′ level, running from 4 to 14′ wide. This is one of the best orebodies recently opened in the Tintic district. In the past twelve years the Bingham Mines Co. has paid off $1,500,000 of indebtedness, purchased two properties for over $1,000,000, and paid dividends of $675,000, with a net increase of only $54,510 in capitalization.

Property: the Dalton & Lark and Commercial mines, 63 claims, patented, 481 acres mineral land, in the Bingham district, and 605 acres non-mineral lands.

Development: at Dalton & Lark and Commercial mines is extensive, there being many miles of workings. New work in the first named in 1921 amounted to 1,732′, compared with 1,296′ in 1920 and 1,358′ in 1919. The Commercial mine has not been worked since 1915. It is considered that a large quantity of ore will be developed in the Brooklyn, Lead Mine and Lark veins below the Mascotte tunnel. Lessees extract ore from old workings in the Dalton & Lark and Commercial and shipped 6,764 tons during 1920, yielding the company a royalty of $64,915. In 12 years to 1920, lessees have produced 1,768 oz. gold, 647,029 oz. silver, 4,623,683 lb. lead, and 8,306,976 lb. copper.

During 1919, company work was mainly, and in 1920 entirely, confined to the Brooklyn vein; an orebody, 350′ x 110′ x 6′ has been opened. Ore blocked out above the Mascotte tunnel has been depleted.

Equipment: at Dalton & Lark—225-h. p. hoists, 14-drill compressor, shops, etc., and spur line with electric locos connecting with the D. & R. G. At Commercial, hoist, 10-drill compressor, and other machinery, all electrically driven.

Production: of Dalton & Lark, exclusive of lessees:

Year	Ore, tons	Gold oz.	Silver, oz.	Lead, lb.	Copper, lb.
1921	24,073	1,655	69,488	157,136	245,417
1920	16,307	1,928	82,214	311,289	479,242
1919	22,895	1,481	90,198	82,955	494,367
1918	31,670	1,501	113,432	432,157	753,641
1917	25,776	1,872	139,241	679,007	1,681,848
1916	27,710	1,900	154,036	736,992	1,502,865
1915	44,975	3,399	188,216	1,221,219	2,244,078
1914	49,867	3,613	188,905	1,110,762	3,738,773
1913	38,988	2,995	179,117	1,122,955	2,745,818
1912	49,987	3,731	225,763	1,427,780	3,777,320

Company is in hands of engineers who have made splendid progress in handling difficult financial and mining problems.

The Dalton & Lark mine was operated at a loss of $21,645 in 1921 and the operating deficit at the Commercial was $1,032. Lease ore yielded $2,097 and operating expenses were $4,029.

Eagle & Blue Bell Mining Co.

Subsidiary of Bingham Mines Co.

Office: 60 Congress St., Boston, Mass. **Operating office:** 404 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Jas. P. Graves, pres.; Henry N. Sweet, v. p.; Imer Pett, asst. treas.-gen. mgr.; Thos. S. Woods, treas.; Myron K. Billings, sec., with Fred H. Williams and John H. Gibson, directors. Wm. Owens, mine supt. Duncan MacVichie, directors. Myron K. Billings, sec. Wm. Owens, mine supt.

Inc. Sept., 1898, in Utah. **Cap.** $250,000, increased, March, 1910, to $1,000,000; $1 par; issued 893,146 shares.

In March, 1910, issued 644,347 shares of new stock at 50c to take up a floating debt of $269,925 and put $50,000 in the treasury, for working capital. Is controlled through stock ownership, by Bingham Mines Co. First National Bank, Boston, registrar; Federal Trust Co., Boston, transfer agent. Stock is listed on the Boston Curb. Annual meeting, first Saturday after first day of October.

Financial Statement, years ending December 31:

Year	Gross Earnings	Expenses at mine	Freight, treatment etc.	General	Net Profit	Div'ds
1921....	$633,315	$166,970	$329,241	$40,064	$97,040*	$44,675
1920....	918,235	254,599	372,569	36,195	254,872	312,091
1919....	622,418	228,087	268,663	23,143	102,525*	89,315
1918....	1,090,303	297,212	462,199	42,162	288,730*	267,943
1917....	1,069,603	223,827	353,970	14,577	393,359*	357,258
1916....	531,451	160,369	207,456	8,849	154,776	89,314
1915....	.....	.....	.....	.....	143,345	133,972

* After deductions for Federal taxes.

Working Capital:

Year	Current assets	Current liabilities	Net current assets
1921.....	$130,682	$9,759	$120,923
1920.....	120,284	452	119,832
1919.....	146,961	452	146,509
1918.....	175,801	34,548	141,253
1917.....	264,933	86,534	178,399
1916.....	67,580	.....	67,580

Dividends: 20 cents in 1913; 15 cents in 1914; 15 cents in 1915; 10 cents in 1916; 40 cents in 1917; 30 cents in 1918; 10 cents in 1919; 35 cents in 1920; and 5 cents on April 28, 1921; total to that date, $1,607,662.

Property: 18 patented claims, 83 acres, includes a 9-acre millsite carrying the water right to a spring having a flow of about 60 gal. per minute. Lands lie between the Centennial-Eureka, Victoria and Chief Consolidated mines, on the Victoria-Grand Central ore zone, in the Mammoth Limestone.

Geology: chamber deposits in limestone, carry silver-lead ores containing gold and some copper. The lime is cut by numerous fissures, at all angles, with mainly vertical dip, carrying pipes, shoots and erratic deposits of ore at the intersections of fissures and bedding planes, in massive blue limestone. The mine has considerable bodies of silicious copper ore, lead sulphides and carbonates. Pay shoots vary from 6 to 100′ in width. Average assays of dry ore: 0.230 oz. gold; 12.99 oz. silver; 0.31% copper; lead ore assayed: 0.13 oz. gold, 16.81 oz. silver and 17.05% lead.

The mine workings indicate 4 separate ore channels striking northerly and southerly, and occasionally joined together by immense ore deposits made along easterly and westerly cross faultings. The ore occurrence shows

a great similarity throughout, giving the zone a width of over 600', but each channel apparently has its characteristic mineral association.

History: according to C. H. Blanchard, pres. of the D. & B. Mines Co., ore was discovered by 30' shaft, and mill erected before ore development warranted, with consequent abandonment. Relocated several times, and property developed by 1,200' tunnel, that eventually found downward extension of ore-shoot cut by shaft. Profitably worked till panic of '93; later reopened and all ore in sight taken out and mine was idle until sold to Bingham Mines crowd who sank deep winze from tunnel; extracted all ore in sight and ran into debt for $300,000; Hornblower & Weeks assumed debt, taking company notes, and installed Imer Pett as manager and Wm. Owens as supt. New management followed for 800' a thin, iron-stained seam on the 1,000' level and found immense body of pay ore, making it one of the big mines of Tintic.

Development: has been extensive in the last few years; the 3-compartment shaft is 2,018' deep.

Two main deposits supply most of the output. One of these is the 1,550' orebody, which, although irregular in occurrence, extends up to 1,350' and down to 1,845'. Stoping is over 900' long. The other orebody is in the North Extension claims, and is found mainly below the 1,000' north drift. Stoping on this ore is also extensive, but its full size is not yet known. Because of adverse conditions during 1919, ore of relatively higher grade was extracted, and development curtailed. In 1921, the main orebody, which has yielded largely from the 1,350', 1,450' and 1,550' levels, was cut on the 1,700'. A new shoot was opened in 1920 above the 1,350' level, and development begun on the 2,000' level. New work in 1920 and 1919, totaled 6,162' and 5,748', respectively, as compared with 5,519' and 4,783' for 1918 and 1917.

Equipment: includes a 300-h. p. double-reel hoist, good for 2,200' depth, a 100-h. p. tubular boiler and a 4x6" electric triplex pump. The mine was electrically equipped throughout and a 250 h. p. air compressor installed in 1916. Electric power is supplied by the Utah Power & Light Co.

Production:

	Ore, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.
1921	26,554	3,654	518,532	1,985,934	2,235
1920	29,640	3,179	528,306	5,408,375	1,095
1919	22,274	1,641	389,526	4,008,342	4,409
1918	42,190	2,605	579,075	9,389,376	16,012
1917	36,146	2,819	519,880	9,069,091	4,089
1916	25,594	987	347,501	5,714,776	577
1915	26,744	1,226	441,263	8,275,734	3,806
1914	32,736	1,444	554,411	8,588,565	31,443
1913	35,244	7,514	417,279	4,664,362	129,062

Victoria Consolidated Mining Co.

Owned by Bingham Mines Co. Mine at Eureka, Tintic district, Juab county, Utah.

Property: the Snowflake and Victoria mines, 8 patented claims, 49 acres, at Eureka, which contain chamber deposits of silver-lead ore in limestone. The ore shoots and streaks are of variable size, up to 100' in width. Copper, occurring as chalcopyrite and tetrahedrite is found with the galena.

Development: includes 1,200' shaft with several thousand feet of workings. Has compressor, 112 h. p. hoist, and uses electric power. Property is operated through No. 1 shaft of the Eagle & Blue Bell. New work in 1918 amounted to 2,313', opened a disappointing tonnage of new ore.

In 1919, operations were conducted on a smaller scale with extensions of 1,817' only, compared with 3,452' in 1920 and 5,910' in 1921. In September, 1921 company broke all records by shipping 18 cars, 900 tons of $30 ore in one week. Gross receipts in 1921 were $664,174; net proceeds, $164,042.

Production:

Year	Ore, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.	Net profit
1921.	26,562	1,961	482,540	5,464,571	.....	.....
1920.	12,068	1,504	183,063	1,540,022	9,787	$82,981
1919.	3,346	385	47,961	544,418	10,489	13,061
1918.	6,790	1,048	139,304	176,019	165,508	44,419
1917.	13,543	2,875	338,751	515,993	119,553	122,297
1916.	7,339	1,894	79,047	657,416	15,261	35,451
1915.	3,071	248	17,985	232,016	.....	....

Yosemite Mines Co.

Subsidiary of Bingham Mines Co.

Property: 66.43 acres, patented, in the West Mountain mining district, Bingham Canyon, Utah.

Development: by the Yosemite shaft connecting with the Mascotte tunnel on the 2,200′ level and the 1,650′ Paradox tunnel. In 1920 new work totalled 1,314′. The annual report for 1918 says: "The results so far attained in the development of this property are by no means satisfactory." In 1919, results were a little more promising, and the 1,100′ level was extended to cut the Cluster ore shoot, but disappointment followed in 1920.

Production:

Year	Ore, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.	Net smelter return
1921....	281	11	2,014	76,068	949	$1,763
1920....	366	25	2,508	93,762	6,422	6,267
1919....	2,037	110	10,705	445,667	25,324	20,109
1918....	2,010	80	10,189	314,258	21,034	18,422
1917....	795	34	5,849	220,644	10,608	12,301
1916....	839	36	5,047	121,776	11,005	9,375

BINGHAM-NEW HAVEN C. & G. MNG. CO. UTAH

Absorbed by the **Utah Metal & Tunnel Co.**, and property described thereunder.

BINGHAM STANDARD COPPER CO. UTAH

Described in Vol. XI of Copper Handbook. See **Bingham Central Standard C. Co.**

BINGHAM-TOOELE MINING CO. UTAH

Address: H. L. Dodd, sec., 307 Utah Svgs. & Trust Co., Salt Lake City, Utah.

Officers: S. D. Huffaker, pres.; H. L. Dodd, sec.-treas.; M. T. Awokt, supt., Box 136, Bingham, Utah.

Inc. May 27, 1915, in Utah. **Cap.** 100,000; 10c par; assessable; assessments of 0.3c were levied May 3, and Nov. 3, 1921.

Property: 13 claims, 187 acres, in Middle Canyon, Tooele county. Company is driving a tunnel, 1,750′ long, May, 1920, in the hope of finding orebodies. Is a prospect.

BIPONT SILVER MINING CO. UTAH

C. A. Phillips, pres., Spokane, Wash.; J. B. Randall, sec., Oakley, Utah.

Company was organized in 1918, to take a $250,000 bond and lease on 55 claims, including the Bipont mine, 20 miles from Oakley and 2 miles from the Idaho-Nevada line. Reported that over 100,000 tons of rich silver-lead ore was available and company would build a mill.

BLACK JACK CONSOLIDATED MINING CO. UTAH

Merged, 1917, with **Empire Mines Co.**, which see.

BLACK ROCK COPPER MINING & MILLING CO. UTAH

Address: Frisco, Beaver Co., Utah. Walter James, gen. mgr.

Property: 11 claims, in Beaver Lake district, 14 miles north of Milford, developed by 250′ shaft and a drift on the 180′ level, exposing a vein in limestone, said to show copper values; 4′ of rich copper-silver ore was cut.

BLANDING IRRIGATION CO. **UTAH**

Acquired control October, 1921, of Dream mine, near Moab, one of the oldest mines of Blue Mountain district, and said to have 60,000 tons of ore in sight. New owners are to drive a 1,000′ tunnel to crosscut vein at 700′ depth.

BLUE RIBBON GOLD MINING CO. **UTAH**

Address: Minersville, Utah.

Officers: W. B. Seymour, pres.; L. Shaw, v. p.; Fred. R. Pryor, sec.-treas., with J. H. McOmie and Clara D. Smith, directors, at last accounts.

Inc. Feb., 1915, in Utah. **Cap.** $100,000; shares 10c par; issued $60,460.

Property: 8 claims in Jarloose mining district, 6 miles E. of Minersville, Beaver county, Utah.

Ore: gold in shoots in vein 6′ to 12′ wide, between well-defined walls of rhyolite. Average assay said to be $9.40 per ton.

Development: by 50′ shaft.

BOG MINING CO. **UTAH**

Described in Vol. XIII. Consolidated, 1918, with the Earl & Eagle Mng. Co., to form the **American Cons. Mines Co.**, which see.

BOLEY MINING CO. **UTAH**

Office: Newhouse Bldg., Salt Lake City, Utah.

Officers: E. G. Jensen, pres.; J. A. Stallings, treas.; Chas. Read, v. p.; J. H. Woodmansee and J. C. Jensen, directors. Arnold Herlin, sec.

Cap. $100,000; 10c. par.

Property: 5 claims, in American Fork mining district, adjoining the Texan, Whirlwind and Miller Hill properties. Mine is to be developed at a depth of 1,000′ by the Texan Mining Co.'s 1,300′ tunnel. Is a prospect.

BONNEVILLE MINING CO. **UTAH**

Office: 11 Knight Blk., Provo, Utah.

Officers: O. Raymond Knight, pres.; J. Wm. Knight, v. p.; R. E. Allen, sec.-treas., with W. L. Mangum and Geo. A. Storrs, directors.

Inc. June 10, 1910, in Utah. **Cap.** $100,000; 5c par; 2,000,000 shares outstanding; assessable to 50% of capital stock. Annual meeting, 2nd Thursday in August. Transfers made at company's office.

Property: in Utah county, between Springville and Provo.

Development: by a 5,100′ tunnel driven some years ago. In March, 1920, company was exploring ground by drilling horizontally from tunnel.

No orebodies have ever been discovered; mine was closed down (1921) and practically abandoned.

BOSTON ACME MINES CORPORATION **UTAH**

Edward Wischmeyer, Jr., pres.; Harry Niles, v. p.; M. K. Tavenner, sec., all of Baltimore.

Said to have a three-quarter interest in the Boston-Utah Mng. Co. In 1918 an attempt was made to acquire control of the Morgan-Crescent Mng. Co., which company claims the Boston Acme Mines Corp. did not live up to the contract and has forfeited all rights on Morgan-Crescent.

BOSTON-DEEP CREEK MINES CO. **UTAH**

Mine address: Gold Hill, Tooele county, Utah.

Property: 12 claims, 240 acres, contains silver-lead ores. Reported under option, 1921, for $200,000 to Philadelphia capitalists. Patrick Conley of St. Paul, awarded 1/6 interest in property by Nephi Courts, 1921.

BOSTON DEVELOPMENT CO. **UTAH**

Office: 502 Boyd Park Bldg., Salt Lake City, Utah.

Officers: F. H. Vahrenkamp, pres. and gen. mgr.; Thos. Austin, v. p.; Richard Winder, treas., with S. S. Stillman and B. F. Fitzgerald, directors; R. B. Garff, sec.; A. Boulais, supt.

Cap. $500,000; shares $1 par; assessable.

Property: the old Maxfield mine on N. side of Canyon, in Big Cottonwood district, 3 miles north of the Cardiff mine, taken over on a $250,000 bond and lease, 1914. The Maxfield mine, discovered in 1872, is one of Utah's well-known early day mines, and is credited with a production of over a million dollars in gold, silver, copper and lead. The present management is said to have spent $70,000 in 1915, in unwatering and equipping the mine.

Ore: above the water level is silver-lead carbonate; below, it is galena, containing gold, silver and copper. Orebodies vary in width from 6" to 24'.

Development: mainly by tunnels. The mine is about worked out above the main tunnel, which was driven north and west, a total of 4,000'. New management planned systematic development work, including the sinking of the 1,900' incline shaft.

Equipment: includes 2 air compressors, pumps and electric power.

Production: shipped steadily in 1916. Ore from 1,800' level averaged $50 a ton. In 1917, 700 tons of $65 ore was shipped and in 1918, a little ore was shipped. More recent information not available.

BOSTON & TINTIC MINING CO. **UTAH**

Described in Volume XIII. Merged, 1917, with **Empire Mines Co.**, which see.

BOSTON-UTAH MINING CO. **UTAH**

Geo. T. Stenhouse, mng. director. Control held by St. Petersburg, Fla., capitalists.

Property: in the Morgan mining district, the supposed northerly extension of the Park City ore zone, shows native copper in fissure on a contact between flat dipping limestone beds and a granite hanging wall. See **Boston Acme Mines Corp.**

BRANBORG MINING CO. **UTAH**

Idle. **Office:** Judge Bldg., Salt Lake City, Utah.

Officers: J. C. Barnard, pres.; D. C. Dart, v. p.; L. R. Waldrop, sec., J. W. McKinney, F. W. Price, directors.

Inc. April, 1915. Cap. 500,000 shares; 10c par.

Property: 11 claims, 220 acres, located at Big Cottonwood. A prospect.

BREWER GOLD & COPPER MINING CO. **UTAH**

Office: 212 Utah Savings & Trust Co Bldg., Salt Lake City, Utah.

Mine office: Ibapah, Tooele county, Utah.

Officers: J. P. Gardner, pres.; S. W. Morrison, v. p.-treas.; H. B. Windsor, sec.; John Mortimer, asst. sec.

Inc. Feb. 16, 1907, in Utah. **Cap.** $50,000; shares 10c par; assessable; 4 assessments have been levied.

Property: 11 claims, 6 patented, on Dutch mountain, in the Clifton district, less than 5 miles to loading station on the Deep Creek railroad. In operation, May, 1917. No later information. Same interests control the Garrison-Monster, 3 miles away and activities are centered on it for the present.

BROADWATER MILLS CO. **UTAH**

Company dissolved, mill dismantled. Described in Vol. XIII.

BUENA VISTA CO. **UTAH**

Address: 4 E. 43rd St., New York.

Officers: Jos. E. Barlow, pres.; C. C. Nolfle, v. p.-treas. and mgr., care Big Indian Mine, Moab, Utah; A. M. Cheney, sec., with N. C. Christensen and C. A. Dowell, directors.

Inc. 1918, in Utah. **Cap.** $1,000,000; $1 par; 600,000 outstanding. Annual meeting, first Tuesday of December.

The company was organized to buy, or lease, and operate mining properties, in particular properties, where it is possible to use the processes owned by the Metallurgic Improvement Corporation, 4 E. 43rd St., New York. A lease was acquired on the Big Indian Mine in San Juan county, Utah, with

the special object of making a commercial demonstration of the Christensen Lixiviation process.

After many delays, beginning with 1918, mill, with a daily capacity of 8,000 lb. of copper, was expected to be in operation, April, 1921. Reported however that lease on Big Indian was relinquished in June.

BULLION BECK & CHAMPION MINING CO. **UTAH**

Fully described under own title in Vol. XIV. Subsidiary of the U. S. Smelting and Mining Co., which see.

BULLION COALITION MNG. CO. **UTAH**

Address: Salt Lake City, Utah.

Assessment of 2c. a share delinquent, Dec. 27, 1921.

BULL VALLEY GOLD MINES CO. **UTAH**

Office: 410 Felt Bldg., Salt Lake City, Utah.

Officers: M. R. Evans, pres.; Willard Scowcroft, v. p.; N. A. Robertson, sec.-treas., with M. P. Braffet and R. G. McQuarrie, directors.

Inc. 1913. **Cap.** $100,000; shares 10c par.

Property: 16 patented lode claims, 295 acres, 1 millsite, and one placer claim, 35 acres in Goldstrike district, near Enterprise, about 40 miles from Modena, on Salt Lake Route.

Ore: free milling gold quartz found in fissure veins, 3′ wide, along porphyry dike in lime, quartz, andesite and rhyolite formation, said to run as high as $50 per ton.

Development: several thousand feet of workings, including 2 tunnels, 500′ and 705′ long, at last accounts. **Ore reserves:** estimated at 10,000 tons milling ore in sight, valued at $20 per ton. **Equipment:** 3-stamp, 10-ton mill.

Production: consisted of several high-grade shipments in 1915. Company does not reply to requests for information.

A part of holdings were under lease to the Goldstrike M. & L. Co. (q. v.). and in August, 1921, entire property was reported to be under option to sell for $105,501.

BULL VALLEY HASSIAMPIE GOLD MINING CO. **UTAH**

Address: Goldstrike, Washington county, Utah.

Officers: J. D. Alsop, pres.; Ren Bryson, v. p. and supt.; J. A. Bryson, sec.-treas., with H. J. Burgess, A. B. Hemenway, A. F. Miles, W. E. Ayer, directors.

Inc. July 28, 1913, in Utah. **Cap.** $100,000; shares 10c par; outstanding, $70,500. Annual meeting, first Monday in July.

Property: 3 claims, 60 acres, unpatented, adjoining Bull Valley Gold Mines Co., in the Goldstrike mining district, covers a large belt of porphyry and quartzite. **Ore:** gold in fissure vein, 17′ wide, with 80° dip, said to assay from $1.20 to $14.60 per ton.

Development: several tunnels and shallow shafts.

Property is still in the development stage. This is one of the many Utah companies who shun publicity—in this book.

BURGOMASTER ORE CO. **UTAH**

Address: C. C. Roshaven, mgr., Zenith, North Dakota.

Property: 120 acres, south of Atlas mine in the Star district, Beaver county, said to show silver ore. Developed by shaft to depth of several hundred feet.

Dormant; and likely to so continue throughout 1922.

CABIN MINING CO. **UTAH**

Address: Alta, Utah.

Property: in Little Cottonwood district, Salt Lake county, just N. E. of Alta, adjoining the Wasatch mine. Silver-lead ore occurs in a bedded deposit in limestone, associated with a strong fissure. Production reported in 1919.

The Wasatch Mines Co. brought suit for trespass in 1920, alleging illegal extraction of ore beginning with 1917.

CALDO MINING CO. **UTAH**

Address: J. M. Callow, pres., care General Engineering Co., Salt Lake City, Utah.

Company had a lease on the dump of the Horn Silver mine at Frisco, Beaver county, Utah, said to contain 200,000 tons of silver, lead, zinc tailings, and operated a 200-ton flotation mill. Operations on the Horn Silver dump have been completed and the company is inactive.

CALIFORNIA COMSTOCK CONS. MNG. CO. **UTAH**

Described in Vol. XIII. Property sold to Silver King Cons. Mng. Co., which see.

CALUMET MINING CO. **UTAH**

Probably dead. Mail returned from Lund, Utah, marked "not operating here any longer".

Property: 19 claims, 30 miles N. W. of Lund, developed during 1917. Management estimated 2,000 ton of 30% lead and 2 oz. silver ore available above 75' level. Shipments in August, 1917, yielded $3,000. Production to September, 1917, was about 700 tons.

CANTON MINING CO. **UTAH**

Probably dead. See Volume XIV.

Property: consisted of 500 acres in Alta-Big Cottonwood district, Salt Lake county, adjoining the Cardiff, etc., with 3,000' of tunnel work.

CAPITOL MINING CO. **UTAH**

Address: Charles Smith, supt., Milford, Utah.

Property: 2 claims, 3½ miles S. W. of Milford, Utah. A 4 to 8' vein in limestone and porphyry has been followed by an incline, 182' deep, March, 1921. The ore occurs as a pay streak averaging $2.20 gold, 10 oz. silver and 28% lead.

CARBONATE CONSOLIDATED MINES **UTAH**

Address: Woolley Brothers, brokers Newhouse Bldg., Salt Lake City.

Officers: Leo Neilson, pres.; D. A. West, sec.-treas.

Inc. in Utah. **Cap.** $1,000,000; $1 par; 600,000 issued. Listed on Salt Lake Exchange, but no quotations given.

Property: 19 claims in Big Cottonwood district. Surface workings said to have yielded $1,250,000 years ago. According to report all litigation has been settled, and development work will be started when funds are on hand.

CARBONATE HILL MINING CO. **UTAH**

Address: First National Bank Bldg., Ogden, Utah.

Officers: Jas. T. Finlen of Butte, Mont., pres.; Oscar A. M. Olsen, v. p.; Wade M. Johnson, sec.-treas., Ogden, Utah.

Inc. 1896, in Utah. **Cap.** $1,000,000; par $1.

Property: in the Argenta district, Morgan county, 6 miles N. of Peterson, covers small shoots of silver-lead ore as bedded deposits in limestone, overlying shales and quartzite. The mine has been something of a producer in the past and shipments average 2.7 oz. silver, 16.9% lead, 33.4% iron and a little zinc.

Development: by 3 tunnels.

Property was under bond and lease to the **Utah Silver Lead M. Co.** (q. v.). Company dormant, but taxes paid for 1922. Wade M. Johnson, Ogden, Utah, is interested.

CARBONATE KING MINING CO. **UTAH**

Mail returned from last known address.

Officers: M. J. Dooley, pres.; J. F. Free, v. p.; F. E. Harding, sec.-treas., of Salt Lake City.

Cap. 1,000,000 shares; 10c par; 400,000 in treasury.

Property: the Hetty Green, Schindler, Ethelwin and Pinky claims, in Ophir camp, near Hidden Treasure mine.

Development: 200' inclined shaft on Hetty Green vein. Property is still in prospect stage. No recent report.

CARDIFF MINING & MILLING CO. **UTAH**

Office: 1105 Newhouse Bldg., Salt Lake City. **Mine office:** Alta, Utah.

Officers: Ezra Thompson, pres.-gen mgr.; Lynn H. Thompson, v. p.; J. D. Murdoch, sec.-treas.; with F. W. Price and T. A. Reamer, directors. Jas. H. Doran, supt.

Inc. 1906, in Utah. **Cap.** $500,000; $1 par; assessable; all issued. Last assessment of 1c per share delinquent June 1, 1914. Listed on Salt Lake Exchange. Shares $1.95 to $5.10 in 1918; $1.50 to $2.95 in 1919; $1.05 to $1.80 in 1920; 82c to $1.72 in 1921.

Revenue in 1919 was $240,697, and expenses were $125,806.

Dividends: initial of 25c Oct. 15, 1915; 25c June 1, Sept. 1, and Dec. 1, 1916; 25c Aug. 1, 1917; 20c Oct. 1, 1918; 15c Dec. 24, 1919; 15c Dec. 18, 1920. The total is $165 per share or $875,000.

Property: 14 claims, patented, 18 miles from railway, in the Alta Cottonwood district, 26 miles from Salt Lake City, includes the Mountain Chief group, N. W. of the Columbus Rexall.

The Cardiff is now one of the richest silver-lead mines of Utah. After being idle for years, a new prospecting tunnel was started in 1914. This tunnel cut a bedded orebody, averaging 10′ thick, on a limestone-quartzite contact, at a point where it was intersected by a fissure vein. The orebody was opened for a length of 235′ and for 795′ on its dip (22°). New orebodies on the same contact were cut at intersections of other fissures. One orebody found 800′ S. of the main working winze is 5 to 9′ wide and is continuous for over 200′ along its strike.

Development: by main haulage tunnel, and an 1,180′ inclined shaft, which follows the ore down along the limestone bedding plane. A new 225′ shaft follows a quartzite-limestone contact. Recent production has come from the 6th, 8th and 9th levels. In Nov., 1921 richest ore ever found in mine was opened on 1,100′ level, and on 600′, ore 4′ to 15′ wide was proved by raise to go up nearly 250′.

Equipment: includes compressor, drills, electric power, dwellings, machine and blacksmith shop.

Production: in 1919 was 6,520 tons of ore yielding 102.043 oz silver, 3,111,000 lb. lead, 106,982 lb. copper, and 952,917 lb. zinc; during 1920-1921, 50 to 60 tons daily of $50 ore. No shipments are made during the winter months, but ore is stored.

CARISA GOLD & COPPER MINING CO. OF MAINE **UTAH**

Fully described in Vol. XII. Property at Mammoth is now part of the holdings of the **Empire Mines Co.**, which see.

CARNATION MINING CO. **UTAH**

Address: T. E. Wessel, mgr., Fish Springs, Juab county, Utah.

Property: a silver mine near Fish Springs, and 65 miles from Oasis, nearest shipping point. Ore cut in 1921, ran 35% lead and up to 250 ounces silver.

CEDAR RIDGE MINING CO. **UTAH**

Owns 5 claims, about 65 acres, adjoining the Lake View mine on N. E. Promontory Point, Boxelder county, Utah. Mail returned, 1919, from Promontory Point.

Samples had good zinc values for length of 1,500′, the ore showing 11.7% zinc for 60 samples cut at regular intervals along workings.

CEDAR TALISMAN CONS. MINES CO. **UTAH**

Offices: 515 Newhouse Bldg., Salt Lake City and Milford, Beaver county, Utah.

Officers: S. S. Pond, pres. and mgr.; F. B. Sherwood, v. p.; Geo. Baglin, sec.-treas., with H M Chamberlain, Geo. Lynch and G. L. Bemis, directors.

Inc. March, 1909, in Utah, as a merger of the Cedar Mining Co. and the Talisman Mining Co.; latter company described in The Copper Handbook, Vol. XI. **Cap.** $500,000; shares 50c par; assessable. The 10th assessment was levied on March 15, 1917, of 1c a share. All outstanding. Stock transferred at company office. Listed in Salt Lake City. Shares quoted on Salt Lake Exchange at ¼c to 2c, Jan. 1921.

Financial statement, January 1 to April 30, 1916, showed profit of $2,851. At this time management changed and in report May 1, to September 16, an operating loss was given of $8,193 on this period, or net loss of $5,341. Management has been changed again and reports are not available.

Property: 13 claims, 8 patented, 250 acres, in the Star mining district, Beaver county, Utah. **Ore:** carbonate of lead, copper, and zinc, containing gold and silver.

Development: several thousand feet of shafts and underground workings, the lowest on the 1,000′ level of the incline, or main working shaft. On 300′ level drift is out 267′ and will be driven 200′ further. Previous to the consolidation the two properties are said to have had a total net production of $130,000, but for years they have not shown a production of any importance. Company claimed 50,000 tons mill ore on dump and blocked out, that will average 8% lead, 14% zinc, 7 oz. silver. In July, 1917, the property was leased for 2 years to H. S. Joseph, who started shipping 12% lead and 10 oz. silver ore in August. Shipments for 1918 totaled 200 tons. No recent information.

CENTENNIAL-EUREKA MINING CO. UTAH

Fully described in Volume XIII. Properties absorbed December 31, 1917, by U. S. S. R. & M. Co., which see.

CENTRAL STANDARD MINES UTAH

Address: Provo, Utah.

Officers: Thos. F. Pierpont, pres.; Willard Scowcroft, v. p.-treas.; J. C. Deal, sec., with J. W. Knight, A. Hedquist, L. N. Ellsworth, and J. W. Smith, directors. J. W. Taylor, supt.

The same management is in charge of the Copper Leaf Mng. Co.

Cap. $100,000; shares, 10c par; issued, 700,000 shares.

Property: 16 claims, 5 patented, in East Tintic mining district, entirely surrounded by holdings of Chief Cons.

Development: by 600′ shaft, sunk to this depth in fall of 1920. Ore of commercial value not as yet found. Equipment includes an electric hoist.

Litigation, with Chief Cons. over the ownership of claims, begun a few years ago, has been settled.

CHIEF CONSOLIDATED MINING CO. UTAH

Company managed by the American Mines Syndicate (q. v.), which holds a 361,000 share interest.

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Walter Fitch, Sr., pres.; Thos. Carmichael, sec.-treas.; Cecil Fitch, v. p.-gen. mgr.; with J. Fred Johnson, J. H. Rice, Wm. M. Bradley and Exilda Fitch, directors.

Officials: J. F. Johnson, gen. mgr.; Paul Hilsdale, supt.

Inc. Feb. 16, 1909, in Arizona. **Cap.** $1,000,000; shares $1 par; non-assessable; issued, $884,032. Walker Bros., bankers, Salt Lake City, registrar. Transfers made at company's office. Has about 1,900 shareholders. Stock listed on Boston Curb. Annual meeting, third Tuesday in February, at office of company, Tucson, Ariz.

Dividends: 1913, 20%; 1914, 10%; 1915, 10%; 1916, 20%; 1917, 35%; 1918, 45%; 1919, 32%; 1920, 40%; 1921, 20%; 5c in Feb., 1922; total to date $2,092,524.

Comparative Balance Sheet:

Assets.

	Mining Property	Mine Inv'ts	Current Assets	Liberty Bonds	Cash	Total
1921.....	$2,080,288	$398,980	$280,625	$647,405	$101,148	$3,508,446
1920.....	1,983,406	155,073	233,857	645,918	28,837	3,047,091
1919.....	1,721,670	126,832	290,961	551,876	325,676	3,017,014
1918.....	1,360,777	95,919	200,067	505,504	200,727	2,362,994
1917.....	1,395,198	81,166	747,570	159,000	337,492	2,099,865

Liabilities.

	Capital Stock	Surplus	Current Liabilities	Deprec. & Tax Res.	Profit & Loss	Total
1921.....	$884,032	$1,641,710	$152,588	$603,461	.....	$3,508,446
1920.....	884,032	1,638,023	151,465	369,683	$ 3,688	3,047,091
1919.....	884,232	1,236,591	129,518	365,241	401,431	3,017,014
1918.....	884,232	512,709	70,325	171,846	723,883	2,362,994
1917.....	884,223	478,673	115,914	247,075	431,936	2,099,865

Property: patented claims, 2,018 acres and 3,304 acres unpatented, in the Tintic and North Tintic mining districts. Also owns the entire capital stock of the **Little Chief M. & M. Co.**; acquired the **Grand Central** mine in 1922 from company of that name. Company owns the mineral rights under the city of Eureka, the **Little Edgard Mining Co.** (entire stock issue) and the Deprizim group. In 1916, purchased control of the **Homansville Mng. Co.** and **Baltimore Cons. Mng. Co.**, the last four groups comprise about 600 acres. Company also controls the **Plutus Mining Co.**, owning 14 adjoining claims and the **Eureka Lilly** which adjoins the Tintic Standard. In 1921, control of the **Apex Standard Mng. Co.** and of the **East Tintic Cons. Mng. Co.** was acquired.

Company owns a continuous strip extending along the mineralized zone for 3½ miles east from its mine, covering 2/3 of the mineralized district.

In 1919, the Tintic Standard started suit against the Chief Consolidated to determine ownership of the White Wing No. 5 claim. Litigation with the Central Standard has been settled. See Vol. X, The Copper Handbook, for further details as to property holdings.

The Eureka lands carry about 4,000′ of the strike of the Victoria ore channel, which has an extreme width of about 400′, the Victoria ore channel being on the Mammoth-Grand Central ore zone, and parallel to the Centennial-Eureka zone. The Victoria ore channel has a practically N.-S. strike, the ore occurring in pipes and shoots in nearly vertical lime beds.

Development: by 5 shafts with total workings, including those of Plutus, of 190,158′, of which 41,323′ was done in 1921 and 23,802′ in 1920. A new concrete lined shaft, No. 2, 1910′ deep, was completed in 1920 and the Water Lily shaft was bottomed at 1468′ in Nov., 1921. Connections have been made with older workings on the 1,000 and 1,800′ levels and drifts started on the 1,442′ level.

During 1920, development and ore extraction were carried on in all levels from the 800′ to the 2,000′. Work in area contiguous to No. 2 shaft showed two ore leads of good grade and permanency. Certain portions of the mine are operated by lessees. The Grand Central mine started shipping ore, Dec. 30, 1921.

Equipment: the plant has three 150-h. p. boilers, with mechanical stokers, a hoist and 2 air compressors. The double-cylinder hoist has 6′ balanced drums, 1⅛″ steel cable, and operates 2 triple-deck cages in balance, carrying 1-ton cars, to depth of one-half mile. Buildings include a power plant, housing the boilers, hoists and air compressors; a machine

shop, carpenter shop, and a smithy, all of steel frame. Late in 1919 there were 450 men employed.

In 1922, company bought a limestone quarry in which there is 175,000 tons of marketable limestone.

Production:

	Ore, tons	Copper, lb.	Lead, lb.	Zinc, lb.	Gold, oz.	Silver, oz.	Value Net
1921.....	93,267	11,563	12,496,433	.....	4,353	3,262,241	$2,167,065
1920.....	82,430	3,814	12,717,410	212,906	4,461	2,622,132	2,242,709
1919.....	63,726	15,574	5,979,588	.....	3,753	2,757,533	2,343,927
1918.....	66,019	4,137	7,906,831	14,597	4,100	2,354,798	1,869,819
1917.....	50,950	.....	10,780,540	600,236	9,175	1,534,907	1,554,714
1916.....	83,606	1,795	18,439,153	879,410	8,331	1,739,004	1,315,441
1915.....	36,412	5,648	8,232,606	622,465	4,634	403,854	309,136
1914.....	40,667	237,901	5,974,008	71,665	6,337	665,947	324,299
1913.....	51,866	117,328	2,597,091	.....	4,806	1,030,132	381,287
1912.....	33,072	.....	1,141,222	.....	7,838	969,907	509,426
1911.....	8,063	.....	825,551	.....	389	306,362	117,583
1910.....	8,841	.....	800,802	.....	584	531,483	217,059

Average gross value per ton of ore in 1921, was $41.89 gross, $23.24 net; in 1920 was $47.29 and $27.21; in 1919, $55.57 and $36.78; in 1918, $45.07 and $28.49; in 1917, $40.12 and $25.93, respectively.

For 1920, the average gold content was 0.0541 oz. and 31.81 oz. silver; lead averaged 14.03% in lead ores and 15.24% in zinc-lead ores. Zinc content was 33.86% in zinc ores and 19.11% in zinc-lead ores. Average price received for metals in 1920 was 18.38¢ for copper, 7.67¢ for lead, 107.7¢ for silver.

In 1921, the average gold content was .0467 oz.; silver, 34.977 oz. lead in lead ores, 16.47% and copper or copper ores, 1.32%. Average price received for metals in 1921 was $20.67 per oz. gold; .99¢ per oz. silver; .04¢ per lb. lead and .1283 per lb. copper.

Chief Consolidated is a valuable property, the largest silver producer in Utah, and is under excellent management.

CHRISTMAS MINING CO., INC. **UTAH**

Address: 802 S. 2nd West St., Salt Lake City, Utah.

Officers: Thos. H. Hazel, pres.-treas.; C. F. Kabisius, v. p.; J. H. Snyder, sec., with A Johnson, and C. F. Adams, Jr., directors.

Inc. April 21, 1891, in Utah. **Cap.** $10,000; 5c par; outstanding, 170,000 shares; assessable. Last assessment, No. 18, ½c a share, was called March 20, 1919.

Property: 12 patented claims, 4 miles from Gold Hill, Tooele county, said to show fissure veins in limestone and porphyry, with gold, silver, copper and lead ore.

Development: 150′ vertical shaft with 100′ of workings. Inactive since 1918 for lack of funds.

CITY ROCKS MINING CO. **UTAH**

Office: Houghton, Mich.

Officers: N. W. Haire, pres.; John Edwards, v. p.; Jas. P. Edwards, sec.-treas.; L. M. Cleaves Byers and Jos. Busch, directors.

Inc. 1906, in Utah. **Cap.** $1,000,000; $5 par. Property consists of shareholdings in the Michigan-Utah Cons. Mines Co., received for lands sold in 1912.

CLEMENTINE MINING & MILLING CO. **UTAH**

Address: M. C. Morris, sec.-treas., 2403 S. 7 E. St., Salt Lake City, Utah. Wm. H. Evans, pres.

Inc. in Utah.

Property: 11 claims, 3 patented, on north side of Little Cottonwood

canyon, Salt Lake county, shows a quartz fissure vein, 14' wide, carrying gold and some copper. An 18" streak of pay ore was opened in November, 1921.

Development: by 800' crosscut tunnel and 100' shaft sunk on vein. Is a prospect.

CLEVELAND MINING CO. **UTAH**

Idle. **Address:** Samuel McIntyre, Jr., pres.; 404 McIntyre Bldg., Salt Lake City.

Inc. Jan. 12, 1892. **Cap.** $500,000; $5 par; fully issued. Is controlled through stock ownership by **Mammoth Mng. Co.** (q. v.). Property at Eureka, Juab county.

CLIFF MINING CO. **UTAH**

Former address: First Nat'l Bank, Milwaukee, Wis. **Operating office:** 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Ophir, Tooele county, Utah.

Officers: A. G. Kern, pres.; Grant Snyder, v. p.-mgr.; J. A. Stewart, sec.-treas., with A. D. Thompson, Frank Adams, Geo. Swift and E. McVicker, directors. A. H. Williams, supt.

Inc. May 31, 1906, in Maine. **Cap.** $3,000,000; $10 par; all outstanding.

Dividends: to 1916, $90,000.

Property: in the Ophir district, contains silver-lead-zinc ore as replacement deposits in limestone.

Development: by tunnels, with several miles of workings.

Equipment: includes electric power and one-mile aerial tram.

Does not reply to requests for information. Presumably idle.

CLIPPER MINING CO. **UTAH**

Successor to Mohawk Mining Co.

Inc. July, 1916, by T. J. Yates, J. S. Barlow, John Russon, Dr. G. N. Curtis and J. A. Dalton, all of Salt Lake City.

Property: 7 claims, near Tecoma, Boxelder county, Utah, shows 2 veins exposed throughout property, carrying silver-lead and zinc ores.

Development: by an 80' shaft with 100' of drifting. Is a prospect only. No recent report.

COIN SILVER MINING CO. **UTAH**

Address unknown, but assessment of ½¢ per share advertised in Salt Lake papers as delinquent, Oct. 29, 1921.

COLORADO CONSOLIDATED MINES CO. **UTAH**

Office: Provo, Utah.

Officers: O. Raymond Knight, pres.-mgr.; J. William Knight, v. p.; R. E. Allen, sec.-treas., with J. S. Smith, K. S. Jordan and A. M. Knight, directors. Controlled by Knight Investment Co.

Is a consolidation of the Beck Tunnel Cons. Mng. Co. and Colorado Mng. Co.

Inc. April, 1916. **Cap.** 2,500,000 shares; 10c par; stock in old companies exchanged share for share. Listed on Salt Lake Exchange.

Shares sold at 2¢ to 4¢ in January, 1922.

Balance sheet of Dec. 31, 1920, shows: assets, $256,649, including property, $69,092; treasury stock, $50,000; accounts, $28,342; and cash $3,373. Liabilities, notes, $6,469. Deficiency is $91, 540. Receipts for 1920 were $163,566 and disbursements, $160,643.

Dividends of $675,000 have been paid by the Beck Tunnel and $2,600,000 by the Colorado Cons.

Property: 28 claims, near the Sioux mines, in the Tintic district, Utah county, contains large deposits of low-grade ore carrying silver-gold, lead and copper values.

Development: main shaft is 2,000' deep and will be sunk to water level. In 1919, the 1,900' level was being explored; no ore has been found to date on this level.

At the close of 1919, exploratory work was discontinued, but lessees continue to operate. Production in 1919 was $107,435.

COLORADO MINING CO. **UTAH**

Merged April, 1916, with the **Beck Tunnel Cons. Mng. Co.** and now called the **Colorado Cons. Mines Co.**, which see.

COLUMBUS EXTENSION MINING CO. **UTAH**

Consolidated with **Rexall Silver & Copper Mng. Co.** to form the Columbus-Rexall Con. Mines Co., which see.

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COLUMBUS-REXALL CONS. MINES CO. **UTAH**

Is a consolidation of the Columbus Extension and Rexall Silver and Copper Mng. Co., described in Vol. XII.

Office: 309 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah

Officers: M. R. Evans, pres.-mgr., with S. G. Saville, Francis Critchlow, John Zink, Herman Harns and A. E. Evans, directors. Chas. M. Evans, supt.

Inc. July 15, 1915, in Utah. **Cap.** $600,000; $1 par; 586,234 shares issued; assessable. Columbia Trust Co., N. Y., registrar and transfer agts. Annual meeting, 1st Monday in June. Listed on Salt Lake City Exchange. Shares jumped from 13c in July to $2 in September, 1917. Prices in 1918 were $1.05 high, 25c low; in 1919, 45c high, 23½c low; in 1920, 71-31½c; in 1921, 42-24c; in 1922, 15¾ to 30c in January. An initial dividend of 2½c a share was paid December 30, 1918. In March, 1921, an amendment to company's constitution was adopted giving a wider scope to its possible operations.

Property: 14 patented claims, 112 acres, in the Little Cottonwood district, Salt Lake county; 11 other claims are in process of patent. Ore is silver-lead with copper and occurs in 2 principal fissures, No. 8 and No. 10, on a limestone-quartzite contact.

Development: through the Howland tunnel, 1 mile long, of the Wasatch Mines Co., from which extensions were made both into Columbus and Rexall ground. An orebody was cut at a point 5,000′ from the tunnel portal at depth of 1,350′; the ore occurs in limestone, near the quartzite contact. This orebody yielded 1,900 tons of ore, assaying 13.9% copper, 3.8% zinc, 0.37 oz. gold, and 32.9 oz. silver per ton.

During 1921, work was confined mainly to the No. 8 workings, 160′ to 300′ above the main tunnel level. Connections have been made with the Cardiff on the 600 and 800′ levels. Most of the ore mined comes from No. 10 workings, 70′ below the main tunnel. Reported that the "ore-making" zone is 900′ long and 400′ on the dip. Ore reserves of $250,000 are estimated.

Equipment: includes tramway and motors.

Production: about 250 tons per month of $40 ore, net value. Since consolidation, Aug. 1, 1917, output to March 26, 1920, amounted to $276,215. Total output in 1919 was 1,337 tons with $39,688 gross; and more than 60 cars were shipped in 1920. Some of the later shipments showed 52 oz. silver, 21% lead and 4.42% copper.

Present company is reported to have expended $275,000, including the liquidation of a $33,000 indebtedness of former companies.

COMMONWEALTH MINES CO. **UTAH**

Address: Wm. M. Bradley, Box 948, Salt Lake City.

Officers: Wm. M. Bradley, pres.; C. N. Strevell, v. p.; W. T. Atkin, sec.-treas., with Dan Livingston, and B. F. Bauer, directors.

Inc. Nov., 1906, in Wyoming. **Cap.** $600,000; $1 par.

Property: the Commonwealth mine, 7 claims, in the Star district, adjoining Lady Bryan and Progressive mines. Claims show Topache limestone with intrusive sheets of altered green porphyry, cut by fissures, with more or less mineralization along fissures and outward along certain limestone beds. Lead ore was produced from surface workings and the Nellie claim has copper sulphides in its bottom workings.

Development: by a 1,400′ tunnel, with back of about 300′. Said to have opened ore assaying up to 4% copper, 20% lead and 60 oz. silver per ton.

Equipment: includes gasoline power and an air compressor. Develop-

ment shows but little ore, mostly low-grade, and claims are not especially promising, according to geological reports.

Five additional claims have been acquired. Shipments were made in 1917 and 1918.

CONGOR GOLD & COPPER MINING CO. **UTAH**

Office: 506 Auerbach Bldg., Salt Lake City, Utah. Mine near Bingham Canyon, Salt Lake county, Utah.

Officers: Glen R. Bothwell, pres. and gen. mgr.; R. C. McConaughy, v. p.; Frank E. Loose, sec., with E. F. Jenkins and C. G. Hall, directors, at last accounts.

Cap. $1,000,000; shares $1 par.

Property: 10 claims, 150 acres, adjoins the United Bingham C. Co. on the north, in Bingham Canyon, Salt Lake county, Utah. Developing 3′ vein from 4,000′ tunnel of Montana Bingham Co., working about 100′ from face of tunnel. Mine reported to have about 100,000 tons of ore exposed, running from $6 to $50 per ton and averaging $14.

Company had a contract with the Montana Bingham Consolidated Mining Co., shipping its ores through the Miller Ore Transportation tunnel of that company to the Denver & Rio Grande railroad tracks at a cost of 25c per ton of ore and 12½c per ton of waste.

Some shipments recorded for 1918; no information since.

CONKLING MINING CO. **UTAH**

Mine office: Park City, Summit county, Utah.

Officers: Wm. C. Hall, v. p.; Geo. A. Lund, sec.; J. Leonard Burch, treas.; preceding, and Margaret Treweek, directors.

Inc. Sept. 17, 1908, in Utah. **Cap.** $500,000; shares $1 par; assessable. Is a close corporation, with 25% of stock owned by Silver King Coalition Mines Company.

Property: 2 claims, 2 miles from a railroad, shows gold, copper and lead ores, developed by a 1,000′ tunnel on the lands of the Silver King. Company brought suit against the Silver King Coalition Mines Co. for illegal extraction of $575,000 in ore from Elephant stope, and in January, 1919, the Circuit Court of Appeals at St. Louis decided in favor of plaintiff, awarding damages of $542,000, with accrued interest, approximately $600,000, thus sustaining the lower court. In Feb., 1921, after a 14 years' fight, the U. S. Supreme Court reversed the decree of the Appelate court.

CONSOLIDATED ORES CO. **UTAH**

Owned vanadium-uranium claims in Brumley ridge district, near Moab, acquired in 1919 by **York Metal & Alloys Co.**, York, Pa.

COPPER BUTTE MINING CO. **UTAH**

Idle. **Office:** Richfield, Sevier county, Utah. Wm. Johnston, pres.; Alfred J. Bird, sec.-treas.

Property: is a copper prospect on Gold mountain, in the Kimberly district, Piute county, Utah. Developed by a short tunnel showing a 6′ vein of low-grade silver-bearing copper ore. Company claims to own a large deposit of alunite, a potash ore.

COPPER LEAF MINING CO. **UTAH**

Officers: I. C. Deal, of Provo, Utah; I. E. Mayer, of Salt Lake City; J. W. Taylor, mgr., of Eureka; T. F. Pierpont and Alex. Hedquist, of Provo.

Inc. 1916, in Utah. **Cap.** 600,000 shares; $1 par. Cash on hand, Jan., 1919; reported as $19,000.

Property: several claims in the Tintic mining district.

Development: by 1,250′ shaft from which exploration has been done from the 1,000 and 1,200′ levels to find the continuation of the Tintic Standard orebody. The management is the same as that of the Central Standard.

COPPER MOUNTAIN MINE **UTAH**

Owned by Samuel Newhouse, Newhouse Bldg., Salt Lake City, Utah.

Property: 7 patented claims, 125 acres, in Beaver Lake mining district, Beaver county, Utah.

Geology: ores containing gold, silver, iron and copper occur as con-

tact deposits in E.-W. shoots with a dip of 70° to the north between a monzonite footwall and a limestone hanging wall. Ore carries copper oxide with lime and iron, the average of carload shipments being 4%.

Development: by a shaft 100' vertical, then 150' incline and 620' of drifts. Mine is worked by overhead stoping.

Equipment: 15-h. p. gas hoist.

Some shipments were made in 1916, 1917 and 1918. Lease to A. J. McMullen has expired and property idle in spring of 1921.

COPPEROPOLIS MINING CO. **UTAH**

Address: N. A. Dunyon, mgr., Tooele county, Utah.

Authorized by Utah Corp'n Commission, 1921, to sell 50,000 shares at 5¢.

Property: 12 unpatented claims in Blue Ledge district. Shipments of selected ore in 1917 reported to have returned 60% copper, 65 oz. silver and $12 gold per ton. **Development:** by tunnels.

COPPER QUEEN MIDLAND MINING CO. **UTAH**

Address: Grantsville, Utah.

Officers: John P. Anderson, pres.; E. T. Woolley, v. p.; Mrs. Emma Erickson, sec.-treas., with Gustave Anderson, and O. W. Anderson, directors.

Inc. June, 1907, in Utah. **Cap.** $125,000; 25c par; issued 380,000 shares.

Property: 15 claims, unpatented, in Clifton mining district, Tooele county, and 6 miles S. E. of Gold Hill; said to show several promising veins with gold-silver values in lead and copper ore.

Development: 6 incline shafts from 50' to 205' deep, two tunnels, 620' and 125' in length. Total workings about 1,850' are mainly result of assessment work. About 30 tons of $50 ore was shipped in 1918.

COPPER RANCH CONS. MINING CO. **UTAH**

Office: 130 South, on West Temple, Salt Lake City, Utah.

Officers: D. L. Evans, pres., Malad City, Ida.; Jos. Pingree, sec.-treas.; A. F. McCulley, v. p.; D. E. Kirk, and E. V. Kessler, directors.

Inc. Sept., 1917, in Utah.

Property: the Copper Ranch mine, 10 claims, located next to Milford Copper Co. ground, 7½ miles west of Milford. Mine operated during 1916-17 by lessees who produced 100 cars of ore netting $32,368 smelter returns. Orebodies in sight reported sufficient for regular shipments for several years. Ore carries 5 to 25% iron with a little copper; desirable for fluxing purposes.

Development: by 300' incline shaft with drifts and crosscuts on ore.

Equipment: motors, hoist and compressor.

Shipments are recorded for 1918; no information as to later activities.

COPPER RANCH MINING CO. **UTAH**

Presumably dissolved.

Former officers: Moses Thatcher, former pres.; C. L. Rood, v. p.

Inc. in Utah. **Cap.** $500,000; shares 50c par.

Property: a mine near Milford, sold Aug., 1917, for $57,000 to D. L. Evans, of Malad City, Jos Pingree and A. F. McCully, of Milford, Utah. This amounted to 13c. per share of Copper Ranch stock. (See Copper Ranch Consolidated.) The company and its property are described in The Copper Handbook, Vol. XI, 1914.

COPPER ZONE MINING CO. **UTAH**

Address: C. L. Richards, Logan, Utah.

Officers: W. W. Wiscourt, pres.; J. R. Richards, v. p. and supt.; Geo. T. Hyde, sec.-treas.

Inc. in Utah. **Cap.** $100,000; shares 10¢ par.

Property: 8 unpatented claims, in T. 35 S. R. 15 W. in Bullion canyon, Pinto Iron Mtn. district, 12 miles from Beryl, in Iron county, said to show very rich silver ore. Developed by a tunnel with ore cut on 200' level. Is a prospect.

Company has spent $84,000, developing the property during past seven

years. Property to be equipped with electrically driven machinery, early 1922.

Financed mainly by Charles L. Richards of Logan, Utah.

COTTONWOOD ATLANTIS MINING CO. **UTAH**

Office: 314 Felt Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers: Samuel Neff, pres.; R. O. Dobbs, v. p.-sec.-gen. mgr.; David Neff, treas., with J. M. Rumsey and R. C. Middlewood, directors.

Inc. July, 1915, in Utah. **Cap.** $100,000; 10c par value; 900,000 shares issued. Transfers made at company's office. Annual meeting in May.

Property: 6 claims, 50 acres, in the Little Cottonwood district. Ore which carries lead, silver, gold and copper, occurs in shoots at the intersection of two orebearing fissures with a thrust fault contact having a limestone footwall and a quartzite hanging wall. This contact courses South 15° East and dips 25°. The developed portion of the Atlantis property was sold to the Louise Mining Co. in November, 1917; the management of both companies is the same.

COTTONWOOD KING MINING CO. **UTAH**

Office: 502 Boyd Park Bldg., Salt Lake City, Utah.

Officers: A. Anderson, pres.; A. L. Thomas, Jr., v. p.; H. H. Harris, sec.-treas., with H. P. Hucy, G. H. Webb, C. R. Halstead and J. W. McLaughlin, directors. A. B. Gattrell, mgr.

Inc. July 2, 1915. **Cap.** $150,000; shares 10c par; 150,000 shares in treasury. Assessments of ½¢ delinquent Aug. 26 and Dec. 3, 1921. Listed on Salt Lake Exchange. Shares sold for ¼ to ¾¢ in 1920; no sales, 1921; 1¢ asked 1922.

Property: 28 claims, 560 acres, and a bond and lease on the Giles property of 31 claims, located between Big Cottonwood and Park City, Utah. It adjoins the Daly Judge and Silver King Coalition.

All the property of the Big King Mining Co., bought, 1917, by exchange of stock share for share, property 52 claims, 1,040 acres, adjacent to Cottonwood King ground.

Development: 2,100′ of tunnels and 187′ shaft with 500′ of workings. Management states that on account of faults, 600′ of development done in 1916-17 proved disappointing. In 1918 the Sunnyside tunnel was advanced 100′. Development was continued during 1919 and 1920 but apparently with disappointing results.

COTTONWOOD METAL MINING CO. **UTAH**

Office: 401 Hooper Bldg., Salt Lake City, Utah.

Officers: W. M. Ferry, pres.; E. E. Watrous, v. p.; S. J. Truman, sec.-treas., with E. P. Watrous, and H. R. Watrous, directors.

Inc. in Utah. **Cap.** $100,000; 10c par; assessable; 205,000 shares paid for property and organization expenses. The balance is to provide funds for development work. Assessments, of ½c, May 31 and 1c Nov. 28, 1921. Listed on Salt Lake Exchange. Shares sold 1-3½c in 1918; 6c in 1919; 1¼-2c in 1920; ¼c in 1921, to June 1st.

Property: 38 full claims, 760 acres, known as the Watrous group, in the Big Cottonwood district, said to be crossed by six large fissures which cut the series of sandstone, shale, quartzite and limestone. These fissures run N. 35°-40°E., dip 60° to the N. W., and are cut by E. and W. fissures. Orebodies are found at these intersections especially in the soluble white lime. The deposits of the district are bedded deposits by replacement.

Development: by 1,376′ tunnel that has cut 4 fissures. It is the plan of the company to continue the tunnel to cut all the fissures. The Silver King fissure should be reached within 200′; work was continued during 1921.

Equipment: 4-drill compressor, blacksmith shop, and houses.

Management frankly states that property is a prospect, and that they will spend the money in honest development.

Examined, Aug., 1920, by A. D. Knowlton, who advises strongly "the continuance of the tunnel to intersect the Silver King fissure."

CREEDMOOR MINES CORPORATION **UTAH**

Address: Manhattan Bldg., Duluth, Minn.

Officers: W. D. Williams, pres.; R. A. Casson, treas.; C. J. Bonner, sec.; with Lloyd Davie, Milford, Utah, directors.

Inc. Aug., 1915, in Utah. **Cap.** 1,000,000 shares; 500,000 outstanding.

Property: 7 claims, 120 acres, in Star district, Beaver county, Utah, said to show silver-lead ore.

Development: open-cuts and shallow shafts. Some ore shipped from mine under former ownership.

CREOLE COPPER MINES CO. **UTAH**

Mail returned from Atlas Bldg., Salt Lake City Utah.

Officers: H. A. Pederson, pres.; H. Brellean, sec.; B. .H Goddard, mgr.

Inc. 1917. **Cap.** $250,000; shares, 15c par.

Property: 10 claims, 6 patented, 75 acres in Lincoln mining district, Beaver county, shows gold-silver-copper-lead ore in a contact deposit between granite and limestone. Deposit has an E. W. course and dips E. 38°. Average assays said to be 12% copper, 5% lead, 17 oz. silver and $1 to $5 gold per ton.

Development: 400′ incline shaft and 200′ tunnel, with total workings, about 2,500′. Management claims to have large bodies of ore blocked out for shipping when copper prices warrant and some ore was shipped in 1918.

Equipment: includes compressor and hoist.

No recent reports.

CREOLE MINING CO. **UTAH**

Was a leasing company. Fully described in Vol. XIII.

CROESUS MNG CO. **UTAH**

Suceeeded by **Eureka Croesus Mining Co.**

CROFF MINING CO. **UTAH**

Officers: R. R. Tanner, supt., Beaver, Utah; G. P. Norton, sec.

Cap. $1,000,000; shares $1 par; 295,000 shares and $7,354 in treasury, January, 1916. Listed in Salt Lake City.

Shares 1½¢ in 1920; ½¢ to 2¼¢ in 1921.

Property: 5 patented claims, in Lincoln mining district, 12 miles east of Milford, Beaver county, Utah. Ore is found along the contact of lime shale hanging-wall and limestone footwall and varies in width from 6″ to 3′. It is said to carry silver, lead, copper and gold.

Development: by 240′ incline shaft, also 665′ of tunnels and drifts. Have proven ore shoot on 150′ level.

Three carloads of ore shipped, 1917, assayed 13% lead, 6 oz. silver and $2.80 gold per ton.

Equipment: includes a gasoline hoist and air-compressor. No recent report.

CROWN POINT MINING CO. **UTAH**

Officers: Jos. Worthlin, pres.; J. F. Greer, sec.-treas.; John Roundy, gen. mgr., Provo, Utah, with F. D. Kimball and Jos. Berry, directors.

Inc. 1907, in Utah. **Cap.** $100,000; 10c par; assessable. Shares quoted Jan., 1922, at 2 to 3½c. Listed on Salt Lake Exchange.

Property: 8 claims, 5 patented, in Tintic district. Ore: silver-lead. Development by 1,000′ shaft and 4,100′ of tunneling. Workings totaled 6,875′, Sept., 1919. **Equipment:** includes a hoist and compressor. Funds for development raised by assessments.

Was reported developing on the 1,000′ level in 1921.

CUPRIC MINES CO. **UTAH**

Address: Herman G. Vetterlein, pres., 56 N. 6th St., Philadelphia.

Inc. May 11, 1908, in New York. **Cap.** $100,000; par 10¢; assessable; 74,788 shares issued.

Property: the Cupric, or Iron Devil mine, 16 claims, patented, in the Frisco district, Beaver county, adjoining the Peacock mine, at the east end of White mountain and 2 miles S. E. of Newhouse. The mine is near

the igneous contact, dikes and tongues of monzonite invading the limestone; there are numerous mineralized fissures carrying chalcopyrite, pyrite, specular hematite and magnetite with garnet, tremolite, muscovite, etc.

Development: by 2 old incline shafts and 425' two-compartment vertical shaft, sunk near the main tunnel of the Cactus mine. Equipped with gasoline hoist.

D. & B. MINES CO. **UTAH**

Officers: C. H. Blanchard, pres., 766 First Ave., Salt Lake City; Wm. H. Dickson, v. p.; A. C. Ellis, sec.; with Pat Donnelly, and Chas. P. Brooks, directors, all of Salt Lake City. L. H. Farnsworth, treas.

Inc. in Nevada. **Cap.** $200,000; shares, 10c par; outstanding, 1,130,000 shares; listed on Boston Curb.

Property: 63 claims, in the North Tintic mining district, said to have gold, silver, lead and copper ore. The claims are in 2 groups, the D. & B. group of 30 claims has a 200' shaft and several hundred feet of workings. The K. & K. group has a 90' and also a 200' shaft. Property is a prospect. The stock has been profusely advertised by Orem & Co., Boston, Mass.

DALY JUDGE EXTENSION MINING CO. **UTAH**

Address: Park City, Utah.

Officers: Mrs. Clarissa Whitehill, pres.; E. Waddanfs, v. p.; S. L. Raddon, sec.-treas.; with S. Lewis, and Henry Spriggs, directors.

Inc. in Utah. **Cap.** $600,000; shares 10c par.

An assessment of ¼¢ was payable Sept. 25, 1920.

Property: 8 claims, 140 acres, partly patented, at Park City developed by 700' tunnel and 2 shafts, said to show copper-lead-silver ore in fissure veins.

DALY-JUDGE MINING CO. **UTAH**

Reorganized in 1916 as the **Judge Mining & Smelting Co.**, which see.

DALY MINING CO. **UTAH**

Office: 1102 Deseret Bk. Bldg., Salt Lake City, Utah.

Officers: Geo. W. Lambourne, pres.-gen. mgr.; S. G. Taylor, treas.; W. A. Dunn, asst. sec.

Inc. in Utah. **Cap.** $4,000,000; $20 par; 150,000 shares issued; assessable. Listed on Salt Lake Exchange. Shares sold at $2 to $4 in 1920; $1.50 to $2.50, 1921; $1 bid, $3 asked, Jan., 1922.

Dividends: paid $2,925,000 to 1897. Dividends resumed in 1917, when $60,000 was paid; in 1918, $75,000; in 1919, $97,500; in 1920, $30,000. The grand total is $3,187,500.

Property: in Uinta district, Summit county, 8 claims and an interest in 14 claims of the Ontario Silver Co. claims; also an interest in 17 claims of the Daly West Co., and 195½ acres owned jointly with the Ontario Silver Mng. Co., total acreage 316, of which all are patented.

Ore: silver-lead-gold and copper in fissure veins in quartzite. The property is an old one, and at last accounts had 2,300' of shafts and much unexplored ground between the surface and 1,700' levels. Work has been carried on intermittently during the past few years. Ore assays from 45 to 80 oz. silver, 8 to 15% lead, and $0.75 to $1.50 gold per ton; shipments are about 500 tons monthly of ore of this character.

Production: in 1921, was 903 tons of ore yielding $37,752.

During 1920, interest of former president, said to be about ⅔, taken over by those in control of Daly-West, Park-Utah and Judge M. & S. Co.

DALY WEST MINING CO. **UTAH**

Property transferred early in 1922 to Park City M. & S. Co. for 250,000 shares of latter company's stock. Company affairs to be wound up.

Office: 1101 Deseret Bank Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit Co., Utah.

Officers: G. W. Lambourne, pres.; Geo. G. Brooks, v. p., with H. M. Stonemetz, N. C. Fox and O. N. Friendly, directors. S. G. Taylor, treas.; A. H. Peabody, sec. Operating officials: O. N. Friendly, gen. supt.; G. R. McKay, mine supt.

Inc. Feb. 14, 1902 in Colorado. **Cap.** $5,000,000, increased from $3,600,000 in 1918; shares $20 par. National City Bank, Salt Lake City, and Ist. Nat'l. Bank, Boston, registrars. American Trust Co., Boston, transfer agent. Annual meeting 2nd Tuesday in May. Stock listed on Boston and Salt Lake exchanges. Sales, $1.60 to $4 in 1921.

In 1920, ore sales returned $615,464; other income totaled $6,810, and dividends which with balance on hand, Jan. 1, 1920, equalled $140,258. Expenditures, were $623,995, leaving balance on hand, January, 1920, $164,253.

Dividends: 30¢ quarterly reduced to 15¢ in 1913; nothing paid from 1914-1919; 90¢ in 1920; total to end of 1920, $6,831,000.

Company has a fifth interest in the Little Bell Cons. Mining Co., a third interest in Silver Lake Water Co.; 50,000 shares of Thompson-Quincy Cons. Mng. Co.; 60,717 shares of West Ontario Cons. Mng. Co.; 17,000 shares of Daly Mng. Co. (q. v.).

Property: the Daly West and Quincy mines with 50 claims, patented, 250 acres in the Park City district. The ores are a complex mixture of argentiferous lead, zinc and iron sulphides, occurring in fissures, and as replacement deposits in limestone. Ore comes from Daly vein, opened by 1,185' of work; Middle vein by 220' and Back vein, 2,121'. The three principal veins are of 4 to 6' minimum and up to 40' maximum width. Upper workings are practically worked out, lower workings show concentrating ore.

Development: from Judge M. & S. Co. levels, 2,810'; from Daly West levels 3,530'. The main shaft is 2,300' deep, and the mine has about 16 miles of workings, an average of nearly 1 mile of new ground being opened yearly. Connection was made, October, 1909, with the 3-mile Ontario drainage tunnel, on the 2,100' level for the use of which company pays $750 monthly rental. In 1919, lease of the Ontario S. M. Co. on upper 1,500' of mine ceased, and company in 10 months made total extensions of 4,928', largely on 500', 900', 1,100' and 1,400' levels; in part through Judge workings. Exploration opened two new orebodies on upper levels. The work in 1920 was similar in character. Some portions of mine are leased to individuals.

Equipment: includes hoists and air-compressor. The 350-ton concentrator was destroyed by fire December, 1913. A new 600-ton mill was built and went into commission January, 1915. Plant includes a flotation unit with capacity of 30 tons of dry slime per day. Mill closed down after completion (late 1918) of crosscut connecting mine with the Judge concentrator.

Production: the metal recovery since incorporation of company is as follows:

Year	Silver, oz.	Gold, oz.	Lead, lb.	Copper, lb.	Sold for
To 1919.....	26,045,487	21,817	250,108,000	17,598,060	$16,485,493
1919.....	187,098	163	1,060,000	130,010	179,910
1920.....	505,506	241	3,364,606	341,465	615,464

The ore production for 1921 was 7,510 tons yielding $253,019; for 1920, 22,000 tons; for 1919, 4,789 tons with net smelter value of $31.55 per ton, of which 1,546 tons were produced by lessees; concentrate and tailing shipped amounted to 1,347 tons and sold for $21.38 per ton.

Property, though an old one, has much new territory yet to be prospected and the known ore shoots give indications of going to greater depths.

The present management took control March 1, 1918; for several years previous to this time the mine had not been operated to best advantage, and only such development work done as was necessary for immediate ore extraction. The new management decided on a more aggressive line of development work and also to mill the ore at the Judge Mng. & Smg. Co.'s plant; this necessitated the driving of a 1,000' crosscut.

Dividend passed on April 1, 1921, because of market conditions; cash balance reported to be $145,000.

UTAH

DAYS FORK MINING CO.

Office: 608 Boston Bldg., Salt Lake City, Utah.

Officers: Henry Harker, pres.; M. T. Ellison, v. p.-mgr.; E. O. Lee, sec.-treas., with H. E. Booth and B. H. Cannon, directors.

Inc. April, 1911, in Utah. **Cap.** $60,000; 10c par; 475,000 shares outstanding.

Property: 5 claims, 85 acres, in Big Cottonwood mining district, said to show gold, silver, and copper ore in fissure veins. **Development:** about 1,000′ of tunneling. Is a prospect.

DEEP CREEK COPPER KING CO. **UTAH**

Mail returned, 1919 from former address, Gold Hill, Tooele county, Utah.

Property: 10 claims in Deep Creek district, extending south from the Western Utah Copper claims.

Development: by 100′ shaft said to be sunk on copper-silver-lead ore. Probably idle.

DEEP CREEK COPPER M. & M. CO. **UTAH**

Office: 501 Boyd Park Bldg., Salt Lake City, Utah.

Officers: R. C. Naylor, pres.; J. Pingree, treas.; A. L. Thomas, Jr., sec., with A. Winzell, L. Housekeeper, I. A. Powell and W. T. Smith, directors.

Property: 10 claims, in the Deep Creek district, Tooele county, said to show lead-silver-copper ore.

Development: by shallow shaft on the Moonlight claim.

DEER TRAIL MINING CO. **UTAH**

Mine address: T. A. McCaskill, gen. mgr., Marysvale, Utah.

Office: 321 Felt Bldg., Salt Lake City, O. J. Salisbury, pres.

Property: the Deer Trail gold mine in Mt. Baldy district, Piute county, near Marysvale. According to the U. S. Geol. Survey, this was practically the only real gold mine operating in Utah in 1920. The ore contains gold, silver and lead.

Development: by tunnels, one over 2,200′ in length.

Equipment: includes 100-ton mill employing concentration and cyanidation. About 80 men employed.

Production: in 1918-19 averaged 10 to 12 carloads a month.

DELSA MINING CO. **UTAH**

Property about 6 miles from Santaquin, reported operated under lease by G. M. McLean in 1917. Ore occurs in veins, 1-2′ wide, carrying silver-lead-zinc. Developed by tunnel, 500′ long at vertical depth of 300′. Probably idle.

DESERET MOUNTAIN MINES CO. **UTAH**

Office: 409 Atlas Bldg., Salt Lake City.

Officers: W. Mont Ferry, pres.; D. H. Livingston, v. p.; Wm. D. Livingston, sec.; S. J. Truman, treas., with J. W. Mellen, J. H. Turner and I. D. Wines, directors. D. E. McPherson, supt.

Cap. 1,000,000 shares; 500,000 reserved for treasury.

Property: 12 claims, 250 acres in the West Tintic mining district, Juab county, said to show a contact vein, between limestone and porphyry, 12′ wide, carrying copper ore that assays better than 3%.

Development: by 300′ new incline shaft and an old shaft 218′ deep, drifts, stopes and raises. Plan continuing shaft to 500′ level. The 300′ level crosscut cut the vein in 1917, but owing to war conditions, mine was shut down until early in 1919, when shaft was unwatered to the 300′ level, and development work resumed.

No recent information.

DETROIT COPPER MINING CO. **UTAH**

Samuel A. King, pres.; Judge Bldg., Salt Lake City, Utah.

Inc. Jan. 1916, in Utah. **Cap.** $1,000,000; shares $1 par; 400,000 in treasury. Held 5-year $100,000 bond and lease, from November 24, 1915, on 40 claims, locally known as Ibex mine, and owned by Ibex Gold Mng. Co.

Company described in Vol. XIII. Property is now held under bond and lease by the **Monarch Cons. Mines Co.**

DEWEY SILVER AND COPPER CO. UTAH

Mail returned, 1918, from former address: Lorin Hall, Brigham City, Utah.

Property: 5 claims, 5 miles N. of Brigham City, Boxelder county.

Development: by tunnels, ore occurring in limestone. Surface ore said to contain up to 60% lead with some silver and copper. Probably idle.

DIAMOND QUEEN MINING CO. UTAH

Address: Richard Campbell, supt., Eureka, Utah.

Property: in Eureka district, 3½ miles S. of Silver City, Juab county.

Development: by 180′ shaft.

Equipment: 60 h. p. boiler, compressor, hoist and buildings. Work paid for by assessments.

DRAGON CONSOLIDATED MINING CO. UTAH

Office: care Knight Investment Co., Provo, Utah. Mine near Tintic, Juab county, Utah.

Officers: O. Raymond Knight, pres.; J. Will Knight, v. p.; R. E. Allen, sec.-treas.; with L. E. Ritter, directors.

Inc. April 8, 1911, in Utah. **Cap.** $2,000,000; $1 par; issued 1,875,000. No funded debt. Stock listed on Salt Lake Stock & Mining Exchange. Shares sold at 5 to 10¢ in Jan. 1922.

Receipts for 1920 were $105,608; of which about $73,000 was from sale of fluxing ores; disbursements were $78,674. Gross earnings for 1921 were $61,636, operating expenses $60,852 and net income, $784. Dividends were $37,500.

Dividends: initial of 1¢ a share declared February 20, 1017, and continued quarterly during 1917 and 1918; 2¢ in 1920.

Property: 28 claims, patented, 122 acres, comprising the Dragon and Governor groups in Tintic district. The Governor group has 2,000′ or more of the big Iron Blossom fissure in limestone, from which the great production of that and the Sioux mines has come. The Dragon group shipped 100 tons per day of iron ore to the U. S. smeltery, for a long time. The Governor ground had a rich orebody of copper-silver ore developed by drifts from the Iron Blossom on the 300′, 600′, 800′ and 1,000′ levels, showing a 20′ vein with 0.5 to 10% copper and 20 to 50 oz. silver. Part of the property is worked through the Black Jack shaft of the Empire Mines Co. In the tunnel connecting the workings with the Iron Blossom property, large bodies of low-grade ore were encountered in 1915.

Low grade ore has in former years been sent to Tintic Milling Co., also a Knight enterprise, but, from 1918 on, the latter, under a lease, has been operating a part of the Dragon mine. Total advance in 1920 was 440′, including 240′ by lessees.

Production: 1,743 tons in 1914, yielding 44,006 oz. silver, 135,814 lb. copper, 57,552 lb. lead and 432.27 oz. gold; 7,804 tons in 1915, yielding 102,143 oz. silver, 490,750 lb. copper, 14,766 lb. lead and 2,559 oz. gold. In 1916 and 1917, silver-copper-lead milling ore was shipped to the Tintic Milling Co.; in 1918, iron fluxing ore was shipped for 10 months, and some silver-lead ore produced. Reported to be shipping 260 tons daily during 1919 with net returns of $86,231 including returns from ore shipped by lessee.

In 1920, the U. S. S. R. & M. Co. had a lease on the iron orebodies, mining from 50 to 100 tons daily for flux for its smelter at Midvale. Operations ceased at end of 1921, due to oversupply.

DRY CANYON CONSOLIDATED MINING CO. UTAH

Address: Gisborn, Tooele county, Utah.

Officers: C. J. Garber, pres.-treas.; L. L. Travis, v. p.; J. E. Darmer, sec., with V. C. Anderson and Violet S. Scribner, directors.

Inc. 1900, in Utah. **Cap.** $100,000; shares 5c par; assessable; 1,800,000 shares outstanding. Annual meeting January 15.

Property: 29 claims, 12 patented, 400 acres, in Dry Canyon, Ophir mining district, Tooele county, said to show a complex ore containing gold, silver, copper, lead, and zinc.

Development: by tunnels, with a total of over 8,000 of workings.

Production: during 1918 produced steadily, smelter returns paying all expense of development work.

No recent information.

DUGWAY COPPER MINING & SMELTING CO. UTAH

Office: 54 East 4th South St., Salt Lake City, Utah. **Mine office:** Clover, Tooele county, Utah.

Officers: O. F. Peterson, pres.-treas.-gen. mgr.; P. C. Kittle, v. p.; A. V. Peterson, sec. with A. E. H. Peterson and H. B. Windsor, directors.

Inc. June 13, 1902, in Utah. **Cap.** $30,000; shares 10c par; assessable; issued, $22,506. Annual meeting, third Tuesday in July.

Property: 6 claims, patented, 118 acres, in the Dugway district, 43 miles from a railroad. Shows an ore zone, reported by company, to be 300′ long on the 200′ level, containing a number of orebodies that carry chalcopyrite, bornite and argentiferous galena, giving assays of 1 to 15% copper, up to 30% lead, up to 7% zinc, up to 66 oz. silver, and $1.60 gold per ton.

Development: by a 333′ incline shaft, with about 1,000′ of workings, showing considerable ore. Idle for several years.

DUGWAY SMELTING CO. UTAH

Office: 203 Atlas Block, Salt Lake City, Utah.

Officers: A. L. Thomas, Jr., pres.; K. D. Kuhre, v. p.; C. S. Goddard, sec.-treas., with E. R. Hardy, and C. G. Adams directors.

This proposed company, with its offer to assist the public to get-rich-quick is presumably dead and ought to be. See Vol. XIV for details.

DULUTH & UTAH DEVELOPMENT CO. UTAH

Property sold to Bullion Coalition, and proceeds distributed. Company presumably dissolved. Fully described in Vol. XIII.

DUTCHMAN COALITION MINES CO. UTAH

Address: Harry W. Holden, American Fork, Utah.

Officers: N. Salmensen, pres.; Jos. R. Haas, v. p.; Harry W. Holden, sec.-treas.

Incorporation pending. **Cap.** $10,000; par 1c.

Property: 5 claims in the American Fork district, Utah county includes the Wild Dutchman mine said to have produced 7,900 tons of high grade silver-lead ore prior to 1880. The ore occurs in bunches in a bedded vein, 20′ wide, in limestone.

EAGLE & BLUE BELL MINING CO. UTAH

A subsidiary of **Bingham Mines Co.**, and described thereunder.

Shares listed on Salt Lake Exchange, sold at $2.05 in 1920 with $2.25 bid, Jan., 1922. Company to be dissolved, 1922.

EAGLE COPPER MINING CO. UTAH

Mine office: Santaquin, Utah county, Utah.

Officers: Armon Cravens, pres.; S. W. Higginson, v. p.; C. E. Snell, sec.-treas.; L. F. Peterson, supt

Inc. May, 1907, in Utah. **Cap.** $1,000,000; shares 10c par. Last assessment of ½c delinquent, April 11, 1914.

Mine on Mount Nebo, east of Santaquin, has shipped a little high-grade lead and copper ore. Developing with a small force at last accounts. No recent information.

EARL & EAGLE MINING CO. UTAH

Described in Vol. XIII; merged with **American Cons. Mines Co.**, which see

EAST ANTELOPE MINING CO. UTAH

Address: 135 E. Broadway, Salt Lake City, Utah.

Officers: John Matson, pres. and mgr.; John W. Chase, v. p.; H. E. Giers, sec.-treas.; with N. P. Hansen, and A. C. Nebeker, directors. C. W. Pettit, supt.

Cap. $100,000; 10c par; assessable; last assessment, ½c a share, delin-

quent September 15, 1919. Listed on Salt Lake Exchange. Shares quoted ¼c to 5c in 1920; ¾c in 1921; ¼c Jan., 1922.

Property: 11 claims, unpatented, on Mineral Mountain, Millard county, adjoins Keno and Antelope Star mines.

Development: by 400′ tunnel with drift on limestone quartzite contact; 800′ of work in 1916-1917, showed excellent ore in small amount in west drift. No recent information.

EAST CARBONATE MINING CO. UTAH

Property: in South Fork of Big Cottonwood canyon. Is an old company doing slight development yearly. Judgment for $701 was given against it in Nov., 1921, for money due for driving a tunnel through the property.

EAST CROWN POINT MINING CO. UTAH

Address: Provo, Utah.

Officers: R. A. Badger, pres.; Chas E. Zabriskie, mgr., with Frank D. Kimball, C. E. Huish and W. A. Beesley, directors. H. C. Jex, sec.

Inc. 1907, in Utah. **Cap.** $100,000; shares 10c par; assessable. Listed on Salt Lake Exchange. Shares sold 1¼-6c in 1920; 1¼-2¼ in 1921; 2c in January, 1922.

Property: 9 silver-lead claims in Tintic district, Juab county, Utah.

A 2-compartment shaft begun in fall of 1920, but apparently to cover assessment work only. Reported that claims are in process for patent.

EAST HECLA MINING CO. UTAH

Address: care J. B. Taylor, 336 E. 8th St. South, Lake City, Utah.

Officers: J. B. Taylor, pres.-gen. mgr.; E. J. Broberg, v. p.; W. Hansen, Jr., sec.-treas.; D. J. Cook, supt.

Inc. in 1916, in Utah. **Cap.** 1,000,000 shares; 10c par.

Property: a group of claims at Alta, adjoining the South Hecla mine, said to show a prominent outcropping vein and about 3′ of ore in a shaft sunk on it. Ore carries copper lead, silver and gold values.

Development: a tunnel, 250′ long, being driven to cut the downward extension of the vein beneath a 75′ shaft, that shows copper ore.

Idle for several years, but company not dead and assessment work performed. Management doing exploration work at last accounts.

EAST STANDARD MINING CO. UTAH

Officers: Fred C. Allen, pres.; Isaac Isaacson, v. p.; M. C. Morris, sec.-treas., with J. Frank Quist, and Gus Wickman, directors.

Inc. 1919, in Utah. **Cap.** $100,000; 10c par; 600,000 issued.

Property: 9 claims, adjoining the Tintic Standard on N. E. in East Tintic district, Juab county, formerly known as the White Track. Management states that a shaft will be sunk to 1,000′ depth. Shaft was reported to have reached 260′ in January, 1921.

EAST TINTIC COALITION MINING CO. UTAH

Address: Provo, Utah.

Officers: John M. Bestelmeyer, pres.; H. G. Blumenthal, v. p.; A. Bestelmeyer, sec.-treas., with D. R: Beebe, and H. C. Hicks, directors.

Cap. $75,000: shares 5c par. Listed on Salt Lake Exchange. In July, 1919, company stated that it had $26,312 in cash and no debts. Shares are assessable; last assessment of ½c was delinquent Aug. 20, 1921. Shares quoted 1c in 1921.

Property: 3 patented claims, located just W. of the Eureka Bullion, said to have gold-silver-lead ore.

Development: 225′ tunnel, and two incline shafts, one 142′, and one 127′ deep. In July, 1919, started work on a new shaft, which had reached 200′ in May, 1920. Is a prospect.

Equipment: includes a head-frame, electric hoist, compressor and drills.

EAST TINTIC DEVELOPMENT CO. UTAH

Property bought, 1916, by **Eureka Lilly Mining Co.**, which see.

ELDORADO GOLD MINING & MILLING CO. UTAH

Address: Don Maguire, mgr. and principal owner, Ogden, Utah.

Property: 900 acres, said to show silver-lead-zinc ore in limestone-quartzite contact. Copper ores occur in granite. Shipments in 1912 ran 37.5% lead, 10 oz. silver and $2 gold. Mine is said to show 40,000 tons of 15% zinc ore and 100,000 tons of silver-lead ore.

Development: includes 1,400′ tunnel. Planned mine development and installation of a new tramway. No recent report. Probably idle.

EMERALD MINING CO. **UTAH**

Mine office: Mammoth, Juab county, Utah. H. C. Hoffman, pres.-gen. mgr.

Inc. 1896, in Utah. **Cap.** $300,000; shares $1 par; asseessable, fully issued. Assessment of 1c delinquent Dec. 15, 1921. Listed on Salt Lake Exchange. Shares sold at 1-15c in 1920; 1-13c in 1921; 1-3c Jan., 1922.

Property: 4 claims and additional land, bought, 1910.

Development: 1,100′ shaft, with about 4,000′ of workings, on a narrow but rich vein, carrying copper, silver and lead ores. A 4′ vein between well defined walls, showing heavy iron mineralization and sugar quartz was opened in a 700′ winze.

Company has levied assessments for years and been regarded as the "wildest of wildcats," but is now in favor and may repay stockholders for their blind faith and yearly contributions.

Reported to look promising on 1,000′ level and during 1920 and into 1921, a drift was driven on this level for 350′.

EMMA CONSOLIDATED MINING CO. **UTAH**

A rank promotion of the notorious promoter, George Graham Rice.

Former officers: G. G. Rice, pres.; Wm. Barret Ridgely (deceased) former v. p.-treas.; Judge H. D. Rummel, 2nd v. p.; I. H. Weinberg, sec.; J. J. Beeson, gen. mgr

Inc. 1917, in Delaware. **Cap.** $3,000,000; $1 par; 2,668,693 issued. Was the holding company, owning more than 98% of the outstanding capitalization of Emma Copper Co. and over 80% of Old Emma Mines Co. Also bought the lease on Old Emma Mines Co. ground from the Old Emma Leasing Co. (now dissolved), which ran until September, 1917.

Emma Copper Co.

Controlled through ownership of over 98% of outstanding capitalization by the Emma Cons. Mng. Co.

In 1918 Emma Cons., after shipping a few hundred tons of ore went into the hands of a receiver, and in 1919, the Emma Silver Mines Co. was formed as a reorganization of the Emma companies, assuming their debts and assets.

EMMA SILVER MINES CO. **UTAH**

Address: F. B. Cook, sec., 125 Main St., Salt Lake City. **Mine address:** Alta, Salt Lake county, Utah.

Officers: C. S. Burton, pres.; J. E. Galogher, v. p., 101 W. 2nd St., South, Salt Lake City; Frank B. Cook, sec.-treas., with J. Herlihy of Salt Lake Hardware Co., and A. L. Hoppaugh, Kearns Bldg., Salt Lake, directors. M. M. Johnson, Cons. engr.; Dave J. Lemmon, supt.

Inc. 1919, in Utah. **Cap.** $5,000,000; $1 par. Registrar and transfer agent, U. S. Corporation Co., New York. Listed on Salt Lake Exchange, and New York Curb. (Mar. 10, 1920). Assessment No. 1 of ¾ cent a share delinquent Dec. 10, 1921.

The financial statement for fiscal year ending Sept. 30, 1921, shows total receipts of $161,107, including ore sales, $49,658; from reorganization, $101,716; 100,000 treasury shares, $7,130. Expenditures were $11,981.

Company is the offspring of **Emma Cons., Old Emma Mines Co.** and the **Emma Copper Co.**, which were controlled by Emma Cons. In 1918 Emma Cons., which had been fostered by George Graham Rice, went into the hands of a receiver and one of the results was the formation of the Emma Silver Mines Co. Shareholders in the Old Emma companies were given the "privilege" of exchanging one share of old stock for three of

new on payment of 10c a share on the old stock or one share of new for one of the old with no assessment; receiving 20c a share cash for each of the old. Some of the shareholders of Emma Cons. had paid as high as $3.75 a share for this stock in 1916; it afterwards fell to a few cents per share.

The new company after paying all debts of the old company is said to have started business with $100,000 and 1,000,000 shares of stock in the treasury and no debts. As there are many who still have faith in the unexplored part of the property, it is hoped that the new management will bring this old and much abused mine into the productive class.

Property: included 11 claims in Little Cottonwood district and the adjoining Vallejo and Joab Lawrence groups, bought 1915 in exchange for 352,000 shares of stock. Two adjoining claims were purchased from the Tipperary Mng. Co. early in 1920.

History: the Old Emma mine was a famous early-day producer, having shipped over $3,000,000 worth of lead-silver ore in the 60's and 70's, from above the 300′ level. It was sold to the Emma Silver Mng. Co., for $5,000,000 and soon afterwards the orebodies appeared worked out, or cut off by a fault. After vain attempts to find the orebodies below the fault, the mine lay idle until 1915.

Chas. S. Herzig made a geological study of the property with the deduction that it contained a faulted portion of the Old Emma bonanza orebody, wherupon diamond drilling was started. Under direction of J. J. Beeson, geologist, the Emma vein was located, 1916, at about 250′ below where it had been cut off by the fault, and the displaced segment of the orebody opened up.

Development: by 1,700′ tunnel, 400′ shaft and drifts on several levels.

Former management diamond drilled in 1917 in hopes of locating the downward extension of 4 other orebodies, all presumably cut off by the Montezuma fault In November, a mineralized zone 50′ wide was passed through assaying a few ounces of silver.

During 1919-20, the larger part of work was done along the Montezuma fault; total extensions were 781′; diamond drilling amounted to 671′. A joint report by Beeson and Johnson recommended temporary suspension of operations below tunnel level because of pumping expense and to confine work to locating faulted segments of orebodies above tunnel.

Production: $3,825,000 up to August, 1919, according to Beeson; of this amount. $273,742 net worth of (10,362 tons) ore was shipped between Jan. 1, 1917, and August, 1918. Development having been neglected, shipments ceased until November, 1919; in following 12 months, the mine yielded 1,484 tons; in 1921, 473 tons.

Reported Dec. 1921, that 4′ of ore was cut in 800′ crosscut from point 1,200′ from portal of Bay City tunnel.

EMPIRE MINES CO. **UTAH**

Address: Knight Investment Co., Provo, Utah.

Inc. 1907, in Utah. **Cap.** 3,000,000 shares; 5c par. Listed on Salt Lake Exchange.

Shares sold 2½c to 5½c in 1921, and 2½ to 12c in 1920.

Is a merger of the Black Jack, Boston & Tintic, Central Mammoth, Lower Mammoth, Garnet, Old Colony and Eureka, Manhattan and Opex Consolidated mining companies, all controlled by the Knight Investment Co.

In April, 1917, the property of the Carisa Gold & Copper Mng Co. of Maine at Mammoth, Utah was bought for $115,000.

Property: over 700 acres in the Tintic district, Utah, east of Silver City and south of Eureka.

Practically all the work done since the consolidation has been carried on through the Lower Mammoth shaft, the main work late in 1919, being on the 1,800′ level, where a 3′ vein of good copper ore was cut in Black Jack group.

Some shipments of iron and silver-lead ore were made in 1918. All

work temporarily suspended in mid-summer of 1920.

ETTA MAY MINING & MILLING CO. UTAH

Charter reported forfeited, April 4, 1921. See Vol. XIV for details.

EUREKA BULLION MINING CO. UTAH

Address: J. M. Bestelmeyer, mgr., Provo, Utah.

Officers: H. C. Hicks, pres.; J. M. Bestelmeyer, v. p.; August Bestelmeyer, sec.-treas., with N. C. Hicks, and H. G. Blumenthal, directors.

Inc. 1916, in Utah. **Cap.** $50,000; shares 5c par; assessable. Assessments of ½c delinquent Sept. 3, and Nov. 5, 1921. Listed on Salt Lake Exchange. Shares sold at 4½c in Jan., 1922.

In January 1920, company formed the Tintic Silver Mining Co., with a capital of $150,000.

Property: 7 patented claims and 2 unpatented claims formerly owned by the Grutli Mining Co., were bought at sheriff's sale 1916 for $8,960. Claims are in the East Tintic district, W. of the Tintic Standard property, and are said to show a 50′ vein on surface with a limestone porphyry contact.

Development: by 900′ shaft reported to show quartz in a cave 150′ long, 50′-75′ high and 75′ wide at 500′, with manganese. A drift on the 800′ level is said to have opened a 4′ vein of ore in June, 1919, with assays 9 to 20% lead, 23 to 70 oz. silver, and about $2 gold per ton. A winze, 600′ from shaft, was sunk to depth of 400′ from the 9th level to reach two intersecting fissures, and drifts have been driven on 925 and 1,150′ levels; on the latter, a second cave was encountered. Reported (May, 1921), that a 3′ vein was uncovered on the 925′ level from which a 40-ton ore shipment averaging $2.40 gold, 60 oz. silver and 2.5% lead was made.

Equipment: includes compressor, 60 h. p. steam boiler, hoist, etc.

EUREKA-COTTONWOOD MINING & SMELTING CO. UTAH

Address: B. A. M. Froiseth, 855 Sherman Ave., Salt Lake City.

Officers: B. A. M. Froiseth, pres.; Percival O. Perkins, v. p.; and R. J. Froiseth, sec.-treas.

Inc. Jan. 7, 1918. **Cap.** $25,000; 5c par; 300,000 shares issued.

Property: 2 patented claims in Big Cottonwood district, Salt Lake county, ½ mile N. E. of the Cardiff mine, showing lead-silver ore. Developed by shafts and tunnels.

Reported in March, 1921, to be awaiting funds.

EUREKA CROESUS MINING CO. OF NEW YORK UTAH

Controls or owns the Eureka Utah Mining Co. of Salt Lake City.

Address: Frank L. Torres, pres., 103 Park Ave., New York.

Cap. $1,500,000; shares $1 par.

Property: the Huebner mine, at Eureka, Juab county, Utah, has shipped some high-grade lead-silver ore. Reported in 1919, that a 250-ton mill would be erected.

No recent information.

EUREKA HILL MINING CO. UTAH

Office: Deseret National Bank Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Moylan C. Fox, pres.; Waldemar Van Cott, v. p.; Jas E. Berkley, sec., with Ed. W. Packard, directors. Jackson C. McChrystal, managing engr.; Chas. Baker, supt.

Inc. Nov. 12, 1875, in Utah. **Cap.** $1,000,000; shares $100 par. Is a close corporation, credited with having paid $2,000 000 in dividends. Paid $1 dividend, Nov. 15, 1921. Annual meeting third third Tuesday in February.

Property: 5 claims, 27 acres, patented, also a 25-acre millsite and 150 acres miscellaneous lands in the Tintic district, adjoins the Bullion-Beck and Centennial Eureka. The Eureka Hill mine has a 1,500′ main working shaft and about 30 miles of workings. Ore bodies are lenticular deposits, carrying cuprite, malachite and enargite with average values of about 1.4% copper, 6% lead, 25 oz. silver,and $3 gold per ton. Mine worked for 45 years, but shut down 1911, and only old workings mined by lessees since

then. Produced many millions of silver-lead ore from above 1,000' level. Deep development in future will be from adjacent mines.

Reported in summer of 1921, that L. E. Riter et al. had leased a large block of Eureka Hill ground to be worked through the Centennial-Eureka shaft.

In recent years company's revenue has come from royalties from leasers in the mine and from rentals and sale of water.

Old tailing dump at mill containing 180,000 tons, leased on royalty, 1921.

EUREKA KING MINING CO. UTAH

Directors: Ray Van Cott, Judge Bldg., Salt Lake City; Geo. M. Chiulos, A. E. Moreton; Geo. B. Bywater and F. J. Sylvester.

Property: in Tintic mining district. In June 1919, merged into the Tintic Paymaster Mines Co. (q. v.). Eureka King has not been dissolved, but conveyance of its properties has been duly completed.

EUREKA LILLY MINING CO. UTAH

Subsidiary of Chief Cons., 1921.

Office: Judge Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Utah.

Officers: W. I. Snyder, pres.; Thos. Barrett, v. p.; Grant Snyder mgr, with Willard Scowcroft and J. W. Knight, directors. Gideon Snyder, sec.-treas.

Inc. 1907, in Utah. **Cap.** $1,300,000; 10c par; all outstanding; assessable; last (No. 17) assessment of 1c., levied May 9, 1921. Listed on Salt Lake Exchange. Company formed to take over holdings of the Lilly Mining Co. Shares sold 5c. to 35c. in 1920; 5 to 13½c in 1921.

Property: Eureka Lilly mine 8 patented claims, in the East Tintic mining district, adjoining the Tintic Standard mine on the west and including the Ralph mine of the East Tintic Dev. Co., bought in 1916, from which considerable high-grade silver-lead ore was mined years ago.

Development: by 1,840' incline shaft which passes through broken limestone to depth of 1,200', where it enters the underlying quartzite, the ground is cut by N. 10° E. and E.-W. fissures, and ore occurs at intersections. On the 1 400' level these fissures have so far shown no large bodies of commercial ore. Shaft deepened 200' to the 1,840' level in 1920 and drift driven to intersect ore shoot opened in Tintic Standard vein on 1,640' level. On the latter, ore was followed for length of 250'. In 1921, work mainly on 500 and 1,400' levels, latter showing ore assaying 33 oz. silver, $12 gold and 26% coppr, while the 500' shows 18' of ore.

Produced over $150,000 worth of ore running 42% lead and 31 oz. silver per ton, from above the 200' level.

Because of financial conditions, all work was suspended at the end of 1920, but was resumed in June following. All indebtedness on property has been paid.

EUREKA METALLURGICAL CO. UTAH

Address: Eureka, Utah.

Officers: M. M. McChrystal, pres.; R. V. Smith, v. p. and gen. mgr.; Thos. McCormick, treas.; Judge E. Pike, sec.; above, with J. Westerdahl, directors. C. M. Oakes, asst. mgr.

Inc. 1917, in Utah. **Cap.** $500,000; shares $1 par.

The company was organized to conduct a general metallurgical business, on the strength of patents of R. V. Smith for treating carbonate lead-zinc ores by flotation. Operates a small mill at Eureka.

Reported that company has succeeded in obtaining financial assistance to carry on experimental work.

EUREKA MINES CO. UTAH'

Mine address: John H. McChrystal, supt., Eureka, Utah.

Office: 722 Kearns Bldg., Salt Lake City.

Officers: Wm. R. Wallace, pres; Jackson C. McChrystal, v. p.-gen. mgr.

J. E. Berkley, sec.; H. J. Wallace, treas., with John H. McChrystal, directors.

Inc. 1916. in Utah. **Cap.** $100,000; shares 10c par; 850,000 shares outstanding. Listed on Salt Lake Exchange. Sales 3¢-18¢ in 1920; 3 to 8¢ in 1921.

Property: in the Tintic district, is bounded by the Chief Consolidated, Gemini, Centennial, Eureka and Eagle and Blue Bell mines.

Ore: silver-lead of milling grade, averaging about 6 oz. silver and 4% lead with occasional zones of enrichment.

Development: mine has been opened up through the deep workings of the Gemini on the 900′ to 1,500′ levels. Work by the company and lessees was continued on the 1,100′ and 1000′ levels, resectively, during 1920-21, and good ore opened on the 900′ and 1,000′ levels. Shipments October, 1921, ran 30 to 40 oz. silver and 10 to 20% lead, ore coming from east drift on 1,000′ level.

EUREKA OPHIR CONS. MINING CO. **UTAH**

Address: John W. Cairns, pres.-mgr., Gisborn, Utah, or H. P. Stone, treas., Warren, Pa.

Cap. 300,000 shares.

Property: 4 patented claims at Dry Canyon camp, Rush Valley district, Toole county, Utah. Two parallel veins with replacement orebodies in limestone at, and near a dike contact, show 4′ copper-lead-silver ore in 10′ vein at bottom of shaft.

Development: by shaft to 375′ level; in 1913, shipments of 50 tons of ore per month were made from this and the 200′ level averaging 8% copper, 10% lead and 15 oz. silver. When property was under bond and lease, some years ago, to the Mineral Devel. Co., $26.92 ore was shipped from 200′ level. In Sept., 1921, property was refinanced and a campaign of development started.

Mine has produced $175,000 and leasers royalties of $11,000 have met all expenses, no assessments being levied in 20 years operations.

EUREKA SILVER MINING CO. **UTAH**

Address: Alma Eldridge, sec., 212 Atlas Blk., Salt Lake City, Utah.

Assessment of ½c. per share delinquent, Jan. 9, 1922.

EUREKA STANDARD MINING CO. **UTAH**

Address: F. G. Richmond, mgr., Salt Lake City.

Property: 14 claims, about 280 acres, in the East Tintic district, formerly known as the Montana group. Shows several large outcrops.

Development: by 500′ 3-compartment shaft. Work on property was resumed in 1919, and a 1,500′ shaft started.

Assessment work only performed, 1920-'21.

EXCELSIOR IRON CO. **UTAH**

Address: J. R. Walker, 321 Felt Bldg., Salt Lake City, Utah.

Property: a large iron ore deposit in Iron Co., Utah, reported under option for $4,000,000, August, 1921.

FALK MINING CO. **UTAH**

Address: K. H. P. Nordberg, pres., Box 203 Sandy, Utah. Alma E. Malstrom, v. p.; Hyrum A. Nordberg, sec.-treas.; with Alma Francom, and Kristina Nordberg, directors.

Inc. 1913, in Utah. **Cap.** $100,000; shares, 10c par; 200,000 treasury shares.

Property: 8 unpatented claims, 160 acres, in Free Coinage district, North Willow Canyon, Tooele county, 8 miles S. W. of Grantsville, said to show veins with lead, silver, gold, copper ore.

Development: by several tunnels and 120′ shaft. Property is a prospect, idle for some time, but management attempting to sell stock to enable company to resume work.

In October, 1921, property was examined by J. T. Breckon, M. E.,

who reported that a body of gold-silver-copper ore had been cut that averaged $27 per ton.

FARRAGUT MINING & MILLING CO. UTAH

Address: care Ashby S. Thatcher, Boston Blk., Salt Lake City.

Property: the Admiral Farragut group of claims in the North Tintic district, near Eureka, developed by a 265' shaft, which was to be sunk to 500'. No recent returns; probably idle.

FEDERAL MINING & MILLING CO. UTAH

Out of business. Former address: Stateline, Iron county, Utah. J. C. Clark, mgr. See Vol. XIII.

FERBER COPPER CO. UTAH

Dead. See Vol. XIII of this work.

FISSURES EXPLORATION CO. UTAH

Company no longer in existence. Entire stock issue owned by **American Fork Exploration Co.**, which see.

FLORENCE MNG. & MLG. CO. UTAH

Address: Marysvale, Utah. J. A. Fitzpatrick, gen. mgr.; W. A. Fitzpatrick, sec.-treas. Operates a 100-ton potash plant, built in 1918. The mine supplies alunite from which the potash is derived.

Mill was in use by other companies for experimental purposes during 1919.

FLUORITE MINES CO. UTAH

Address: Box 425, Salt Lake City.

Officers: Leo H. Crane, pres.; E. W. Crane, Jr., v. p.; A. R. Sorensen, sec.-treas., with Mrs. E. W. Crane, Jr. and Mrs. A. R. Sorensen, directors.

Inc. Jan. 25, 1921, in Utah. **Cap.** $100,000; par 10c; 600,000 treasury shares; assessable.

Property: 2 unpatented claims, and bond and lease on 4 patented claims, on Wildcat Mt., Tooele county. A fissure vein in limestone is reported to show silver-copper ore, with a fluorspar gangue. Opened by 100' incline, and equipped with gasoline hoist and compressor.

FORTUNA GOLD QUEEN MINING CO. UTAH

Mail returned from B. F. Capper, pres., 333 Judge Bldg., Salt Lake City, Utah.

Property: 3 claims at Fortuna, Beaver county, said to show free gold in 8' quartz vein in limestone and porphyry. Opened by tunnels and 200' shaft. Equipped with gasoline hoist. Closed down. No recent returns.

FORTUNA INDEPENDENCE MINES CO. UTAH

Inactive. **Address:** E. C. McGarry, pres., 1388 S. 9th E. St., Salt Lake City, Utah.

Property: 8 claims in Fortuna district, Beaver county, and 2 claims in Grand county, held under bond and lease. Ore occurs in intrusive rocks, porphyry and trachyte predominating. Mine is developed by 165' shaft and 400' adit, said to show an oreshoot 18" wide and exposed for 135', giving assays of $20 gold and 3-5 oz. silver. Management planned extending the adit to 800' in 1917. Five-stamp mill built in 1917, at company's Henry mountain property, 85 miles S. of Green River station. No recent returns

FORTUNA MINING & MILLING CO. UTAH

Inactive and property sold to Montana Bingham. See Vol. XIII.

FREE COINAGE MINING & MILLING CO. UTAH

Letters neither answered nor returned from office: 69 Commercial Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. L. A. Evans, pres.; D. H. Wenger, sec.-treas.

Inc. 1896, in Utah. **Cap.** $125,000; shares 25c par, assessable, with 2 assessments levied.

Property: 4 claims, 3 patented, in Little Cottonwood canyon, 2 miles from a railroad, developed by shaft and tunnels, showing lead and copper ores.

FREE GOLD MINING & MILLING CO. **UTAH**

Officers: Ephriam Jensen, pres.-treas.; L. C. Cluff, sec.; with E. R. Ellerbeck. A. Szizek, Jos. S. Wells and E. V. McCune, directors.

Inc. 1901, in Utah.

Property: a group of claims in Farmington canyon, Davis county, shows silver-lead ore with some gold. Is a prospect. Company dormant since 1915.

GALENA PARK MINING CO. **UTAH**

Address: Milford, (or Newhouse), Utah.

Officers: F. W. Thackwell, pres.; W. J. Critchlow, v. p.; S. C. Powell, sec.; J. E. Beesan, treas.

Inc. Sept., 1919, in Utah. **Cap.** $125,000; par 10c.

Property: in Beaver Lake district, Beaver county, is being developed by a tunnel following a fissure toward an old shaft from which ore was mined in early days.

GARDEN CITY MINING & SMELTING CO. **UTAH**

Address: Victor Lensky, pres., Ogden, Utah.

Officers: above with S. C. Powell, v. p.; T. M. Cain, 2nd v. p.; P. A. Patterson, sec.-treas. all of Ogden and J. Morrison, Garden City, directors.

Inc. January, 1922, in Utah. **Cap.** $125,000; par 25c.

Property: in Rich county, Utah.

GARFIELD CHEMICAL & MANUFACTURING CORP'N **UTAH**

Subsidiary of the American Smelting & Refining Co. and Utah Copper Co., operated under joint agreement.

Address: Garfield, Utah.

Officers: C. W. Whitley, pres.; C. M. MacNeill, v. p.; R. C. Gemmell, v. p.; J. M. Bidwell, sec.-treas.

Treats concentrate from the Utah Copper Co. and the custom ores from scattered points in Utah. To supply sulphuric acid for leaching copper ore and other purposes, a 150-ton acid plant costing nearly $500,000 was erected late in 1916. Fumes from the smelter supply the sulphur.

Equipment: two 20′ Herreshoff roasting furnaces of 50-ton capacity each, brick-lined steel flue, pyrite burners, Glover tower, lead-lined acid chambers, and two Gay-Lussac towers. Both 66° and 98° B. acid are made. Leaching and flotation plants nearby will consume most of the acid.

Operated for 11 months in 1920 and produced 25,844 tons of 60-degree acid, of which Utah Copper Co. used 22,298 tons; at beginning of 1921, the latter was using entire production of plant.

GARFIELD SMELTING CO. **UTAH**

Office: 120 Broadway, New York. **Operating office:** 714 McCornick Blk., Salt Lake City, Utah; J. M. Bidwell, mgr., of Utah Dept. **Works office:** Garfield, Salt Lake Co., Utah; A. H. Richards, mgr. Entire capital stock owned by American Smelters Securities Co.

Operates a copper smelter with an annual capacity of 2,100,000 tons; fully described in Vol. X.

GARRISON-MONSTER MINING CO. **UTAH**

Office: Utah Sav. & Trust Co., Salt Lake City, Utah. Mine near Gold Hill, Tooele county, Utah.

Officers: J. P. Gardner, pres.; J. S. Garrison, v. p.; H. B. Windsor, sec.; S. W. Morrison, treas.

Inc. June, 1906, in Nevada. Cap. $1,000,000; $1 par; assessable; last assessment (No. 15), of ½¢, levied in July, 1920. Is a merger of the Garrison G. & C. Mng. Co. and the Monster Mng. Co.

Property: 26 claims, patented, on Dutch mountain, in the Deep Creek district, 40 miles from Wendover, on Western Pacific railroad. A branch line to the district was completed in 1917, reducing transportation costs materially. The Garrison Monster company built a loading station at Garrison station on its spur from the Deep Creek line. Mine has over 3,500′

of workings and is said to show considerable bodies of silver-lead ore. Work was resumed in 1917.

During both 1919 and 1920, a few ore shipments were made. Company developing known orebodies by tunnel to make possible the exploitation of ore by gravity.

The **Brewer G. & C. Mng. Co.** is under same management.

GEMINI MINING CO. UTAH

Office: 723-4 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: E. W. Packard, pres.; Jackson C. McChrystal, v. p. and gen. mgr.; J. E. Berkley, sec.; E. O. Howard, treas., with W. Van Cott, directors. John H. McChrystal, supt.

Cap. 5,000 shares, $100 par. **Dividends:** to 1918, totaled $482 per share. In 1916, $16 per share was paid and in 1917 $20 per share.

Property: the Gemini is a silver-lead mine with accessory copper ore, in shoots. There are 3 fissure veins, in an ore-channel about 450′ wide, cut transversely by a number of cross-fissures, making a rather complex system of orebodies, the main fissure of 15 to 20′ width, having a S. E. dip, with ore-shoots raking to the north. Ore in the upper workings averages about 12% lead and 40 oz. silver, while the bottom level, at 1,600′, shows a 20′ vein carrying argentiferous 3% copper ore.

Development: by 1,700′ shaft and a 300′ winze, equipped with electric hoist. The adjoining Ridge & Valley mine is operated through the Gemini shaft, and workings of Eureka Mines Co. are connected with those of the Gemini. Mine management of the 3 companies is the same.

Early in 1920, reported that ore had been uncovered on 1,700′ level west of the main fissure. Mine is operated in part by lessees.

Production: in 1919 was 7,804 tons of ore, yielding 143,983 oz. of silver and 1,499,820 lb. of lead. Gross profit was $201,577, and expenditures $222,538. No figures available for 1920-'21.

The Gemini has been a regular producer since 1886. Management, like many in Utah, extremely reticent about giving any information.

GENERAL EXPLORATION CO. UTAH

Alfred Frank, gen. mgr., Newhouse Bld., Salt Lake City, Utah.

Officers: Alfred Frank, pres.; E. L. Newhouse, Jr., v. p.; C. G. Bamberger, sec.-treas. (all of Salt Lake City), with John MacGinniss, of Butte, directors.

Inc. in Utah, in June, 1915. **Cap.** 10,000 shares; $1 par; 7,500 out-

Company operated the Ohio Copper Co., property until it was taken over by the reorganized Ohio Copper Co. of Utah. Royalties aggregating upwards of $500,000 were paid, and lessees are said to have made large profits.

GENERAL EXPLORATION CO. UTAH

Address: Providence Bldg., Duluth, Minn.

Officers: Hansen Evesmith, pres.; Wm. O. Pealer, v. p.; M. W. Evesmith, sec., with E. I. Bricker, U. L. Yynott, and E. J. Hansen, directors.

Inc. July 21, 1903, in Minnesota. **Cap.** $100,000; $50,000 in preferred, and $50,000 in common stock; outstanding, $50,000, and $300 preferred.

Company is an exploration and holding company interested in the St Croix and other companies in Star and South Star districts, Beaver county.

GETHIN LEROY UNITED MINES CO. UTAH

Office: 517 Atlas Blk., Salt Lake City, Utah.

Officers: A. S. Fowler, pres. and treas.; Jas. Moffat, sec., with Given Fowler and Loris Pratt, directors.

Cap. $1,000,000; $1 par; 750,000 issued. Paid a dividend of 1c per share, November, 1913.

Property: in Silver Islet district, Tooele county, 15 miles north of Wendover. Company has made several shipments of silver ore, but ran out of money and leased mine; lessees are said to have shipped 500 sacks of ore in January, 1906.

Property reported sold in August, 1917, to satisfy a judgment for $3,616 in favor of E. Hanson. No later information.

GINZA COPPER CO. **UTAH**

Idle. Mine near Kelton, Boxelder county, Utah. Operations stopped in 1915 after considerable prospecting had failed to locate ore of commercial grade. Described Vol. XI, Copper Handbook.

GLEN ALLEN MINING CO. **UTAH**

Address: Box 88, Park City, Utah.

Officers: J. B. Allen, pres.-gen. mgr.; W. F. Normandy, v. p.; J. S. Grace, sec.; Prince Francesco Rospigliosi, treas., with S. A. King, Russel Schulder, Nash Rockwood and R. H. McNeill, directors.

Inc. May 31, 1918, in Utah. **Cap.** $2,000,000; $1 par; assessable; issued 1,730,799 shares. Annual meeting in June. Secretary acts as transfer agent.

Property: 10 claims, patented, in Glencoe canyon, 3 miles S. E. of Park City, including the old Glencoe mine, a silver-lead producer. Also controls by stock ownership the Second Ontario Mining Co., which owns 12 claims. Veins carry complex ore carrying gold-silver-lead-zinc-copper and iron, one vein opened for 1,500′ said to show 30,000 tons mill ore.

Development: 200′ vertical shaft and a 2,250′ tunnel, with total workings of 3,500′. Management claims 50,000 tons ore blocked out with average assays of 10% lead, 10 oz. silver, 16% zinc and ½% copper.

Equipment: includes 50 h. p. hoist and 6-drill compressor. A 225-ton concentration mill with flotation unit was completed in 1921. Although comparitively high in silver and lead, the zinc content has made the ore undesirable for smelting, but differential flotation is expected to solve the problem. Tests have shown a 90% recovery. Examined by J. S. Weeks and Frank D. Pagliuchi.

In November, 1921, foreclosure proceedings were begun by Prince Rospigliosi, under $300,000 mortgage notes, dated Sept. 8, 1920.

GLENWOOD MINING CO. **UTAH**

Office: 1102 West Seventh South St., Salt Lake City, Utah.

Officers: E. P. Mowers, pres. and gen. mgr.; N. W. Sonnedecker, v. p.; M. L. Grovenor, sec.-treas.

Inc. Feb. 21, 1901, in Utah. **Cap.** $30,000; shares 10c par; assessable; increased 1912, to $125,000, shares 25cts. par.

Property: 8 claims, patented, in Big Cottonwood district, 6 miles from a railroad, opened by shafts and tunnels, with about 1,600′ of workings. No recent information.

GLOBE CONS. MINING CO. **UTAH**

John Cleghorn, pres.-gen. mgr., Boston Bldg., Salt Lake City, Utah.

Shares are assessable; ½¢ assessments became delinquent on July 30, and Nov. 14, 1921.

Property: located in American Fork Canyon, said to show limestone cut by fissure veins with lead-silver ore.

Developed: by tunnels—main tunnel had a length of 800′ early in June, 1919. Management claims to have a good tonnage of milling ore. Reported to have cut full face rich copper-gold-silver ore, November, 1921, in Read & Benson lime beds, by crosscut driven from Holden drainage tunnel. Ore is in Silver Wave claim, leased by **American Leasing Co.**

GODIVA MINING CO. **UTAH**

Office: 735 Kearns Bldg., Salt Lake City, Utah. Mine office: Eureka, Juab county, Utah.

Officers: E. W. Packard, pres.; J. C. McChrystal, v. p. and gen. mgr.; J. E. Berkley, sec.; E. O. Howard, treas.

Cap. $1,000,000; $1 par. In 1919, 144,000 treasury shares offered to public at 30c. Financial statement for 1918 showed receipts from ore sales, $49,260; expenditures included $20,502 paid lessees and $14,029 for development. Cash on hand, January 1, 1919, $4,112. Shares are assessable; 1c assessment became delinquent on August 1, 1921.

Property: 64 acres of patented claims in Tintic district. Only leasing done for some years, company not operating on account of settlement of estates.

Development: by 1,200′ shaft, with a winze 150′ below that level. New work in 1918 amounted to 1,057′. Good lead-silver ore is said to have been opened on the 1,300′ and 1,350′ levels.

Equipment: 250-h. p. hoist, compressor, 100-ton concentrator, ore bins, buildings, etc.

From 1908 to April 1, 1917, production was 13,701 tons of crude ore and 2,861 tons of concentrate, worth $805,687. In 1916 zinc and silver-lead ores yielded $93,000, mostly from 700′ level. In 1918, ore mined totaled 1,800 tons, average value, $37.13 per ton.

Rumored late in 1920 that property had been sold, but confirmation is lacking.

GOLD BOND MINING & MILLING CO. UTAH

Idle. **Last address:** 27 Latimer Block, Salt Lake City, Utah.

Officers: A. A. Crome, pres.; Walter Crome, v. p.; Wm. Crome, sec.-treas., with W. C. Howe and C. F. Stanley, directors.

Inc. 1898, in Utah. **Cap.** $25,000; 5c par; assessable; 200,000 shares outstanding.

Property: 2 unpatented claims, 4 miles from a railroad, Tooele county, shows a contact fissure vein, traceable on surface and carrying streaks of copper, gold, silver ore in limestone formation. Assays average 4% copper. Is merely a prospect reported to have good showings. Developed by a shallow shaft and 120′ tunnel, with about 300′ of workings. No recent information.

GOLD CHAIN MINING CO. UTAH

Provo, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: C. E. Loose, pres. and gen. mgr.; J. T. Farrar, v. p.; P. G. Peterson, sec.-treas., with G. Simmons and John R. Turloes, directors. W. D. Loose, supt.

Inc. Dec., 1910, in Utah. **Cap.** $250,000; shares 25c par. Listed on Salt Lake Exchange.

Dividends: to date, $130,000. Company absorbed the Ajax Mining Co., said to have paid upwards of $1,000,000 in dividends.

A dividend of 1¢ per share declared at end of 1920.

Property: the Gold Chain group and Ajax mine in the Tintic district. Development on the 1,500′ level opened an orebody averaging 15 to 20 oz. silver, 40 to 50% lead and $2 to $3 gold per ton.

Development: new work in 1919, was being done from the 1,800′ level of the Empire Mines Co.

Operations were entirely in the hands of lessees in 1920.

Equipment: hoist, 17-drill compressor, and electric motors.

Mine is operated jointly with the Opohongo, and equipment is under joint ownership.

GOLD CROWN MINING & MILLING CO. UTAH

Address: Milford, Beaver county, Utah.

Officers: A. L. Cullimore, pres.; C. G. Johnson, v. p.; S. L. Swanson, sec.-treas.; James Kirk, mgr.; W. E. Yardley, asst. mgr.

Cap. $10,000; shares $1 par.

Property: 7 claims and lease on another in Star district, Beaver county. Some rich lead-silver ore opened. Reported in May, 1919, that nine cars

of ore had been shipped, mainly from 300′ level, said to assay 20-25% lead and 45 oz. silver.

Small ore shipments were continued during 1920 and early in 1921.

GOLDEN EMMA MINING CO. **UTAH**

Geo. F. Busch, pres. and mgr., 426 Vermont Bldg., Salt Lake City.

Cap. $1,000,000; shares $1 par.

Property: 30 claims, under development in 1918. No recent report.

GOLDEN REEF CONS. MNG. & DEV. CO. **UTAH**

Address: 22 Keith Emporium Bldg., Salt Lake City, Utah.

Officers: D. P. Rohlfing, pres. and mgr.; Leon Sweet, v. p.; H. S. Young, sec.-treas., with L. Simons, J. Rosenberg, C. B. Stewart and David Spitz, directors.

Cap. $100,000; shares 10c par; 800,000 shares outstanding.

Property: about 750 acres, in Beaver county, about 5 miles N. of the Horn Silver mines, developed by a 2,000′ tunnel and a 450′ double-compartment shaft with four levels.

Work was resumed in November, 1919, after a shutdown of several months. No recent report.

GOLDEN RELIEF MINING CO. **UTAH**

Address: Provo, Utah. Ben. H. Bullock, mgr.

Property: located in Santaquin district, was under development in the fall of 1919. No later report.

GOLD HILL MINES DEVELOPMENT CO. **UTAH**

Main office: 425 Atlas Block, Salt Lake City, Utah. **Mine office:** American Fork, Utah.

Officers: Theo. Nicholes, pres. and gen. mgr.; A. J. Weber, v. p.; H. J. Fitzgerald, sec.-treas.

Inc. July, 1916. **Cap.** $1,000,000; par $1; 300,000 in treasury; 290,000 sold. Increased 1916 from $50,000; 10c par; assessable.

Property: 9 claims in American Fork district, Utah county, on Miller Hill. Ledge said to show copper ore, with lead, gold and silver.

Development: by 3 short tunnels, lowest driven to open ore found in upper tunnel.

GOLD SPRINGS MNG. CO. **UTAH**

Defunct many years ago.

GOLDSTRIKE BONANZA MINING CO. **UTAH**

Probably dead, see Goldstrike Con. Both companies described in Vol. XIII.

GOLDSTRIKE CONSOLIDATED MINING CO. **UTAH**

Dead. Mail sent Rolla E. Clapp, pres., returned, from former office, 603 Newhouse Bldg., Salt Lake City. Described in Vol. XIII.

GOLDSTRIKE MINING & LEASING CO. **UTAH**

Mail returned, 1919, from former address, 603 Newhouse Bldg., Salt Lake City, Utah.

Officers: H. G. Snyder, pres.; E. J. Lund, v. p.; Rolla E. Clapp, sec.-treas., with Clyde McQuarrie, Louis R. Lund and H. A. McQuarrie, directors. **Inc.** April 16, 1915. **Cap.** $100,000; shares 10c par.

Property: lease Nos. 1 and 2 on Hamburg claims of Bull Valley Gold Mines Co., 3 claims of the Herd Girl group, Last Chance and Cripple Creek groups in Goldstrike district, Washington county, Utah. Said to show gold ore occurring in fissure vein, 4′ wide and averaging from $7 to $20 per ton. **Ore reserves:** 10,000 tons blocked out, according to published reports.

Development: 500′ adit, at depth of 300′ with several winzes, drifts and upraises.

Equipment: two 3-stamp mills of 20 tons daily capacity, 20-h. p. engine and compressor.

No recent report, probably idle. The Goldstrike district had a boom several years ago, but is at present inactive.

GRAND CENTRAL MINING CO. UTAH

Office: Provo, Utah. **Mine office:** Mammoth, Juab county, Utah

Officers: Jos. T. Farrar, pres.; H. L. Holbrook, v. p.; Preston G. Peterson, sec.-treas., Col. Edwin C. Loose, gen. mgr.; W. D. Loose, supt.

Inc. Feb., 1902, in Colorado. **Cap.** $600,000; increased 1909 from $250,000; shares $1 par, non-assessable; issued 600,000. Stock listed on Salt Lake Exchange.

Dividends: in 1914, 15c per share; in 1915, 2½c; in 1916, 8c; in 1917, 16c; in 1918, 12c.; in 1919, 4c; in 1920, 7c; in 1921, 1c to Jan. 21; 1½c No 75) on Dec. 20; total, $1,895,000.

Property: the Grand Central is the deepest mine of the Tintic district. It adjoins the Centennial Eureka and is opened to the 2,600' level, carrying a main ore channel the full length of the property. The orebody is 200' wide in places and of low average grade, though it is the largest orebody in the Tintic camp. In 1920, mine was producing from the 540' to the 2,100' levels. Mine reopened and regular shipments begun Dec. 20, 1921. Seventy leasers at work, 1922. Shipments, about 200 tons weekly. Mine sold to Chief Cons., 1922.

Equipment: includes hoist, tramway, electric power and a compressor, installed 1920.

Production: about $10,000,000 to date.

GRAND RIVER PLACER CO. UTAH

Office: 201 Felt Bldg., Salt Lake City, Utah.

Officers: O. W. Kumrow, pres.; Leo Erdman, v. p.; W. H. Penner, sec.-treas., mgr.

Inc. 1918, in Utah. **Cap.** $100,000; shares 10c par; 300,000 shares issued; 700,000 in treasury; assessable; a 10c assessment became delinquent, August 5, 1921. Annual meeting, first Monday in July.

Property: 3,000 acres of placer ground, at Grand River, Grand county, Utah. Gravel runs from 80 cents to $7 per cu. yd. Equipped with a Mitchell amalgamator of 35 tons capacity. Expended $6,000 in 1918. No production reported.

GRANITE COPPER CO. UTAH

Address: Beaver, Beaver county, Utah.

Officers: A. L. Fotheringham, pres. and mgr.; Jos. McEwen, v. p.; J F. Tolton, sec.-treas., at last accounts.

Cap. $1,000,000. Shares, $1 par.

Property: the King of the Hills mine in the Mineral range between Milford and Beaver, has a 2' vein, carrying high-grade silver-lead ore with some copper.

Opened by a 250' shaft and 1,100' tunnel. About $25,000 has been spent on the mine. No recent report, probably idle.

GRANITE MINING & MILLING CO. UTAH

Address: Santaquin, Utah.

Officers: F. O. Bylund, pres.; Jos. Tietjen, v. p.; Jas. Goodall, sec.; C A. Lindstrom, treas.-supt., with T. B. Heelis, R. J. Armstrong and Jos. Crook, directors.

Property: 12 claims, unpatented, near Santaquin, includes the Granite mine. Claims show limestone with ore-bearing fissures, carrying replacement deposits of copper and silver-lead ore developed by 1,000' tunnel. No recent report, probably idle.

GRATER CONS. MINES CO. UTAH

Reorganized as **Mutual Metal Mines Co.**, which see.

Address: 201 Ness Bldg., Salt Lake City, Utah.

Inc. Feb., 1919, in Utah. **Cap.** $1,500,000 $1 par; over 1,000,000 treasury shares. Assets, Jan. 1, 1921, $25,000. Reorganized and capitalization reduced July 12, 1921.

Property: 76 claims in Big Cottonwood Canyon. Company plans driving a 5-mile tunnel to unwater mines and cut mineral bearing fissures of

Carbonate Cons., Cardiff, Prince of Wales, and several other companies. The project has merit and is certainly ambitious.

GREAT COPPER KING MINING CO. **UTAH**

Inc. Aug., 1904 in Utah. Cap. $50,000; shares 10c par; issued, $47,500; assessable; last assessment 1/10 ct. delinquent March 7, 1914.

Property: 10 claims, unpatented, including 4 claims, 1 fractional, held under bond and lease, near the mouth of Little Cottonwood canyon, 7 miles from Alta.

Development: by shallow shafts and a 300′ tunnel with about 800′ of workings, showing auriferous and argentiferous copper and lead ores. Ore occurs in fissure veins as contact deposit in granite and quartzite.

Samples taken from main tunnel on 300′ level said to assay from 19-33% copper. J. E. Smith, a director, was developing property under contract in 1916. No later information.

GREAT DIVIDE MINES CO. **UTAH**

Property purchased by the **Homestake Tunnel & Copper Co.**, which see.

Office: 521 Atlas Block, Salt Lake City, Utah. John B. Taylor, supt.

Inc. Aug. 15, 1903, in Utah. **Cap.** $2,000,000; $5 par.

Property: 108 claims, mainly patented, 1,735 acres, 600 considered as well mineralized, with 160 acres mill and smelter sites, lying on the Tooele side of the Oquirrh mountains and on the summit of the range, west of the holdings of the Utah Consolidated. Property shows Cambrian quartzite, monzonite-porphyry and altered limestone, with a number of fissure veins and contact deposits between limestone and quartzite. Claims cover 11,600′ on the westerly course of the mineralized limestone beds of Bingham. This tract is 2 1/6 miles from E. to W. and 10,800′ N. S., and contains the apexes of many ore-bearing fissures, and the westerly extensions of the ore-bearing limestone bed worked in the Utah Consolidated, Bingham New Haven, Utah Apex and Yampa Mines.

Development: includes the 400′ Homestake tunnel in Pine Canyon, 525′ North tunnel at 6,600′ elevation, and the 2,457′ Spring tunnel. These tunnels are prospect work only, but ore is cut in the last named at 1,050′ and shows a 5′ width for 40′ along the drift and in a 25′ raise. A vertical E. W. fissure 100′ wide is also cut at 2,250′ from the portal and shows kidneys and stringers of silver-lead ore.

Equipment: includes a 35-h. p. electric plant, with a 1-drill compressor, and there are 10 buildings, including a small power house, 2 smithies, a bunk house, stable and dwellings. Electric current is taken from the Telluride Power Co., over this company's private line from the sub-station at Bingham.

GREAT WESTERN GOLD & COPPER CO. **UTAH**

Merged with Mountain Lake Mining Co. and Thor Mining Co. under title of **Great Western Mines Co.**, which see.

GREAT WESTERN MINES CO. **UTAH**

Office: Knight Bldg., Provo, Utah.

Officers: O. Raymond Knight, pres.; J. W. Knight, v. p.; R. E. Allen, sec.-treas., with Jas. H. Moyle, W. I. Snyder, R. A. Brighton and K. S. Jordan, directors.

Inc. 1916, in Utah. **Cap.** $300,000; 10c par; increased in 1920 from $150,000. Listed on Salt Lake City Exchange. Company is a merger of the Great Western Gold & Copper Co., Mountain Lake Mining Co., and the Thor Mining Co., all described in Vol. XI, Copper Handbook.

Property: 98 claims, in the Big Cottonwood and Snake Creek districts, in Salt Lake and Wasatch counties.

Ore: gold, silver, copper and lead, mainly in contact deposits; no estimate of ore in sight.

Development: 500′ of shafts, 8,500′ of tunnels, 350′ winzes and raises, and 2,000′ of crosscuts. Ten cars of copper ore said to have been shipped from the property. Company has a transportation agreement with the Snake

Creek Mining & Tunnel Co., a subsidiary of the Judge Mining & Smelting Co., for use of the 14,500′ tunnel.

GREEN MOUNTAIN MINING & MILLING CO. **UTAH**

Probably idle. No 1917-19 returns secured.

Officers: Dr. R. S. Millbee, Marshfield, Wis., pres.; Dr. H. H. Millbee, v. p.; A. E. Goodell, sec.; S. Amberson, treas., with B. S. Rich, directors.

Inc. 1915, in Utah. **Cap.** 1,500,000 shares; 100,000 issued.

Property: Green Mountain group in Miners Basin, Grand county, Utah, 35 miles S. E. of Cisco, on the D. & R. G. R. R., formerly owned by the Green Mountain G. & C. Mining Co., and fully described in Vol. XI. Copper Handbook.

Ore: gold, silver and copper, low-grade ore said to average about $8 per ton; also said to show some high-grade ore. Developed by Dewey crosscut tunnel.

Equipment: 30-h. p. gasoline engine, 2 sets of power drills, compressor and pumps.

GRIGGS-HUISH LEASING CO. **UTAH**

Dead. **Former address:** Thos. O. Keefe, supt., Eureka, Utah.

GRUTLI MINING CO. **UTAH**

Described in Volume XIII. Reorganized, November, 1917, and now known as the **Eureka Bullion Mng. Co.**, which see.

HANAUER SMELTING WORKS **UTAH**

At Salt Lake City, Utah. Absorbed by **American Smelting & Refining Co.**, and plant dismantled.

HELLGATE MINING CO. **UTAH**

Address: Dr. Hugo Rettich, pres., 52 W. 68th St., New York City. E. O. Leatherwood, v. p.

Inc. Feb. 5, 1916, in Utah. **Cap.** $150,000; par 25¢.

Property: the Hellgate, No. 2, 3 & 4 claims between Superior and Peruvian gulches, in heart of Alta Cottonwood camp. Cardiff fissure said to cross claims. But little work done, 1918-1920.

Property drained by Wasatch Mines Co. drain tunnel. The Frederic, Crown Prince, Alaska and Alaska Extension, above the Hellgate group, are owned by Dr. Rettich personally.

HIGHLAND BOY GOLD & COPPER MINING CO. **UTAH**

Controlled by **Utah Cons. Mining Co.**, and described under that title.

HINMAN MINING CO. **UTAH**

H. W. Hinman, pres., F. G. Morse, sec., 168 S. Main St., Salt Lake City, Utah.

Property: the old Pocahontas lead-silver mine, 6 claims, located 6 miles from Gold Hill. A tunnel was driven to get under the ore disclosed in the 130′ incline shaft above, and some ore was shipped in 1918.

HOMESTAKE T. & C. CO. **UTAH**

Address: John B. Taylor, 678 E. So. Temple St., Salt Lake City, by whom company is controlled.

Officers: J. H. Hurd, pres.; John B. Taylor, v. p.-mgr.; Walter A Cook, sec.-treas.

Inc. 1906, in Utah. **Cap.** $100,000; shares $5 par; assessable; fully issued. Is a close corporation, with only 5 stockholders. The Western Mining & Milling Co. (q. v.) is a subsidiary.

Property: 30 claims, in Pine Canyon, West Mountain section, Tooele county, with water rights, tunnel rights and franchise for a deep tunnel from Pine Canyon into the Bingham district; also several hundred acres of bench lands, and an 800-acre smelter site, 4 miles from the International smelter. Claims show bedded veins with lead and copper ores.

Also owns by later purchase, property of the Great Divide Mines Co. Homestake holdings were under bond and lease for 12 months ending July 1, 1919. No later information.

HOPE OF ISRAEL MINING CO. **UTAH**

Ben H. Bullock, pres., Provo, Utah; Noro A. Bullock, sec.-treas.

Inc. 1918, in Utah. **Cap.** $50,000; shares 1c par.

Property: at Santaquin, being developed by tunnel said to have opened up low-grade lead-silver-copper ore.

HORN SILVER MINES CO. **UTAH**

Office: 27 Cedar St., New York. Operating office: McCornick Bldg., Salt Lake City, Utah. Mine office: Frisco, Beaver county, Utah.

Officers: Jacob Neadle, pres.; Alex. B. Simonds, v. p.; M. S .Hirschberg, sec.; Harvey N. Wadham, treas., with Geo. A. Critchlow, A. B. Simonds, Jacob Neadle, W. R. Britton, Chas. Brenneman, S. T. Perrin, H. N. Wadham and H. S. Young, directors. Wm. H. Hendrickson, mgr.

Is a reorganization of the Horn Silver Mining Co., which was incorporated in 1879 in Utah, with capital of $10,000,000; shares $25 par. Stock in old company exchangeable for stock in the new on an equal basis.

Inc. Oct. 17, 1917. **Cap.** $400,000; $1 par; all issued. Bankers Trust Co., New York, registrar. Annual meeting 3rd Thursday in August. Listed on New York Curb, but not on quotation sheets or lists.

Dividends: old company paid $5,642,000 in dividends up to 1907. Three dividends of 5c each were paid in 1916, two by the former company and one by the present. Two 5c dividends were paid in 1917, and one of same amount in 1918. None since. Statement for 1919 (last issued) shows receipts from ore shipments $149,668, compared with $181,235 in 1918; miscel. income, $4,345, compared with $4,513; operating expenses, $151,739, against 1918 figure of $147,864; general expenses, $41,581, compared with $20,383; net profits, $2,071, compared with $33,371 in 1918; $27,283 in 1917 and $62,798 in 1916.

Property: 19 claims, 9 patented. The mine is extensively developed, and has been a large producer of zinc, lead, silver and gold, with some copper as a by-product. The old bonanza ores extended down to depth of about 800', with silver ores on the footwall and copper ore on the hanging. Main orebody was lost at 900' and present company's main object is to find its extension below that level.

Development: by 1,200' shaft and considerable work done on the lower levels. Last report for year 1919 shows 1,704' of work on all levels. The north 900 and 1,000' levels show shipping ore. In addition the low grade ores and tailings are estimated at 180,000 tons and carry workable values.

Production: in 1916, 16,567 tons of ore were shipped, made up of 8,504 tons lead-silver ore, 3,986 tons zinc-lead, 102 tons zinc, 1,237 tons copper and 2,739 tons old slag. In 1917, output was 11,736 tons of ore, consisting of 10,507 tons lead ore, 131 tons zinc ore and 1,098 tons copper ore. In 1918, 12,528 tons, consisting of 11,712 tons lead ore, 170 tons copper and 646 tons lead concentrates.

In 1919, company shipped 19,469 tons lead, zinc and copper ore, and 1,816 tons lead concentrate, for which it received $149,668; most of the ore came from above the 700' level. No official report was issued for 1920, but it is understood that ore shipments of 1,000 tons per month were made during at least part of the year; and in 1921 some shipments of milling ore were made to the Tintic Milling Co.

HORN SILVER MINING CO. **UTAH**

Reorganized, 1916, as **Horn Silver Mines Co.**, which see.

HOWELL MINING CO. **UTAH**

Office: 209 Felt Bldg., Salt Lake City, Utah.

Officers: T. L. Walden, pres.-mgr.; M. J. McGill, v. p.; J. H. Deming, sec.-treas.; with Jas. Burke and T. H. Paull, directors.

Inc. in 1910. **Cap.** $600,000; $1 par; 555,000 shares outstanding. Assessments of 1c a share levied March and Sept., 1921, and No. 13, Jan. 1922. Listed on Salt Lake Exchange. Shares sold 3½-17c in 1918; 7-12½c in 1919; 4½-11c in 1920; 6¾-12c in 1921 to June.

Property: an old mine, formerly known as the Baby McKee, 7 patented claims, in the Alta-Cottonwood district, about 25 miles S. E. of Salt Lake City, adjoins the Cardiff property on the east. Claims cover strike of

Howell vein, said to be traceable on property for over a mile, with strike N. E.-S. W. and 4′ width. Country rock is quartzite and limestone. **Ore:** silver, copper, lead, zinc and antimony, said to average $20 to $50 per ton.

Development: 150′ of shafts, and over 1,800′ of tunnels. The main tunnel is in about 2,000′. It will have a back of 300′ below old workings in the Baby McKee fissure and is reported to have cut streaks of good ore in fall of 1920. Shipments were made prior to 1910. Development work only is being done; several small fissures have been cut.

IBAPAH GOLD MINING CO. **UTAH**

Property: the Queen of Sheba mine, in the south end of the Deep Creek country, Beaver county, Utah, an old gold mine credited with a production of $80,000. Mine shows vein 5-18′ wide. Pay ore occurs in shoots assaying from $10-$13 per ton.

Development: by an 1,187′ main tunnel, several short tunnels and a 376′ raise.

Equipment: includes a small mill.

Worked under a 3-year lease from 1914 by C. E. Johnson. No later information.

IBEX GOLD MINING CO. **UTAH**

A **Knight Investment Co.** property.

Address: Knight Blk., Provo, Utah.

Officers: O. Raymond Knight, pres.; Reed Smoot, v. p.; R. E. Allen, sec., with W. Lester Mangum, J. Wm. Knight and C. E. Loose, directors.

Property: the Ibex mine, 40 patented claims, in the Detroit (Iov) district. Millard county, 35 miles from Oasis, located nearly 40 years ago. Claims cover 2 horizons of limestone, both cut by porphry dikes and intrusives. Ore occurs in veins and bedding offshoots, (the veins being 25-100′ wide), and carries 2-20% copper, up to 3 oz. silver, and $1 to $20 gold per ton.

Development: by 2 shafts, 500′ and 600′, and a tunnel.

A former company failing in winter of '94-'95, Jesse Knight took the property up in 1906 and did some work. Idle from 1907 to Nov. 24, 1915, when property was leased to the Detroit Copper Mng. Co. for 5 years under a $100,000 bond. In 1919, the lease was taken over by the **Monarch Cons. M. Co.**, which see.

IMPERIAL LEAD MINING CO. **UTAH**

Office: 406 Hooper Bldg., Salt Lake City.

Officers: W. Mont Ferry, pres.; J. H. Turner, mgr.; Frank Jardine, supt.

Assessments on shares were levied summer of 1920 and in January, 1921.

Property: in West Tintic district, Tooele county, said to show a 6′ vein of lead-silver ore, assaying 40% lead and 10 oz. of silver.

Shipments are reported for 1918-'19, attaining a substantial tonnage in 1920. Operations largely suspended in December, but were to be resumed early in 1921.

INDEPENDENCE MINING CO. **UTAH**

Address: A. G. Mattson, Eureka, Utah.

Officers: A. G. Mattson, pres.; P. J. Fennell, v. p.; Harold Shriver, sec.; Robt. Kallander, treas., with W F. Shriver and Enoch Newman, directors.

The last assessment, ½c a share, was delinquent March 1, 1921.

Property: a group of claims near the Copper Leaf, in the Tintic district. Company bought the old mill and other equipment of the Bullion Beck & Champion Mining Co. at Eureka. A shaft is being sunk and electrically-driven machinery erected. Shaft had reached 300′ in April, 1921. Company spent $28,000, and owed $10,000 at last account.

INDEPENDENCE SILVER MINING CO. **UTAH**

Address: O. Holm, pres., St. Paul, Minn. **Mine address:** Edward Bardsley, mgr., Milford, Utah.

Property: 12 claims in Beaver Lake district, 6 miles west of Reed station on the railroad, and near Milford, is being developed by new 100′ shaft,

sinking to 500′ depth; produced 145 tons of lead-silver ore in Aug., 1921, from 35′ level.

Mine equipped, 1921, with machinery.

INDIAN PETE MINING & MILLING CO. **UTAH**

Address: Hans C. M. Christensen, sec.-treas., 109 South West Temple St., Salt Lake City.

Assessment No. 12 of ½¢ per share levied Oct. 15, 1921; No. 13 of ½¢, Nov. 15, 1921.

INDIAN QUEEN CONSOLIDATED MINING CO. **UTAH**

Office: Provo, Utah. **Mine office:** near Newhouse, Beaver county, Utah.

Officers: O. Raymond Knight, pres.; L. N. Morrison, v. p.; R. E. Allen, sec.-treas.; K. S. Jordan, gen. mgr.; J. W. Knight, directors.

Inc. 1907, in Utah. **Cap.** $150,000; shares 10c par. Listed on Salt Lake Stock Exchange.

Property: 39 patented claims in Newhouse district.

Development: by 3 tunnels, 4,700′, 300′ and 200′ long, respectively; also prospect tunnels and shafts.

Equipment: includes compressor, drills, blower and electric power. Part of the mine has been worked by lessees.

Shipments of lead-silver-gold ore were made in 1918.

INTERMOUNTAIN MINING & INDUSTRIAL ASS'N **UTAH**

Thos. B. Crawford, sec., Ouray, Colo.

Inc. 1905, in Arizona. **Cap.** $5,000,000; par $1.

Property: Mystic Shrine group of claims, at Bingham, which adjoins property of Utah Copper Co. Evidently idle and for sale.

IOWA COPPER MINING CO. **UTAH**

Address: Park City, Utah.

Officers: L. R. Perry, pres., Forrest City, Iowa; D. G. Scott, v. p.-gen. mgr.; R. T. Kimball, sec.-treas., with J. Carson and D. E. King, directors. Dave Scott, supt.

Cap. $100,000; 10c par; 750,000 issued; assessable; last assessment, 1c per share, levied June, 1920. Ore sold, 1917, was valued at $5,740, and in 1918, at $2,277.

Property: 4 patented claims, and 2 unpatented claims, 180 acres, in Big Cottonwood district, 1,000′ N. W. of Silver King Coalition.

Development: by tunnel, with 200′ incline in ore and several hundred feet of workings, mainly along a limestone quartzite contact.

In 1917 a compressor and other mining machinery was installed. Several shipments were made, yielding as high as $900 per carload. Company is working only 3 or 4 men, and shipped 125 tons in 1919. Reported November, 1919, that during the past year, $2,500 had been spent on new equipment, and 550′ of new work done.

In 1920, a crosscut was driven on the 200′ level. No recent information.

IRON BLOSSOM CONSOLIDATED MINING CO. **UTAH**

Office: 11 Knight Blk., Provo, Utah.

Officers: O. Raymond Knight, pres.; J. Wm. Knight, v. p.-gen mgr.; R. E. Allen, sec.-treas., with A. M. Knight, directors. Frank Birch, asst. mgr.

Inc. Nov. 7, 1899, in Utah. **Cap.** 1,000,000 shares; 10c par; assessable; all outstanding. Listed on Boston Curb and Salt Lake City Exchange.

Balance sheet for Dec. 31, 1920, shows: assets of $1,336,563, including $1,156,206 for property and plant, $53,500 for notes, $110,072, cash, and $12,000, Liberty bonds; liabilities include $1,098,806 for depletion, accounts and notes, $13,751, and $122,305, surplus. Receipts were $387,152, of which ore sales were $359,642; expenditures $403,156, covering $95,566 for operations, $171,158 to lessees, and $50,000, dividends. Net operating loss of 1920 was $3,400.

Dividends: $400,000 in 1913; $330,000 in 1914; $350,000 in 1916; $250,000 in 1917; $75,000 in 1918; $50,000 in 1919; $50,000 in 1920; 2½c a share or $25,000, Dec. 20, 1921. The total is $3,310,000, or $1.30 per share.

Property: 15 claims, patented, 147.75 acres in the Tintic mining district, Juab county, Utah. The Iron Blossom mine is in limestone cut by a large fissure vein on which the orebodies are aligned.

Development: property is opened to a depth of 2,200' with about 12 miles of workings.

The future of the mine, apparently, depends on the development of the unexplored ground for only a limited supply of ore is available in the old mine and most of the ore now being shipped is mined by lessees. Diamond-drilling for 1,300' on the 1,900' level failed to disclose anything of value.

Company work in 1919 and 1920 was confirmed to the 1,700, 1,800 and 2,185' levels, but results were not satisfactory. In first half of 1921, good copper-silver ore was found above the 600' level, but development work is much curtailed.

Production: in 1918, amounted to 684,275 lb. copper, 624,547 lb. lead, 386,093 oz.. silver, and 1,406 oz. gold. This ore is treated by the Tintic Milling Co.

All production, 1921, from lessees' operations.

IRON KING MINING CO. **UTAH**

Address: Eureka, Juab county, Utah.

Officers: Col. C. Edw. Loose, pres.; Reed Smoot, v. p.; P. G. Peterson, sec., all of Provo, Utah. B. F. Grant in charge for A. S. & R. Co.

Cap. $2,000,000; $1 par; increased from $1,000,000, July, 1917; assessable. Assessments of 1¢ a share have paid for development work. Listed on Salt Lake Exchange.

Property: 400 acres in Tintic district, near Eureka. Mine developed by shaft, 1,400' deep, July, 1919, and a 3,500' tunnel, planned to be driven 6,000'. The shaft will be sunk to the 2,000' level. The mine is said to show 100,000 tons of iron ore blocked out and ready for stoping. Mine closed down in 1912, owing to inability to market the iron ore at a profitable figure, was re-opened in April, 1917. Development in 1920 was performed on the 1,000' and 1,565' levels.

Shipments of iron ore, for fluxing purposes, made possible by the new Goshen Valley R. R., began April, 1920, at rate of one car per day; the ore comes from above the 350' level. Reported early in 1921 that iron-ore-bodies were under lease to the A. S. & R. Co., and 500-ton shipments made weekly until November. Total shipments for 1921 were 509 carloads.

Equipment: a compressor and an electrically-driven double-drum hoist.

JAY HAWKES MINING CO. **UTAH**

Dead. See Vol. XIV of this Handbook.

JEANNETTE COPPER MINING & MILLING CO. **UTAH**

Address: via Vernal, Utah.

Officers: J. T. Fitch, pres.; F. B. Hammond, v. p.; C. R. Jones, sec.-treas., with G. A. Storrs and W. H. Griffin, Jr., directors.

Cap. $200,000; shares 20c par.

Property: 34 unpatented claims in the Uintah basin, Utah, 55 miles S. of Rock Springs, Wyo.

Development: by 1,000' of tunnels and shafts, costing $10,000. Ore contains up to 20% copper and good gold and silver contents. Shipments were made in 1916. Mine idle, 1916-20, until June when resumption of work was reported; presumably idle again. Due to a long haul, this venture is not likely to be profitable, unless ore is treated on the ground.

JOE BOWERS MINING CO. **UTAH**

Office: 600 Dooly Bldg., Salt Lake City, Utah. **Officers:** John Dern, pres., Jas. F. Dunn, v. p.; A. Reeves, sec.-treas., with G. H. Dern and Chas. E. Wild, directors.

Inc. June, 1898, in Utah. **Cap.** 700,000 shares; $1 par; assessable; 547,442 shares outstanding. Listed in Salt Lake City. Annual meeting first Monday in April.

Property: 2½ claims, patented, 40 acres in the Tintic district, show silver-lead ore.

Is an old time producer, $41,924 worth of ore being shipped 1899-1900. Not operated, 1921.

JOY MILLING CO. **UTAH**

Address: H. Green, sec., 205 Scott Bldg., Salt Lake City, Utah. Assessment No. 4 levied April 9, 1920.

JUDGE MINING & SMELTING CO. **UTAH**

Office: 1101-3 Deseret Bank Bldg., Salt Lake City, Utah. **Mine P. O.** Park City, Summit county, Utah.

Officers: G. Lambourne, pres. and gen. mgr.; M. C. Fox, v. p., with Wm. M. Bradley, Otto Ludeking, all of Salt Lake, and Adolph G. E. Hanke, of Cincinnati, O., directors. S. G Taylor, treas.; A. H. Peabody, sec.

Operating staff: O. N. Friendly, gen. supt.; John Elsworth, supt. of mills.

Inc. 1901, in New Jersey, as the Daly Judge Mining Co. Reorganized March 27, 1916, under present name. **Cap.** $300,000; shares $1 par; increased March, 1916 to $500,000; 480,000 shares issued. Stock listed on Salt Lake Exchange. Annual meeting 3rd Tuesday in May.

Dividends: 100% in 1916, the same in 1917; 50% in 1918; two of 12½% in 1919; 37½% in 1920.

Income Account to Dec. 31st:

Year	Ore sales	Total Inc.	Expenses	Taxes, etc	Div'd	Deficit
1916....	$839,435	$2,212,271*	$1,861,138X	$39,750	$435,000	$123,617
1917....	953,729	992,863	884,905	49,408	480,000	421,450
1918....	701,401	1,090,342	865,533	46,468	240,000	61,659
1919....	711,847	724,898	526,741	61,951	60 000	s-76,206
1920....	675,677	984,924	842,089	49,914	180,000	87,079

* Includes $1,320,000 for sales of stock; X includes $1,310,180 paid for Snake Creek M. & T.; s-surplus.

The company is a consolidation of the Daly Judge and Snake Creek Mng. & Tunnel companies. In May 1920, joined the Daly West and Park Utah Mng. companies in purchase of 76,000 shares, or control of the Daly Mng. Co., which see. Recently the same interests acquired control of the Daly West and Park Utah companies and all these mines are operated under same management.

Company's mine and 500-ton concentrator are just above Park City near the portal of the principal mine tunnel. The electrolytic zinc plant is 2½ miles from the town. The Daly, Daly West and Judge mines are connected underground and all mill ore is hauled for 1½ miles to concentrator at mouth of Judge tunnel.

The Park City district which lies near the summit of the Wasatch range, has yielded $150,000,000 in silver-lead ores since 1870. The ores occur as lode deposits and closely associated bedded deposits in two N. E.-S. W. parallel zones adjacent to diorite porphyry. The bedded deposits mined to about 1,000′ depth, are massive, granular sulphides replacing the limestone beds in two of the calcareous formations of the Quartzite series. The orebodies vary from a few inches to 10′ thick, 500′ to 800′ long and at most 200′ on dip.

The lode deposits cut both the bedded rocks and the porphyry, are as much as 30′ in width, of steep dip and carry ore to greatest depth mined. At the Judge property 3 main fissure lodes the Daly, Back and Middle veins are worked. The ores are complex, containing galena zinc blende, chalcopyrite and tetrahedrite, with values in silver, lead, zinc and a little copper, in quartzite and jasper gangue.

Both smelting and milling ore are mined in the Judge group, the shipping ore carrying about 30 oz. silver, 50c gold, 16% lead, 1.25% copper, 8.25% zinc and 7.75% iron, compared with the concentrating ore with 14.5 oz. silver, 40c gold, 10% lead, 0.75% copper, 12.5% zinc and 5% iron. This mill ore makes a 4.5 into 1 lead concentrate and a 3 into 1 zinc concentrate.

Property: company has valuable holdings, about 2 000 acres patented ground, covering 11,000′ of a fissure vein system, in Park City district.

Development: to 2,500′ level by main drainage tunnel. New work in 1918 amounted to 5,761′ of which 10.98% is on the Daly vein, 64.65% on the Back vein, 24.37% on the Middle vein. The depth ranged from 300 to 1,400′. In 1917, the development definitely established the existence of an ore zone not previously known containing one of the largest deposits of shipping ore ever found in the mine.

Property of **Snake Creek Mng. & Tunnel Co.**, comprised 750 acres of patented mineral and 320 acres of other lands. A 14,500′ drainage and transportation tunnel begun in 1910 and completed in 1916, serves this and adjoining properties. Tunnel has back of 2,800′ at face, and is deeper at other points. In 1914, suit was brought by an irrigation company to prevent mining company from utilizing 4,500 gal., p. m. water; case now in U. S. Supreme Court.

Mine operations in 1921, opened a new orebody above the 900′ level of the old Judge mine 4-5′ thick, that averaged 35 oz. silver and 35% lead. At 8,000′ from portal of the Ontario lower drain tunnel, a crosscut on the 1,800′ level shows 5′-27′ of shipping ore in several shoots, one over 300′ long. Development work 1920, totaled 2,793′.

The concentrator and electrolytic zinc reduction plant are quite fully described by A. B. Parsons, Mng. & Sci. Press, Jan. 20, 1921; by I. W. Chapman, Chem. & Met. Engrg., March 20, 1920 and Geo. C. Heikes in E. & M. J., Dec. 11, 1920.

Equipment: includes 400-h. p. electric hoist and compressor

The 450-ton wet concentrating plant with flotation unit for treatment of slimes, makes a zinc and lead product. There is also an electrolytic plant producing 12 to 15 tons daily of 99.95% zinc.

Production:

	1916	1917	1918	1919	1920
Crude ore sold, tons....	4,164	7,247	9,633	7,075	9,150
Residues, tons.....	.....	.....	2,843	2,237	.....
Ore concentrated.....	61,787	58,186	40,622	40,396	.....
Ore mined, tons.....	65,951	65,427	50,255	47,471	41,316

	Silver oz.	Gold oz.	Lead lb.	Zinc lb.	Copper lb.	Sold for
To 1916	5,622,420	11,800	116,601,381	86,937,150	2,984,875	$6,482,834
1916....	477,852	535	8,114,627	5,153,049	341,198	839,455
1917....	585,680	532	7,919,720	.....	428,000	953,729
1918....	508,434	490	7,931,566	.....	371,036	1,061,642
1919....	410,307	402	6,989,908	1,262,760	276,926	711,847
1920....	483,390	650	7,877,121	2,664,005	359,186	969,123

Company is ably managed and has a very promising future.

JULIAN MINING & MILLING CO. UTAH

Dead. Described Vol. XIII. Formerly operated at American Fork.

KEARNS-KEITH MINING CO. UTAH

Out of business, property conveyed to the **Silver King Coalition Mines Co.**, of Park City, which see.

KENNEBEC CONSOLIDATED MINING CO. UTAH

Addess: 1105 Newhouse Bldg., Salt Lake City, Utah.

Officers: Ezra Thompson, pres.; Jas. D. Murdoch, sec., with A. T. Sanford, Shand Smith, W. G. Craig, Lynn H. Thompson and P. S. Keogh, directors.

Inc. in 1901. **Cap.** $400,000; shares 1c par; 63,390 shares in treasury.

Company is a reorganization of the Kennebec Mining Co., effective Oct. 4, 1917; stock exchanged on equal terms and new company assumed obligations of old.

On the basis of 3c per share on their holdings, shareholders subscribed to a loan bearing 8% in June, 1917.

Property: 30 patented claims, about 400 acres, in the South Fork of the Big Cottonwood district, adjoins the Cardiff on the east and north and the Wasatch Mines and Columbus Rexall on the north.

Development: by a 700′ incline shaft, a 3,000′ lower tunnel and an upper tunnel.

Property is an old-time, but very small silver-lead producer. Inactive for some time, but in June, 1919, company levied an assessment of 3c per share to provide money for resumption of work. Last assessment, of 2½c, levied Feb. 21, 1921.

KENNEBEC MINING CO. **UTAH**

Company reorganized in October, 1917, under name of Kennebec Consolidated, which see.

KENO M. & M. CO. **UTAH**

Controlled by Knight Investment Co., Provo, Utah. **Mine office:** Frisco, Utah.

Officers: O. Raymond Knight, pres.; R. E. Allen, sec.-treas.; Knight Starr Jordan, gen. mgr.; R. S. Andrew, supt.

Inc. March, 1907. **Cap.** 500,000 shares; 10c par. Stock listed on Salt Lake Exchange.

Property: located in the Antelope mining district, Millard county, is in the development stage.

KENTUCKY-DOUGLAS MINING CO. **UTAH**

Mail returned, 1918, from former address, care Roger Traweek, sec., 62 W. 3d St. N., Salt Lake City.

Officers: E. S. Holt, pres.-treas.; Thos. E. Brooks, v. p.; with T. S. Fowler, directors.

Inc. 1916, in Utah. **Cap.** $1,000,000; $1 par; 600,000 paid for property, 400,000 in treasury.

Property: 10 claims, in Silver Islet district, western Tooele county, said to show silver-lead ore in veins and deposits in limestone, at and near porphyry contacts.

Development: 150′ crosscut tunnel, expected to cut vein at 250′. Is a prospect. Presumably idle.

KEYSTONE EXTENSION MINING CO. **UTAH**

Mine near Bingham, in West Mtn. district, Salt Lake county, Utah. Company inactive for some time owing to heavy flow of water in mine workigs. Property covers about 3,000′ of the Keystone vein outcrop and shows ore said to average $14 per ton in gold, silver, lead and copper values, from surface down to bottom of 165′ shaft.

Development: by inclined shaft with drifts on vein, opening up stopes from which shipments have been made. The Montana Bingham Consolidated Mining Co. was to open the ground by its deep tunnel thus eliminating pumping costs and heavy wagon-haul charges on ore shipped.

KEYSTONE METALS REDUCTION CO. **UTAH**

Office: Farmers Bank Bldg., Pittsburgh, Pa. · I. N. Goff, gen. mgr.

Mine address: Polar Mesa, Grand Co., Utah.

Inc. 1920 in Delaware.

Company owns carnotite claims on the Colorado-Utah line. Uranium, vanadium and radium custom ores are also sent to the reduction plant at Cheswick, Pa. for refining.

KEYSTONE MINING CO. **UTAH**

Offices: 163 S. Main St., Salt Lake City, Utah, and 32 Broadway, New York.

Officers: H. G. McMillan, pres.; Ernest Bamberger, v. p. and treas., with John Dern, E. O. J. Hanke, C. W. Saacke, Alfred Frank, John McGinnis, directors. L. B. McCornick, sec.; Herbert Cohen, asst. sec.; J. L. Tilton, asst. sec.

Inc. Sept. 12, 1902, in Wyoming. **Cap.** $1,000,000; shares $1 par; outstanding $900,000; assessable last assessment 2c. December, 1915. Transfer

office: J. L. Tilton, 32 Broadway, New York. Empire Trust Co. New York, registrar. Listed on Salt Lake Exchange and on New York Curb as a prospect.

Property: 16 patented claims, 66 acres, in Uinta mining district, 3 miles S. W. of Park City, said to show silver-lead ore.

Development: 225′ vertical shaft and 700′ tunnel, work of former years. After settlement of litigation present company began active development through the Kearns-Keith shaft, June, 1920, and discovery of orebody, carrying 35-40% lead and 15 to 20 oz. silver was reported.

The property was rehabilitated in 1916, compressor and motor installed and exploration started. A suit against the Kearns-Keith Mng. Co. and the Silver King Coalition Mines Co., asking $1,500,000 damages for alleged unlawful extraction of ore was pending, June 1916, but in December, 1919, the Silver King Coalition announced that this dispute had been settled.

KING COPPER MINING CO. **UTAH**

Controlled by the Baileys of Salt Lake City. Property, located on the divide between Emigration and Red Butte canyon, 12 miles E. of Salt Lake City, shows 6′ vein of copper carbonates on contact between quartzite and blue limestone. Is developed by 300′ tunnel, principally in sandstone. Ore said to carry $14 in gold, copper and silver.

KING DAVID MINING CO. **UTAH**

Address: Provo, Utah. **Mine office:** Frisco, Beaver county.

Officers: O. Raymond Knight, pres.; David Evans, v. p.; R. E. Allen, sec.-treas.; K. S. Jordan, gen. mgr.

Inc. 1908, in Utah. **Cap.** $500,000; shares 50c par; assessable; 67,000 issued. Shares listed on Salt Lake City Exchange.

Property: 63 claims, patented, 940 acres, adjoining the Horn Silver mine, and supposed to carry the extension of the Horn Silver vein. Claims are well mineralized. **Ore:** mainly silver-lead bearing, with small quantities of zinc and copper. **Development:** by 800′ 3-compartment shaft and several prospect tunnels and shafts. Present work consists of drifting, sinking and diamond-drilling.

Equipment: includes two 80-h. p. boilers, a double-drum hoist, 5-drill air compressor, 14 machine drills, generator, blower and steel head-frame. Inactive 1919-1921.

KING OF THE HILLS MINE **UTAH**

Address: Milford, Beaver county, Utah. Mine in Granite district, 25 miles N. E. of Milford, reported to have a 14 to 18′ contact metamorphic vein of copper-lead ore in limestone, cut by porphyry.

Development: by tunnels. Equipped with concentrating mill, making a product carrying 10% copper, 42% lead and 10 oz. silver.

KING WILLIAM MINING CO. **UTAH**

Office: 546 E. First South St., Salt Lake City, Utah. **Mine address:** Eureka, Juab county, Utah.

Officers: at last accounts; Chas. H. Blanchard, pres. and gen. mgr.; F. G. Morse, v. p.; W. A. Wright, sec.; N. G. Hall, treas.

Inc. 1907, in Nevada. **Cap.** $1,250,000; $1.25 par.

Property: 2 claims, patented, 16 acres, surrounded by the holdings of the Eagle & Blue Bell, Centennial-Eureka and Grand Central.

Development: is through the Eagle & Blue Bell workings, on the 500′ and 1,000′ levels, corresponding with the 1,400′ and 1,900′ levels of the King William. There are several shallow shafts.

In October, 1916, the mine was sold by the sheriff to a company that has 1,000,000 shares, on which an assessment of ½c each was levied. There is no information from the mine for 1917-21.

KNIGHT INVESTMENT CO. **UTAH**

Offices: Knight Blk., Provo, and 817 Newhouse Bldg., Salt Lake City, Utah.

Officers: O. Raymond Knight, pres.; J. Wm. Knight, v. p.; R. E. Allen,

sec.-treas.; with Amanda M. Knight, W. Lester Mangum and Knight Starr Jordan, directors. R. S. Anderberg, asst. sec.

Controls 22 properties, ranging from prospects to successful dividend paying mines. The operating ompanies are as below:

Utah: in Tintic district, Big Hill Mng., Colorado Cons. Mines, Dragon Cons. Mng. Empire Mines, Ibex Gold Mng. Iron Blossom Cons. Mng. Swansea Cons. Mng., and Tintic Central M. & M. Co. In other districts; Bonneville Mng., Bingham Empire Mines, Great Western Mines, Indian Queen Cons. Mng., Keno M. & M., King David Mng., Miller Hill Mng. and North Bingham Cons Mng. Also, Tintic Drain Tunnel, Tintic Milling and Utah Ore. Sampling companies are part of the organization.

Arizona: Bullion Mines Co.

Colorado: Rico Cons. Mines and Rico-Wellington Mng.

Nevada: Comstock-Phoenix Mng., Ely Amalgamated Copper and Lucky Boy Cons. Mng.

Company also operates the Knight Woolen Mills, Spring Canyon Coal, Eureka Hill R. R. Co., and other enterprises.

Each individual company is described under its title.

LADY BRYAN MINING CO., THE — **UTAH**

Address: Chas. T .Birchard, 18 Fremont St., Boston.

Officers: Ellery C. Wright, pres.; Chas T. Birchard, sec.-mgr.; J. Frank Batchelder, treas., with John Thomson, directors.

Inc. in Utah. **Cap.** $1,000,000; par $5; 80,816 treasury shares; assessable. Transfers at company's office. Annual meeting 1st Tues. in June.

Property: 5 claims, (2 patented) the Lady Bryan mine, in Star district, Beaver county, S. of the Moscow. Formation is limestone in contact with quartz monzonite, with silver-copper ore occurring as replacements in E. W. fissures. Some bismuth appears and ore is high in iron, making it desirable for fluxing.

Development: by 510′ shaft. **Equipment:** gasoline hoist and 2 compressors.

Mine was something of an early-day producer and a former company is reported to have made shipments subsequent to 1910.

LAKEVIEW MINING CO. — **UTAH**

Office: Ogden, Utah. Mine offile: Promontory Point, Utah.

Officers: W. H. Wattis, pres.; L. F. Farr, sec.-treas., with C. L. Farr and Jas. Wotherspoon, directors.

Inc. March 9, 1915 in Utah. **Cap.** $50,000; shares 5c par; assessable; all issued to officers of the company. Annual meeting, March 9.

Dividends: to May, 1916, amounted to $124,000.

Property: 15 claims, unpatented, 235 acres, at Promontory Point, Boxelder county, 3 miles E. of Saline on the S. P. R. R., shows zinc-lead ore in a contact deposit between limestone foot and shale hanging-wall. The orezone runs 35° W. and dips 35° N. E. Pay shoots are from 1′-20′ wide and from 52′-250′ along the strike. Assays reported to average 32% zinc, 5% lead, 2% iron, 16% insoluble.

Development: to 1,000′ below the outcrop by 5 adits, from 250′-350′ long. Zinc ore as shipped averaged 32%, and lead ore 26%.

Equipment: includes 600′ tram and oil-driven Chicago Pneumatic compressor of 187 cu. ft. capacity.

Production: to July 1, 1917, 279 cars realized $352,471, mostly from zinc carbonate ore.

Lessees shipped several hundred tons of lead-zinc ore in 1918.

The mine made quite a remarkable record. Located January 27, 1915, work was commenced March 9, with a small force and by December, 1915, all debts were paid, the mine was developed, equipped and shipping, a $70,000 dividend paid to stockholders and a cash surplus remained in the treasury. Mine developed into a lead property with depth, sulphides replacing oxidized ore. Property examined and sampled by Pierre Peugot, July, 1917.

In July, 1919, mine was again being operated in a small way under management of W. H. Wattis; company had approximately $20,000 in the treasury.

Early in 1920, a shaft was reported to have reached 450', but work apparently ceased with the fall of metal prices.

LAST CHANCE MINING CO. UTAH

Address: Newhouse Bldg., Salt Lake City, Utah.

Officers: Jas. A. Hauerbach, pres.; F. O. Horn, sec.-treas.

Cap. $25,000; 10c each; assessable; 200,000 shares issued. Company is reported out of debt and amply financed.

Property: 1 patented claim adjoining the Cardiff, in the Big Cottonwood district, near Alta.

Development: 400' tunnel and 150' winze. Ore is said to assay 60-70% lead, and 50-75 oz. silver. Employs 3-4 men steadily on development.

LA VORE GOLD MINES CO. UTAH

Idle for past 5 years. **Address:** W. Scowcroft, Ogden, Utah. Mine is near St. George, Utah.

Officers: Willard Scowcroft, pres.; R. G. McQuarrie, v. p.; D. H. Morris, sec.-treas., with Irvine McQuarrie and Herrick McQuarrie, directors.

Inc. 1915, in Utah. **Cap.** $100,000; shares 10c par; 60,000 issued.

Property: 10 claims in the Goldstrike district, Washington county, said to show a vein 11' wide, averaging $5 gold per ton.

LEHI-TINTIC MINING CO. UTAH

Address: J. S. Card, sec., 417 Boston Bldg., Salt Lake City, Utah.

Officers: Chas. Zabriskie, pres.; W. H. Trask, Jr., v. p.; Geo. B. Doyle, treas., with Geo. Klenke, and J. A. Barclay, directors.

Cap. 1,000,000 shares; 974,000 issued; assessable; assessment No. 37 of 1c., was levied in Sept., 1920. Assessments in 1921, ½c., June 14; ½c., August 14; 1c., Nov., 12.

Property: 12 claims in the Tintic district, about 4 miles from Eureka, shows silver-lead-gold ore in fissure vein.

Development: by 2,100' tunnel. Equipped with compressor and steam power. Reported early in November, 1917, that the tunnel had cut the Empire vein, assaying 28% lead, 6 oz. silver, and $2 gold per ton. During 1919, development was performed on the 900' level, and a small output of lead ore was reported. In 12 months ending Sept., 1920, 1,900' of new work was performed, but ore of commercial grade and in sufficient amount apparently not discovered. Sterling Talmadge, geologist, concludes that upper workings are valueless and recommends opening lower vein at depth. By March, 1921, a shaft was 340' deep. A deep-shaft hoist has been added to the equipment.

Control of company is in dispute, and court on Sept. 26, 1921 ordered Nicholes fraction to surrender possession of mine to Chas. Zabriskie and others.

LEONORA MINING & MILLING CO. UTAH

Office: 18-20 E. First South St., Salt Lake City, Utah. Mine office: Milford, Beaver county, Utah.

Officers: John Matson, pres.-mgr.; B. H. Goddard, v. p.; H. F. Giers, sec.-treas., with L. H. Stohr and J. W. Chase, directors; C. W. Pettit, asst. sec.-treas.

Inc. Dec. 19, 1903, in Utah. **Cap.** $130,000, increased from $100,000, January, 1920, shares 10c par; assessable. Listed on Salt Lake Exchange.

Share sales varied, ¼ to 2c in 1919; 1 to 9c in 1920; 1 to 2¾c in 1921, to June.

Property: 13 claims, in the North Star district, near Milford, shows fissures in limestone carrying replacement deposits of gold, silver, zinc and lead ores.

Development: by tunnels of 1,500', 500' and 300' and new shaft 145' deep, being sunk, 1921. During 1920, 400' of extensions were made and ore was uncovered in a winze, assaying 7 oz. silver and 6% lead. Prospecting on

surface has opened a promising east-west fissure. A large body of 20-35 oz. siliceous ore was cut in 1921, and shipments started.

Equipment includes electric hoist and air compressor.

LION HILL CONSOLIDATED MINES CO. **UTAH**

Described in Volume XIII. Property acquired in December, 1919, by the **Ophir Metals Co.**, which see.

LITTLE BELL CONSOLIDATED MINING CO. **UTAH**

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit county, Utah. Solon Spiro, pres and gen. mgr.; S. M. Bamberger, sec.; Joe Kemp, supt.

Inc. 1902, in Wyoming. **Cap.** $1,500,000; shares $5 par; non-assessable; fully issued. Began payment of 5c quarterly dividends, November,1909, and up to and including September 2, 1910, had paid 4 quarterly dividends of $15,000 each. Shares listed on Salt Lake Stock Exchange; 20% of stock owned by Daly West Mng. Co.

Property: 30 claims, patented, in Park City district. **Development:** extensive showing deposits of lead-silver ore.

Equipment: includes steam power, with hoist and air compressor. Electric power is taken from the Knight plant at Provo. The old 100-ton mill of the Fortuna Mining Co., at Bingham Canyon, was bought 1910, and re-erected at Park City.

Practically idle for 8 years, until August, 1920, when 700′ shaft, etc., were leased to **New Quincy Mng. Co.** (q. v.)

LITTLE MAY MINING & MILLING CO. **UTAH**

Office: 135 E. Broadway, Salt Lake City, Utah. **Mine office:** Silver City, Utah. Chas. Johnson, supt.

Officers: John Matson, pres.-mgr.; B. H. Goddard, v. p.; H. E. Giers, sec.-treas.; with W. B. Scoville, and V. P. Felt, directors

Assessment: No's 4, 5 and 6, ½c each, made in 1921. Accounts for 1920 show—$11,064 received, including stock sales $8,324 and loans from banks, $2,500. Expenses were $10,247 including labor, $5,930, machinery, $1,216 and $1,000 paid bank on note. This compares with receipts in 1921 of $19,180 from assessments, $6,000 borrowed, $942 from ore shipments, miscellaneous, $1,187, a total of $27,309 and disbursements of $25,369. Cash on hand January 1922, $1,939.

Property: in Silver City section of Tintic district, S. of Iron Blossom Cons. and S. E. of Dragon Cons. The Cornucopia and Treasure veins are said to cross the claims.

Development: for 1921, 335′. Work was begun June, 1919 and workings totaled 780′ up to end of 1921. Shaft is 260′ deep. Drifting on 200′ level opened the Cornucopia fissure for 240′. The vein in rhyolite shows 6-12′ of sulphide ore assaying $1.60 gold, 9 oz. silver and 13.5% copper. In July a 5-car shipment was reported.

Equipment: includes power, compressor, pumps and various buildings.

LITTLE VALLEY MINING CO. **UTAH**

Owned 9 claims in compact group N. and E. of the Lakeview property, Promontory Point, Boxelder county, Utah. Mail returned, 1919, and company probably idle.

LOG CABIN MINING CO. **UTAH**

Address Salt Lake City, Utah.

Assessment of ¼c. a share levied August, 1921. Sale day, Oct. 20, 1921.

LOGGER MINING CO. **UTAH**

Officers: R. D. Maxfield, pres.-mgr.; Jas. Marlow, v. p.; D. J. Bloem, sec.-treas., with J. M. Hamilton, and Henry Erickson, directors.

Inc. July, 1915. **Cap.** 1,000,000 shares; 1c each. Stock listed on Salt Lake Exchange. Quoted 1¾-2c in 1919; ¼-4c in 1920; ¾-1¼c. in 1921, to June.

Property: the Logger mine in Big Cottonwood canyon, adioining the Maxfield mine, shows a 1′ fissure vein, developed by a 475′ adit, a winze

sunk on the vein from the 200' point and a crosscut at 350' from portal exposing ore. Assays said to return $16.47 gold 13.4 oz. silver and 11% copper.

A lower tunnel was started 100' below upper tunnel, 1916, and is reported to have cut the vein seen above with several other small veins of ore, assaying from $50-$240 per ton in copper, gold and silver. Development work was resumed in 1919.

No more recent information.

LOUISE MINING CO. UTAH

Address: 314 Felt Bldg., Salt Lake City. **Mine address:** Alta, Utah.

Officers: Samuel Neff, res.; R. O. Dobbs, v. p.-sec. and gen. mgr.; David Neff, treas.; with J. M. Rumsey and R. C. Middlewood, directors.

Inc. Nov. 16, 1917, in Utah. **Cap.** $100,000; 10c par; assessable; outstanding 780,000 shares.

Assessment No. 6, of 1½c, levied July 15, 1920; last of ¾c, became delinquent June 1, 1921. Trial balance of Dec. 31, 1920, shows $87,560 for mining property and $32,029 for development:

Property: 8 patented claims, 75 acres, in the Little Cottonwood mining district at Alta, includes the Moltke group and a portion of Cottonwood-Atlantis (q. v.) holdings.

Development: by 3 adits, 1,200', 800' and 450' long, with total workings of 4,500'. Small tonnage of oxidized ore is developed in upper adits. Company plans (1921) to continue work on lower levels to cut ore zones found above.

Equipment: includes a compressed air unit.

Production: for 1919 is reported, but presumably small.

LOWER MAMMOTH MINING CO. UTAH

Merged, 1917, with **Empire Mines Co.**, which see. Stockholders receive 15 shares of Empire for every 100 of Lower Mammoth held.

LOWLAND TUNNEL WATER & TRANSPORTATION CO UTAH

Office: C. L. Whitney, sec., 26 Stock and Mining Exch. Bldg., Salt Lake City. **Mine office:** Starr, Utah.

Officers: Louis Fugal, v. p.-mgr.; C. L. Whitney, sec.-treas., with Geo. F. Wasson and D. H. Livingston, directors.

Inc. Nov., 1912, in Utah. **Cap.** 1,000,000 shares 1c par; 350,000 issued. Assessments of ½c per share, levied Aug. and Dec., 1921.

Property: 36 unpatented claims, 700 acres, in Nebo mining district, Juab county, said to carry gold-silver-lead-copper-zinc-iron ore. Formation is quartzite, lime and granite.

Ore: occurs as a contact deposit and in fissure veins, running N. S. with dip of from 40-90°.

Company was organized to drive a 10,000' drainage and transportation tunnel into the Mt. Nebo mineral belt to serve 11 companies operating in that district and to develop its own mineralized ground. After idleness of 3 years operations resumed December, 1920; tunnel was in 700' early in 1921.

LUCIN COPPER CO. UTAH

Address: 314 Kearns Bldg., Salt Lake City.

Officers: R. W. Powers, pres.; D. J. Wheeler, v. p.; G. S. Norris, sec.-treas., with Franklin Riter and V Erquiaga, directors.

Property: near Lucin, Boxelder county, said to have a promising showing of ore.

LUCKY BOY MINING & MILLING CO. UTAH

E. E. Lowry, pres.; Ira Griffiths, sec.-treas.

Inc. April 20, 1916. **Cap.** $50,000; shares 10c par; assessable; 25,000 shares outstanding.

Property: 6 claims, in Clear Creek mining district, Boxelder county, said to show copper-silver-gold ore. No recent information.

LUCKY STAR COPPER MINING CO. UTAH

Mail returned; last address, care N. J. Nielson, sec.-treas., Dugway, Tooele county, Utah.

Officers: G. N. Strike, pres.; J. T. Aydelotte, v. p., with Israel Larson and Peter Sacos, directors.

Cap. $500,000; shares 10c par. 275,000 in treasury.

Property: Lucky Star mine in Dugway district, 45 miles from rail at Faust, developed by 260′ incline shaft with drifts on ore 5′ thick, for length of drift, said to assay 9% copper and 15 oz. silver per ton.

Company was developing and made one shipment of copper sulphide ore in 1918; no later report.

MAJESTIC COPPER MINING & SMELTING CO. **UTAH**

Office: 53 State St., Boston, Mass. John M. Dick, president. To all practical intents and purposes this company was succeeded 1904, by Majestic Copper Co., which was succeeded, 1908, by Majestic Mines Co. Majestic Copper M. & S. Co., however, is still in existence, though practically the entire stock issue, and a large majority of the bonds, are owned by the Majestic Mines Co. Very fully described in Vol. IV, of the Copper Handbook.

MAJESTIC MINES CO. **UTAH**

Office: 342 Exchange Bldg., Boston, Mass. **Mine office:** Milford, Beaver county, Utah.

Officers: John M. Dick, pres.; H. M. Inman, v. p.; D. J. Flanders, sec.-treas.; J. A. Bailey, G. F. Kellogg, John Muller, R. H. Phillip, E. M. Southworth and John Freeland, directors; Alex. D. Moffat, mine mgr.

Inc. May 18, 1908, in Maine, practically as successor of Majestic Copper Co. and Majestic Copper Mining & Smelting Co. **Cap.** $5,000,000; shares $5 par; assessable; issued, 808,795 shares.

Stocks of both companies were exchanged share for share for stock of the Majestic Mines Co. on payment of 15c a share; bonds of the Majestic Copper Mining & Smelting Co. were exchanged for stock of the Majestic Mines Co., giving 900 shares of new stock for each $1,000 bond.

The result of the reorganization was as follows: all floating indebtedness of the operating company has been liquidated; $868,500 of the $1,000,000 outstanding bonds have been purchased and are now owned by the Majestic Mines Co.—practically 87%—which gives the Majestic Mines Co. control of the situation.

Assessments of present company have been as follows: 15c in 1908; 5c in June, 1910; 10c in April, 1911. Assessment, 10c per share, was payable April 25, 1919. Shares listed on Salt Lake Stock Exchange, Boston and New York Curbs. 500 shares sold at auction for $9 the lot, October, 1921 in New York. Federal Trust Co., transfer agent; State Street Trust Co., registrar, Boston, Mass. Annual meeting third Tuesday in March.

Property: 120 claims, 2,450 acres, in 8 groups, also an 80-acre smelter site, and 800 acres miscellaneous lands. The groups, located in 5 different districts of Beaver county, are the O. K., Old Hickory, Harrington-Hickory, Vicksburg, Hoosier Boy, Southern States, Larkspur, Copperfield and Treasurer, said to have about 100 orebodies, carrying copper, gold, silver platinum, lead, cobalt, bismuth, vanadium and uranium. The company has platted the town site of Lewisville, where the smelter was located, and the property is served by the Salt Lake Route.

Development: there are 18 shafts, 100 to 600′ deep, with a total of 6 miles of workings. The Old Hickory and O. K. mines yield copper ores, the others silver-lead ores. Recent work has been on the Old Hickory group of 9 claims, and in July 1919, rich copper ore was reported on the 400′ level.

The **O. K. mine,** 7 claims, formerly the principal producer, has a 500′ three-compartment shaft, with a vein up to 20′ in width, development being mainly on the 300′ and 400′ levels. This mine had over 500,000 tons of low-grade ore blocked out in what apparently was a stockwerk, up to 250′ in width, carrying stringers of high-grade ore.

The **Harrington-Hickory** group of 27 claims, partly fractional, shows numerous fissure veins, intersected by cross veins, both approximately

vertical, and in addition has a series of bedded veins, presumably, following bedding planes, dipping at 30 to 35°, giving 3 separate intersecting systems of orebodies. Development is by a 600′ two-compartment vertical main working shaft, with drifts on the 500′ level, where there is a body of high-grade ore, assays from which have given 1% copper, 37 to 55% lead, 18 to 22 oz. silver, and about $1 gold per ton.

The **Vicksburg** group of 4 claims, a lead-silver mine, formerly worked for gold, has 3 practically vertical fissures, of 2 to 20′ width, with mineralized cross-fissures, developed by a 200′ 2-compartment working shaft, a 150′ incline shaft and numerous shallow shafts and pits. It is said that high-grade ore has been encountered at a depth of 150′ in this mine. Worked by lessee and 20% royalty paid to company on gross proceeds.

The **Hoosier Boy**, a silver-lead mine is about 3 miles from the Horn Silver mine. An 800′ shaft has been sunk and considerable work done at 200′, 400′, 600′ and 800′ depth.

Equipment: includes 6 gasoline and 1 steam hoist. Electric power, for lighting and pumping is taken from the Beaver River Power Co.

Mines closed down from August, 1914, to May, 1915.

Production: in 1916 was about 6,500 tons of ore, yielding 350,065 lb. copper, 294,678 lb. lead, 257,476 lb. zinc, and 18,680 oz. silver. Produced about 600 tons per month, 1917.

The O. K., operated by lessees, produced some copper ore and heavy shipments were made from Old Hickory, in 1918. Company reported inactive, 1919, but shipments were apparently being made early in 1920.

MAJOR EVANS MINING CO. UTAH

Mail returned, 1918, from former address, 440 Boston Bldg., Salt Lake City, Utah. C. B. Felt, pres.; R. Leo Bird, sec.

Inc. 1915, in Utah. **Cap.** $100,000; 10c par; assessable; treasury, 440,000 shares.

Property: 42 claims in American Fork mining district, said to show copper-lead-silver ore. Is a prospect. Probably idle.

MAMMOTH COPPER MINING CO. UTAH.

Office: 219 Judge Bldg., Salt Lake City, Utah. Edward Bardsley, pres.; B. D. Lyon, sec.-treas.

Inc. in Utah. **Cap.** $10,000; issued, $6,000; shares 1c par; assessable. A 10c assessment was delinquent, March, 1921. Listed on Salt Lake Exchange.

Owns 240 acres in Millard county, 15 miles from Milford, said to show a vein of copper ore in monzonite. Development is surficial only, and property is but a prospect. No recent returns.

MAMMOTH MINING CO. UTAH

Office: 404 McIntyre Bldg., Salt Lake City, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: Samuel McIntyre, pres. and gen. mgr.; Samuel McIntyre, Jr., v. p. and supt.; Col. R. M. Wilkinson, sec., with Earl McIntyre, and R. E. Marks, directors.

Inc. 1881, in Utah. **Cap.** $10,000,000; shares $25 par. Reincorporated Dec. 5, 1906, in Nevada. **Cap.** $1,000,000; $2.50 par; assessable; decreased, 1920, to $40,000; 10c par. Last assessment (No. 2) of 5c was payable March, 1919. Controls the Cleveland Mining Co., through ownership of 70% of capital stock. Annual meeting, first Tuesday in February.

Dividends: 5c per share in 1913, 5c in 1915, 25c in 1916, and $1 in 1917; total to date, $2,820,000.

Property: 19 claims, in Tintic district. Mine opened about 1870, is developed extensively and has a 2,300′ main shaft, the deepest in the Tintic camp. Irregular shoots and chimneys of gold, silver, and copper ores occur.

Equipment: includes complete plant, installed in 1910.

Production: 36,000 tons in 1914; 26,000 tons in 1915; 36,000 tons in 1916;

24,000 tons to July, 1917; about 18,000 tons in 1918. Dumps said to contain over 250,000 tons.

Shipments from dumps were made mid-summer of 1920 and ore shipments began later, but by April, 1921, operations had practically ceased.

MAMMOTH No. 2 MINING & MILLING CO. UTAH

Idle. **Office:** 204 McIntyre Bldg., Salt Lake City, Utah. Mine at Mammoth, Juab county, Utah.

Officers: Wm. H. McIntyre, pres.; Samuel McIntyre, v. p. and treas.; W. P. Jennings, sec.

Inc. 1900, in Utah. **Cap.** $300,000; $1 par; reduced in 1920 to $15,000; par 5c; assessable; fully issued.

Property: 2 claims, patented, adjoining the Mammoth Mining Co., shows lead and copper ores.

MARTIN GOLD AND SILVER MINING CO. UTAH

Address: C. F. Johnson, 201 Ness Bldg., Salt Lake City, Utah.

Property: 9 claims, unpatented, located on west side of Thaynes canyon, near Park City.

MARY ELLEN MINING & MILLING CO. UTAH

Address: American Fork, Utah.

Officers: W. C. Boley, pres.; T. S. Priday, v. p.; J. W. Storrs, sec.-treas.; with R. C. Boley and T. M. Allman, directors.

Inc. 1909, in Utah. **Cap.** $100,000; 10c par; assessable; 650,000 issued.

Property: 7 claims, 125 acres, in American Fork district, Utah, said to show a vein in quartzite and limestone. **Ore:** is partly sulphide, and contains lead, silver, and gold.

Development: by tunnels totaling 700'. Idle for 3 years, but work resumed in 1917. No report since.

MASTER KEY MINING CO. UTAH

Address: 1014 Boston Bldg., Salt Lake City, Utah.

Officers: A. G. Gutheil, pres.; C. W. Reese, v. p.; G. M. Sullivan, sec.-treas., with A. J. Mooney and Henry Barney, directors.

Inc. Feb., 1915, in Utah. **Cap.** 1,000,000 shares of no par value; assessable; 500,000 held by Trustee.

Property: 7 claims, 5 patented, 123 acres, 8 miles W. of Milford, Star district, Beaver county.

Geology: ore occurs in bedding planes and fissures in limestone dipping N. E., the Mowitza shale-contact carrying the large orebodies, which extend along the bedding into the Red Warrior limestone. Company expected to cut ore horizon at depth of 250'. Hoosier Boy fissure intersects it. Is a prospect. No recent report.

MAY DAY MINING & MILLING CO. UTAH

Address: 600 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: John Dern, pres.; G. H. Dern, v. p.; A. Reeves, sec.; W. S. McCornick, treas., with J. C. Dick, directors.

Inc. 1896, in Utah. **Cap.** $200,000; shares 25c par; assessable; all outstanding. Stock transferred at company's office. Annual meeting, first Monday in April. Listed on Salt Lake City Exchange.

Last assessment, of 2c., became delinquent, April, 1921. Dividends total $300,000.

Property: 6 claims, 5 patented, 60 acres, in the Tintic mining district, said to show zinc, silver and lead ore in limestone.

Development: by 1,100' vertical shaft and 1,500' tunnel. The mine has been practically out of ore several times; at one time the supply was so low the stock dropped to 1c per share; the larger part of its dividends has been paid since then.

Beginning with 1920, mine has been developed through the Yankee Cons. 1,800' shaft, but apparently without significant results. Work is financed by assessments.

Equipment: includes 50-h. p. electric hoist and compressor, capacity 250 cu. ft.

Production: since 1907, when present management took hold, gross value of output is $833,725. During 1920, 109 tons of ore yielded $6,456.

METAL STATES MINING & MILLING CO. UTAH

Address: care Jesse F. Cannon, 743 S. 3 E. St., Salt Lake City, Utah.

Officers: Jesse F. Cannon, pres.; Henry Schepper, v. p.; E. S. Fisher, sec.

Inc. 1919, in Utah. **Cap.** $100,000. Company was organized to develop copper-gold claims in the Dugway district, Utah.

MICHIGAN-UTAH CONSOLIDATED MINES CO. UTAH

Office: 411 Felt Bldg., Salt Lake City, Utah. **Mine address:** Wm. C. Stewart, mine supt., Alta, Utah.

Officers: Norman W. Haire, pres.; H. R. MacMillan, v. p. N. A. Robertson, sec.-gen. mgr.; L. H. Farnsworth, treas.; with Frank B. Cook, C. A. Gillette, and W. J. Halloran, directors.

In April, N. A. Robertson was appointed general manager under supervision of directors acting through an executive committee comprised of the general manager, R. A. Brown, cons. engr., and W. J. Halloran, chairman.

Inc. April 26, 1915, in Utah, as a reorganization of the Michigan-Utah Mining Co. **Cap.** 1,500,000 shares; 25c par; assessable; 1,328,255 shares issued. Listed on Salt Lake Exchange. Columbia Trust Co., registrar. Annual meeting, 2nd Monday in February. The City Rocks Mng. Co. (q. v.) became a shareholder in exchange for property sold.

Assessment No. 3 of 2½c, levied Aug. 10, 1920; No. 4, 2c, and No. 5, 1½c, Nov. 1921. Share sold for 9-23c in 1918; 8-15c in 1919; ¼-9c in 1920; ¼-3¼c in 1921, to June.

Gross earnings in 1917 were $226,408; all from ore sales.

Property: 72 claims, 42 patented, 1,200 acres, including a millsite, in the Big and Little Cottonwood mining districts. Claims show Paleozoic sediments cut by granite, the ore occurring in fissure veins in limestone, and as contact metamorphic deposits between limestone and granite, having a general strike of N. 65° E., and a dip 32°. There are 5 distinct and parallel veins showing average widths of 2½′ and traceable 5,000′, reported to carry copper, lead, zinc, silver and gold values, averaging $25 per ton. Ores are carbonates at and near surface, succeeded below by sulphides.

Development: principally by tunnels, all workings being in the oxide and carbonate zones, but sulphides are proven to occur in depth by workings of the nearby Wasatch Mines Co. Total underground openings aggregate over 50,000′, about one-half being tunnels, drifts and crosscuts that are all in ore, raises and winzes aggregating 10,500′ additional. Ore is transported by aerial tramway to Tanners flat, 5 miles from the mine, thence by narrow-gauge railway to Wasatch, where connection is made with the Salt Lake & Alta standard gauge road which runs to the Midvale smelter. The tram has a maximum capacity of 200 tons daily.

The Copper Prince tunnel has been driven under property about 2,000′, exposing several large orebodies.

Equipment: includes two 90-h. p. hoists, and everything necessary for mining 150 tons daily. Air is supplied by the Wasatch Power Co. from Little Cottonwood creek.

Buildings include machine shop, carpenter shop, several dwellings and a smithy, located underground as a measure of protection from snowslides, which are of frequent occurrence in this region.

Production:

Year	Gold Oz.	Silver Oz.	Copper Lb.	Lead Lb.	Receipts Net
1915.....	67	43,146	99,066	515,296	$29,901
1916.....	154	90,816	364,685	916,851	130,342
1917.....	227	148,318	384,906	1,865,379	244,125

The mine was worked continuously throughout 1918, and in July 1919, production was about one car of ore daily, the company, like many others, being short of miners.

Production for 1920 not reported, but shipments made, summer of 1921, although work is principally confined to development. Tram terminal has been connected by spur to the new Little Cottonwood Transportation Co.'s R. R.

Part of the property was operated under lease by the Triangle Mng. Co., a close corporation, which in 1919 became bankrupt.

MIDVALE LEAD SMELTER UTAH

Address: C. E. Allen, gen. mgr., Newhouse Bldg., Salt Lake City; J. C. Brumblay, field representative. **Works address:** W. A. Howard, mgr., Midvale, Utah. Plant includes a lead and zinc concentrating mill; both mill and smelter treat custom ores.

Owned by **U. S. Smelting, Refining and Mining Co.**, which see for more complete description.

MIDWEST DEVELOPMENT CO. UTAH

Address: Salt Lake City, Utah.

Officers: Geo. S. Silsby, pres.; A. W. Larson, R. V. Smith and Albert W. Hahn, directors.

Inc. 1921 in Utah.

Property: a lease and bond on the Old Miller and other claims in American Fork district. Development begun, September, 1921. Shipments of carbonate ore made late in 1921.

MILFORD COPPER CO. OF UTAH UTAH

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Milford, Utah.

Officers: Alfred Frank, pres.-mgr.; E. L. Newhouse, Jr., v. p.; H. A. Frank, sec.-treas.; J. H. Greenwood, supt., with O. Brodbeck and C. W. Saacke, directors.

Inc. Feb. 3, 1917, in Utah. **Cap.** $500,000; $1 par; all issued. Transfer office 52 William St., New York. U. S. Corporation Co., New York, registrar. Stock listed on Salt Lake Exchange. Annual meeting, January 15. Earnings at rate of $100,000 per year.

Property: 18 patented claims, 300 acres, at Milford, Beaver county, Utah, known as the Montreal mine, being one of the properties developed extensively by the defunct Glasgow & Western Exploration Co. In February, 1916, mine was leased by Alfred Frank and others, who eventually organized the Milford company.

Geology: contact deposit in limestone and quartz-monzonite. Orebody 10 to 50′ wide, dips 45°, and has an irregular course. Ore is partly sulphide and averages 2.5% copper, 0.75 oz. silver, 0.01 oz. gold, 15% silica and 37% iron.

Development: by tunnels and shafts to 400′ depth, workings amount to 3,000′. Ore reserves estimated at 30,000 tons copper ore. In addition 200,000 tons of iron ore, with small values in silver and copper, have recently been opened up.

Equipment: 8x10″ air-hoist and 10-drill compressor.

Production: ships 100 tons daily to Murray smelter, Utah, which needs the ore as a flux.

MILFORD MAGNOLIA MINES CO. UTAH

Address: R. B. Garff, pres., 219 Colfax Ave., Salt Lake City; H. A. Smith, C. I. Goff, A. F. Judd, and John Clayton, directors.

Inc. 1919, in Utah. **Cap.** $10,000; shares 1c par.

Property: the old Magnolia group of 9 claims, 12 miles S. W. of Milford, which contain lead-silver ore.

Development: by 125′ and 150′ shafts when the company acquired the property (1919). Company sank the 125′ shaft to the 200′ level on which exploration work exposed 4′ of high-grade lead-silver ore.

MILLER HAMILTON MINING CO. UTAH

See under Nevada.

MILLER HILL MINING CO. UTAH

Office: Knight Block, Provo, Utah. **Mine office:** American Fork, Utah county, Utah.

Officers: O. Raymond Knight, pres.; J. Wm. Knight, v. p.; R. E. Allen, sec.-treas.

Cap. $100,000; shares 10c par; assessable. Shares listed on Salt Lake Exchange. In September, 1917, 25,000 shares of stock were offered for sale at 50c a share. Assessment of 2c per share was called November 12, 1917. Shares sold from 2 to 15½c. in 1918; 1½ to 4c. in 1919; 1-3c. in 1920; 1½-5c. in 1921 to June.

Property: 33 claims, 30 patented, adjoining the Mineral Flat mine, developed by 2,200′ tunnel with about 2,400′ of workings.

Property was worked in 1918, but is now idle.

MILLER MINES DEVELOPMENT CO. UTAH

Dead; see Vol. XIV for description.

Office: 804 Newhouse Bldg., Salt Lake City, Utah.

Officers: J. H. Leavell, pres.; G. H. Ryan, v. p.; H. W. Ragland, sec.-treas.; with M. P. Kirk, and L. D. Foreman, directors. J. C. Fitzgerald, supt.

Inc. in Utah. **Cap.** $1,000,000; 10c par; 543,500 issued.

Held a 5 year's lease and bond on property of Miller M. & S. Co. (q. v.). Lessee company failed in 1918, and lease forfeited.

MILLER MINING & SMELTING CO. UTAH

Office: 406 Dooly Block, Salt Lake City, Utah. W. A. Wilson, gen. mgr. F. De P. Foster, pres., 44 Wall St., New York.

Property: Miller mine. 11 claims, 10 patented, 70 acres, at Miller Hill, in American Fork district, 50 miles from Salt Lake City.

Geology: replacement deposit in upper Cambrian limestone. Orebody said to be 600′ long and of good width. Ore carries lead and zinc carbonates, and is reported to assay 0.73 oz. gold, 20.7 oz. silver, 43.95% lead, 17.2% iron, and 6.1% zinc.

Development: by tunnels 300 to 1,200′ long to depth of 400′ with total underground workings of about 15,000′.

There seems little likelihood of opening other replacement orebodies and future possibilities apparently depend upon fissures in underlying quartzite.

Production: estimated to be $3,000,000, from 1870 when this old mine was discovered, up to 1919.

A 5-years' leased held by the Miller Mines Dev. Co. was forfeited in 1918. Production by lessees negligible. Property under lease and bond, for $150,000, to A. W. Hahn, et al., but idle during 1920.

MINERAL FLAT EXTENSION MINING & MILLING CO. UTAH

Name changed to **Alta Superior Mining & Milling Co.**, which see.

MINERAL FLAT MINING CO. UTAH

Fully described in Volume XIII. Consolidated with **Albion Cons. Mining Co.**, which see.

MINERAL LANDS CO. UTAH

Idle. **Office:** 102 Exchange St, Portland, Me. Carl W. Smith, treas. **Inc.** 1913, in Maine. **Cap.** $100,000; $5 par. Company owns large interest in Bingham Coalition Mines Co., also Vespasian-Hoogly group of claims in Markham gulch, Bingham, and other mining interests.

MINERAL MOUNTAIN MINING CO. UTAH

Address: Tecoma, Nevada.

Officers: G. Austin, pres.; F. Litz, v. p.; E. B. Whipple, sec.; C. F. Whipple, treas.

Inc. March, 1908, in Utah. **Cap.** $100,000; shares 10c par; 632,000 is-

sued; assessable to 1c yearly; assessment No. 4, levied July 2, 1919, 1c a share.

Property: 13 unpatented claims, 250 acres, in Lucin district, Utah, 6 miles from Tecoma, Nevada, said to show contact and fissure veins in limestone, quartzite and granite. Shoots are from 12 to 24" wide. Ore carries lead carbonate, silver, and gold.

Development: by 350' shaft and 350' tunnel.

MINERAL POINT COPPER MINING CO. UTAH

Address: Andrew Madsen, mgr., Logan, Utah.

Property: claims in East Paradise canyon, near Logan, developing 1921, by 282' upper and 100' lower tunnels, both showing a vein of high grade copper ore and 20' of gold bearing quartz.

MINERAL RANGE GOLD MNG. CO. UTAH

Address: J. L. Craig, sec., 353 W. 2nd S. St., Salt Lake City, Utah.

Assessment No. 9 of 1 mill per share levied March 30, 1921.

Property: a silver-lead mine in Star district Beaver county. Idle several years.

MINERALS PRODUCTS CORPORATION UTAH

Address: Marysvale, Utah. N. Touroff, supt.

Is a subsidiary of the Armour Fertilizer Works.

Property: alunite bearing claims, 9 miles S. W. of Marysvale.

Equipment: includes aerial tram 6,200' long, 600-h. p. steam plant and 50-ton mill to extract potash from the alunite, which is a hydrous sulphate of aluminum and potassium. In October, 1918, reported as shipping 600 tons of potassium sulphate per month; plant in operation part of 1919; all operations ceased Jan. 1, 1921.

MONARCH CONS. MINES CO. UTAH

Address: 631 Judge Bldg., Salt Lake City, Utah.

Officers: Joshua Greenwood, pres., 1150 Herbert Ave., Salt Lake City; W. T. Goslen, v. p.; with M. K. Parsons, M. P. Broffet, J. M. Hayes, directors.

Inc. in Utah. **Cap.** $2,000,000; shares $1 par; issued 800,000 shares.

Company has a bond and lease on the property of the Ibex Gold Mining Co., which see, formerly held by the Detroit Copper Mining Co.

MONARCH MINES CO. UTAH

Title changed from Plentiful M. & M. Co., 1916.

Address: American Fork, Utah.

Officers: Chas. Ohran, pres.; F. W. Wright, v. p.; with W. A. McBride, E. J. Seastrand, and J. A. Kauffman, directors. J. Watt Storrs, sec.-treas.

Inc. June, 1915, in Utah. **Cap.** $30,000, increased March, 1916, to $40,000; increased November, 1917, to $62,500; shares 5c par; 600,000 issued; assessable.

Property: 9 claims, 186 acres, near American Fork, Tooele county, in Lakeside mountains, shows galena and carbonate ore in fissure vein cutting blue and gray limestone, with N.-S. strike and dip of 70° W. Pay ore reported to have been cut in 1916, at 140' depth in a 40' vein of lead carbonates. A 2½' streak is said to assay 78% lead and 10 oz. silver.

Development: by 3 incline shafts, deepest 193'. **Ore reserves:** 100,000 tons estimated as blocked out.

Equipment: includes 2 motor trucks. Company does not reply to requests for information.

MONETAIRE MINING CO. UTAH

Office: 405 Newhouse Bldg., Salt Lake City, Utah.

Officers: D. J. Williams, pres.; N. V. Jones, v. p.; B. F. Cummings, sec.-treas.; with W H. King and D. W. Cummings, directors.

Inc. Sept. 19, 1912, in Utah. **Cap.** $250,000; shares 25c par; assessable; 885,000 shares outstanding. Annual meeting third Tuesday in January.

Property: 2 patented claims, 6 acres, in Little Cottonwood mining district, said to show lead-zinc ore, with some molybdenum, in fissure veins in

limestone and quartzite. Veins strike E. W. and dip almost vertical. Ore shipped said to have returned $17 per ton. No recent shipments reported.

Development: 127′ vertical shaft and tunnels, with about 1,000′ of workings. Claim to have 20,000 tons of ore blocked out.

Equipment includes an electric hoist.

MONO DEVELOPMENT CO. **UTAH**

Mail returned from Salt Lake City. J. H. Cook, pres., Salt Lake City, Utah. Mine at Dry Canyon, near Ophir, Salt Lake County, Utah. Stock assessed ¼c a share.

Property: a group of claims, 300 acres, noted in 1872-3 for its high-grade silver ore. Claims are near the following producing mines; Mono Brooklyn, Thad Stevens, Kearsarge and Eureka Ophir. A new wagon road was built October, 1917, from Dry Canyon to the railway; heretofore ore was hauled 9 miles to Stockton.

Development: by 2,500′ tunnel. Idle.

MONTANA-BINGHAM CONSOLIDATED MINING CO. **UTAH**

Office: 401 Dooly Blk., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Utah. Imer Pett, gen. mgr.;T. P. Billings, engr.-gen. supt.; Harry Bowman, mine supt.

Officers: H. H. Green, pres.; Chas. E. Adderley, v. p.; J. R. Brain, sec.-treas., with Frank Thornberg, A. G. MacKenzie, A. L. Headberg and Harry Bowman, directors.

Inc. July, 1910. **Cap.** $3,000,000; $1 par; issued, 2,491,996; assessable. An assessment of 10c a share, levied March, 1918; one of 3c in November, 1918; a third, 2c in May, 1919; and a fourth of 2c on April 20, 1920, netted $49,576. Annual meeting, first Tuesday in March. Owns 165,000 shares of United Bingham C. Co. stock.

Debentures: $200,000, 6%; $178,600 outstanding; due June 1, 1918; extended to June 1, 1919; Utah Savings & Trust Co., Salt Lake City, trustee for bondholders.

Financial statement Dec. 31, 1920, shows fixed assets of $3,404,266; investment in U. B. C. Co., $54,300; cash, $20,510, with total current assets, $29,602. Current liabilities were $8,809, and include unpaid bond interest. During this year final payment of $25,000 made on purchase of mine from Fortuna M. & M. Co.

Income statement for year ending December 31, 1921, shows; total income, $88,199, of which net ore sales were $80,195. Operating expense, including $12,660 for prospecting and developing, was $84,320. Net operating profit was $3,878, but net loss was $7,138, after deducting bond interest, etc. Surplus shows a decrease of $94,012; credits include $49,576 from assessment, and debits, $36,376 for depreciation and $85,699 for stock discounts.

Profit and loss statement for 1918 shows a charge of $10,000, "special compensation to president—for surrender of life position in Honolulu, for loss through sacrifice sale of personal effects and property, and to cover expenses of moving to Salt Lake City," he also received 50,000 shares of capital stock as part compensation.

In 1919, a committee representing the minority stockholder's interest was "instrumental in causing the cancellation of the contract which employed the president and general manager for five years with a salary of $15,000 per annum for two years and $25,000 per annum for three years there-after, of which contract a little than more one year had run; also has been instrumental in causing economies in the overhead expenses of the company to the extent of several hundred dollars per months."

This controversy continued into 1920, and on July 1st suit by stockholders was filed for an accounting against the directors.

Property: consists of 335.5 acres, patented, in the West Mountain mining district (Bingham), Salt Lake county, Utah, comprising the Fortuna group of 23 claims, 170.8 acres, underlying the town of Bingham; (2) the Ed-

group of 23 claims, 170.8 acres, in the Keystone and Dalton gulches, and the Thrush claims, 6.2 acres, underlying the town of Bingham; (2) the Eddie group of 4 claims, 50.3 acres in Bingham Canyon; (3) leases and options on the Valentine patent and Tiewaukee group, 10 claims, 114 acres, in Bingham Canyon.

The Montana-Bingham Transportation & Drainage tunnel over 5,540′ long, enters the mountain in the N. W. corner of the Eddie group, within 50′ of the D. & R. G. railway, and runs S. E. through the Eddie group, then through the United Bingham Copper Co. group and the Congor G. & C. Mng. company's ground to the Fortuna group. This tunnel crosscuts, nearly at right angles, the Eddie and the Cleveland veins of the Eddie group, the Copper Glance and Manifay veins of United Bingham group, the veins of the Congor group, the Chester and Virtick veins of the Keystone Extension Co's group and the Sierra Grande, Fortuna and Mayflower veins of the Fortuna group. The three last named veins, are cut 470′ vertically or 1,400′ on the dip, below the lowest of the 3 long drift tunnels of the old Fortuna mine, but the S. rake of the orebodies opened in the old mine, carries them 1,700′ or more south of this tunnel. Extensive lateral development was done to block out ore. The Mayflower vein at this horizon shows an oreshoot estimated by the manager to be 700′ long, 22′ thick, and 1,400′ on the dip, equal to 1,500,000 tons of 2% ore with an equal amount between the M. B. tunnel and the Mascotte (of the Ohio Co.), 475′ vertically, or 1,000′ on the dip below it.

Geology: the Fortuna group, the most important holding of the company, shows an intruded sheet of monzonite-porphyry in tilted series of quartzite and limestone beds, traversed by four nearly parallel veins following the strike and dip of the monzonite sheet or of the quartzite bedding, occasionally cutting across and accompanied by some fracturing and crushing. These veins are 2 to 25′ thick and carry streaks and shoots of pyrite with varying copper value as chalcopyrite and chalcocite. Southern workings have shoots of silver-lead ore and in Eastern end of workings, lenses of ore occur that are 20′-50′ thick and carry 2% copper.

These veins are opened by the 4,200′ Keystone tunnel and 3 other tunnels comprising the old workings of the Fortuna mine.

Tiewaukee mine: 10 claims, 114 acres, is explored by a main tunnel, 1,000′ long, cutting several bedded veins, large stopes of old workings north of it, contain much milling ore. Pillars left in stopes show 18.9% lead, 6% copper, 27 oz. silver per ton. Tiewaukee shaft is 90′ vertical, connecting with a drift from the main tunnel, while shaft continues as an incline on the bedded vein.

The Valentine mine: also in Bingham Canyon, has been an irregular shipper from an orebody assaying 4% copper. It has a 500′ tunnel and 225′ shaft, cutting a vein of silver-copper ore.

Company has contracts with United Bingham C. Co. and will receive 10% of net proceeds on all ore shipped through the tunnel; from Keystone Extension Mng. Co., 25c per ton of ore and 12½c per ton for waste; from Bingham-Congor C. Co., 15c p. t. of ore or waste; from Congor Gold & Copper M. Co., the same as from Keystone; also an agreement with Col. E. A. Wall to handle Starless ores when drift from tunnel has been extended on one of Montana-Bingham veins into Starless ground; 300,000 gallons water per day is flowing from tunnel, which is valuable for milling etc.

Development: totaled 1,718′ in 1920, largely below M. B. tunnel, and included sinking incline to 260′ depth. Two separate ore shoots of high copper content were developed. Arrangements have been made to exploit property through the Mascotte tunnel.

Production: Nov., 1918, to July 9, 1919, was 1,547 tons of ore yielding $20,720 net smelter returns. About half of this ore was mined by leasers.

Work was resumed in June, 1919, after a shutdown of four months.

Shipments for 1919 totaled 4,763 tons of ore containing 220 oz. gold; 14,[illegible] oz. silver; 99,051 lb. lead; 358,212 lb. copper, all of a gross value of $110,390. Operations for 1919 resulted in an expenditure of $15,829 over and above ore returns.

Shipments for 1920 were 4,434 tons containing 349 oz. gold, 12,663 oz. silver, 16,278 lb. lead and 750,210 lb. copper, with a gross value of $108,121. Lessees shipped 815 tons and royalties to company were $4,827. In December, 1921, 60 men were working and shipments of 100 tons per day were made of fluxing ore low in copper.

MONZONITE SILVER & COPPER CO. UTAH

Idle. **Officers:** S. S. Pond, pres. and gen. mgr.; D. Rigby, sec.; Geo. Baglin, treas.

Cap. $50,000; shares 5c par; assessable. In treasury, Jan., 1916, 400,000 shares; bills receivable and cash, $2,500. Stock listed in Salt Lake City.

Property: 7 unpatented claims, near Milford, Beaver county, 6 miles from the railroad, surrounded by the Leonora, Hoosier Boy and Paloma Extension mines. Ore: silver and copper.

Development: 100′ shaft with 50′ of crosscutting. Is a prospect.

MORGAN ARGENTINE MINING CO. UTAH

Office: 22 E. Broadway, Salt Lake City, Utah. Mine near Peterson, Morgan county, Utah.

Officers: Herbert Pembroke, pres.-gen. mgr.; A. B. Pembroke, sec.-treas.

Inc. 1900, in Utah. **Cap.** $5,000; shares 1c par.

Property: 15 claims, 10 patented, 300 acres, in Argenta district, shows fissure veins in limestone carrying silver-lead and copper-gold ore.

Machinery was added, and development work started in 1917 and continued in 1918, 1919 and 1920.

MORGAN CRESCENT MINING CO. UTAH

Mail returned from Geo. T. Stenhouse, gen.-mgr., Morgan City, Utah.

Property: in Morgan district, Morgan county, 1 mile N. of Morgan City, shows a vein, 4-12′ wide, in limestone, free from igneous disturbance. The ore, in part replacement, is largely limonite carrying copper, silver and gold, some of which was shipped in 1918 for fluxing purposes.

MORGAN-GALENA MINING CO. UTAH

Address: 417 Kearns Bldg., Salt Lake City, Utah.

Officers: J. W. Rozzelle, pres.-treas.; A. H. Levine, v. p.; J. H. Ritchie, sec., with F. H. Ashihira and Frank Troxler, directors.

Inc. Oct., 1916, in Utah. **Cap.** $100,000; shares 10c par; 500,000 issued.

Property: 6 claims in Morgan county, Utah, said to contain fissure veins in porphyry carrying 37% lead ore with some gold-silver values. Development by shafts and tunnels. Is considered a good prospect. No recent report, probably idle.

MOSCOW MINING & MILLING CO. UTAH

See Vol. XIV for description. Company merged into **Moscow Silver Mines Co.**, which see.

MOSCOW SILVER MINES CO. UTAH

Company is a merger, March, 1920, of Moscow Mng. & Mlg. Co., Red Warrior Mng. Co. and Beaver Combination Mng. Co.

Office: 312 McCornick Bldg., Salt Lake City. **Mine address:** Robt. Sherwood, mine mgr., Milford, Utah.

Officers: Fred J. Leonard, pres.; F. J. Hagenbarth, v. p.; M. B. Johnson, sec.-treas.; Garret S. Wilkins, gen. mgr.; with Angus Buchanan, directors.

Inc. 1920, in Utah. **Cap.** $2,500,000 par $1; 2,100,000 shares issued to merger companies, 1,000,000 to Moscow, 600,000 to Red Warrior and 500,000 to Beaver Combination.

Dividends: in recent times, up to September, 1917, Moscow has paid $108,000 to shareholders.

Property: 3 adjoining groups, 640 acres, in Star district, Beaver county, 8 miles from Salt Lake Route.

Moscow: 7 claims, including Moscow mine, one of the oldest in district, having been worked over 30 years ago. Ground covers ½ mile of the strike of an ore zone, 50 to 60′ wide; ore mainly silver-lead, with some copper and zinc.

Red Warrior: N. and W. of Moscow, including property of Mowitza Mng. Co. purchased in 1917, shows orebodies along the bedding planes of limestone, one of which is 6′ thick, 50′ long, and proven for 600′ on dip. Ore similar to that of Moscow, copper apparently increasing with depth; one average assay showed 21% lead, 1% zinc, 18 oz. silver and 25¢ gold per ton.

Beaver Combination: lies E. of Red Warrior and N. E. of Moscow.

Development: at the Moscow, by tunnels and shaft to 1,400′. The Red Warrior is opened by 800′ shaft with levels at 500 and 675′, and by 3,000′ of old workings, or 7,000′ total. Mine was operated from 1870 to 1889, and reopened 1907. The Beaver Combination is opened to a depth of 400′.

The Moscow and Red Warrior are more fully described in Vol. XIV of this Handbook.

Equipment: includes hoist good for 1,500′, 3-drill compressor, etc.

Production: was considerable in early days from the Moscow and Red Warrior. Shipments from the former had been fairly consistent up to September, 1917, when operations ceased; the latter was a small producer in 1917 and 1918.

MURRAY LEAD SMELTER — **UTAH**

Owned by the American Smelting & Refining Co.

Office: 120 Broadway, New York. **Operating address:** J. M. Bidwell, mgr., 714 McCornick Blk., Salt Lake City. **Works address:** W. W. Norton, supt., Murray, Utah.

Its annual capacity is 700,000 tons.

MUTUAL METAL MINES CO. — **UTAH**

Successor to **Grater Cons. Mines Co.**

Address: 201 Ness Bldg., 30 W. Second St. S., Salt Lake City, Utah.

Officers: Chas. E. Steed, pres., Hyrum Neilson, v. p.; B. D. Field, sec.-treas., with Jos. E. Flint and Chas. E. White, directors.

Inc. July 12, 1921 in Utah. **Cap.** $150,000; par 10c.; 472,960 shares issued; assessable. Assessment of ½c. per share levied in 1921. Operating expenses for 1921, $11,000. Treasury stock sold at $1 per share, 1922.

Property: 76 claims, unpatented, in Big Cottonwood district, Salt Lake county, contains silver-lead deposits of carbonate and sulphide ore on the Logger contact fissure between limestone and porphyry. Company also owns tunnel and water rights for deep transportation tunnel near Park City.

Development: by 2,400′ tunnel, giving depth of 1,900′; 1,200′ of this work was done in 1921.

Equipment: includes compressor and electric power. Mine is not yet a producer, though ore assaying $60 to $100 per ton has been found.

NAILDRIVER MINING CO. — **UTAH**

Address: 163 So. Main St., Salt Lake City, Utah. **Mine address:** J. D. Fisher, supt., Park City, Utah.

Officers: W. Mont. Ferry, pres.; Herbert Cohen, sec.-treas.

Inc. Oct. 2, 1902. **Cap.** $600,000; shares $2 par; assessable; 287,450 shares issued. Stock listed on the Salt Lake Exchange. A ⅓ share interest is held by the Ontario Silver Mng. Co.

Property: 13 claims in Park City mining district, Summit county, shows silver-lead-gold-copper ore.

Development: to depth of 900′ by shaft and drifts; additional depth of 400′ attained through Ontario workings. An orebody, 3-4′ wide, uncovered on the 700′ level has been followed to 500′ and 900′ levels. Up to August, 1919, mine worked mostly by lessees.

Production: was reported to be 500 to 600 tons of ore in 1918; small shipments in 1919 until mine reverted to company, since when it has been a steady shipper; during 1920, said to be about 20 tons of ore per day. One shipment carried 31 oz of silver and 11% lead per ton.

Examined by Fred. R. Weekes.

NATIONAL RADIUM MINES CO. **UTAH**

Henry Schwartz, Denver, Colo., pres., at last accounts. **Inc.** in Colorado. **Cap.** $400,000.

Property: in Green River district, Emery county, shows uranium and vanadium ore in a 5" vein, said to run as high as 20% uranium. Developing in 1916. No recent returns. Probably idle.

NEBO SILVER-LEAD MINING CO. **UTAH**

Company was operating a property near Mono, Utah, reported to show ore which assays about 60% lead and 8 oz. silver per ton.

NEVA MINING CO. **UTAH**

Office: 400 Boyd Park Bldg., Salt Lake City, Utah. **Mine office:** Brighton, Utah.

Officers: A. H. Rock, pres.; C. E. Cole, v. p.; Walter Steadman, sec.

Inc. 1906, in Utah. **Cap.** $75,000; shares 15c par; last assessment, of 2 mills, delinquent. Aug. 12, 1921. Stock is listed on Salt Lake Exchange. Sales ¼ low, 1c high, 1918; ¼-½c in 1919; ½c-1½c in 1920; ¼c in 1921 to June.

Property: 5 unpatented claims, adjoining the Cardiff on the W., show silver-lead-gold ore in a fissure vein, running E. W. along a quartz-lime contact and said to give assays of 45% lead, 30 oz. silver and 0.1 oz. gold. Developed by incline shaft and tunnel. Operations were resumed in 1915 and shaft sunk to intercept the Cardiff contact lode.

Property in dispute with the Cardiff M. & M. Co. was won by the Neva, and is considered valuable. Operations are carried on by small assessments.

NEW ENGLAND GOLD & COPPER MINING CO. **UTAH**

Address: Geo. F. Bradstreet, 120 Tremont St., Boston.

Dead; Fully described in Vol. XIV. Company lost its charter in 1914 and went into hands of receivers; mortgage held by trust company has not been foreclosed and bonds authorized by the New England company are under option to the **Utah-Boston Development Co.**, incorporated in 1920 in Maine, and organized to take over the New England holdings at receiver's sale, subject to exploratory work now under way. None of the rights under the Utah-Boston charter have as yet been exercised.

NEW QUINCY MINING CO. **UTAH**

Office: 202 Atlas Blk., Salt Lake City. **Mine address:** E. A. Taylor, supt., Park City, Utah.

Officers: W. S. McCornick, pres.; W. R. Hutchinson, v. p.; A. L. Thomas, sec.; Herman Bamberger, treas., with F. J. Hagenbarth, Geo. W. Morgas, G. L. Bemis and M. B. Johnson, directors. W. B. Cole, supt.

Inc. June, 1915. Is a reorganization of the Thompson Quincy Mining Co. **Cap.** $125,000; shares 10¢ par; 200.611 treasury shares; assessable: with assessments not to exceed 3c during the first year. Last call due Feb. 23, 1921. Exchange of stock made on a share-for-share basis, calling for distribution of 1,055,958 shares. Stock is listed on Salt Lake Exchange. The New Quincy Co. assumed the obligations of the Thompson Quincy.

Annual report for 1920 shows receipts totaling $16,109, of which $419 was from ore sales and $10,514 from assessments. Disbursements were $13,580, of which mine expense was $10,142. Cash on hand, Jan. 1, 1921, was $2,528. Note indebtedness totals $40,840, largely in favor of Daly West.

Property: 140 patented acres in Park City district, with rights of way and easements from the Daly West, Daly and Ontario companies. The claims supposedly carry the extension of the Quincy orebody of the Daly West mine. Developed by a 625' two-compartment vertical shaft, a

crosscut tunnel through the Little Bell mine, cutting a contact vein, said to carry ore assaying up to 20% lead, 160 oz. silver and $2 gold per ton, and through the Ontario drain tunnel No. 2, which was extended to the Quincy mine by the Ontario company.

On April 1, 1918, Daly West shaft was closed. In August, 1920, company obtained a lease on the 700′ shaft and buildings of Little Bell Cons. (q. v.), purchased new electric compressor and hoist, and started work on 700′ level. Reported that 2′ of 50 oz. silver ore had been found in winze below the 700′ level. Four shipments netted company $6,163, ore running 55.3 oz. silver, 18.1% lead, 1.12% copper, 12.1% zinc, 42.1% insoluble, netting $48 per ton.

NEW STOCKTON MINING CO. UTAH

Office: J. C. McLain, sec., No. 11 E. First South St., Salt Lake City. **Mine office:** at Stockton, Utah.

Officers: F. M. Currier, pres.; R. A. Dunham, v. p.; W. Z. Harrison, sec.-treas., Hess Bldg., Salt Lake City. W. A. Wilson, cons. engr., 406 Dooly Block, Salt Lake City; C. B. Kennedy, W. D. Kimball and M. M. Ferguson, directors. Assessment of 2¢ per share made Dec., 1921.

Property: the old Ben Harrison mine at Stockton showing a vein with one to two feet of ore, which averages 10% to 45% lead, 5 to 40 oz. silver and 60c. to $7 gold per ton.

Development: by shaft with main work on 200′, 500′, 700′, and 850′ levels.

Production: $70,000 in 1913-1914. As shipped the ore has averaged $12 to $15 per ton with silver-gold-lead values. In 1917 lessees shipped ore averaging 45% lead and 35 oz. silver per ton. Was a producer in 1918.

NEW UTAH BINGHAM MINING CO. UTAH

Successor to Utah Bingham Mng. Co.

Described in Vol. XIII. Property and assets acquired by **New York Bingham Mining Co.**, which see.

NEW YORK-BINGHAM MINING CO. UTAH

Acquired property and assets of New Utah Bingham Mining Co.

Office: Kittery, Me. Office of treasurer: 920 Broadway, New York. **Mine office:** Michel Gibbons, mgr., Bingham Canyon, Utah.

Officers: T. B. Becher, pres.; with F. T. Bellows; J. W. Thompson, E. S. Burns and H. F. Hoevel, directors. H. A. Bellows, treas.; R. L. Reisch, sec.

Inc. Nov. 19, 1918, in Maine. **Cap.** $200,000; 20¢ par; 73,648 shares outstanding, March, 1920. Overdue bonds of old company outstanding are being refunded; $11,000 in March, 1921. Stock was exchanged share for share. Annual meeting, 3rd Monday in November. On Oct. 31, 1920, current assets were $1,408, and liabilities, including bonds, $12,199.

Property: 20 claims, 19 patented, 130 acres adjoining the Telegraph of the United States Mining Co., in Bingham Canyon, Utah. Claims cover about 3,000′ along the footwall portion of the Jordan limestone ore-bearing zone of Bingham. The large orebodies of this district are found in fissures within the limestone, or along limestone contacts, and the Jordan belt is the most productive of the 3 belts known in the camp; 16 fissure veins have been opened. Before the company acquired the property a number of promising veins carrying ore in the porphyry, but too narrow to be valuable, had been exposed. These veins pass into the limestone and are expected to have large orebodies at the contact. Ore is mainly silver-lead.

Development: consists of about 15,000′ of work, mainly by 3 tunnels. In the Turngren tunnel, over 1,300′ long, 8 veins from 1 to 4′ thick have been cut, 7 showing ore and 2 of them worked. These two veins run north, are parallel and contain high-grade ore in the Spanish mine and along the outcrop in the company's ground. The Harrison tunnel, 600′ long, is in quartzite and will crosscut the Rough and Ready veins, which are opened by 3 other tunnels higher up the mountain, all showing ore. Work on these

veins has been discontinued and all work concentrated on the Giant Chief.

The Giant Chief vein is a fault fissure, developed by a 200' shaft from which further exploration is being conducted on the 150' level; 600' of drifts and crosscuts driven in 1915 from this point have at 800' depth in the sulphide zone cut 7 fissures encountered in the higher workings. These veins carry oxidized mineral matter, surrounded by a soft lime, and show porphyry mineralized with iron pyrites. A small vein of carbonate ore, running nearly 50% lead, has been opened; the Bonanza tunnel was driven 977' along the Giant Chief vein, and across it to reach the ore, 150' deeper than where first opened.

The Kilkenny shaft is 284' deep. In 12 months ending with October, 1920, lessees advanced 500'; no work by company.

Equipment: includes compressor, 180-h. p. electric plant, taking current from the Utah Power & Light Co., hoist and all necessary buildings.

Production: by lessees during year ending Nov. 15, 1920, amounted to 400 tons of ore yielding $18,613 of which company received 25%.

Property is well adapted for tunnel work, has large blocks of virgin ground and is considered promising. Company is an intermittent producer and hopes to meet development costs largely from royalties.

Reported that 27 acres were sold to the new Bingham-Galena Mng. Co.

NEW YORK BONANZA MINING CO. **UTAH**

Park City, Summit county, Utah.

Reported, September, 1919, sold to the Naildriver Mining Co.

Old company described in Copper Handbook, Vol. XI.

NIAGARA MINING CO. **UTAH**

Is controlled by **United States Smelting, Refining & Mining Co.**, which see.

NORTH BECK MINING CO. **UTAH**

Address: E. J. Raddatz, mgr., 19 Haxton Place, Salt Lake City, Utah.

Property: in northwestern part of Tintic, adjoining Centennial-Eureka, and Gemini.

Development: by 1,600' shaft. A leached zone was opened at 1,200'. Mine is fully equipped.

Drift on 1,600' level driven from bottom of shaft, 1921-'22.

Management does not reply to requests for information.

NORTH BECK MINING CO. OF SPANISH FORK **UTAH**

Officers: M. K. Nebo, pres.; S. N. Nelson, v. p.; H. A. Gardner, sec.-treas., 1134 Bueno Ave., Salt Lake City, with B. H. Brown, W. A. Jones, Edward Money, and R. H. Andrus, directors.

Inc. 1919, in Utah. **Cap.** $10,000; 1c par.

Property: a group of silver-bearing claims in Spanish Fork section, Utah county.

NORTH BINGHAM CONSOLIDATED MINING CO. **UTAH**

Office: Provo, Utah. Mine near Bingham Canyon, Salt Lake county, Utah. O. Raymond Knight, pres.; Wm. W. Matthews, v. p.; R. E. Allen, sec.-treas., with J. Wm. Knight, directors.

Inc June, 1907, in Utah. **Cap.** $100,000; shares 10c par; assessable. Is controlled, through stock ownership, by the Knight Investment Co.

Property: 6 claims, in Barney Canyon, has a very wide ore zone, said to show leached ore carrying traces of copper and up to $2.80 gold per ton.

Development: includes a tunnel of about 1,000', and a 2-compartment shaft. Property is considered a good development proposition. Idle.

NORTH SCRANTON MINING CO. **UTAH**

Address: H. B. Merrihew, Box 355, Lehi, Utah.

Officers: H. B. Merrihew, pres.-mgr.; B. C. Lott, v. p.; F. R. Heidebreich, sec.-treas., with D. H. Cox, directors.

Inc. May, 1905, in Utah. **Cap.** $100,000; shares 10c par; assessable; 421,000 issued.

Property: 10 unpatented claims, 200 acres, on west slope of Tintic

range, in North Tintic district, Utah, 3½ miles by good road from railroad. Group shows outcrops of silver-bearing zinc-lead ore in a well-defined fissure in dolomitic limestone. **Ore** consists of 6 to 8″ streaks, reported to carry 23% lead and 6 oz. silver per ton.

Development: by 2 tunnels and winzes with total workings of 2,300′. Tunnel No. 1 exposes 18% zinc ore at depth of 40′. Tunnel No. 2 shows ore assaying 74% lead and 54 oz. silver, at depth of 75′. While not in commercial quantity, this ore warrants further development to reach the main fissure. The fissure has been followed down for 200′.

Is a prospect. Assessment work only done during past 5 or 6 years.

NORTH STANDARD MINING CO. **UTAH**

Office: 404 Walker Bldg., Salt Lake City. **Mine address:** J. H. Manson, mgr., Eureka, Utah.

Officers: Dr. C. F. Wilcox, pres.; J. H. Manson, v. p.; John Dorius, sec.-treas., with Frank L. Copening and L. A. Marks, directors.

Cap. $100,000; par 10¢; assessable; first assessment levied October, 1919, and two, of 1¢ each (Nos. 8 & 9), in 1921. Stock is listed on Salt Lake Exchange.

Property: 22 claims, north of the Tintic Standard, at Eureka, Juab county.

Development: in year ending April, 1920, a 2-compartment shaft was sunk 525′, with 1,925′ total workings. By March, 1921, shaft had reached 1,100′ and a N. E. drift started to cut intersection of 2 fissures uncovered on 500′ level.

Equipment: includes electric hoist, and a compressor.

OGDEN-TINTIC LEASING CO. **UTAH**

Has a lease on part of property of Tintic Central Mining & Milling Co., which see.

Company probably dead; Tintic Central property reported taken over by Knight Investment Co.

OHIO COPPER CO. OF UTAH. **UTAH**

Office: 15 Broad St., New York. Operating office and concentrator: Lark, Utah.

Officers: Chas. A. Kittle, pres.; E. S. Hooley and Alfred E. Cortis, v. ps.; with J. H. Flagler, Hubert E. Rogers, A. R. Peacock, Hugh Aiken, St. John Wood and Jas. A. Heitzmann (sec.-asst. treas.), directors. S. K. Kellock, treas.-asst. sec.

Inc. Nov., 1916, in Maine, as a reorganization of the Ohio Copper Mining Co., formerly the Ohio Copper Co. **Cap.** $3,500,000. increased from $3,000,000, Sept. 10, 1919, which had been increased from $2,500,000 on Jan. 3, 1919: par $1; 2,225,625 shares issued; 1,000,000 shares retained in treasury to provide for converting $1,000,000 7% ten-year bonds and to retire $250.000 three-year notes. New York Trust Co., transfer agent; Columbia Trust Co., New York, registrar. Listed on Salt Lake Exchange and on Boston Curb. Price range 70¢ to $1.05 in 1918; 35¢ to 50¢ in 1919; 5¢ in 1920. 50.000 shares sold for 11¢ each at public auction in New York on Dec. 31, 1920.

Balance sheet as of December 31, 1918, shows; total assets, $2,676,732, which includes: property, $2,096,793; stocks and bonds of Bingham Central Ry., $327,820; current, $118,108; prepaid insurance, interest, etc., $21.087; general profit and loss-deficit, $112,925. Liabilities show: capital stock, $2,225,625;3-year convertible 7% notes dated September 20, 1918, $250,000; current, $156,389; sundry reserves, $44,718.

Profit and loss statement shows: total value metals produced, $817,210; cost of production, $941,745; operating loss, $124,535; rents, interest received, etc., $2,999; miscellaneous expenses, $18.764; profit and loss deficit, 1918, $140,300. Deficit, December 31, 1918, $112.924. Fire loss, due to burning of the mill, is given as $104,233.

Revenue in 1919 was $188,599 from concentrates sold, and expenses were $230,386.

For detailed history of old company and the plan of reorganization, see Vol. XIII of the Mines Handbook.

Property: 14 claims, patented, 120 acres, bounded on the N. and W. by holdings of the Utah Copper Co., on the E. by the Montana Bingham Cons. M. Co., on the S. by United States Mining Co., and on S. W. by the Boston Consolidated. The Mascotte tunnel, owned by the Bingham Central railway, a subsidiary company, charges toll on all ore hauled to the mills.

Geology: property carries a belt of quartzite 500′ wide carrying 2 parallel veins known as the What Cheer and All's Well. These veins are more than 500′ apart, and separated by mineralized quartzite which constitutes the main orebody of the property, the ore averaging 1.015% copper. The quartzite, which adjoins the laccolithic mass of monzonite-porphyry of the neighboring Utah Copper and Boston Consolidated properties, is much shattered and broken, with ore disseminations and impregnations along shatter and cleavage planes, ore in the brecciated material being chiefly chalcocite and chalcopyrite, associated with pyrite, readily amenable to concentration, and lying above the level of the Mascotte tunnel.

Estimates of ore developed vary greatly, the former management claiming that ore had been developed under about 5 acres, the "porphyry" orebody being estimated as 400′ wide, 1,000′ long and 600′ deep. One estimate gave 3,746,165 tons of ore developed with 9,738,690 tons of probable ore and the average tenor probably about that of the ore milled, or 1.01% copper. Proven ore reserves July 31, 1919, were 6,000,000 tons of 0.8% copper, with another large block of ore not yet fully developed that averages 1% copper.

The 14,000′ single track Mascotte tunnel, connecting with the shaft at depth of 1,100′, cares for the large volume of water coming from the workings. Ore is blocked out in 100′ squares, with extensive development on the 3rd, 5th and 7th levels, and the caving system is used in extraction. Ore is sent from the upper workings, through chutes, to a 4,000-ton ore-bin, 20′ wide and 200′ long, extending over both tracks; loaded in about 4 minutes from the bins into trains of 18 to 20 five-ton double-bottom steel cars, and hauled by electric locomotives to the concentrator at Lark.

The mill: at Lark, 3,200′ from the mouth of the Mascotte tunnel. On August 10, 1918, fire destroyed the mill. It was rebuilt and operations were again started, October 1, and by February 23, 1919, the 5-unit flotation mill was completed.

Production: in 1918 was 3,362,119 lb. copper, compared with 5,279,259 lb. in 1917. In 1918, there was also produced 5,290 oz. silver and 731 oz. gold.

Output in 1919 was 1,012,920 lbs. copper, 1,149 oz. silver and 96 oz. gold.

On March 10, 1919, all operations were suspended due to the depressed copper market, and had not been resumed up to September, 1921.

OHIO COPPER CO. UTAH

Succeeded by Ohio Copper Mng. Co., and in turn by Ohio Copper Co. of Utah, which see.

OHIO COPPER MINING CO. UTAH

Property sold at foreclosure sale, August, 1916, to representatives of bondholders' committee and company reorganized as Ohio Copper Co. of Utah, which see. Also see Vol. XII.

O. K. EXTENSION MINING & REDUCTION CO. UTAH

Office: 609 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Milford, Beaver county, Utah.

Officers: A. J. McMullen, pres. and gen. mgr.; S. S. Pond, v. p.; Chas A. Weaver, sec.-treas., with R. H. Greenhalgh, directors.

Inc. Nov., 1899, in Utah. **Cap.** 300,000 shares; 3c par; assessable; issued, 125,000. Annual meeting, second Tuesday in October.

Assessment No. 19, ¼¢ per share, delinquent Jan. 3, 1922.

Lands: 6 claims, 3 patented, 120 acres, near the Majestic mine, in the Beaver Lake district, show monzonite and quartz-porphyry, carrying 2 fissure veins, of 5 to 24′ estimated average width, traceable 150′. Opened by 7 pits and shafts of 15 to 510′ depth, and a 150′ tunnel, with 1,045′ of workings, showing chalcopyrite estimated to average 2% copper. Inactive except for annual assessment work.

O. K. SILVER M. & M. CO. **UTAH**

David Keith, gen. mgr., Kearns Bldg., Salt Lake City, Utah. Thos. Kearns, pres.; W. G. Lamb, sec.-treas.

Inc. 1909, in Utah. **Cap.** $100,000; shares 10c par; assessable; assessment No. 18 of ½c per share levied Nov., 1920. Stock listed on Salt Lake Exchange.

Property: 33 claims in Erickson mining district, Indian Springs (near Tintic Jn), Tooele county.

Development: by a 280′ incline shaft, reported all in ore running better than 186 oz. silver and $4.70 gold per ton.

Production: in 1916, 5 cars of ore shipped netted $30,000. No recent report.

OLD EMMA LEASING CO. **UTAH**

Dissolved April, 1917. Assets consisting of 416,667 shares of Emma Cons. Mines Co. stock were distributed to stockholders at ratio of 3 shares of O. E. L. for 1 share of Emma Cons. Was a George Graham Rice promotion.

OLD EMMA MINES CO. **UTAH**

Successor to Old Emma Mng. Co.

Emma Consolidated Mining Co. owned 80% of the outstanding capitalization.

Property was leased for 14 months from July, 1916, to Old Emma Leasing Co., which was dissolved in April, 1917. Lease sold to Emma Cons. Mining Co. Company went into hands of receiver in 1919. Property now controlled by Emma Silver Mines Co., which see.

OLD EVERGREEN M. & T. CO. **UTAH**

Address: H. G. McMillan, gen. mgr., 649 E. South Temple St., Salt Lake City, Utah.

Officers: Hy Cohen, pres.; H. G. McMillan, sec.-treas., with Herbert Cohen and Z. H. Farnsworth, directors.

Cap. $300,000; shares $1 par; all outstanding.

Property: 12 patented claims, 3 miles N. E. of Alta, in the Big Cottonwood district. Mine is an old-time producer of gold-copper ore, with 2,700′ drainage and transportation tunnel. Idle.

OLD SUSAN MINING CO. **UTAH**

Mail returned, 1918, from former address, 411 Felt Bldg., Salt Lake City, Utah.

Officers: W. H. Simmons, pres.; P. F. Thompson, v. p.; E. D. R. Thompson, sec.-treas.-mgr., with F. A. Druehl, directors.

Inc. 1899, in Utah. **Cap.** 400,000 shares; 10c par; 257,572 shares outstanding. Annual meeting, first Monday in January.

Property: 3 patented claims, 25 acres in Tintic mining district. Juab county, shows gold-silver lead ore in fissure veins in porphyry and monzonite. Developed to depth of 300′ by 1,500′ tunnel. The mine, at last accounts was worked by lessees on a royalty basis.

ONTARIO SILVER MINING CO. **UTAH**

Offices: 163 So. Main St., Salt Lake City; Room 1208, 32 Broadway, New York. **Mine office:** Newton A. Dunyon, gen. supt., Park City, Utah.

Officers: J. E. Bamberger, pres.; D. M. Hyman, v. p.; Ernest Bamberger, treas.-gen. mgr., with N. A. Dunyon, Wm. C. Osborne, P. L. Benjamin, L. E. Bamberger and Walter Linforth, directors. Herbert Cohen, sec.; J. L. Tilton, New York, asst. sec.

Inc. Dec. 15, 1876, in California. **Cap.** $15,000,000; $100 par; all issued. Stock is listed on New York Exchange. Transfer office, J. L. Tilton, asst.-

sec., 32 Broadway, New York. Central Union Trust Co., New York, registrar. Annual meeting, third Monday in January. 103,120 shares sold on N. Y. Stock Exchange during 1921, the range being $o high and 3¢ low, compared with $9½ high in 1920 and $5.37 in Jan., 1922.

The annual report, Dec. 31, 1920, shows total receipts $585,180, including $551,369 from ore sales; disbursements $426,854. Cash in bank was $40,765; bills receivable, etc., $65,871; stocks and bonds $517,146.

Dividends: $14,932,500 to end of 1902, then a break without disbursements until, 1918; $1.00, or a total of $150,000 in 1918; $75,000, or 50¢ a share on Jan. 5, 1919; none since. Total $15,157,500.

Property: the Ontario mine, 800 acres, patented, at the head of Little Cottonwood canyon; also owns a 57% interest in the **Weber Coal Co.**, 311 acres coal land; 75,000 shares of **New Quincy Mining Co.** stock, and ⅓ interest in **Naildriver Mining Company,** and **Silver Lake Water Co.**

The Ontario is an old and famous silver-lead mine in which the ore occurs in a great pipe and chamber deposit in limestone. Ore shows an increase in zinc content at depth. Mine was once the largest silver producer in Utah.

Development: about 60 miles of old workings, includes two tunnels and a shaft 2,000′ deep. From the 900′ level to surface, mine is worked by lessees.

In December, 1915, the manager decided to re-open the Ontario mine below the 1,500′, or drain tunnel No. 2 level. The old workings were unwatered to the 1,700′ level and work was done on the 500, 1,000, 1,500 and 1,700′ levels in 1916, on company account.

Shaft caved in badly in November and the lower levels were flooded, but by May, 1917, re-timbering and unwatering had been accomplished.

Ore extraction is mainly from workings between 1,500 and 2,000′ levels where low-grade ore is mined. Silver-chloride ore 12-18″ wide and running over 200 oz. was recently cut above 500′ or Union tunnel level. Management is hunting oreshoots beyond Ontario fault.

During 1919, work was largely done below the 1,500′ level; orebodies of small size, but good grade, were opened between the 1,500′ and 1,700′, and on the 1,800′ levels; total extensions, 3,311′. In 1920, the 2,000′ level was unwatered after 20 years flooding, but mining operations were confined to the levels above 1,800′; workings for the year totaled 5,087′.

Equipment: includes 3½-mile power line, 2 electric pumps, hoist, compressor, and 100-ton mill.

Production: about $35,000,000; ore sales in 1918 were $573,070; $284,379 in 1919; $551,369 in 1920.

Stock believed to have a speculative value in addition to its liquidation value of about $4 per share.

OPEX CONSOLIDATED MINES CO. **UTAH**

Is a part of **Empire Mines Co.**, which see.

OPHIR CENTRAL MINES CO. **UTAH**

Office: 1609 Walker Bank Bldg., Salt Lake City.

Officers: W. S. Elliott, pres.; John F. Bauchelle, v. p.-treas.-mgr.; W. E. Rhoten, sec., with F. M. Wichman, Andrew Hexem and Oscar H. Upwall, directors.

Inc. Dec. 18, 1919, in Utah. **Cap.** $1,000,000; par $1; 351,838 treasury shares; assessable. Transfers made at company's office. Annual meeting, 2nd Monday in December.

Property: 21 claims (15 patented), 328 acres, in Ophir district, Tooele county, S. of Ophir Hill Cons. Silver-lead-copper ore occurs in chamber deposits in limestone, said to average $40 per ton in value; 1 oz. of silver is present for each unit of lead, and copper content is 1½%.

Development: by drilling for 12 months to May, 1920. Now sinking 2-compartment shaft. Total expenditures have been $30,000.

Equipment: 100-h. p. electric hoist and a compressor.

OPHIR HILL CONSOLIDATED MINING CO. **UTAH**

Office: Ophir, Tooele county, Utah.

Officers: Wm .A. Clark, pres.; W. C. Siderfin, sec.; M. H. Hartman, gen. mgr., with Chas. W. Clark, directors. A. G. Swanson, mine supt.; F. Wellenger, mill supt.; E. Bowman, engr. Company is owned by Senator Clark and managed as a close corporation.

Property: one-half mile north of Ophir, carries the 5′ Top-vein, the 20′ Big vein, the Middle vein 10′, the Copper vein 8′, and the Blue vein, 6′ thick and from 10′-100′ wide.

Ore: contains argentiferous galena, with pyrite, averaging 6% lead and 6 oz. silver per ton; some copper is also present. Ore occurs as replacements in argillaceous limestone and shale, in 3 clearly defined shoots, known as the Wild Delirium, Miner's Delight and Western Slope.

Development: an 1,800′ incline shaft, with the usual levels and stopes, also a transportation tunnel nearly 1 mile long, through which all ore is taken. This tunnel intersected the vein on the 1,300′ level; it also drains the mine at depth.

Equipment: includes a steam plant, not operating, and a hoist; there is a gravity tramway from the mine to the 200-ton mill.

Production: averages about 200 tons daily of lead-silver ore, with a little gold and 2½% copper. Concentrates run about 10-20 oz. silver and 10-12% lead per ton. The property is an excellent one. A branch of the Salt Lake Route known as the St. John & Ophir R. R. Co. was built to the property in 1912.

In 1919, mine produced 33,895 tons of ore, yielding $705,856 gross, or $155,633 net. Ore contained 373,435 oz. silver, 6,595,743 lb. lead and 210,241 lbs. copper. The net proceeds for 1920 were $138,909, and improvements cost $129,180.

Took lease and bond, Oct., 1921, for $115,000, on **Ophir Coalition Mines Co.** property, consisting of 12 patented and several unpatented claims adjoining Ophir Hill Cons. on the west and south.

OPHIR KING GOLD MINING CO. **UTAH**

Mail returned from Ophir, Tooele county, Utah.

Inc. November, 1917, in Utah. **Cap.** $10,000; shares 2c par; assessable.

Lands: 30 acres, patented, 9 miles from railroad, adjoining the Ophir Hill and Cliff Mining Co.'s properties carry auriferous and argentiferous copper and lead ores. Mine has 400′ tunnel, with some crosscutting and several shallow shafts. Property and equipment were sold at sheriff's sale in November, 1914, to John B. Holmes, for $1,750, to satisfy a judgment obtained by Holmes.

OPHIR METALS CO. **UTAH**

Address: W. B. Farmer, Hampton Falls, N. H.

Offices: 1609 Walker Bldg., Salt Lake City and 53 State St., Boston.

Inc. 1919, in Utah.

Property: 13 claims, patented, 146 acres, and 27 unpatented claims, that of the Lion Hill Consolidated Hill Mines Co., 640 acres in the Ophir section of the Tintic district, carrying silver-lead ore in fissure veins in limestone.

Development: by over 5,000′ of shafts, tunnels, and drifts. A 1,500′ tunnel is being driven about 500′ below old workings, to prospect Buckhorn and Cliff limestone horizons.

OPHIR QUEEN MINING CO. **UTAH**

S. Crawford. Cedar River, Mich., controls property.

OPHIR SILVER MINES CO. **UTAH**

Mine address: Sol. Snider, supt., Ophir, Utah.

Officers: Guy R. La Coste, pres.-gen. mgr., 309 Felt Bldg., Salt Lake City; H. W. Lane, v. p.; Ira C. Tichenor, sec.; E. W. Toole, treas., with L. F. Adamson, directors.

Inc. Nov., 1919, in Utah. **Cap.** $100,000; par 10c; 250,000 shares in treasury.

Property: 15 claims, in Ophir district, Tooele county, adjoining the Ophir Hill property, said to show well-defined veins of silver-lead ore. Previous development, mainly tunnels, is estimated to have cost $30,000. Work in 700′ lower tunnel suspended and an upper exploratory tunnel begun to open Buckhorn fissure had advanced 175′, April, 1921.

Examined by F. M. Wichman.

OPHIR-UTAH MINING CO. UTAH

Idle. **Address:** G. G. Schliep, pres., 361 E. 3 S. St., Salt Lake City. C. L. Olson, sec.-treas. Mine near Ophir, Tooele county.

Inc. Feb. 13, 1909, in Utah. **Cap.** $250,000; 25c par.

Lands: 7 claims, 9 miles from railroad, show copper and lead ores. Has several buildings and a hoist.

OPOHONGO MINING CO. UTAH

Office: H. T. Hatfield, sec., Room 211, Felt Bldg., Salt Lake City, Utah.

Officers: Wm. Hatfield, pres. and mgr.; C. E. Loose, v. p.; H. T. Hatfield, sec.-treas..

Inc. 1908, in Utah. **Cap.** $250,000; shares 25c par; assessable. Shares are listed on the Salt Lake Stock Exchange.

Dividends: three 1c and two 2c declarations in 1911-12, and one of 2c on January 30, 1913 a total of $80,907 to 1916. Assessments levied 1919-'20; No. 5, ¼c, Sept., 1921.

Property: 3 claims, patented, in the vicinity of the Gold Chain and Empire mines.

Development: by shafts and tunnels, with over 2,000′ of workings, to depth of 1,800′. The mine is operated jointly with the Gold Chain, with which it is connected on the 300′ level, and hoisting is through the Black Jack shaft. The 450′ level shows an 18′ orebody, said to give assays up to 10% copper and $60 gold per ton. The 700′ level shows this same ore shoot. Present development is mainly in the winze below the 1,800′ level, down 75′ in favorable ground.

Equipment: owned jointly with the Gold Chain, includes an air compressor.

Production: has been intermittent since it began in 1909.

ORPHAN BOY MINING CO. UTAH

Idle. Milford, Utah.

Officers: James R. Craig, pres.; W. D. Williams, v. p. and mgr.; Chas. A. Doe, sec.-treas., with M. R. Williams and P. J. Evans, directors.

Property: in Star district, 20 miles S. W. of Milford, Beaver county, Utah, shows limestone, cut by quartz monzonite, with ore in veins and replacements. There are 11 claims, adjoining the Red Warrior and Mowitza mines, developed by 500′ shaft with 1,200′ of tunnels and workings from which considerable high-grade ore has been shipped. Vein, though narrow, has bodies of lead-carbonate ore carrying a little copper. Presumably doing only annual assessment work.

OSBORN CONSOLIDATED MINING & MILLING CO. UTAH

Dead. Described in Vol. XIII.

OXFORD CONSOLIDATED MINING CO. UTAH

Eureka, Utah. James Crooks, pres.; Geo. W. Owen, sec.-treas.; C. H. Spriggs, mgr.

Inc. June, 1909, in Utah. **Cap.** $25,000; shares 5c par; assessable.

Lands: 9 claims, patented, show copper and lead ores. Levied an assessment of one-half cent, early 1911, to pay indebtedness incurred through litigation. No work has been done since patent to property was issued.

PACIFIC GOLD MINING & MILLING CO. UTAH

Office: American Fork, Utah.

Officers: J. L. Craig, pres.-mgr.; Jas. Chipman, Jr., v. p.-treas.; H. C. Johnson, sec., with C. F. Muller, A. K. Thornton, directors.

Inc. 1900, in Utah. **Cap.** $100,000; shares 10c par; assessable; 400,000

shares outstanding. Annual meeting, first Monday in February. Financial statement for 1920 showed balance in bank, $320; receipts from assessments were $7,198 and expenditures $7,399. Assessment 58, of 1¢, levied Nov. 17, 1920.

Property: Blue Rock group, 7 patented claims, 120 acres in American Fork mining district, shows quartzite and limestone, carrying several fissure veins varying in width from 17" to 15'. Veins strike N. 30° E. and dip 50° N. W.

Ore: lead-silver sulphide, estimated by management to average 50% lead, 25 oz. silver, .02 oz. gold, 1.5% zinc, 15% iron, 0.1% copper, 22% sulphur.

Development: by 3 tunnels, 300', 700' and 1,000' long with about 5,000' of workings.

Work in 1921 on a strong fissure 1,100' from portal of main tunnel, 400' below surface, opens 4' vein, on which a 400' drift and 75' raise is in milling ore, some of which was extracted and stored.

Equipment: includes a hydro-electric-generating plant, installed in Dec., 1916, at a cost of $20,000. A 200-ton mill, constructed during 1917, treated about 70 tons per day in 1918, concentrates netting $37 per ton.

Lease formerly held on company's property by American Fork Exploration Co., through stock ownership of the Fissures Exploration Co., relinquished in 1919. Both of these companies are now defunct, but apparently left debts which creditors were endeavoring to collect from the Pacific company; the decision of the lower court is in favor of defendant.

PALOMA EXTENSION MINING CO. **UTAH**

Office: 222 Judge Bldg., Salt Lake City, Utah. Lorin Hall, pres.; Willard Scowcroft, v. p.; John W. Scowcroft, sec.-treas.

Inc. in Utah. **Cap.** $50,000; shares 5c par; assessable; last assessment, 1c. a share, delinquent, September 13, 1919; 700,000 shares outstanding.

Property: 300 acres in Star mining district, Beaver county, shows N. E. fissures carrying silver-lead-ocpper ore. These fissures cross contacts between limestone beds running N. and dipping E., quartzite that runs E. and dips N., and a granite or quartz monzonite. Ore occurs where the contacts are crossed by the fissures.

PALOMA GOLD AND SILVER MINING CO. **UTAH**

Office: Judge Bldg., Salt Lake City, Utah. **Mine and works:** Moscow, Beaver county, Utah.

Officers: M. P. Braffet, pres.; H. W. Lane, v. p., with W. Scowcroft, H. B. Cole and B. F. Caffey, directors; J. H. Braffet, sec.-treas.; C. J. Graff, supt.

Inc. in Utah. **Cap.** $100,000; shares 10c par; assessable; last assessment 1c. levied September 17, 1918. Stock is listed on the Salt Lake Exchange. Prices varied between ¼ and 3¼c. a share in 1918; ½-3c in 1919; ½c in 1920; ¼-2c in 1921.

Property: 14 claims in Star district, near Moscow, said to cover 3,000' along a limestone-monzonite contact intersected by 2 fissure veins, carrying silver, lead and copper ore.

Development: by 500' of trenching in 900' incline shaft, with development work in progress on 900' level in May, 1919.

Production: over 200 tons of ore in 1917 and a small output for 1918 are reported.

No recent information.

PANAMA MINING & MILLING CO. **UTAH**

Mine address: Fred McCoy, mgr., Castleton, Grand Co., Utah.

Office: Grand Junction, Colo.

Officers and Directors: J. W. Hoke, of Palisade, pres.; Chas. Tharp, of Palisade, v. p.; C. N. Nelson, sec. and H. R. Post, treas., both of Grand Junction, Colo.

Inc. 1921 in Utah. **Cap.** $100,000; par $1.

Property: 300 acres, at 10,300' elevation in La Sal mountains, Grand county, shows granite and monzonite. Claims are 50 miles S. E. of Cisco and 6 miles from the Utah-Colorado line. Said to have a good showing of high grade silver-copper ore. In 1918, former company started a 2,400' tunnel to cut a big dike of porphyry containing disseminated copper ore said to carry 2½% copper. In 1921, a vein of high grade ore was cut and shipments started.

PARK CITY KING MINING CO. **UTAH**

Officers: Thos. Marioneaux, pres., Kearns Bldg., Salt Lake City; Frank Barnes, sec.-treas.; Sam'l Dowse, supt., with D. M. Griffith, directors.

Inc. May, 1917, in Utah. **Cap.** $100,000; shares 10c par; 625,000 shares in treasury.

Property: 60 acres, adjoining the Silver King on the W. at Park City, said to carry 3 fissure veins, showing copper and silver values.

Development: by 600' tunnel.

Reported, March, 1921, that reorganization was in contemplation, but in mid-summer property was under bond and lease to I. C. Thoresen, et al.

PARK CITY MINES CO. **UTAH**

Company defunct. See description in Vol. XIV. of the Mines Handbook. John Pingree, former sec., 189 First Ave., Salt Lake City, Utah

Lease on American Flag mine, with purchase option of $250,000, forfeited in 1917.

Company owned $34,000 bonds and 65,000 American Flag shares.

PARK CITY MINING & SMELTING CO. **UTAH**

Officers: G. W. Lambourne, pres. & mng. dir.; Movlan C. Fox, v. p.; D. C. Murphy, sec.

Inc. 1922, in Colorado. **Cap.** $7,500,000; $5 par.

The company will acquire the Daly West Mining Co. of Park City, by exchange of stock, share for share, as already authorized by that company, and the Judge Mining & Smelting Co. will be united to transfer its holdings on an equitable basis.

PARK UTAH MINING CO. **UTAH**

Mine address: Geo. D. Blood, gen. mgr.; Paul Hunt, supt., Park City, Utah.

Office: Deseret Nat'l Bank Bldg., Salt Lake City, Utah.

Officers: G. W. Lambourne, pres.; W. M. Bransford, v. p.; Geo. W. Blood, gen. mgr., with M. C. Fox, J. S. Bransford, Frank Pingree, and Otto Ludeking, directors. W. A. Dunn, sec.; S. G. Taylor, treas.

Inc. 1917. **Cap.** $1,250,000; $1 par; outstanding, 854,000 shares. Dividend of 5¢ a share, or $50,000, paid Dec. 15, 1921.

Development: crosscutting N. and S. from the Ontario drain tunnel at about 10,000' in from the portal, which is the 1,500' level. Management is trying to solve the problems of the Frog Valley and McHenry faults.

Work to the S. opened a big fissure in June of 1920 with 3' of good silver ore, 450' in length; ore is of milling grade but includes high grade streaks; shipments made at rate of 2,000 tons a month, average $45 to $50 per ton.

Company is controlled by Judge interests.

PATHE MINING CO. **UTAH**

Address: American Fork, Utah.

Officers: John E. Berg, pres.; L. A. Anderson, v. p.; Boise A. Wells, second v. p.; S. L. Anderson, sec.; S. T. Shelley, treas., with W. F. Anderson and Abner Chipman, directors.

Inc. March, 1917, in Utah. **Cap.** $10,000; shares 1c par.

Property: the Silver King Nos. 1 and 6 claims in American Fork district. No recent information; probably idle.

PENNUVA COPPER CO. **UTAH-NEVADA**

Office: 226 Dooly Blk., Salt Lake City, Utah.

Officers: J. R. Austin, pres.; G. D. O'Connor, v. p. and mgr.; F. L. Hummel, sec.-treas.; W. N. Beatty and W. R. McPherson, directors.

Inc. 1916, in Utah. Cap. $25,000; shares 5¢ par; outstanding, $22,500, assessable. In December, 1919, the State Securities Commission granted company permission to sell 68,000 and in February, 1921, 20,000 treasury shares.

Property: 21 claims, unpatented, 385 acres, situated on Promontory point, next to the Lakeview and 2 miles from Saline St'n. on the S. P. R. R.

Company holds also 5 years' bond and lease on the Black Devil group of 10 claims in Silver Zone district, Elko county, Nevada, near Proctor and 23 miles W. of Wendover on the W. P. R. R.

Development: at Saline, Utah, by 200′ shaft and 260′ of drifts in quartz vein showing chalcopyrite-bornite ore in bunches, assaying 20-45% copper; at Proctor, Nevada, by shallow shafts and tunnel in quartz fissure in limestone, carrying silver values. A hoist has been installed, and a new adit started. Still in prospective stage.

PERUVIAN CONS. MINING CO. **UTAH**

Office: 53 S. West Temple St., Salt Lake City. Henry Welling, pres.; J. P. Clays, sec.

Property: a group of claims near Alta, near South Hecla mines, from which company shipped 11 cars of $18-$25 lead-silver ore during summer of 1919.

Property reopened, 1922.

PHOENIX MINING CO. **UTAH**

See **Utah Apex Mining Co.**

PINE CANYON & BINGHAM TUNNEL CO. **UTAH**

Office: 121 N. W. Temple St., Salt Lake City, Utah.

Officers: J. B. Moreton, pres.; Richard Savage, v. p.; Homer Benton, 2nd v. p.; Louis Levine, sec.-treas.

Inc. July 28, 1916, in Utah. **Cap.** $1,500,000; $1 par; 800,000 issued and in secretary's hands.

Property: 42 claims, 150 acres patented, covering apex of mountain, W. of Bingham, shows two N. E.-S. W. fissures, a bedded contact deposit and the Star vein, in quartzite carrying limestone beds and cut by Bingham monzonite porphyry.

Company owns, 2,000′ tunnel running from Pine Canyon toward Bingham. Portal of the tunnel will be 1½ miles from the International smelter at 5,600′ elevation. The Great Western tunnel at an elevation of 7,300′ is between the Great Divide group and the Star group, half way up the mountain side between the Nancy Hanks and the portal of the new Pine Canyon tunnel. Company does not reply to requests for information.

PINION QUEEN MINING CO. **UTAH**

Mine address: John Westerdahl, supt., Eureka, Utah.

Address: Provo, Utah. **Mine office:** Dividend, Utah.

Officers: E. J. Raddatz, pres.-mgr.; J. William Knight, v. p.; J. C. Deal, sec.-treas., with Andrew Sutherland, supt., and Wm. Scowcroft, directors.

Property: 16 claims, in East Tintic district.

Development: by 800′ shaft and 400′ of drifts up to March, 1921.

PITTSBURGH CONSOLIDATED MINING & MILLING CO. **UTAH**

Address: P. S. Keogh, pres.; 208 Walker Bank Bldg., Salt Lake City.

Described in Vol. XIV. Reorganized, November 1920, as Pittsburgh Silver Mng. Co., which see, which took lease and bond for $150,000 on company's Alta property.

PITTSBURGH RADIUM CO. **UTAH**

Address: Pittsburgh, Pa. **Mine address:** Yellow Cat, via Thompsons, Grand county, Utah.

Officers: W. J. Stevenson, pres.; J. H. Fuller, of Cleveland, v. p.; E. H. Beckstrand, of Univ. of Utah, v. p., Edwin N. Ohl, sec. together with Henry Fitzpatrick and J. L. Fonter, all of Pittsburgh and Alfred A. Cohen of New York, directors.

Inc. 1920, in Utah. **Cap.** $500,000; $1 par. Is the operating company for

the National Vanadium Products Co., a Delaware corporation, which owns all the stock.

Mining property: a group of carnotite claims at Yellow Cat, south of the Rio Grand Western R. R. at Thompsons and 20 miles north of Moab, Grand county, Utah.

Owns the Overland mills at Denver, remodelled in 1921 to treat 120 tons of caronotite and 500 tons vanadium ore monthly. Electric furnaces are used and ferro-vanadium produced.

Operated and employed 18 men at mine during 1921 after 2 years suspension of work.

PITTSBURGH SILVER MINING CO. **UTAH**

Is a reorganization, or successor of the Pittsburgh Cons. Mng. & Mlg. Co.

Mine address: W. K. Yorston, mgr. American Fork, Utah.

Officers: A. D. Myers, pres.; Heber M. Wells, v. p.; Jos. H. Bigger, sec.-treas.

Inc. 1920 in Delaware. **Cap.** $1,250,000, divided into $250,000 "silver ore certificates" and 1,000,000 shares of $1 par. Certificates are secured by ore in the mine, and it is provided that holders will receive 40% of net profits until repaid; holders receive also equal amount in stock.

Property: the Pittsburgh mine 9 claims, 8 patented, in both Salt Lake and Utah counties, mainly on the American Fork side of the Divide. Ore occurs in fissure veins.

Development: on the Pittsburgh fissure, by 3 tunnels from American Fork canyon. A 500′ upper tunnel is credited with a production of 11,000 tons under former management. Operations were resumed in 1914 after an examination of the property by J. Benton Leggatt. No. 2 tunnel a 12′ orebody of solid lead-zinc sulphide is said to be exposed at a vertical depth of 800′ to 900′: reopened and work resumed Oct. 1921.

In 1915 the 3 tunnels were connected and drifts run along the several fissures. A fourth tunnel, started to tap the Pittsburgh fissure 150′ lower than No. 3, will be driven 1,200′ and is to serve as a means of transportation.

Equipment: necessary buildings erected 1921. Has a 6,000′ tramway of 150 tons per day capacity, mining machinery, etc. A mill will be erected 1922.

PLANETARY MNG. & MLG. CO. **UTAH**

Inactive. **Address:** T. E. Weyher, sec., 210 Judge Bldg., Salt Lake City, Utah.

Cap. $10,000; shares 10c par; assessable; reduced from $500,000 in November, 1917.

Property: claims near the old Century mine, N. W. of Kelton, Box-elder county, Utah. Development work is continued by assessments.

PLUTUS MINING CO. **UTAH**

Controlled through stock ownership by Chief Consolidated Mng. Co.

Address: Eureka, Juab county, Utah.

Inc. 1907, in Utah. **Cap.** $100,000; shares 10c par; fully issued; assessable. Last assessment of 1 ct. per share delinquent December 6, 1921. Absorbed the Tetro Mining Co., January, 1909. Shares are listed on the Salt Lake Stock Exchange.

Property: 14 claims, patented, including the Tetro group of 3 claims, from which the Tetro Mining Co. paid $18,000 in dividends. Mine carries auriferous and argentiferous lead and copper ores, developed by a 600′ shaft, about 3,700′ of tunnels, and 1,250′ of other workings. Is being developed by Chief Cons. Mining Co. from its 1,900′ shaft; during 1920, exploratory work was done on 1,750 and 1,000′ levels.

POLE STAR COPPER CO. **UTAH**

Officers: Vandergrift Bldg., Pittsburgh, Pa. and Newhouse Bldg., Salt Lake City, Utah.

Officers: P. S. Chambers, pres.; D. A. Rees, v. p.; A. E. Custer, 2nd v. p.; F. A. Duerr, treas.

Inc. Nov., 1916, in Delaware. **Cap.** $1,500,000; shares $1 par. Statement rendered March 20, 1917, showed cash on hand and accounts receivable, $125,402.

Property: 15 claims, 5 patented, about 230 acres, in the Clifton or Deep Creek mining district, Tooele county, Utah, 167 miles S. W. of Salt Lake City. Gold Hill is the post office address, about 2 miles south.

Geology: country rock is monzonite with porphyry intrusions. East and west veins traverse the claims and are in turn cut by N.-S. dikes, the rich ore occurring at these contacts. Veins are said to be 4-12′ wide and ore to average 5-7% copper, 49 oz. silver, $4.65 gold, with about 12½% bismuth.

Development: by 9 shafts, 5 tunnels, several drifts and open cuts. Main vertical shaft is 336′ deep. In 1918 company was doing prospecting work on the 336′ level; no later report.

Equipment: includes 2 gasoline hoists, compressor, etc.

Literature sent out from Pittsburg is suspiciously lurid, though mine may have merit and officers be reputable.

PRICE MINING CO. **UTAH**

Office: Room 1 Mackintosh Block, Salt Lake City, Utah.

Officers: F. W. Price, pres.-mgr.; M. R. Evans, v. p.; J. H. Woodmansee, sec.-treas.

Inc. April, 1915. **Cap.** $250,000; shares 25 cts. par; assessable; last assessment, ½c a share, delinquent, Aug. 2, 1921; 700,000 issued. Stock is listed on the Salt Lake Exchange. Shares sold 1-3¼c in 1918; 1¾-10c in 1919; 5-10½c in 1920; 4¾-5c in 1921.

Operating expenses in 1916 were $8,000.

Property: 17 claims, 300 acres, 120 patented, in South Fork canyon, Alta-Cottonwood mining district, considered to carry the Cardiff contact, which is intersected at right angles by several fissure veins. Samples taken from first fissure crossed, assayed 34% lead, 20% zinc, 9% copper, and 300 oz. silver per ton. The streak of ore is 4″ to 16″ in width. No work has been done on it.

Development: by 1,400′ tunnel to depth of 600′. Company actively pushing development 1921-22, driving tunnel and raising 125′ on fissure in quartzite carrying high grade streaks, to reach limestone-shale contact, where large orebodies are likely to occur.

Equipment: includes an electric compressor.

PRINCE OF WALES MINING CO. **UTAH**

Address: Walker Bros., Salt Lake City, Utah.

Property: at Alta, 60 acres, was closed down, 1914, when a snowslide destroyed its equipment. Mine has 950′ incline shaft from which $2,000,000 worth of ore was mined, 1870-1875, until the influx of water stopped operation. Alta T. & T. Co. tunnel will entirely drain the ground.

Partly reopened, July 1917, and 19 tons of $100 ore shipped, and in 1918 several carload shipments of ore made.

Company inactive, 1919-21. Reopened, 1921.

PROGRESSIVE MINING CO. **UTAH**

Office: 229 South West Temple St., Salt Lake City, Utah. Mine near Milford, Beaver county, Utah.

Officers: L. B. Bohn, pres.; I. Lessing, v. p. and mgr.; C. T. Mixer, sec.-treas. and cons. engr., Box 56, Salt Lake City; preceding, with F. J. Nichols, C. C. Crimson and Jas. Barrett, directors.

Inc. Aug. 20, 1906, in Utah. **Cap.** $250,000; shares 50c par; assessable; fully issued. Total assessments to date, $10,000.

Property: 6 claims, 80 acres, patented, in the Star district, 8 miles from a railway, carrying argentiferous copper and lead ores. The mine has a 150′ incline shaft, with about 1,000′ of workings, developing a 3′ vein, said to carry ore assaying up 8% copper, 35 oz. silver and $1 gold per ton. A few small shipments have been made.

Mine was under lease in 1916, but presumably idle from 1917 up to present time.

PROMONTORY MINING CO. UTAH

Described in Volume XIII. Name changed to **United Promontory Mining Co.**, which see.

PROVO MINING CO. UTAH

Address: Room 312, Dooly Block, Salt Lake City.

Officers: F. L. Cowan, pres.; A. H. Williams, v. p.; Jas. W. Wade, sec.-treas., with Wm. Merea and L. H. Stohr, directors.

Inc. Feb. 28, 1887, in Utah. **Cap.** $100,000; 10c par; assessable; 837,440 issued. Listed on Salt Lake Exchange. Shares 1¼ to 6c, 1921. Assessment No. 7 of ¼c a share, levied Aug. 1921.

Property: 3 patented claims at North Tintic, adjoining the Tintic Standard. Lead-silver-zinc ore occurs in pockets. Development by 300′ shaft. As company was without funds, control passed to a new syndicate late in 1919, who paid 9c. a share for the stock.

QUADMETAL MINES CO. UTAH

Address: 41 Broad St., New York. Mine office: 414 Judge Bldg., Salt Lake City.

Officers: R. F. Robertson, pres.; H. A. Stoneham, v. p.-sec.-treas., with Chas. A. Stoneham, W. I. Snyder, and Grant Snyder (gen. mgr.), directors.

Cap. $1,000,000; $1 par; issued 600,000 shares; assessable.

Property: 8 claims, patented, near Frisco, Beaver county, contains silver-lead ore in fissure veins, dip 80° N. The Carbonate and Rattles orebodies from which $900,000 worth of high grade silver ore was once shipped, vary from 20′ to 40′ in width and from 100′ to 200′ in length.

Development: by 700′ vertical shaft with drift on vein 10′-25′ wide, of low grade ore containing masses of galena and quartz in winze below 700′ level.

Equipment: includes a 50-h. p. electric hoist, compressor, and 150-ton flotation mill.

The mine was worked for several years previous to 1884 and reported to have produced $960,000. The present management started operating its mill late in 1918, and during 1919 was operated in part on custom ores.

In 1921, shipments made from the 700′ level netted $1,700, $2,800 and $3,700 per carload of 50 tons.

QUEEN ISABELLA MINES CO. UTAH

Officers: Alex. Caldwell, pres., Eureka, Tooele county, Utah; Alex. Ray Irvine, v. p.; S. R. Thurman, sec.-treas., with Daniel Caldwell and Bert Thurman, directors.

Inc. 1916, in California. **Cap.** $50,000.

Property: 14 claims adjoining the Sharp mine, Tintic district, and carrying the extension of the Sharp vein. The Sharp mine while under 2-year lease and bond to Mr. Alex. Caldwell produced 15 carloads of silver-lead ore, netting $15 to $20 per ton. At last accounts, 1918, the company was planning to give a lease on the property.

QUEEN LEASING CO. UTAH

Mail returned from Alta, Utah. Col. C. R. Greene, mgr. Has a lease on part of the Cardiff mine.

QUEEN OF SHEBA MINING CO. UTAH

Owned by J. W. Lawton, Chicago, Ill.

Property: near Ibapah, in the Deep Creek district, about 29 miles S. W. of Gold Hill, includes the old Queen of Sheba mine. Ore carries free milling gold in a quartz vein said to be from 14-25′ wide.

Development: by 1,080′ tunnel and a 276′ raise, driven in 1914.

Equipment: includes 10-stamp mill and 1,700′ aerial tram. The mine is credited with past production of $150,000. Operated by lessees in 1917.

No recent information.

RARUS MINING & SMELTING CO. UTAH

Address: P. O. Box 40, Salt Lake City.

Officers: Henry Tattersall, pres.-supt., E. Tattersall, v. p.-treas., Thos Adams, sec., Geo. Hohnberg and Jas. T. Gardner, directors.

Property: in Snake Creek district, Wasatch county.

RAYMOND-ILLINOIS MINING CO. **UTAH**

Office: 312 McCornick Bldg., Salt Lake City, Utah. Mine is at Eureka, Juab county, Utah.

Officers: F. J. Hagenbarth, pres. and mgr.; J. M. Wheeler, v. p.; J. C. Lynch, treas., and Thos. Kearns, directors; M. B. Johnson, sec.

Inc. 1905, in Utah. **Cap.** $450,000; shares $1 par; assessable. Assessments of one-half cent a share fell due May 7, and June 29, 1917.

Property: 15 patented claims, in the Tintic district, shows fissures and replacements in limestone. Developed by about 1 mile of tunnels and a 1,500′ vertical shaft, which as yet have shown but little ore. The bottom workings are wet. Diamond drilling was done, 1909-10, from the bottom of the shaft. Idle since 1914.

RED BELL MINING CO. **UTAH**

Office: 519 Newhouse Bldg., Salt Lake City, Utah.

Officers: S. A. Parry, pres.; M. E. Price, v. p.; H. H. Harris, sec.-treas.

Inc. Nov., 1916. **Cap.** 800,000 shares; 10c par; 340,000 shares in treasury.

Property: 16 claims in Big Cottonwood canyon, about ¼ mile E. of the Old Maxfield mine, reported to have produced rich silver-lead ore.

Development: by 150′ tunnel, said to have penetrated a 12′ porphyry dike carrying lead, iron and copper. Started making shipments in 1918.

No recent information.

RED CLOUD MINING CO. **UTAH**

F. N. Leonard, mgr. Property at American Fork includes the Eudora, First Chance, and Red Cloud claims and 2 millsites.

Development: by 675′ tunnel in quartzite, said to show 5′ of silver-lead ore. In June, 1919, was preparing to ship ore.

No later information.

RED WARRIOR MINING CO. **UTAH**

See Vol. XIV for complete description. Company absorbed. March, 1920, by **Moscow Silver Mines Co.**

REED'S PEAK CONS. MINING CO. **UTAH**

Is a merger (1920) of Reed's Peak Mng. Co. and Big Cottonwood Cons. Mng. Co.

Office: 919 Boston Bldg., Salt Lake City.

Officers: J. F. Dunn, pres.; Frank Andrew, v. p.; W. J. Bardsley, sec., with Harold C. Fabian and Paul Keyser, directors.

Assessment of 1¢ a share levied July 1921. Shares sold 1¢-1½¢ in 1921.

Property: 30 claims on South Fork, Big Cottonwood district, Salt Lake county, 12 miles from a R. R. Silver-lead ore occurs in fissure veins in limestone and quartzite; gold and copper are also present.

Development: on what was formerly called the Big Cottonwood Cons., (11 claims), includes the Victor tunnel, which aggregates 2,200′ in length; property is still a prospect.

The Reed's Peak group is opened by 2,100′ of tunnel and drifts, driven to explore at depth of 800′ the Birthday fissures, Nos. 1 and 2, said to have been productive on upper levels. Company still doing development work in tunnels; no ore encountered yet.

Equipment: includes a compressor, etc.

REED'S PEAK MINING CO. **UTAH**

See Vol. XIV for complete description. Merged into the Reed's Peak Cons. Mng. Co., which see.

REPUBLIC MINING CO. **UTAH**

Address: 422 Dooly Bldg., Salt Lake City.

Officers: Thos. Weir, pres.-mgr.; John Weir, v. p.; J. M. Burt, sec.-treas.; Elizabeth P. Weir and Robt. E Mark, directors.

Inc. May 6, 1899, in Utah. **Cap.** $50,000; 5¢ par; 228,321 treasury shares;

assessable. Transfers made at company's office. Annual meeting, 1st Monday in May.

Property: 22 claims (21 patented), 352 acres, in Tintic district, Juab county, formerly owned by Trephine Mng. Co. and transferred to present company in 1919. Ore returns average 9.27 oz. silver and 4.75% copper, with a little gold.

Development: by 290′ shaft, with 1,740′ of total workings. Has been inactive for past 3 years.

RETTICH GROUP **UTAH**

Address: Dr. Hugo Rettich, owner, 52 W. 68th St., New York City.

Property: in the Little Cottonwood, or Alta district, between the two groups owned by the Wasatch Mines Co., embraces the Frederic, Crown Prince, Alaska and other claims.

Development: includes the 230′ Frederic and the Crown Prince shafts, also the Frederic or Alleghany tunnel, in which a 1,000′ raise was made, 1921-22.

REVELATOR CONS. MINING CO. **UTAH**

Address: Salt Lake City.

Inc. 1921, in Utah. **Cap.** $300,000; par 50¢; 100,000 in treasury; assessable. Levied ¾¢ April, 1914; ½¢ in 1919; ½¢ in Oct. 1921, delinquent Dec. 5.

Property: John the Revelator mine, near Park City, on which work has been done at intervals since 1914. Mine shows gold-copper ore in limestone-quartzite contact fissure, from which considerable ore has been shipped.

Development: by tunnel and incline. On 300′ level, 2″-10″ of $175 ore was cut.

REVENUE CONSOLIDATED MINING CO. **UTAH**

Address: John B. Taylor, 678 E. S. Temple St., Salt Lake City.

Property: 66 claims, 22 patented, 1,320 acres in Pine Grove district, T. 28 S. R. 16 W. on west side of Wah Wah Mtns., 20 miles S. W. of Frisco or Newhouse, stations on Milford branch of Salt Lake Route. Elevation 7,500′ at mine camp. Peaks 3,000′-4,000′ higher.

Geology: claims cover quartzite beds, overlain by 600′ of green shales, capped by 5,000′ of thickly bedded limestone, intruded by thin dikes and a boss of yellowish decomposed porphyry. These beds dip eastward into the mountains at 20° to 40°, the west slope of the range being of similar structure, with igneous rocks forming the east side. A strong E. W. fault runs through the center of the property, dislocating the beds 1,000′ to the east, on S. of fault, and ending in a porphyry intrusion. Ores are lead and silver bearing and occur in fissure veins in quartzite. Four parallel N. W.-S. E. veins north of Pine creek are 3′-6′ wide, have smooth walls, quartz filling and carry galena of concentrating tenor, with occasional masses of shipping ore. There are several other undeveloped parallel veins, but all end at the shale belt. South of the fault a parallel 6′-20′ vein represents the probable faulted continuation of the Cliff vein north of the fault.

Development: active in 1904-05; work was resumed 1913, but stopped 1914. It comprises the 500′ Buckbee and 600′ Southside tunnels, 125′ Cliff shaft with 200′ drift work, 130′ Tasor shaft and various lessor openings. The Revenue tunnel is to crosscut all these veins in depth and supply the mill.

Equipment: includes 300 cu. ft. compressor, steam engine, etc. Property promising, but idle, pending financing.

REXALL SILVER & COPPER MINING CO. **UTAH**

Consolidated, 1916, with Columbus Extension Mng. Co., and now known as **Columbus-Rexall Cons. Mines Co.**, which see. Described Vol. XII.

RICHMOND & ANACONDA CONSOLIDATED MINING CO. **UTAH**

See **Uncle Sam Consolidated Mining Co.**

RIDGE & VALLEY MINING CO. **UTAH**

Address: 723 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Wm. R. Wallace, pres.; Jackson C. McChrystal, v. p.-mgr.; J. E. Berkley, sec.; Herbert S. Auerbach, treas.; J. H. McChrystal, supt., with Sarah H. McChrystal, directors.

Cap. $1,000,000; originally $150,000, increased 1915 to $500,000 and in 1916 to present amount; par, 50c.; issued 500,000 shares.

Property: 39 claims, 443 acres, adjoining the Gemini property, and operated through the Gemini shaft for many years. Ores carry lead-silver-copper-gold values.

Development: by 1,800′ shaft, and extensive workings. Recent development work on the 1,800 foot level is claimed to be satisfactory. In 1918 4,000 tons of ore shipped sold for $14,721, giving net profits of $4,240.

The output of 1919 was 6,447 tons of ore, producing 105,011 oz. of silver and 2,044,280 lb. of lead. Gross profit was $181,602 and disbursements $167,024. A part of the mine is operated by lessees.

ROB ROY MINING CO. **UTAH**

Address: P. T. Farnsworth, 164 E. S. Temple St., Salt Lake City.

Mine near Beaver City, Utah, at mouth of Indian Creek Canyon. T. P. Farnsworth, Salt Lake City, owner. Developed to depth of 300′. Mine has produced very rich gold ore, but was closed down several years ago when the vein was cut off by faulting. Tunnel was to be driven south in hopes of finding orebody. No recent report, probably inactive.

SACRAMENTO MINING CO. **UTAH**

In liquidation. Glenn R. Bothwell, pres.

Declared a dividend of 0.9c. a share, payable August 1, 1919.

Property: located in Mercur district, paid out $308,000 in dividends before closing down in 1912. At that time there remained $10,000 in the treasury and the 1919 dividend was paid from this fund.

ST. CROIX CONS. MINES **UTAH**

Organized in August, 1917, to continue work of St. Croix Mines Co.

Address: 223 Fargusson Bldg., Duluth, Minn., and 261 Broadway, New York City. **Mine address:** Milford, Utah.

Officers: M. J. O'Brien, pres.; A. D. MacIntyre, v. p.; W. M. Evered, sec.-treas., with David Graham, L. Davis, M. J. Filiatrault, and H. G. Middaugh, directors.

Inc. 1917, in Utah. **Cap.** $600,000; $1 par; outstanding, 500,000 shares. Listed on New York Curb; 120,700 shares traded in 1919 at 50c. to $1 a share.

Transfer agt., Security Transfer & Registrar Co., New York.

Property: 6 claims, 1 patented, about 90 acres, in Star district, Beaver county, 4 miles from Milford, shows 3 contact deposits between porphyry and a so-called white and blue lime. Copper-lead ore occurs as "chimneys," and shipments have run as high as $75 per ton.

Development: by 300′ shaft and 400′ tunnel, opening ground to depth of 500′. Workings total 1,500′.

Equipments: 35-h. p. gasoline hoist, and 4-drill compressor.

Production: intermittent since 1870; recent production about 250 tons annually.

Company hopes to become active with improved industrial conditions.

ST. CROIX MINES CO. **UTAH**

Successor to St. Mary Mng. Co.

Office: 601 Providence Bldg., Duluth, Minn. **Mine office:** Milford, Utah.

Officers: Hansen Evesmith, pres.

Inc. March 10, 1915, in Utah. **Cap.** $1,000,000; 25c par; non-assessable. Is a holding company having part of stock of St. Croix Cons. Mines.

ST. MARY MINING CO. **UTAH**

Described in Volume XIII. Superseded by **St. Croix Mines Co.**, which see.

ST. PATRICK MINING & MILLING CO. UTAH

Office: 855 Sherman Ave., Salt Lake City, Utah. **Mine office:** Hughes Canyon, Salt Lake county, Utah.

Officers: D. A. Buck, pres.; Franklin J. Webb, v. p.; B. A. M. Froiseth, sec.-treas.

Inc. March 17, 1906, in Utah. **Cap.** $50,000; 20c par; issued 180,000 shares.

Property: 6 claims, unpatented, 7 miles from railroad, in Big Cottonwood mining district, opened by shaft and tunnel, with about 750' of workings, showing gold and silver-copper ore. Annual assessment work only being done.

Funds for development are apparently lacking.

SALT LAKE COPPER CO. UTAH

Office: 11 Broadway, New York.. **Operating office:** McIntyre Bldg., Salt Lake City, Utah. **Mine office:** Lucin, Boxelder county, Utah.

Officers: Frederick Lewisohn, pres.; Walter Lewishon, v. p.; E. C. Westervelt, treas.; other directors, S. W. Peck, E. H. Westlake, E. J. Macnamara, O. B. Van Sant and E. B. Corbet, mgr.

Inc. October 10, 1906, in Maine. **Cap.** $2,200,000; shares $10 par. Registrar, Equitable Trust Co., of New York.

Property: 108 claims, known as the Copper Mountain mine, at an elevation of 7,200' above sea level, in the Newfoundland district.

The Copper Mountain mine has a number of tunnels and shafts, the 1,500' main tunnel having a back of about 400'; a 500' tunnel planned to be driven 1,200', to enter the hoped-for sulphide zone, has not realized expectations. The mine has upwards of 2 miles of workings, and is estimated to have in sight and blocked out, 75,306 tons of copper ore of 1.1% average tenor. For the last few years the mine has been worked by lessees. Approximately 3,000 tons ore, assaying ½% copper and 45% excess iron were shipped in 1918.

Lessees reported operating summer of 1920.

SANTA MARIA GOLD & COPPER MG. & REDUCTION CO. UTAH

Office: P. O. Box 517, Ogden, Utah. **Mine office:** Utah Hot Springs, Boxelder county, Utah. Don Maguire, pres. and mgr.

Inc. 1907, in Utah. **Cap.** $500,000; shares; $1 par.

Property: includes mill and smelter sites in the Sierra Madre district, a very rugged section of the Wasatch mountains. Land carries 7 fissure veins, practically parallel with a strong cross-fissure, and a contact deposit. The veins range from 12 to 70' in width, and ore contains chalcopyrite, associated with pyrite and occasional small amounts of galena, ore being mainly of concentrating grade.

Development: by the 2,000' Clara Belle tunnel, cutting 3 veins, and planned to cut 5 more, with backs of 200 to 1,800'. The mine has about a mile of workings showing ore developed regarded as sufficient to warrant a mill.

Equipment: includes a power house, air compressor, smithy and boarding house. Idle several years.

SANTAQUIN CHIEF MINING CO. UTAH

See Vol. XIV for description. Company absorbed by **Santaquin Cons. Mines Co.**, which see.

SANTAQUIN CONS. MINES CO. UTAH

Is a consolidation of Santaquin King and Santaquin Chief mining companies.

Office: 219 Ness Bldg., Salt Lake City.

Officers: E. J. Shields, pres.; H. L. Pratt, sec.-treas.-mgr.; J. A. Ferraro, v. p.

Inc. 1918, in Utah. **Cap.** $150,000; par 10c; assessable 1,125,000 treasury shares. An assessment of ¼c was levied in May, 1919.

Property: 13 claims in Santaquin district, Utah county, 65 miles S. of

Salt Lake City, 7 miles from R. R. Shows limestone cut by well defined fissure vein carrying zinc-lead-silver ore.

Development: on King ground by tunnels with total workings of 550'. A winze has exposed 2' of ore, assaying 35-40% zinc and a little lead. A 150' tunnel on the Chief shows small bunches of lead ore, 600' lower than King workings.

Company reports "no indebtedness and no funds;" development to continue.

SANTAQUIN KING MINING CO. **UTAH**

Fully described in Vol. XIV. See Santaquin Cons. Mines Co., into which it has been merged.

SCOTIA MINING CO. **UTAH**

Address: Jas. S. Morgan, 1425 Roosevelt Ave. Salt Lake City.

Officers: Willard E. Weihe, pres.; Alvin A. Beesley, v. p.; Jas. S. Morgan, sec.-treas., with Harmel L. Pratt, Francis M. Bishop and Orlon G. Pratt, directors.

Cap. $500,000; 10c par; 200,000 shares issued.

Property: in Honeycomb Gulch, of Big Cottonwood, shipped a few carloads of lead-silver ore in 1918.

Company is handicapped by lack of funds.

SCRANTON LEASING CO. **UTAH**

Mail returned from Eureka.

Address: care Wade & Funkel, Scranton mine, Eureka, Utah. Operates under lease the Scranton mine at North Tintic, Utah. Produces lead and zinc ores from new discovery on surface and from Magazine tunnel. Employs 52, men.

In 15 months to July, 1917, the output was 6,000 tons, containing 20% lead and 32% zinc. Shipments were made in 1918.

SCRANTON MINING & SMELTING CO. **UTAH**

Offices: McIntyre Bldg., Salt Lake City and Scranton, Tooele county, Utah.

Officers: T. G. Wolf, pres.; H. A. Knapp, treas., with B. H. Throop, all of Scranton, Pa., R. J. Deighton, sec.-mgr., and Wm. H. Bramel, Salt Lake City, directors.

Cap. $30,000; shares $1 par.

Property: in the North Tintic district, is an old producer of silver, lead and zinc ore. The company operated the mine until 1915, and the stopes were pretty thoroughly worked out.

SECRET MINING & MILLING CO. **UTAH**

Offices: 618 Newhouse Bldg., Salt Lake City and Alta, Utah. Reported "dead" in Copper Handbook, Vol. X. Reorganized and rejuvenated in 1915.

Officers: R. W. Clough, pres.; W. M. Minor, v. p. and treas.; H. S. Harper, sec., with E. R. Phelps and W. H. Clough, directors.

Inc. about April, 1906, in Utah. **Cap.** $300,000; increased in 1915 to $600,000; shares $1 par. In 1919 increased number of shares to 1,000,000; par 10c. Listed on Salt Lake Exchange. Share sales 1c, 1918, and ¼c in 1920.

Property: 15 claims, 300 acres, 100 patented, at Alta, Little Cottonwood mining district, adjoining the Albion on the S. E., said to show lead-silver ore. Country rock is quartzite.

Development: by tunnels; reported in April, 1916, that an 80' tunnel would be extended to cut the surface showings at a depth of 800'. The company is also reported as having obtained the right from the Albion to drive a crosscut into Secret ground from a point 2,500' in from the portal of the Albion tunnel. An upper tunnel is in 500'. Workings total 700'. No orebodies large enough for production have been found. In May, 1919, work was again resumed after a period of idleness. Property is in the speculative class.

SELLS MINING CO. UTAH

Address: Continental Bank Bldg., Salt Lake City, and V. S. Snow, supt., Alta.

Officers: Geo. H. Watson, pres.-mgr.; John Zinc, v. p.; R. F. Marvin, sec.-treas., with W. H. Weyher and V. S. Snow, directors.

Inc. 1914, in Utah. **Cap.** 1,000,000 shares; 15c par. Assessment No. 4 of 1c a share levied, 1919. Last assessment, 2c a share, delinquent October 18, 1919.

Listed on Salt Lake City Exchange. Shares 8½ low, 21 high in 1918; 4 low, 13½ high in 1919; 1½ low, 23½ high in 1920; 1¾ low and 6¼ high in 1921 to June.

Property: 16 claims, 6 patented in the Alta-Cottonwood mining district, 8 miles from a railroad, said to cover 1,800' to 3,000' along the mineralized zone passing through the South Hecla property which adjoins on the west.

Ore: carries silver lead, zinc and copper, in fissure veins in limestone and in contact deposits between limestone and granite; veins strike N. E.-S. W.

Development: about 5,000' of workings from the Dwyer tunnel of the South Hecla company and the Lexington tunnel.

Gross output for 1919 was $10,940, and total expenses, $35,080, leaving a net deficit of $24,140. Early in 1920 a 125' raise above the tunnel level, opened ore in the Skipper fissure, said to sample $14.50 gold and 240 oz. silver per ton, with 4% copper. This orebody proved small.

Geo. H. Watson and Co. took option on 412,446 shares treasury stock, Dec. 1920, after shareholders had privilege of subscribing for stock at 3c a share. The property has since been consolidiated with **South Hecla Mines Co.**

Production: about $200,000 to end of 1921. Shipments run about $30 per ton, in silver, copper, lead and bismuth.

Is a speculative mining venture that has promising ground.

SELMA MINES CO. UTAH

Office: 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Knightsville, Juab county.

Absorbed White Star Mining Co., also of North Tintic, late 1921, Selma giving 2 shares for each 3 shares White Star stock held.

Officers: W. I. Snyder, pres.; J. C. Jensen, v. p.; with R. A. Brown, C. J. Peterson and E. T. Walton, directors. Cora V. Thompson, sec.

Inc. Dec., 1909, in Utah, as successor of Selma Consolidated Mining Co. **Cap.** $50,000; shares 5c par; assessable, except 50,000; 740,000 outstanding. Assessments No. 21 and No. 22 of half cent a share, levied in May and Oct., 1921.

Property: 34 claims, unpatented, near the Lehi Tintic mine, supposed to carry the Northern extension of the mineral zone of the Colorado mine, 2 miles from a railway. The property has a lime-porphyry contact, with 3 principal fracture zones carrying silver-lead-copper ore.

Development: by 250' three-compartment shaft, and tunnels showing leached ground with occasional bunches of good ore. The old company expended about $75,000 on development. Workings total 2,650', including tunnels 80, 900, and 1,400' long, opening ground to depth of 1,000'. **Equipment:** includes electric power and electric hoist.

SEMINOLE COPPER CO. UTAH

Address: F. L. Wilson, Brooks Arcade Bldg., Salt Lake City, Utah.

Property: adjoining that of Western Utah Copper Co., near Gold Hill, Deep Creek district, Tooele county. Ore deposits said to be numerous and varied in character; tungsten ore was opened to depth of 135', and molybdenite was also developed. The 50-ton mill was enlarged in 1918. Operated intermittently.

SHEEP ROCK MINING & MILLING CO. **UTAH**

Office: W. A. Wilson, 406 Dooly Block, Salt Lake City, Utah.

Officers: W. A. Wilson, pres. and treas.; C. W. Morse, v. p.; C. Browne, sec., with W. B. and F. B. Eiseman and L. A. Jeffs, directors.

Inc. Sept. 4, 1893, in Utah. **Cap.** $100,000; 10c par; 450,000 issued.

Property: 10 patented claims, 177 acres, in Newton district, Beaver county, which show a fissure vein in rhyolite. Ore contains gold and silver, with quartz and manganese gangue. Alunite is also found on the property.

Development: by 300′ shaft and 1,000′ tunnel. **Equipment:** 25-h. p. electric hoist and compressor.

In development stage. No recent work done.

SILVER CONTACT MINING CO. **UTAH**

Address: P. O. Box 606, Salt Lake City.

Officers: C. G. Ballantyne, pres., 24 E. First North St., Salt Lake City; S. B. Robins, v. p.; Paul Luff, sec.; H. P. Huey, and Frank Newton, directors.

Authorized 1921 by Utah Corp. Commission to sell 100,000 shares at 5c to net company 3¾ cents.

Property: 3 claims on S. side of American Fork canyon.

Development: by incline shaft, sunk 1920, on silver-lead ore and a new tunnel, 150′ lower to cut ore at 700′ in.

SILVER FLAT MINING CO. **UTAH**

Presumably dead. **Property:** the old Nebraska mine in Delta Creek, Silver Lake section, American Fork, Utah, shows silver-lead ore in fissures in limestone cut by porphyry dikes.

Ore: complex silver-copper-lead, high in zinc.

Development: by 1,200′ of tunnels. No recent information.

SILVER HILLS MINING CO. **UTAH**

Address: L. M. Francis, sec., 539 Koneta Ct., Salt Lake City, Utah.

Assessment No. 2 of 3 mills per share, levied January 30, 1922.

SILVER KING APEX MINING CO. **UTAH**

Officers: J. C. Thoresen, pres.; J. F. Tyler, v. p.; L. H. Gray, sec.-treas., with Roland Williams, P. G. Bosley, John D. Winward and Jos. Lapish, directors.

Inc. Sept., 1921, in Utah. **Cap.** $50,000; par 10c.

Property: a lease and bond on Paul Jones, Nelson, Farragut, and Toga claims in Cottonwood district, Salt Lake Co., Utah. Incorporators include above and Dr. Geo. J. Field, A. L. Burns, W. T. Smith, S. C. Hatch, L. H. Gray, H. L. Wilkins, H. C. Jex, and E. Carlgren, all of Salt Lake City, and Chas. Osborn of Moulton, Idaho.

SILVER KING COALITION MINES CO. **UTAH**

Office: Kearns Bldg., Salt Lake City.

Mine address: M. J. Dailey, mine mgr.; Forrest Mathez, supt., Park City, Utah.

Officers: Moylan C. Fox, pres.; W. Mont Ferry, v. p.-mgr.; dir.; F. J. Westcott, sec.; W. S. McCornick, treas., with Henry Newell, Jas. Ivers, Jr., Thos. F. Kearns, David Keith, and W. J. Halloran, directors.

Inc. May 20, 1907, in Nevada. **Cap.** $6,250,000; $5 par; all issued. Annual meeting, third Monday in May. Transfer agent; F. J. Westcott, Salt Lake City. Registrar: Utah Savings and Trust Co., Salt Lake City. Stock listed on Salt Lake City and Boston Stock Exchanges.

Financial statement of Dec. 31, 1920, shows; total income, $1,056,042 of which $1,006,687 was for ore sales and $36,724, royalties. Expenses include: $594,944 at mine; $18,020, administration and $31,988, legal. Net operating profit was $411,089, and $358,360 after depreciation. Current assets over liabilities, $795,427 and surplus Jan. 1, 1921, was $511,766.

The mine produced $25,000,000 from 1892 to 1912.

Dividends: to May 1921, $4,888,292, exclusive of $10,675,000 paid by original Silver King Mining Co. No dividends were paid between this date

and Jan. 1, 1918, pending decision in the Conkling case. In 1921, dividends Nos. 25 and 26 of 15c each were declared, latter payable Jan. 2, 1922.

The mine is electrically equipped, and company owns a 600 ton mill. A flotation section, which started operating December 5, 1915, is said to give an increased saving of from 10% to 15% silver and 10% lead. Company employs 400 men.

Mill was destroyed by fire in January, 1921. A new mill using gravity concentration and flotation, with 450-ton capacity was completed, Jan., 1922.

Production: at end of 1921, varied between 1,500 and 3,000 tons per month. In 1919, production was 54,513 tons of ore, of which 11,037 tons were shipped, the remainder producing 8,423 tons of concentrate; total yield was 528,328 oz. silver, 14,587 oz. gold, 10,862,687 lb. lead and 145,176 lb. copper. Of the shipping ore, 207 tons were produced by lessees.

In 1920, shipping ore amounted to 14,517 tons, sold for $807,862 and 25,103 tons milling ore, producing 4,568 tons concentrate, sold for $198,825. Lessees produced 1849 tons of ore from abandoned stopes, sold for $116,958, with royalty to company of $36,724. Total ore mined 41,470 tons, yielding 629,929 oz. silver, 1,386 oz. gold, 10,604,453 oz. lead and 230,619 lb. copper.

The company is a consolidation of many noted Park City properties.

Property: 327 patented claims, about 2,341 acres, covering 19,000' along the strike of the ore zone at Park City, 35 miles S. E. of Salt Lake City, consists of 9 mining claims besides the holdings of the following mining companies; Silver King, Union, Park City, Fairview Alliance, Woodside, Mass., Jupiter, Kearns-Keith, Crescent, Apex, Boss, Baltimore, St. Louis-Magnolia, Pinyon Ridge, Odin, Belmina and Uintah Treasure Hill Coalition.

Ore: silver-lead-zinc sulphide ore occurs in fissures and large replacements in limestone and quartzite. For geology see U. S. G. S. Prof. Paper No. 77.

Development: by 2 shafts to depth of 1,300' and over 100 miles of workings. One of the main workings is the 3-compartment Silver Hill winze sunk from the Alliance tunnel level, at a point 8,500' from the portal; the collar of the winze is 1,600' from surface. In 1917 extensive development was done N. W. of the shaft, towards Thayne canyon, and large orebodies found in the Park City limestone.

Exploratory work on the M. L. M. ore shoot on the 1,300' and 1,450' levels proved very satisfactory as 3' of highgrade silver-lead ore was opened on latter level. The O'Brien fissure was cut in 1921 and the development indicated that it is one of the most productive ore channels of the camp; there is 3,500' of virgin ground on the strike of this fissure.

The Conkling Mining Co. brought suit for $575,000 against the company for alleged illegal extraction of ore. Judgment was rendered in favor of the Coalition Co.; the Conkling Co. appealed the case to the Circuit Court of Appeals, which reversed the former decision. The Coalition Co. then filed a petition for a rehearing in the Circuit Court of Appeals. On October 20, 1919, the U. S. Supreme Court issued a writ of certiorari to the Silver King Co. Argument was heard on Jan. 19, 1921, and on Feb. 28, the Supreme Court reversed decision of the Circuit Court and relieved Silver King from paying about $706,800.

Litigation with the Keystone Mng. Co. was settled in December, 1919.

SILVER KING CONS. MINING CO. OF UTAH **UTAH**

Offices: Newhouse Bldg., Salt Lake City and Park City, Utah.

Officers: Solon Spiro, pres.; R. P. Morris, v. p.; D. L. Wertheimer, treas., with H. A. Lee, Sherman Fargo, Wm. C. Kennett, Jr., and Herman Harms, directors. G. W. Browning, sec.; N. N. Blye, supt.; Harry A. Lee, cons. engr. and asst. mgr.

Inc. 1902, in Wyoming, as the Silver King Cons. Mng. Co., re-incorporated Feb. 24, 1908, in Utah. **Cap.**, $700,000; increased Sept. 12, 1912, from $500,000; increased January 31, 1918, to $1,000,000; increased Nov. 30,

1920, to $1,250,000; $1 par; assessable: issued January 1, 1921, 850,537½ shares. Empire Trust Co., New York, transfer office. Metropolitan Trust Co., New York, and Columbia Trust Co., Salt Lake City, registrars. Annual meeting, last Saturday in February. Stock listed on New York Curb and Salt Lake Exchange; 250,000 additional shares listed Jan. 13, 1921, on New York Curb. Assessments of 10c a share delinquent Oct. 22, 1921.

Shares sold 93c to $2.05 in 1920; 39.5c to $1 in 1921.

Annual report for year ended January 1, 1921, shows balance, January 1, 1920, $32,987; ore sales, $26,305; convertible notes, $152,600; total receipts, $253,876. Disbursements were $216,053, leaving a balance, Jan. 1, 1921, of $37,823.

Dividends: year ended Jan. 31, 1914 $308,791, derived from judgment paid by co-tenant; 1914, $251,033; 1915, $255,032; 1916, $294,561; 1917, $383,287; 1918, $70,000; none in 1919 and 1920; total, $1,562,705.

In December, 1917, company purchased, for $300,000, the entire property, 135 acres of the California Comstock Cons. Mng. Co.; it is located in Thaynes Canyon and comprises the "western territory" of the Silver King Cons. At time of purchase, this property was developed by a 450′ 3-compartment shaft and equipped with a 150-ton mill.

Property: 1,211 acres near Park City, adjoins Silver King Coalition on the west, and covers a mile of the westerly extension of the ore-bearing veins of Park City. **Ore:** carries lead, silver, gold and copper in replacement deposits in limestone and quartzite. For geology of the district, see U. S. G. S. Prof. Paper No. 77.

Development: in 1916, company began work on the Spiro tunnel, a 14,000′ adit, to open up 1,200 acres of new territory, covering south-western extension of vein system from which the Silver King Con. and Silver King Coalition derived their ores. This tunnel, 8′x8′ in section, is on company ground and will serve for drainage, transportation and development. By July, 1921, the breast was at 14,400′. The distance driven in 1918 cost $30,487 per foot, compared with $21,618 per foot for 5,000′ driven in 1917. In 1919 and 1920, the advance made was 2,622′ and 2,487′, respectively, at an average cost per foot for the 2 years of $39.96. The cost of the tunnel was estimated at $400,000.

In 1921, drifts were run on ore channels at 13,000′ from tunnel portal and at levels 275′ above the tunnel, ore "bedding out" from a fault fissure. The main tunnel was extended through the D. & M. fissure and underneath the newly acquired California Comstock ground.

The **California Comstock** shaft has recently been unwatered to the 450′ level; in 1918 the 250′ level was worked, but the grade of ore mined there showed little or no profit under the existing conditions. The 150-ton mill was remodeled and put in operation; a 10,200′ tramway was built in 1916 to convey ore to the mill and railroad, and a flotation mill, initial capacity 70 tons daily, was installed.

Production, years ending January 31 until January 31, 1917, when fiscal year was made to agree with calendar year:

	Ore, tons	Lead, lb.	Silver, oz.	Gold, oz.	Copper, lb.	Net value
1920....	438	234,509	12,721	27	1,375	$ 26,305
1919....	1,352	742,944	34,020	51	13,465	62,248
1918....	4,901	2,433,365	206,357	200	107,456	275,971
1917*...	10,260	5,016,627	451,627	403	248,771	642,467
1917....	10,082	5,273,216	439,007	423	228,819	500,499
1916....	13,719	7,843,139	652,076	605	411,086	519,478
1915....	9,987	5,593,786	503,784	514	257,912	346,990
1914....	609	316,434	22,319	40	6,343	19,847
1913....	612	461,830	27,813	55	9,656	27,143

* February 1 to January 1, 1918.

Two 10c assessments were levied, April 6 and June 16, 1921. The management was bitterly attacked at time of first assessment and not perhaps without some cause. It wold seem that with little commercial ore in sight, company s other resources should in former years have been conserved.

Mining operations at King Con. ceased in April, 1920. California Comstock was inactive throughout the year.

SILVER MOON MINING CO. **UTAH**

Address: Mrs. Rachel Crome, 923 Third Ave., Salt Lake City, who holds control.

Officers: A. L. Headbug, pres.; Wm. Crome, sec.-treas.

Inc. Jan. 29, 1912. **Cap.** $10,000; shares 2c par; assessable. Last assessment levied August 15, 1919. In treasury, May, 1916, 200,000 shares and $780 in cash; no debts.

Property: 7 unpatented claims in the Big Cottonwood district.

Ore: carries silver, gold, lead. Little development has been done.

SILVER PEAK MINING CO. **UTAH**

Officers: J. R. Rickards, mgr., Cedar City, Utah; R. B. Shepard, pres., 408 State St., Salt Lake City; T. F. Jennings, sec.-treas., Garfield, Utah.

Inc. July, 1915, in Utah. **Cap.** $10,000; shares 1c par; 600,000 issued.

Property: the Blair mine, 6 claims, 120 acres, unpatented, near Pinto, in Pinto Iron mining district, Iron county shows a contact deposit 8-10' wide, carrying copper-lead ore with gold-silver values.

Development: 200' shaft and 2 others. Dumps show 100 tons of $8 to $300 ore. Company doing assessment work only.

SILVER REEF CONS. MINES CO. **UTAH**

Controlled by The Alvarado Mining & Milling Co.

Address: 347 Madison Ave., New York City, or care of Frank C. Morehouse, 681 So. Catalina St., Los Angeles, Calif.

Officers: Frank C. Morehouse, pres.; A. J. McQuatters, v. p. Richard F. Parker, sec.-treas., with Alex. Coldbath, and Thomas Homer, directors.

Inc. 1918, in Utah. **Cap.** 1,000,000 shares, all issued. An assessment of 1c was levied, April, 1919.

Property: 61 claims (21 patented), 1,080 acres, one mile from Leeds, in Harrisburg (Silver Reef) district, Washington county, covering about 2 miles in length on each of the two principal ore bearing sandstone beds, locally called reefs, known as the Buckeye and White reefs, and embracing the Barbee and Walker group, and former holdings of Stormant, Christy and Leeds Mining companies, all early-day producers. Also, mill sites and water rights. Oxidized silver ore, with some copper, occurs as impregnations in the White sandstone whose copper content ranges from 0.5 to 3% in certain beds.

Silver was first discovered in this district in 1875 and up to 1888, when operations practically ceased, produced between $8,000,000 and $15,000,000 of high grade and milling ore; the latter is estimated to have averaged 25 oz. silver per ton.

Development: by this company begun July, 1920, has reached 300' below lowest levels of old workings and is reported to have opened considerable high grade and a large tonnage of 25 oz. ore. A large tonnage of ore, assaying 8-16 oz. silver and 1-2% copper, is said also to be exposed in old workings.

Equipment: includes 3 electric hoists; erection of mill at an early date is planned.

Controlling interest in company has been purchased for cash by Alvarado M. & M. Co. (which see in Mexican section of this volume.)

SILVER SHIELD MINING & MILLING CO. **UTAH**

Fully described in Vol. XIV. Succeeded by the **Bingham Galena Mng. Co.**, which see.

SILVER SIDE MINING CO. **UTAH**

Address: American Fork, Utah.

Officers J. E. Beveridge, pres.; A. O. Jacobson, v. p.; W. Holmes, sec.-treas., with H. P. Huey and M. M. Beaver, directors

Inc. 1916, in Utah. **Cap.** $50,000; shares 5c par.

Property: 5 miles up American Fork canyon, is said to show silver-lead ore in contact deposit between limestone and quartzite.

Development: by tunnels and shallow shaft. No recent information.

SILVER TIP GOLD & SILVER MINING CO. **UTAH**

Address: J. R. Jones, mgr., Kelton, Boxelder county, Utah.

Inc. 1921, in Utah.

Property: a group of claims, 30 miles north of Kelton on S. P. R. R., developed by 100' incline shaft in 1921. Ore, at 50' depth, was 2'-3' wide averaging 1.4 oz. gold, 71 oz. silver and 3.1% copper.

SINCLAIR CONSOLIDATED SILVER, INC. **UTAH**

Address: C. S. Cresser & Co., fiscal agents, 83 Pine St., New York.

Inc. 1920, in Delaware. **Cap.** $1,000,000; non-assessable. National Security & Transfer Co., New York, registrar and transfer agent. Shares offered at 20c in March, 1920.

Officers: Salvatore Bonomolo, pres.; Col. Weatherly, v. p.; W. G. Stoddard, treas.; M. E. Schek, sec.; with Ronald Ridgway and B. J. Boemerwald, directors.

Property: 10 claims in the Pinto district of Iron county, Utah, at the mouth of Chloride canyon. The vein runs S. E.-N. W. and dips 85° S. Silver-lead ore from the outcrop shipped to the Silver Reef mill is said to have yielded $75 per ton. Examined by E. J. Eddards.

Company prospectus contains this literary gem: "The formation of Chloride Canyon belongs to the miocene and quatenary ages, with paeleozoic intermingled. The porphyry lies on the east and has been wholly undisturbed, while the rhyolite on the west seems to have had some heavy movements. The porphyry is magnifurious, granite porphyry."

Only surface work has been done so far; tunnels are to be driven.

A market letter of July 2, 1920, annouces that 4 claims were acquired in the Alta district and that a new directorate had been elected. The "wide publicity compaign" contemplated was not apparently continued, for no other information has been received.

SIOUX CONS. MNG. CO. **UTAH**

Succeeded by **Sioux Mines Co.**, which see.

SIOUX MINES CO. **UTAH**

Is a reorganization of Sioux Cons., fully described in Vol. XIII.

Address: Provo, Utah.

Officers: Reed Smoot, pres.; K. S. Jordan, sec., with Jesse Knight, W. Lester Mangum, and R. L. Anderberg, directors.

Inc. 1917, in Utah. **Cap.** $100,000; par 10c; all outstanding.

Property: 6 patented claims, 47 acres, in Tintic district, said to show silver-lead ore.

Development: by shaft to the 1,000' level. During 1919 and 1920, operations were conducted through the 1,700' level of the adjoining Iron Blossom; a good showing was encountered in virgin territory, but no commercial ore developed.

Inactive in 1921.

SOFFE SILVER MINING CO. **UTAH**

Letters returned unclaimed in May, 1917. Probably dead.

Directors: J. C. Soffe, pres., W. R. Soffe, v. p.; J. W. McKinning, sec.-treas., with W. J. Soffe, mgr.; A. J. Shulson, at last accounts.

Inc. May 7, 1916, in Utah. **Cap.** $10,000; shares 1c par.

Property: 12 claims, unpatented, in Erickson mining district, Tooele county, 30 miles west of Faust Station on Salt Lake Route. Claims show high-grade silver-gold ore.

SOUTH CARDIFF MINING CO. **UTAH**

Address: George N. Lawrence, pres., 420 Boston Bldg., Salt Lake City; W. H. King, v. p.; Allen Sanford, sec.-treas., with George A. Steiner, directors.

Inc. April 9, 1916, in Utah. **Cap.** 1,000,000 shares; 450,000 in treasury.

Property: 10 claims, 160 acres, in Cottonwood district, adjoining the Cardiff, Howell & Monte Cristo, and the Canton Mining Co., holdings, is supposed to carry extension of Cardiff fissure. No recent information; Probably idle.

SOUTHERN PACIFIC GOLD & COPPER M. & M. CO. **UTAH**

Office: Walker Bank Bldg., Salt Lake City, Utah. Mine near Ogden, Weber county, Utah.

Officers: H. T. Strauss, pres. and gen. mgr.; W. C. Kellerman, sec.

Inc. July 20, 1903, in Utah. **Cap.** $1,000,000; shares $1 par; assessable; issued 792,593. Shares are listed on the Salt Lake Stock Exchange.

An assessment of 3c per share became delinquent March 5, 1921.

Property: 12 claims, unpatented, 240 acres, 3 miles from a railway and about 8 miles north of Ogden, in the Sierra Madre district, reported to carry 25 orebodies in contact deposits between quartzite and gneiss. The main vein of about 50′ width, shows some oxidized ores, but mainly auriferous sulphides, including covellite, bornite and chalcopyrite, with some molybdenite, in a 6′ vein.

Development: by two incline shafts on the Wizard claim, and a main tunnel in 500′ in June, 1919, with about 1,000′ of workings, said to show ore assaying up to 15% copper, 37 oz. silver and $1.60 gold per ton. Company plans driving the tunnel an additional 200′.

Work was underway in December, 1920, but no details available.

SOUTHERN SWANSEA MINING CO. **UTAH**

Mine office: Silver City, Juab county, Utah.

Officers: Geo. Jones, pres.; Geo. A. Shepard, v. p.; Richard B. Shepard, treas.; Emma C. Shepard, sec., 408 S. State St., Salt Lake City. R. E. Jones, supt.

Inc. July 31, 1907, in Utah. **Cap.** $10,000; shares 1c par; issued, $8,500; assessable; last assessment, one mill a share, delinquent Sept. 1, 1920.

Property: 12 claims, unpatented south of the Swansea mine and supposed to carry an extension of the Swansea vein, showing porphyry, quartzite and lime, with a fissure vein of 12′ estimated average width, traceable 1 mile, carrying auriferous and argentiferous oxidized and sulphide ores of copper and lead, developed by a 200′ shaft.

SOUTH HECLA EXTENSION MINING CO. **UTAH**

Company fully described in Volume XIV.

Holdings, acquired October, 1921, by South Hecla Mines Co., on a basis of one share for eight old shares.

Property comprised 37 acres, on which there was little development work save that through the Quincy tunnel of the So. Hecla Mine.

SOUTH HECLA MINES CO. **UTAH**

Address: 135 S. Main St., Salt Lake City, Utah. **Mine address:** Alta, Utah.

Officers Geo. H. Watson, pres.-gen. mgr.; Geo. F. Wasson, v. p.; Robt. F. Marvin, sec.-treas., with J. Will Knight, and A. B. Watson, directors.

Organized Oct., 1921, as a consolidation of South Hecla Mining, Albion Cons., Alta Utah and South Hecla Extension.

Cap. $500,000; 10c par; $237,400 outstanding. The South Hecla received 4 shares of new stock for 1 share of old; Albion Consolidated share for share; Alta Utah 1 new for 2½ old shares; South Hecla Extension, 1 new for 8 old shares. Shares offered at 12½c., Nov., 1921.

Property: covers about 1,400 acres, patented, in one contiguous block, extending across the Alta divide, down into the American Fork district, with a production record to 1921 of about $4,000,000.

The South Hecla group comprises 41 claims, patented, 550 acres, at Alta, in the Little Cottonwood district. Claims carry 8 well-defined ore-bearing fissures in granodiorite and limestone, running N. 70° E., dipping 70° N., also contact deposits between limestone and granite.

Company also owns over a 7/8 interest in 1,600 acres of oil lands situated in the San Rafael Swell, Emery county, Utah, on which drilling was begun in 1921.

Development: at various properties is very extensive, aggregating 50,000′ of workings. Tunnels said to block out ample ore and to furnish water for a large mill. The eastern workings show shipping ore running about 5½% copper, 30% lead, 12 oz. silver, 20% iron, 20% sulphur. The western workings yield ore said to vary from $15 to $25 per ton. For more complete details of recent operations, see individual descriptions of companies noted above, and described under old titles in this volume.

In 1921 work in the South Hecla exposed the intersections of several well marked fissures with the "thrust contact" and overthrust fault whose quartzite hanging wall had been found to determine the existence of the large orebodies cut in the Cardiff and more recently, in the Columbus Rexall Mines. This fault, running N. 70° E., is cut at an angle of 60°-70′ by several cross fissures.

Where the Wedge "fissure" or vein, intersects the "thrust contact", an enormous shoot of clean sulphide ore of shipping grade occurs. Similarly in the Quincy tunnel, an orebody was found where the Rustler fissure cuts the thrust fault, the ore, which is the probable downward extension of the "Rustler orebody," being 1,200′ beneath the surface, and 800′ below the old Rustler workings. This newly opened ore averages 35 oz. silver, 16% lead, and $2 gold per ton. The "Thrust Contact" extends south into the Louise property, where it is cut by several fissures and continues into the Mineral Flat tract of the South Hecla Mines Co. Until this new Rustler discovery, work was mainly on the Kate Hayes orebody which is 900′ long, and on the two ore shoots in the Wedge fissure.

In the Wasatch (the old Columbus Cons.) workings, the Braine fissure intersected the thrust contact at 70°, and in December, 1921, good ore was found where this intersection was opened by workings on the main drainage tunnel level 500′ below the outcrop.

Equipment: includes a 60-h. p. electric plant, with a 10-h. p. hoist good for 200′, and three compressor plants. Buildings include a shop building, housing smithy, machine and carpenter shops, with a 3-story boarding house and 5 dwellings.

SOUTH HECLA MINING CO. UTAH

Consolidated late 1921, with Albion Cons. Mng., Alta Tunnel Mng., and South Hecla Extension Mining companies to form South Hecla Mines Co., shareholders of So. Hecla Mining Co., getting 4 new shares for each old share.

Office: 135 So. Main St., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake county, Utah.

Officers: Geo. H. Watson, pres.-gen. mgr.; Herman Bamberger, v. p.; Robt. F. Marvin, sec.-treas., with A. B. Watson, and H. C. Edwards, directors.

Inc. Sept. 14, 1910, in Utah. **Cap.** $500,000; $1 par; assessable; issued $262,920. Geo. H. Watson & Co., registrar. Annual meeting, second Wednesday in September.

Listed on Salt Lake Stock Exchange. Shares, 63c low, $1.30 high, 1918; $1.30-2.70 in 1919; 65c-$1.30 in 1920; 52c-65c in 1921.

Company was organized as a merger of the South Columbus Consolidated Mining Co., and Alta & Hecla M. & M. Co., and holds properties

formerly held by the Bingham-Centennial, Alta-Quincy, Columbus Wedge Ivanhoe and Lilburn mining companies. Company exchanged stock on the basis of 1 share of South Hecla for 5 shares of South Columbus, and 1 share of South Hecla for 5 shares of Alta-Hecla.

Assets as of March 15, 1921, totaled $2,355,781, including property, $203,020; development, $1,827,710; treasury stock $200,000; discounts, $64,610 and investments, $47,900. Liabilities include surplus, $36,524; profit and loss, $1,815,119. Two dividends of 15c each, last September, 1919, total $78,888.

Property is described under **South Hecla Mines Co.**

Production: company in 1916 shipped 7,962 tons of ore contaning 267 oz. gold, 164,619 oz. silver 1,236,357 lbs. lead, 55,366 lbs. copper, 738,473 lbs. zinc and 782,059 lbs. iron. Lessees marketed 1,097 tons of ore containing 34 oz. gold, 16,493 oz. silver, 218 lbs. lead, 5,361 lbs. copper, 157,854 lbs. zinc, and 47,089 lbs. iron In 1918, combined output by company and lessees was 9,232 tons ore, yielding 165 oz. gold, 112,920 oz. silver, 248,985 lb. lead, 577,773 lb. copper, 137,556 lb. zinc, and 4,261,888 lb. iron.

In 1919, the output was 7,634 tons of ore yielding 106 oz. gold, 71,200 oz. silver, 41,786 lb. lead and 361,385 lb. copper. In 1920, production was 3,581 tons of ore, 161 oz. gold 56,542 oz. silver, 329,836 lb. lead and 12,395 lb. copper. Bad roads and labor shortage reduced the 1920 production.

SOUTH IRON BLOSSOM MINING CO. UTAH

Robinson, Juab county, Utah. George Jones, pres.; T. L. Schofield, sec.-treas.

Inc. 1908, in Utah. **Cap.** $100,000; shares 10c par; assessable; outstanding 241,000. Listed in Salt Lake City.

Property: 4 claims in the Tintic mining district, showing silver-lead ore

SOUTH PARK MINING & DEVELOPMENT CO. UTAH

Officers: O. A. Relf, pres.; J. Tracy Wootton, sec.-treas.

Inc. May 24, 1916. **Cap.** $50,000; shares 5c par; assessable; $3,000 issued. Last assessment, ½c a share, delinquent, September 27, 1919. Listed in Salt Lake City.

Property: 17 claims, 14 patented, in American Fork mining district, said to show iron carbonate containing silver and lead.

Development: by tunnels, crosscutting the formation. Work has usually been suspended during the winter months, and resumed in May. At that time in 1919 main tunnel had a length of 700', and a drift was started on an orebody showing 450' from the portal.

In fall of 1920, tunnel was being continued.

SOUTH STANDARD MINING CO. UTAH

Address: 422 Judge Bldg., Salt Lake City.

Officers: E. J. Raddatz, pres.-treas.; W. I. Snyder, v.-p.; Orson P. Rumel, sec.

Cap. 1,300,000 shares; assessable: last assessment ½c a share, was levied in June, 1919. Listed on Salt Lake Exchange. The United Tintic Mines Co. and Tintic Tunnel Co. were consolidated with S. S. Mng. Co.

Property: 47 claims, in Juab and Utah counties, includes the Montreal Tintic Combination and Bullock groups, of the United Mines and holdings of Tintic Tunnel Co.

Reported, in 1920, that a deep shaft was to be sunk; no recent information.

SOUTH STAR MINING CO. UTAH

Address: Chas. L. Alexander, pres.-mgr., Fergus Falls, Minn.

Officers: above with C. W. Cockroft, v. p.; L. C. Alexander, sec.-treas., and L. Davie, directors.

Inc. July 15, 1915, in Utah. **Cap.** $100,000, 25c par; issued 200,000

Property: 7 unpatented claims, about 90 acres, in South Star district, Beaver county, said to show copper, silver-lead ore in a contact deposit

in limestone. Only surface development work has been done. Idle, except for assessment work.

SOUTH UTAH MINES & SMELTERS UTAH

Office: 165 Broadway, New York. **Mine office:** Newhouse, Beaver county, Utah.

Officers: Hugo Hoffstaedter, pres.; V. Morrison, sec.-treas., with Louis N. Kramer, E. P. Earle and Samuel Newhouse, directors; W. L. Heidenreich, gen. mgr.

Inc. Oct. 21, 1909, in Maine, as successor of Newhouse Mines & Smelters. **Cap.** $4,300,000; shares $5 par; issued 676,200 shares. **Debentures:** $919,000 of 6%, 20-year income bonds, convertible into stock at par, remaining from a $1,500,000 bond issue put out by the Newhouse Mines & Smelters. Interest on bonds is said to be payable annually, but only if and when earned, and then out of net profits of the year's operations. None paid to date.

The old company defaulted in interest on its bonds, and the property was bought for $500,000 under foreclosure, old shareholders being given stock share for share, plus a payment of $1 per share for new stock. The reorganization brought about $600,000 into the treasury, of which all but about $200,000 was required to liquidate the floating debt of the old company. Current assets as of June 30, 1920, were $78,713, and liabilities, $2,508; accumulated deficit for this date was $201,655.

Listed on Boston Stock Exchange and on New York Curb. Equitable Trust Co., New York transfer agent; Empire Trust Co., New York, registrar. Annual meeting, third Monday in October, in Augusta, Me.

Property: the Cactus mine, 13 claims, with miscellaneous holdings, including the Midvale placer, 168 acres, water rights at Wah Wah springs, mill, town sites and grazing lands, total holdings of 7,882 acres.

The Cactus mine shows monzonite- porphyry country rock, near a limestone contact, and ore is essentially an irregular mass of brecciated monzonite, carrying copper impregnations, including some oxidized ores in the upper workings but at depth mainly chalcopyrite, assocated with pyrite. There is about 168,000 tons of developed low-grade ore scattered about the mine. Much of this ore will assay only 1.05%, while some of the smaller blocks consist of 1.75% ore. Such material can be profitably handled in the company's mill with flotation units, but as there seems to be no chance of finding additional orebodies it will not pay to reopen the mine and remodel the mill.

Development: by two working shafts of 600′ and 900′ depth, with levels at 100′ intervals, and connected on the 600′ level with a 6,300′ main haulage tunnel. The mine has upwards of 4 miles of workings.

Equipment: includes 200-h. p. steam plant, with a 150-h. p. hoist good for 600′, and a 40-drill air compressor, both operated electrically. There also is an auxiliary electric hoist on the second level.

The mine and mill are connected with the Salt Lake Route.

Mill: the 1,000-ton mill contains three 10x24″ crushers, 4 sets of rolls, 1 Huntington mill, 22 Harz jigs, 58 tables, 8 slimers, 16 Callow tanks, settling tanks and classifiers.

The old tailings were treated by Utah Leasing Co. on a royalty basis. In 1914 a $175,000 flotation plant was built for this purpose. The tailings were exhausted in 1919.

Litigation with Utah Leasing Co. was decided in favor of lessor by U. S. Circuit Court of Appeals early in 1920.

Production: from 1906 to mid-1914, amounted to 22,412,082 lb. copper; 146,148 oz. silver and 6,443 oz. gold. Mine will not be reopened, but the company is free from debt and has about $65,000, in the treasury, in addition to the mine and mill equipment at Newhouse. It is on the lookout for mining properties worthy of development.

STAMPEDE MINES CO. UTAH

Mail returned from A. T Burton, sec., Beaver City, Utah

Officers: B. F. Caffey, pres.; Archie MacFarland, v. p.; A. T. Burton, sec.-treas., with Sam. Glaser and R. H. Strickland, directors.

Inc. 1916, in Utah. **Cap.** $100,000; shares 10c par; assessable; 800,000 issued.

Property: 14 claims, 250 acres, in Lincoln or Jarloose district, Beaver county, Utah, said to show fissures in limestone, dipping 40° and pitching N. 70° E. Sulphide ore reported to contain 0.09 oz. gold, 25 oz. silver, 21.5% lead and 2.46% copper. Shoot occurs at junction of 2 fissures. Development: shaft, down 235′ in November, 1918, cut ore whose persistence in depth is a favorable indication.

Equipment: 6-h. p. gasoline hoist, 140 cu. ft. compressor, etc. **Production:** 21 tons in 1916. A small mine with possibilities. Rail and smelter facilities nearby.

STARLESS MINE UTAH.

Office: care Col. Enos. A. Wall, owner, Salt Lake City, Utah. **Mine office:** Bingham Canyon, Utah.

Property: 8 claims patented, 160 acres, lying N. E. of the holdings of the Utah Copper Co., is developed by an incline shaft and numerous tunnels, longest 2,000′, with crosscuts and upraises, aggregating 10,000′.

Development: said to block out 800,000 tons of 1 to 2% copper ore.

Equipment: includes a hoist.

The 125-ton mill, idle, though it was enlarged and remodeled 1910, at a cost of $50,000, is equipped throughout with machinery of Col. Wall's own design, comprising Wall corrugated rolls, Wall steel rolls for middlings, 3 sets of jigs, 2 tables for concentrates, 2 Wilfley tables and washers, of trough form, with valves and sprayers, concentrates being discharged through the bottom and sands from the top.

STIBNITE MINING CO. UTAH

Address: H. C. Baker, 2421 Washington Ave., Ogden, Utah.

Officers: H. C. Baker, pres.; A. M. Miller, v. p.; G. M. Flowers, sec.-treas., with Leroy Buchmiller and H. J. Craven, directors.

Inc. April, 1917, in Utah. **Cap.** $100,000; 10c par; 800,000 issued.

Property: 686 acres, patented, 4 miles N. of Bingham, in Wasatch Range, Boxelder county, Utah.

Development: by 2,452′ adit, total openings 4,315′ to depth of 800′, showing various types of ore deposits in limestone, quartzite and shale, the ore containing lead and antimony. Reserves are estimated at 126,000 tons. Antimony ore mined in 1916 was 67 tons, assaying 66% metal.

Equipment: compressor, 6,200′ tram, 125-ton concentrating plant. Flotation was to have been added in 1918. No recent information, probably inactive.

STOCKTON STANDARD MINING CO. UTAH

Address: W. N. Gundry, 523 Atlas Bldg., Salt Lake City, Utah

Officers: C. F. Buehner, pres.; E. V. Anderson, v. p.; W. N. Gundry, sec.-treas., with F. Salzner, A. McCune, A. P. Davidsen, and W. F. Glissmeyer, directors.

Inc. May 16, 1916, in Utah. **Cap.** $10,000; 1,000,000 shares 1c par; assessable, not more than 1c. per year: issued 700,000 shares.

Property: 13 claims, 5 patented, 240 acres, in Rush Valley district, Tooele county, said to show a vein of silver-lead ore.

Development: by 200′ shaft, with 450′ drift in which a N.-S. fissure has been cut showing silver-lead ore for 60′. In 1918 $2,000 was spent by the company.

Reported in 1921 that gas hoist had been installed and shaft, to be sunk to 400′, had reached 300′ in July.

SWANSEA CONSOLIDATED MINING CO. UTAH

Office: Knight Bldg., Provo, Utah.

Officers: O. Raymond Knight, pres.; R. E. Allen, sec.-treas.

Inc. in Utah. **Cap.** $100,000; shares 10c par; 999,798 outstanding; assessable. Listed on Salt Lake Exchange.

Owns 145 acres in Tintic mining district, said to show silver-lead ore. Property closed.

Reported that the Tintic Mlg. Co. (q. v.), also a Knight company, had reopened shaft, June, 1921, to the 500′ level. Ore reserves of milling grade are said to be exposed.

SWANSEA EXTENSION MINING CO. **UTAH**

Has passed on. Described in Vol. XIII.

SWASTIKA MINING CO. **UTAH**

A. H. McKnight, pres.-mgr.

Operates a property in Honeycomb gulch, near Alta, formerly owned by Bishop L. G. Hardy, of Salt Lake City. Reported to have opened a large deposit of low-grade ore by several thousand feet of workings.

SYNDICATE MINING & MILLING CO. **UTAH**

In May, 1919, property and assets of the **Syndicate Mining Co.** were transferred to this company; stockholders received share for share in the deal.

Address: Santaquin, Utah county, Utah. Benj. H. Bullock, pres.-mgr., Nora A. Bullock, sec.-treas.

Inc. 1919, in Utah. **Cap.** $25,000; in 1,250,000 shares par 2c. Listed in Salt Lake City. Assessable. Assessments of 1½ mills each, delinquent August, and Oct. 27, 1921.

Property: 10 unpatented claims, near Santaquin, said to show a 20′ vein containing ore with gold, silver, and copper. The vein fissures are in limestone and orebodies are expected at vein intersections.

Development: Late 1921, tunnel was 2,145′ long with face 800′ below surface, and company driving adit on promising vein in S. E. fissure. Property is a prospect, in which ore in commercial amount has not yet been found, though surface croppings are promising.

TALISMAN CONSOLIDATED MINING CO. **UTAH**

Address: P. O. Box 1065, Salt Lake City. **Mine office:** W. W. Crone, supt., Milford, Utah.

Officers H. S. Joseph, pres.; S. S. Pond, v. p.; H. W. Brock, sec.; L. B. McCornick, treas., with L. B. Merriman and M. J. Morris, directors.

Inc. July 7, 1917, in Utah. **Cap.** $100,000; shares 10c par; assessable; 300,000 issued.

Property: 20 claims; also Cedar Talisman and Empire mines under lease for 2 years, total 450 acres, in Star district, Beaver county, Utah.

Geology: fissures and contact deposits in limestone. Orebody is from 1 to 5′ wide and ore said to assay 10% lead, 15 oz. silver, and 10% copper, with some zinc and gold.

Development: by incline shafts 200 and 1,000′ deep. Workings total 5,000′. Reserves consist of 1,000 tons of high-grade and 40,000 tons of low-grade ore, the latter in the leased mines. No recent information, probably idle.

TAR BABY MINING CO. **UTAH**

Office: 523 Atlas Block, Salt Lake City, Utah. **Mine office:** Alta, Salt Lake county, Utah.

Officers: J. M. Matsen, pres. and gen. mgr.; J. W. Brewer, v. p.; W. N. Grundy, sec.-treas.; Geo. W. Morgan and R. W. Savage, directos; H. D. Greene, supt.

Inc. 1911, in Utah. **Cap.** 500,000 shares, increased June, 1916, from 400,000; 20c par; outstanding, 483,000 shares. Listed on Salt Lake City Exchange. Shares 1½c. low, 5¾c. high in 1918; 2c.-7½c in 1919; 1-6c. in 1920; ¾-2¾ in 1921, to June. Assessment No. 24, of 1c. levied Jan. 3, 1921; No. 25, 1c. delinquent Nov. 2, 1921.

Property: 6 claims, in the Alta-Cottonwood district, on the south [illegible] of Big Cottonwood.

Development: by 2 tunnels, one 2,200' long, projected to cut the Cardiff lime-quartzite contact. Extensions for year ended June 1, 1922, totals 800'. No ore in commercial amount has yet been found.

TECOMA CONS. MINING CO. UTAH

Address: 1407 Walker Bank Bldg., Salt Lake City. C. S. Woodward, manager.

Cap. $100,000 common stock, 10c par; and $40,000 preferred stock, $1 par. Listed on Salt Lake Exchange.

Property: 8 claims in Lucin mining district, Boxelder county. Ores carry gold, silver, lead, copper and zinc.

Mine is an old time lead-silver producer. Lessees were operating during 1918 and shipped oxidized copper and some lead ore.

TEXAN MINING CO. UTAH

Office: 400 W. 7th South St., Salt Lake City, Utah.

Officers: Chas. Tyng, pres.; Frank Nelson, sec.

Inc. in Utah. **Cap.** $1,000,000; shares $1 par; outstanding, 825,000. Listed in Salt Lake City. Share prices 1c-8c in 1918. No quotations, 1919-'20.

Property: 200 acres in American Fork district, said to show silver-lead-copper-gold ore. A tunnel was driven over 1,000' in the Texan mine, while the Miller Hill tunnel is in 2,100'; both tunnels are in quartzite. No commercial orebodies have yet been found. Probably idle.

THOMPSON-QUINCY CONSOLIDATED MINING CO. UTAH

Reorganized 1915, as **New Quincy Mining Company**, which see.

THOR MINING CO. UTAH

Merged, 1916, with **Great Western Gold & Copper Co.** and **Mountain Lake Mining Co.**, with title of **Great Western Mines Co.**, which see.

THREE KINGS CONS. MINING CO. UTAH

Formerly the Three Kings Silver Mining Co.

Mine office: David Erickson, supt., Park City, Utah.

Office: 616 Newhouse Bldg., Salt Lake City.

Officers: J. R. Elliott, of Pittsburgh, pres.; W. J. Burton, v. p.; P. J. Mackintosh, sec.-treas.-mgr., with W. A. Stewart and G. F. Campbell, directors.

Inc. May 13, 1914, in Utah. **Cap.** $250,000; 25¢ par; 147,500 shares issued; assessable. On August 1, 1920, the cash on hand was $7,682.50; receipts from assessments, fire insurance, etc., $22,151, making a total of $29,834. Disbursements, labor, office and general expense, etc., $24,426; cash on hand July 31, 1921, $3,454; notes receivable, $1,954; total $5,408. Total assets of company $248,538; liabilities, capital stock, $250,000; net deficit, $1,462.

Property: the Nelson and Mineola groups, 156 acres, in heart of Park City, showing usual geologic conditions of that camp, with fissures carrying silver-lead ore.

Development: by shaft to 700' depth. Most recent development said to have opened a vein from 1' to 3' in width and assaying more than $40 per ton. In 1920 and 1921 the mineral bearing limestone was explored by diamond drilling from the 625' level. A crosscut on 700' level uncovered 7 fissures, 2 of which are being further developed, by upraising to the ore-bearing limestone beds.

Equipment: includes electric hoist and compressor driven by 75-h. p. motor. Examined by Robert Linton. Management is confident of finding commercial ore.

THREE KINGS SILVER MINING CO. UTAH

Name changed to **Three Kings Cons. Mining Co.**, which see.

TINTIC BULLION MINING CO. UTAH

Officers: John M. Bestelmeyer, pres., Provo, Utah; T. Nicholes, v. p.;

H. C. Hicks, sec.; August Bestelmeyer, treas., with Samuel Bennett, directors.

Inc. 1919, in Utah. **Cap.** $75,000; 5c par.

Property: located in East Tintic mining district, adjoining Eureka Bullion.

TINTIC CENTRAL MINING & MILLING CO. **UTAH**

Mine address: Silver City, Utah.

Office: Provo, Utah.

Officers: O. Raymond Knight, pres.; R. E. Allen, sec.-treas.

Inc. June, 1907, in Utah. **Cap.** $50,000; 5¢ par; assessable; all issued. Last assessment (No. 27), of ½¢, delinquent May 7, 1920. Stock listed on Salt Lake Exchange.

Property: 20 claims, covering ground adjacent to the Iron Blossom in the Tintic district and supposedly carrying the extension of the ore-bearing fissures of that mine. These fissures are in limestone and are cut by porphyry, carrying irregular orebodies.

Development: includes a 1,038′ shaft with extensive workings on the 870′, 920′ and 1,020′ levels. Recent work has been performed through the Iron Blossom mine, consisting of over 2,000′ on the 1,700′ level.

Inactive since March, 1920.

TINTIC CHIEF MINING CO. **UTAH**

Office: Provo, Utah.

Officers: H. C. Hicks, pres.; J. M. Bestelmeyer, v. p.; August Bestelmeyer, sec.-treas., with E. A. Peay, and N. C. Hicks, directors.

Inc. July, 1919, in Utah. **Cap.** $75,000.

Property: located in Tintic mining district, Juab county.

TINTIC COALITION MINES CO. **UTAH**

Address: Eureka, Utah.

Officers: Frank Thornburg, pres.-treas.-gen. mgr.; Jas. H. Worrall, v. p.; Gordon Thornburg, sec., with Mrs. Ione Thomas and Herbert A. Coster, directors.

Inc. in Utah. **Cap.** $1,000,000.

Property: 15 claims, 300 acres, in south end of Tintic district, 3½ miles S. of Silver City, reported to show 2 fissure vein systems in porphyry, with veins 5 to 12′ wide. Ore is silver-lead-zinc.

Development: by 150′ shart, 1,900′ tunnel, with a 600′ back, and numerous smaller workings. Production by former owner said to be $40,000.

During first half of 1920, Salt Lake market letters were offering shares at 12½¢; these offers abruptly ceased.

Examined by A. P. Mayberry.

TINTIC COMBINATION MINING CO. **UTAH**

Consolidated with Tintic Empire and Bullock M. & M. companies to form United Tintic Mines Co. in 1911, which in 1918, was itself consolidated with the **South Standard Mng. Co.**

TINTIC CO. **UTAH**

Office: 665 Fifth Ave., New York.

Officers: E. B. Schley, pres.; Kenneth B. Schley, v. p.; E. Richter, sec.-treas.; C. G. Raynor, asst. sec.-treas.

Inc. 1903, in Maine. **Cap.** $2,700,000; shares $3 par; issued $2,091,249. Original cap., $3,000,000; shares $5 par, increased, 1906, to $4,000,000, with an outstanding issue of $3,500,000 stock in 700,000 shares of $5 par, which was first reduced 1909, to $2,100,000, by cutting the par value from $5 to $3 and was immediately thereafter increased to present amount of $2,700,000.

Bonds: $500,000 authorized, at 6%, convertible into stock, of which $422,900 is outstanding, this bond issue having been made to liquidate a floating debt. The company is a securities-holding corporation only, and was the parent company of the Tintic Mining & Development Co., Yampa Smelting Co. and West Mountain Tramway Co.

TINTIC-DAVIS MINING CO. UTAH

C. M. Morris, pres., 813 E. 1 S., Salt Lake City; Geo. H. Taylor, mgr Inc. in 1919.

Property: located in North Tintic mining district, adjoins Chief Cons. In October, 1919, machinery was added, and a head-frame built. Details of operations not available.

TINTIC DELAWARE MINING CO. UTAH

Address: Holbrook Blk., Provo, Utah.

Officers: Jos. Hatch, pres., Heber, Utah; R. Jones, v. p.; Chase Hatch, sec.; J. A. Holdaway, treas.; with J. H. Ekker, W. R. Wherritt and E. W. Murdock, directors.

Inc. in Utah. **Cap.** $100,000; increased June, 1919, to $200,000; 10¢ par; stock made assessable, fall of 1920. Listed on Salt Lake Exchange.

Property: 21 claims in West Tintic district, Juab county, 25 miles from Jerico, shows zinc-lead-silver ore. Development underway.

TINTIC DELMAR MINING CO. UTAH

Office: Snow Bldg., Provo, Utah. **Mine** office: Eureka, Juab county, Utah.

Officers: Lewis Merriman, pres.; Andrew Madsen, v. p.; Harvey Cluff, sec.-treas., with C .W. Reed and T. Boardman, directors.

Inc. March 27, 1909, in Utah. **Cap.** $100,000; shares 10c par.

Property: 20 claims, partly patented, in the North Tintic district, on which limestones occur with geologic conditions like those of Centennial Eureka mine.

Development: by 350′ tunnel, to be extended to crosscut formation, which shows stringers of quartz carrying ore said to give good assay values in silver, lead and copper where two large cross breaks intersect. A 114′ winze encountered fissures opened by a drift, 100′ below the tunnel, reported to show ore carrying 300 oz. silver, some gold, lead and a little copper in a shoot encased in low-grade ore.

Property reported on favorably by C. A. Porter of the Utah Copper Co. and by Prof. J. E. Tallmadge. No recent report of operations received. Is a promising mining gamble.

TINTIC DRAIN TUNNEL CO. UTAH

Address: Provo, Utah.

Officers: O. Raymond Knight, pres.; R. E. Allen, sec.-treas., with J. S. Smith, E. F. Birch, Henry Barney, A. M. Knight, K. S. Jordan, and J. K. Jordan, directors. Listed on Salt Lake Exchange.

Organized in September, 1917, to drive a 5½ mile adit from Goshen valley to a point near Silver City, for drainage of adjacent mines and sale of water for irrigation. In September, 1919, tunnel was in 3,400′ and advancing about 10′ daily—no timbering required at that time. Company owns 300 claims along the right-of-way.

By mid-summer of 1920, tunnel length was 7,000′ and ventilating-shaft started; work was then suspended until February, 1921.

TINTIC EASTERN MINING CO. UTAH

Address: S. S. Pond, sec., 609 Newhouse Bldg., Salt Lake City, Utah

Above named sued company in 1921 for recovery of 200,000 shares stock and $5,000 alleged due for services as general manager.

TINTIC EMPIRE MINING CO. UTAH

Address: H. J. Fitzgerald, 409 Atlas Bldg., Salt Lake City, and Eureka, Utah.

Officers: Theo. Nicholes, pres.; L. E. Chipman, v. p.; H. J. Fitzgerald, sec.-treas.; with H. E. Phelps, and Orsen Keeler, directors.

Cap. $125,000; 10¢ par; 625,000 issued. Assessment 1¢ a share delinquent Nov. 12, 1921.

Property: is in the North Tintic mining district, near Eureka, between the Lehi-Tintic and the Tintic Paymaster. A shaft was started in September, 1919, and was 100′ deep in January, 1920, and 280′ tunnel driven; 36%

lead and 7 oz. silver ore was uncovered on the surface. Equipment being installed.

TINTIC INDIAN CHIEF M. & M. CO. UTAH

Address: Oran A. Lewis, mgr., Spanish Fork, Utah.

Officers: Oran A. Lewis, pres.; Mark L. Halsfa, v. p.; Laura Lewis, sec. treas., with Perry F. Fuller, J. W. Lewis and Wayne Nevis, directors.

Inc. February, 1920, in Utah. **Cap.** $10,000; 1¢ par; 500,000 treasury shares. Annual meeting in February.

Property: 22 claims, 440 acres, in South Tintic district, 5 miles from the Salt Lake Route, shows silver-copper-lead ore, with some gold in a limestone-porphyry contact; assay value $22. Is a prospect.

TINTIC MAYFLOWER MINING CO. UTAH

Address: H. G. Snyder, 934 Hollywood Ave., Salt Lake City.

Officers: H. G. Snyder, res.; J. C. Anderson, sec.-treas.; with J. Wm. Knight and W. L. Brimhall, directors.

Property: adjacent to the Tintic Standard. An assessment of ¼¢ per share was levied, March, 1921.

TINTIC MILLING CO. UTAH

Address: Provo, Utah.

Officers: O. Raymond Knight, pres.; J. S. Smith, mgr.; R. E. Allen, sec.-treas.; T. P. Holt, gen. supt.

Inc. in Utah. **Cap.** $750,000; par 25¢; increased, in 1920, from $30.000 with share of 3¢; assessable.

The total revenue in 1920 was $640,519; operating expenses were $558,588 and depreciation, etc., $49.661.

The purpose of the company is to provide a process and a mill for treating low-grade ore of the locality, hitherto found valueless. The mill employs the Holt-Dern and Knight-Christensen roasting furnaces and leaching.

The mill is situated in the Tintic district on the Eureka Hill, D. & R. G. and Los Angeles & Salt Lake railroads and was originally built to treat the refractory, low-grade silver-copper-gold ores of the Knight mines. Operations began February, 1916, mostly on ores from the Iron Blossom and Dragon Cons., but were not completely satisfactory until 1917. About $50,000 of bullion is produced monthly, and up to March, 1920, plant had treated 250,000 tons of ore. Ore is handled from 20 different properties; some custom ores are treated.

The Holt-Dern and Knight Christensen roasting furnaces and leaching are employed and briefly the process is: crusher, 4 sets of rolls, 11 roasting furnaces; leaching tanks, and scrap iron precipitating boxes. The charge for roasting is a mixture of oxide and sulphide ores and coal dust. In 1920, an electrolytic section was added for the precipitation of lead. Plant is described by T. P. Holt in the Mining and Scientific Press, for April 24, 1920.

TINTIC MINING & DEVELOPMENT CO. UTAH

Property sold to **Utah Cons. Mining Co.**, and company dissolved. Described in Vol. XIII.

TINTIC PAYMASTER MINES CO. UTAH

Office: 414 Judge Bldg., Salt Lake City.

Officers: W. I. Snyder, pres., Eureka, Utah; J. W. Knight, v. p.; H. G. Snyder, sec.-gen. mgr., with W. Scowcroft and R. E. Allen, treas., directors.

Inc. 1919, in Utah. **Cap.** $1,000,000; 50c. par; issued, 600,000 shares; assessable; assessments Nos. 6, 7 and 8 of 1c. each levied, 1921.

Property a consolidation of about 1,700 acres, including the Eureka King, located in the Tintic mining district, between the Lehi Tintic and the Selma.

Development: on the Eureka King, by a 500′ shaft. Mine was actively developed during 1920 until December, when all work was suspended.

Equipment: electric power, 52-h. p. motor-driven hoist, 46′ head-frame,

52-h. p. 5-drill compressor, automatic bucket dump, and all surface accessories.

TINTIC PEERLESS MINING CO. **UTAH**

Address: Silver City, Utah.

Officers: Perry B. Fuller, pres.-mgr.; Frank S. Allen, v. p.; Robt. A. Wilkins, sec.-treas.; with E. Frank Bird and Hyrum Madsen, directors.

Inc. January, 1920, in Utah. **Cap.** $10,000; par 1¢; assessable; 600,000 treasury shares. Annual meeting, November, 15.

Property: 34 claims, 702 acres, in Juab and Utah counties, 1 mile S. of Diamond City. Gold-silver-copper ore occurs in fissures in monzonite in a prospect.

TINTIC PRIZE WINNER MINING CO. **UTAH**

Address: Springville, Utah.

Officers: H. Straw, pres.; Edw. Bingelson, v. p.; W. B. McPherson, sec.-treas., with Mel Chase, and Earl Bissell, directors.

Inc. July, 1919, in Utah. **Cap.** $100,000; par $10.

Property: in Tintic district, Juab county.

TINTIC QUADRANGLE MINING CO. **UTAH**

Officers: Geo. Horton, pres.; Samuel Bennett, v. p.; Geo. F. Tilson, sec.-treas., with C. S. Goddard and Geo. Horton, Jr., directors.

Inc. about Oct., 1919. **Cap.** $100,000; par 10c.

TINTIC SILVER MNG. CO. **UTAH**

Address: August Bestelmeyer, sec.-treas., Provo, Utah.

Officers: H. C. Hicks, pres.; J. W. Lamb, v. p., with August Bestelmeyer, W. O. Dennis, J. D. Boyd and John M. Bestelmeyer, directors.

Inc. 1920, in Utah. **Cap.** $150,000.

Property: 10 claims in Tintic district.

Development work started late 1921.

TINTIC STANDARD MINING CO. **UTAH**

Office: 422 Judge Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: E. J. Raddatz, pres.-treas-gen. mgr.; W. I. Snyder, v. p.; L. H. Stohr, sec., with Willard Scowcroft, and Ira I. Travis, directors. John Westerdahl, supt..

Inc. Oct. 2, 1907, in Utah. **Cap.** $1,300,000; $1 par; assessable; issued, 1,175,000. Has levied 19 assessments of ½c. each up to 1916. Stock listed on Salt Lake Exchange. Annual meeting, January 10.

Dividends: initial of 20c. paid June 23, 1917, and 40c. during that year; 47c. in 1919; 40c. in 1920; 10c. in 1921 (2Q), with total of $1,547,432. None for last half, 1921.

Balance sheet of March 30, 1921, shows total assets of $2,492,721; includes property, $1,234,145; plant, $599,029; Goshen Valley R. R. $342,720; and current, $191,493. Liabilities include accounts payable, $61,955 and earned surplus of $1,201,632.

Property: 95 claims, 1,760 acres, of which 15 claims, 300 acres, are patented, covers a long stretch on the ore zone. In November, 1919, company started suit against the Chief Cons. concerning ownership of the White Wing No. 5 claim.

Geology: mine shows limestone, quartzite, and porphyry, carrying fissure veins with N.-S. strike and dip of 55° E. in limestone. Ore comes from a north-south fault fissure at contact of shale with underlying quartzite.

Ore: a fine-grained aggregate of galena and tetrahedrite, plus a little pyrite, in barite and quartz, and is reported to assay from a trace to 50% lead, 1 to 105 oz. silver, and $1 to $15 gold per ton. The management reports the main orebody as 200′ wide.

Development: one 1,450′ three-compartment main working shaft, and about 8,000′ of drifts, etc. The second shaft, 1,700′ south of main shaft is

also 1,450′ deep and connects with the other. Both shafts show shipping ore. Ore developed is on the 1,250 and 1,350′ levels.

Equipment: includes a 100-h. p. steam plant, with an 80-h. p. double-cylinder, hoist, good for 1,500′ depth. Also double-drum hoist with 300-h. p. motor and an 800 cu. ft. compressor with 150-h. p. motor.

Production: in 1919, about 50,000 tons of ore. Total from 1915-'18 inclusive, 58,495 dry tons that yielded 1,900,000 oz. silver, 7,900,000 lb. lead, 750,000 lb. copper, and 1,582 oz. gold.

In 1920, 73,848 tons of ore of assay value of $3,544,335 and a net smelter value of $1,655,923 were shipped. During first quarter of 1921, 24,566 tons were produced, having an assay value of $812,577 and a net smelter value of $355,679; these latter figures do not apparently cover any ore shipments to mill, although it was reported in July that most of output was being treated there.

Seems to be a worthy enterprise.

A 9-furnace 200-ton mill using Holt-Dern wasting and leaching process was completed in 1921, at Warm Creek, near Goshen on the D. & R. G. R. R. Mill produces about 100,000 ounces silver per month.

TINTIC STAR MINING CO. **UTAH**

Jesse M. Harms, mgr.

Inc. 1918, in Utah. **Cap.** $100,000; 10c par.

Property: 4 miles S. E. of the Tintic Delaware near Dunbar, Juab county, said to show copper-silver ore.

TINTIC TUNNEL CO. **UTAH**

See Vol. XIV. Consolidated with **South Standard Mng. Co.**, which see.

TINTIC UNION MINING CO. **UTAH**

Address: H. G. Snyder, 414 Judge Bldg., Salt Lake City.

Officers: Lewis Merriman, pres., Ogden, Utah; W. I. Snyder, v. p.; H. G. Snyder, sec.-treas., with Gideon Snyder, and J. W. Scowcroft, directors.

Inc. 1919, in Utah. **Cap.** $1,000,000; 50c par. Last (No. 2) assessment, of ¼¢, levied April 27, 1921.

Property: 22 claims, located in southern part of East Tintic district. Company plans exploration work.

TINTIC WINCHESTER MINING CO. **UTAH**

Mail returned from L. N. Ellsworth, Tintic, Eureka county, Utah.

Officers: G. F. Tilson, pres.; William Haws, v. p.; L. N. Ellsworth, sec.-treas.., with S. Trotter and H. B. Cole, directors.

Inc. Dec., 1919, in Utah, to engage in general mining business.

TINTIC ZENITH MINING CO. **UTAH**

Address: A. W. Larsen, Eureka, Utah.

Lewis Merriman, pres.-gen. mgr., holds controlling interest. An amalgamation with Tintic Union and Apex Standard was proposed late, 1921. Geo. A. Udall, and A. W. Larsen, of Eureka, reported as stockholders.

Property: located in eastern part of Tintic mining district, Juab county.

TINTIC ZINC CO. **UTAH**

Has passed away. Described in Vol. XIII.

TOM MOORE GROUP **UTAH**

Office: 159 South State St., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake county, Utah. A. M. Surbaugh and Thos. Moore Surbaugh, owners.

Property: 39 claims, 22 patented, 715 acres, with direct rail connection, in the N. E. part of the Bingham camp.

Development: by 16 shallow shafts and short tunnels, principal work being by the Highline tunnel, with another tunnel driving at lower depth. The mine carries gold and silver-bearing lead and copper ores, with small quantities of native copper, in quartz. Owners do not care to have output or other details made public, and returned letters unopened. Probably idle.

TOOELE GOLD HILL M. & M. CO. UTAH

Address: Peter Clegg, Tooele, Utah.

Officers: Peter Clegg, pres.; C. W. Bailey, v. p.; T. S. Marks, sec.-treas., with W. Carder and J. Donovan, directors.

Inc. April 7, 1917, in Utah. **Cap.** $50,000; shares 10c par; 222,500 issued.

Property: 6 claims, patented, 110 acres, in Clifton district (Deep Creek), Tooele county, said to have a contact deposit in granite and limestone. Ore carries gold, silver, copper and lead.

Prospecting in August, 1917; no news received since then.

Presumably inactive.

TOOELE SMELTER UTAH

Works address: A. B. Young, supt., Tooele, Utah. **Operating office:** J. O. Elton, mgr., Kearns Bldg., Salt Lake City.

A lead and copper smelter owned by International Smelting Co. and described thereunder.

TREPHINE MINING CO. UTAH

A. P. Hanson and Robt. E. Mark, owners of majority of outstanding stock, called a meeting of stockholders October 6, 1919, at 902 Kearns Bldg., Salt Lake City, to elect officers to wind up affairs of company. They claim that no annual meeting has been held, nor officers elected since company was incorporated in 1899. The charter and franchise of company were revoked by State in April, 1910, for failure to pay annual license tax for 1909.

Property and assets sold to **Republic Mng. Co.** (q. v.) in October, 1919.

TRIANGLE MINING CO. UTAH

Went into receiver's hands, Jan., 1919. N. W. Haire, receiver, 411 Felt Bldg., Salt Lake City, Utah. **Mine address:** Alta, Utah.

Officers: Howard C. Fields, pres.; Wm. C. Stewart, v. p.; Irma R. Fields, sec.-treas.; Howard H. Fields, mgr., with Harry A. Marsh and Wm. C. Lidvall, directors.

Inc. July 15, 1917. **Cap.** $25,000; shares $1 par; 6,201 outstanding. Operated as a close corporation. Annual meeting, first Saturday in September.

Production: in 1915 was 2,000 tons; in 1916, 5,000 tons averaging $25 per ton.

TUNNEL HOLLOW MINING CO. UTAH

Address: Frank De More, Morgan City, Utah.

Property: 13 claims in Morgan county, 4½ miles E. of Morgan City. Small lenses and bunches of black copper oxide, carrying native silver, are found interbedded in sandstone.

Development: by 120′ incline and 570′ tunnel; total workings about 900′. Equipped with gasoline hoist.

UNCLE SAM CONSOLIDATED MINING CO. UTAH

Office: 600 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Hon. John Dern, pres.; G. H. Dern, v. p.; Frank D. Kimball, treas.; Fred. C. Dern, sec.; J. C. Dick, gen mgr.; W. P. Carter, supt.

Inc. June 29, 1900, in Utah. **Cap.** $750,000; shares $1 par; assessable, increased August 21, 1912, from $500,000; 365,080 shares issued. The company formerly owned a 50% stock interest 400,000 shares, in the May Day Mining & Milling Co., which stock was distributed 1910, to shareholders, as a stock dividend. The Richmond & Anaconda Cons. Mng. Co., adjoining, was absorbed 1912, by the Uncle Sam.

Shares are listed on the Salt Lake Exchange. Annual meeting, first Monday in June.

Regular dividend rate was 2cts. per share monthly, changed June, 1910, to 2 cts. quarterly, with an extra dividend of 3 cts. December, 1910; dividends for 1910 having been 19 cts. per share; total dividends to April, 1913, were $470,000; none since. Assessment of 1c. a share was delinquent on April 22, 1920.

Property: 4 claims, patented, in Tintic district, including the Humbug mine, which is the principal property, producing mainly auriferous silver-lead ore of both smelting and milling grades. A good orebody was developed in the western part of the property. **Equipment:** is electrical.

Production: in 1916 was 290 tons of ore; in 1917 and 1918, lessees were responsible for a small output, the latter realizing $5,487. No production in 1920.

Company is expending all energies in development work.

UNEVIDA GOLD MINING CO. **UTAH**

A. B. Lewis, pres.; W. S. McCornick, treas., 205 Center St., Salt Lake City; W C. Ralston, Jr., sec.-mgr.

Inc. May 14, 1917, in Delaware. **Cap.** $7,500,000; $1 par; non-assessable; 3,370,000 shares and $12,500 cash in treasury, October, 1918. Debts amounted to $89,000.

Company controlled several miles of alluvial and gravel ground along Carson river in Nevada from which it was proposed to recover the amalgam lost from the old Comstock mills; also reported to have mining properties in Beaver county, Utah and in Idaho. Details of company, organization and operations not obainable, save in January, 1919 company brought suit against two former directors and others, charging them with having induced owners of leases under which company operated, to cancel and transfer them to Comstock Lode Recovery Corp.

UNION CHIEF MINING CO. **UTAH**

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine address:** Albert N. Larson, Santaquin, Utah.

Officers: G L. Bemis, pres.-mgr., Santaquin, Utah; Geo. Baglin, sec.

Inc. 1903, in Utah. **Cap.** 1,000,000 shares; par 10c; assessable; assessment No. 10, or ½c., was levied May 2, 1921. Listed on Salt Lake Exchange Shares sold ¾-4c. in 1918; and up to 8c. in 1919; 3-13c. in 1920; 3½c. in 1921 to June.

Expenditures for 1920 were $10,283, leaving an unpaid indebtedness of $863 on Dec. 31.

Property: 18 claims, 6 patented, 370 acres, in Santaquin mining district, shows lead-silver ore in vein reported to be about 6" wide.

Development: over 8,000' of tunnels and drifts. Reported to have found high-grade ore at 550' depth in 1916, but as only picked samples seem to have been asayed, no averages can be given. Equipped with electric power line and compressor.

In 1920, 754' of development was done at a cost of $10.03. No well-defined orebody was found, but 200 tons of ore, averaging 20 oz. silver and 25% lead, were extracted.

UNITED BINGHAM COPPER CO. **UTAH**

Office: 508 Continental Bank Bldg., Salt Lake City.

Officers: L. A. Marks, pres.; G. R. Bothwell, v. p.; F. R. Snow, sec.-treas., 252 Canyon Road, Salt Lake City, with P. E. McConaughy, and W. P. Davis, directors.

Inc. 1919, in Utah. **Cap.** $100,000; 10c par; issued 900,000 shares.

Company is the successor of Bingham Amalgamated Copper Co., described in Vol. XIII. The new company was organized in order to make the stock assessable. Old stock was exchanged for new on payment of 1c. a share. An assessment of 1c. was levied June 21, 1920.

Property: 22 claims, 300 acres, patented, known as the Illinois and Copper Glance groups, carrying 7 mineralized veins. The principal orebodies exposed in the Bingham Amalgamated are on the same vein as the Congor orebodies and of about the same character of ore. Vein is 15 to 40' thick, developed for several hundred feet in depth, but the water and high cost of wagon haul stopped further development. In a tunnel on the west side of the property a 20' vein shows streaks of good ore all through it. The Montana Bingham tunnel cuts this vein about 100' deeper, 3,948' from the

portal, and opened it for 100'. Samples taken from this vein said to run from 3.2-6.5% copper, 7 oz. silver, $1.20 gold and 25% iron. Development work resumed the latter part of 1915 after an idleness of several years.

The Illinois has a 640' copper ore, with occasional assays up to 40%, the streak of about 5% copper ore, with occasional assays up to 40%, the average of 50 assays being 2.8% copper, 2 oz. silver and $2 gold per ton. The Copper Glance group has a 1,400' tunnel, in McQuire gulch. Mine has a total of 2,450' of workings.

In summer of 1917, company mined ore from a raise at the East end of the 300' level. A trial shipment of 90 tons in June, yielded $25 per ton, the ore carrying 4.73% copper, 2 oz. silver, $1 gold, and 26.4% iron and 31.6% insoluble. The shaft, flooded in July was reopened later. Recent work has been on a small scale on the 400' level, east side; some ore was shipped in 1918.

Mine has been idle since early in 1920.

UNITED PROMONTORY MINING CO. UTAH

Office: 72 West Second So. St., Salt Lake City.

Officers: B. D. Siegfus, pres., 560 12 E. St., Salt Lake City; A. L. Burns, sec.-treas.; W. E. Siegfus; A. H. Hash, O. P. Peterson, T. W. James, and W. C. Smaltz, directors.

Inc. in Feb., 1915, in Utah. **Cap.** $7,000; 1c par; 100,000 treasury shares; assessable; assessment No. 6, of 1½ mills, levied Jan. 24, 1921. Annual meeting first Thursday in January. Company's name was formerly Promontory Mining Co.

Property: 14 unpatented claims, in Boxelder county, Utah, 7 miles N of Promontory, on the S. P. R. R., shows vein 20' thick in limestone-porphyry contact.

Development: 1,200' including 90' shaft, and two tunnels, 200' and 450' long. Upper level showed some high-grade copper-silver ore. Company has been developing the mine for about 8 years, spending $3,000 in 1918.

Reported Jan., 1921, that lower (450') tunnel would be extended.

Equipment: includes a compressor.

UNITED STATES METALS REDUCTION CO. UTAH

A close corporation, controlled by a Pittsburg syndicate. A 15-ton plant, 15 miles from Castleton, and 50 miles from Cisco, was built in 1918, to treat radium bearing ores. The company owns 37 claims.

No recent information.

UNITED STATES SMELTING CO. UTAH

See Vol. XI for individual description and under U. S. S. R. & M. Co. in Vols. XII and XIII. Was merged with latter company, December, 1917.

UNITED TINTIC MINES CO. UTAH

Described in Vol. XIII. Company was a consolidation of Tintic Combination, Tintic Empire and Bullock M. & M. companies. Reported in 1916 that company had become a part of the Tintic Tunnel Co., but this merger did not apparently materialize. In 1918, it was consolidated with **South Standard Mining Co.**, which see.

UTAH & EASTERN COPPER CO. UTAH

Idle. **Office:** 127 Church St., New Haven, Conn. **Operating office:** 508 McCornick Bldg., Salt Lake City, Utah. **Mine office:** Dixie, Washington county, Utah. **Works office:** Shem, Washington county, Utah.

Officers: Louis E. Stoddard, pres.; T. W. Farnam, sec.-treas.

Inc. 1901, in West Virginia. **Cap.** $1,500,000, increased later to $3,500,000, shares $5 par, in $2,000,000 preferred and $1,500,000 common stock.

Property: 11 claims, patented, 220 acres, and a 40-acre smelter site, including the old Dixie mine, in the Tutsagubet or Cave Springs district, near Green river.

Geology: 5 replacement deposits in limestone, 1 of 40' estimated average width, carrying cuprite, azurite, and massive malachite ores, said to give average assays of 15% copper.

Development: by a 775' blind shaft, sunk from the breast of a 225' tunnel. This tunnel caved, 1905, and it was necessary to run a new tunnel of 800', to reopen the mine. Old workings said to show about 100,000 tons of ore.

Equipment: includes a small gasoline plant. The company has 2 smelters. 1 worthless; the new smelter has a 100-ton water-jacket blast furnace, with water power, secured from the Santa Clara river, 2 miles distant, and a small auxiliary steam plant. The smelter is at Shem, about 50 miles from Acoma, on the Rio Grande Western railroad, the nearest shipping point, and transportation for 14 miles of the distance is by traction engine.

Production: 1,448,597 lb. copper in 1904; 400,166 in 1905, and 391,779 in 1907. Property considered promising but is handicapped by lack of rail transportation. Worked by lessees, who have shipped several cars of 30% ore.

Letters returned unanswered, and no recent report received.

UTAH-APEX MINING CO. **UTAH**

Office: 10 Post Office Square, Boston, Mass. **Mine office:** Bingham Canyon, Utah.

Officers: R. F. Haffenreffer, Jr., pres.; J. J. Murphy, v. p. and treas., with N. P. Duvally, sec.; G. F. McGahey and M. W. Sangy, directors. **Operating staff:** V. S. Rood, gen. mgr. J. A. Norden, asst. mgr.

Inc. May, 1902, in Maine, as a merger of the Copperfied Mining Co. and York Mining Co. **Cap.** $3,000,000; increased 1906, from $2,500,000; $5 par; issued 528,200 shares; $359,000 unissued. State Street Trust Co., Boston, transfer agent. Federal Trust Co., Boston, registrar. Listed on Boston Stock Exchange and on New York Curb.

For fiscal year ending August 31, 1920, gross receipts from ore sales, royalties, etc., were $1,263,981. Expenses including litigation, taxes, depreciation, etc., $1,224,277, leaving a net profit of $55,285. At close of fiscal year, current assets, cash and liberty bonds were $621,535, against current liabilities of $77,501, leaving working capital of $544,034.

Dividends: initial quarterly dividend, 12½c., paid Oct. 1, 1915; 75c. in 1916; 50c. in 1917; 50c. in 1918; none in 1919; 25c. in 1920.

Property: 34 claims, 244 acres, includes the York and Copperfield groups, together with the Dana, Petro, Highland Boy Consolidated groups, comprising 23 mines in Carr Fork, Bingham and West Mtn. districts, next to the Utah Consolidated on the south and west. Company owns the Phoenix Mining Co.

Geology: the claims show a great thickness of quartzite beds at times limey, and containing 2 well defined, persistent limestone strata, called the Highland Boy and Yampa beds, which dip at about 45° into the hill and are cut by dikes of monzonite porphyry. These rocks are cut and faulted by fissure veins and lodes, containing large orebodies and ore deposits also occur in the limestone beds near the veins. The Dana-Leadville lode is the lead carrier; the Highland Boy vein carries copper ores; the Petro vein yields copper and lead ores.

Develoment: by over 20 miles of openings, with main working shaft, 2,400' deep. The tunnels, known as the Parnell, Minne Smilax, Andy, Andy No. 2 and Parvenu, are spaced at 200' vertical intervals, and are connected by incline blind shafts, with electric hoists, on the Parnell vein.

The Parvenu tunnel, which is the principal working, is about 1 mile in length, cutting the Parnell vein with a back of about 2,200'.

Ore reserves are estimated at over 200,000 tons, assaying 0.03 oz. gold, 3.5 oz. silver, 11% lead and 8% zinc. Present indications show that new ore will maintain, if it does not increase reserves.

On the 1,300 and 1,400' levels the Parvenu orebody is very rich. On the 2,000' level a rich orebody was cut in 1920, and mine can produce 1,000 tons daily.

Mill: treats about 300 tons per day and has oil flotation plant.

Equipment: includes two 15-drill air compressors and 2 electric hoists, 1 of which is a double-drum hoist installed at the 7th level station in the Parvenu tunnel.

Production, years ended August 31:

Year	Ore Tons	Gold, Oz.	Silver, Oz.	Lead, Lbs.	Copper, Lbs.
1920.....	109,578	2,732	352,663	22,300,652	788,142
1919.....	93,571	3,353	290,527	22,887,788	635,268
1918.....	181,869	6,171	641,551	42,811,805	1,427,576
1917.....	118,748	3,551	396,989	24,414,451	.....
1916.....	189,331	4,924	620,022	37,304,675	2,355,475
1915.....	170,573	4,000	560,000	32,000,000	2,400,000

Zinc produced in 1919 amounted to 7,671,742 lb. and 9,496,169 lb. in 1920. Company is largest lead producer of Utah and normally employs 500 men.

The Utah Apex won in 1921 its various suits against the Utah Cons. for value of ore extracted from its ground. The suits involved ownership of orebodies of lead and silver ore in the Highland Boy and Yampa limestones in the Bingham district, where the two companies joined holdings.

When the Haffenreffer regime came into control of Utah-Apex about two years ago, the company began intensive development of its property underground. It opened a very high grade ore body on the 18th level. The ownership of this vein was immediately disputed by Utah Consolidated on the theory that it was found in the so-called limestone bed and therefore was part of an orebody which apexed in its (Utah Consolidated's) property.

The Utah-Apex Mining Co., however, under the guidance of geological experts, determined that not only had it been mining within its own borders, but it had the apex on its own property of the two veins in dispute, Highland Boy and Yampa, and that Utah Consolidaed had itself been mining and had taken huge tonnages of ore from these veins.

Utah-Apex immediately entered suit against its neighbor—made the former plaintiff the defendant and claimed damages of $2,500,000.

The question at issue was whether the limestone beds which traverse the Bingham mining district for miles constituted separate and distinct lodes. The Utah Consolidated Co. maintained that they were; that it held apex rights to the orebodies which Utah Apex Mining Co. was then and had been mining for some years. It also contended that these lime beds did not necesssarily need to be ore bearing; the mere fact that they seemed at intervals to maintain their formation and semi-regular size indicated that they constituted veins, the apex rights to which Utah Consolidated professed to have, and any mining thereon constituted violation of apex rights, or in other words, illegal extraction of ore.

The Utah Apex company on the contrary, denied that the Yampa limestone bed is sufficiently altered or generally mineralized to justify its designation as a vein or lode. It asserted that the orebodies in controversy are closely associated with distinct fissure veins which were the source of mineralization of their particular bodies; and that these veins, together with all their orebodies, including those held in controversy, are situated vertically beneath the surface of mining claims owned by the Utah Apex company. In other words, the Utah Apex company denies that the Utah Consolidated company has extralateral rights which will include orebodies in dispute, and asserts that they belong to the Utah Apex company by virtue of ownership of the overlying surface.

The question was whether or not the Yampa limestone bed is sufficiently mineralized to constitute a vein or lode within the contemplation of the mining statute. The lower court found that the Yampa limestone bed does not constitute a lode.

The United States District Court made its final decision Dec., 1921 in favor of the Utah-Apex, awarding a total of $1,154,928. This includes $948,340. representing ores unlawfully extracted by the Utah Consolidated from Utah-Apex ground, and interest amounting to $206,587. This case has since been appealed to the U. S. Supreme Court.

UTAH BALTIMORE CONSOLIDATED CO. **UTAH**

Mail returned, 1918, from former address. J. P. Evans, pres., 408 S. 13 E. St., Salt Lake City, Utah; J. M. Williams, v. p.; C. A. Doe, sec.-treas.; J. T. White, W. D. Williams, directors.

Inc. in 1916. **Cap.** $1,000,000; shares 5c par; no indebtedness.

Property: 10 claims, 5 in Beaver county, known as the Mollie Pitcher group 5 in the Rocky district, known as the Bill Williams group. Mollie Pitcher group has a 100′ shaft in vein of copper ore said to be 60′ wide and of shipping grade. Loading station on R. R. about a mile from mine. Probably idle.

UTAH-BOSTON DEVELOPMENT CO. **UTAH**

Address: Robert M. Hampton, Tonopah, Nev. Henry M. Adkinson, mng. director, Walker Bros. Bank Bldg., Salt Lake City, Utah.

Inc. 1920, in Maine. **Cap.** $500,000; par $1.

Property: 50 acres, includes the old Nast mine, in West Mtn. district, Salt Lake county, adjoining Utah Copper Co. on the S. W. Was formerly owned by the New England G. & C. Mng. Co., now dead. A porphyritic rock is cut by 3 fissure veins of 30″ average width, showing ores carrying 30% lead, 10% zinc, 15 oz. silver and $4.50 gold, with a small copper content.

Development: by 1,600′ Nast and 1,670′ Benton tunnels, and 2 shafts, with 6,000′ total workings. Prior to 1907, property was a considerable producer, and on the active list up to 1912, when operations ceased. Working a few men, 1922.

Equipment: includes a steam plant with 2 hoists, and a concentrating plant.

UTAH CENTENNIAL MINING CO. **UTAH**

Address: Pleasant Grove, Utah.

Officers: J. E. Thorne, pres.; L. L. Nelson, v. p.; D. Noble, sec.-treas.; J. W. Thorne, J. E. Thorne, C Thorne and L. L. Nelson, directors.

Inc. 1907. **Cap.** $1,000,000; shares 5c par; outstanding, 250,000 shares; assessable; last assessment, $5 per 1,000 shares, called in May, 1919. Annual meeting in April.

Property: 10 claims in American Fork Canyon, American Fork district. Fissure vein carries gold, silver, lead, copper ore. Developed by a 450′ tunnel and reported to have struck a few inches of high-grade silver-lead ore. Property is a prospect undergoing development.

UTAH-COLORADO MINING & MILLING CO. **UTAH**

See this title under Colorado.

Address: Wm. Penn Hotel, Denver, Colo., and 411 Bonfils Bldg., Kansas City. Chas. E. Havenner, pres.

Company has large holdings in Utah and in Colorado.

UTAH CONSOLIDATED MINES CO. OF TINTIC **UTAH**

Office: 425 Atlas Bldg., Salt Lake City. T. R. Cutler, pres.; H. J. Fitzgerald, sec.-treas.

Inc. in Utah. **Cap.** $1,000,000; $1 par; all issued.

Property: 100 acres in Tintic mining district, shows silver-lead ore. Presumably idle.

UTAH CONSOLIDATED MINING CO. **UTAH**

Office: 25 Broadway, New York. **Operating office:** 608 Dooly Block, Salt Lake City, Utah. Mine office: Bingham Canyon, Utah.

Officers: R. H. Channing, Jr., pres.; Adolph Lewisohn, v. p.; with Sidney Chase, J. S. Dunstan, H. H. Anthony, J. W. Allen, Maxwell Woodhull, directors; A. H. Melin, sec.-treas.;

Operating staff: Frederick Cowans, gen. mgr.; A. S. Winther, supt.; T. S. Van Wagoner, purch. agt.

Inc. March 4, 1903, in New Jersey. **Cap.** $1,500,000; shares $5 par; all issued.

Is a reorganization of **Utah Consolidated Gold Mines, Ltd.**, a British corporation that in turn succeeded the **Sevier Gold Mines, Ltd.**, October,

1896. Property of the Utah Consolidated Mining Co. is 2,490 shares of the 2,500 shares of the capital stock of the **Highland Boy Gold & Copper Mining Co.**, of New Jersey, the latter corporation holding direct title to the Utah properties. The company also owns 8,250 shares of the Anaconda Copper Mng. Co., stock derived from sale of Internat'l S. & R. Co.

Shares are listed on the Boston and Salt Lake Stock Exchanges. Price range, $7 to $10 in 1918; $7½ to $12¾, 1919; $2¼ to $9¾ in 1920; $3½ to $4 in 1921, to September, $1⅛, Dec. 1921. Transfer agent, International Trust Co., Boston. **Registrar:** Old Colony Trust Co., Boston. Annual meeting, first Tuesday in April.

In February, 1921 company took an 0.34% interest, $136,000 total amount in the Copper Export Association's $40,000,000 8% bond issue.

Comparative Profit and Loss Account shows:

	1920	1919
Sale of metals	$1,529,749	$1,987,582
Other receipts	82,080	72,822
Total receipts	1,611,829	2,060,404
Mining expense	1,104,769	1,077,759
Smelting expense	475,836	632,807
Refining, Marketing, etc.	133,584	6,749
Administration and legal expense	44,721	44,719
Litigation expense	49,059	116,404
Total expense	$1,807,969	$1,878,438
Net profit	*196,140	181,966

* Loss.

Current assets exceed liabilities by $380,171 at end of 1920.

Dividends:

1903	$3.20	1909	$2.00	1915	$2.00
1904	3.00	1910	.50	1916	1.50
1905	3.50	1911	.50	1917	3.75
1906	5.00	1912	1.50	1918	1.50
1907	7.00	1913	1.50	1919	
1908	2.00	1914	2.00	1920	nil

Litigation: The litigation between the Utah-Apex and Utah Consolidated mining companies, both of Bingham Canyon, Utah, consists of six suits; but, as the same fundamental question is involved in each, it was decided by mutual consent that the court should try two of the cases, decision on which would govern the rest.

The U. S. District Court, in October, 1920, decided five of the cases in favor of the Utah-Apex, and in one unimportant case the opinion of the court was that the Utah-Apex had not proved its contentions.

In the accounting stage of the case, which followed, the court awarded the Utah-Apex the sum of $1,154,928.98 besides costs. In the meantime, the Utah Consolidated appealed on one case (the Yampa) which governs three others; and on Nov. 14, 1921, the U. S. Circuit Court of Appeals confirmed the decision of the trial court. On Feb 1 the Utah Consolidated filed a bond with the American Surety Co. of New York as surety for $1,300,000, covering damages and costs, this bond serving as a supersedeas on the Utah Consolidated's appeal to the Supreme Court in the Highland Boy case.

Property: 46 claims, patented, 393 acres, known as the Highland Boy group, in Carr Fork canyon, 2½ miles from Bingham canyon. The Highland Boy mine was a considerable producer of silver-lead ore, 1870-90.

In 1915 the Bingham Copper Boy group adjoining the Utah Cons. on the north was purchased for $18,747. Property promising but undeveloped. In 1918, the Yampa mine, 51 acres, adjoining on the north, was purchased from the **Tintic Mining & Dev. Co.** for $100,000. In 1918, took option on **Utah Lead & Copper Co.s'** group of 85 acres pat'd, north of U. C. holdings.

Geology: the Highland Boy group, the original property, has 6 ore deposits which are replacements of limestone beds 150 to 300′ thick, with quartzite above and below. These beds dip from 25 to 45° N. and the rocks are cut by a series of porphyry dikes that are nearly vertical and run N. E. The ore deposits form well-defined shoots with E.-W. strike and N.-E. pitch. They are large, varying up to 100′ in width and 100 to 200′ in length, and are separated by barren limestone; the largest orebody so far developed is said to be 320′ in extreme horizonal width and 340′ in length. An ore-shoot carrying galena was found in the lower workings in an extension of the Yampa limestone. The predominant ore of the mine carries chalcopyrite, with some bornite and chalcocite, associated with pyrite in a limestone gangue.

Development: the Highland Boy mine is opened by a main shaft 1,600′ deep, and 7 tunnels, of 1,000 to 2,600′ in length. No. 7 tunnel, 700′ below the crest of the mountain, is 2,600′ in length and is the main haulage way, all tunnels being connected, and ore milled, through chutes, to this tunnel There are 2 blind shafts, deepest 500′ starting from the 700′ level, with large electric hoists, raising ore to that point for extraction by the electric haulage plant in No. 7 tunnel. The ore breaks easily and is extracted by the top-slice caving system, mainly on contract.

New openings totalled 29,206′ in 1917; 21,067′ in 1918; 17,407′ in 1919; 10,412′ in 1920.

About one-third of the 1919 extensions were made in upper limestone on 1,200′ 1,300′, 1,500′ and 1,600′ levels in main orebody, which has a length of 1,100′ on the 1,200′ and 1,500′ on the 1,600′ level, with an average width of 4′ and an average assay of 2.18% copper, 0.05 oz. gold and 0.85 oz. silver; this body has been cut also on the 1,800′, where it is 6′ wide. The vertical shaft from the 1,300′ level was sunk to 2,000′ and at the 1,600′ level, 2 orebodies were uncovered in the Highland Boy limestone.

In 1920, the vertical shaft was sunk to the 2,400′ level and raised from the 1,300′ to the 900′ level (Craig tunnel) and main shaft was carried through to the surface. Work in the Highland Boy limestone was disappointing.

In 1918, an option was taken on adioining property of the Utah Lead & Copper Co. Exploration work is being done in this ground from the 1,300 and 1,500′ levels.

Ore reserves:

	Cop. Ore Tons	Cop. %	Sil. Oz.	Gold Oz.	L'd. Ore Tons	Lead %	Silver Oz.	Gold Oz.	Cop. %
1920.....	815.000	1.96	0.57	.40	.....	....	...	...	...
1919.....	848.000	1.94	0.66	.040	38.400	15.70	5.36	.060	0.90
1918.....	277,939	2.33	0.78	.048	29,591	15.93	5.23	.058	0.8
1917.....	141.000	1.76	0.65	.05	31,000	14.90	4.96	.06	0.61
1916.....	180.000	1.77	0.69	.048	23,400	16.03	5.62	.038	0.81

Lead ores are involved in suit with Utah Apex and thus no figures are given for 1920.

A 4-mile aerial tram connects the mine with a 1,000-ton concentration and flotation mill, situated within a few hundred feet of the International smelter. The mill, begun in 1920, will treat low grade copper ores with a concentrating ratio of 7 to 1. A subsidiary aerial tram conveys mining supplies across Carr Fork canyon.

While the great orebodies of the mine are worked out the property is far from exhausted, and development work is encouraging.

Production:

	Copper Ore Tons	Copper %	Silver Oz.	Gold Oz.	Lead Ore Tons	Lead %	Silver Oz	Gold Oz	Cop. %
1920	57,747	2.45	1.34	.052	44,427	14.00	4.85	.039	.85
1919	124,199	2.22	1.27	.070	45,377	17.50	5.34	.041	.82
1918	221,651	2.03	0.82	.054	31,725	15.18	4.71	.04	.64
1917	226,536	1.797	.764	.050	58,247	13.91	4.57	.039	.61
1916	360,034	1.734	.796	.052	74,542	14.17	4.25	.041	.74

Metal produced:

	Lbs. Copper	Lbs. Lead	Oz. Silver	Oz. Gold
1920	3,187,492	9,999,350	273,730	4,097
1919	5,710,346	13,072,177	373,180	10,548
1918	8,476,197	7,812,653	306,152	13,307
1917	7,968,165	13,014,841	408,560	13,530
1916	12,211,118	18,175,709	558,845	21,727
1915	8,836,091	17,777,604	370,985	19,387
1914	7,584,391	14,588,276	284,196	15,528
1913	7,710,668	19,208,063	378,960	14,172
1912	6,506,814	8,734,398	230,004	14,042
1911	9,162,023	3,311,939	160,366	16,730
1910	7,489,471	.....	154,321	14,802
1909	10,043,900	.....	.....	.....
1908	10,648,243	.....	.....	.....
1907	13,987,557	.....	390,296	34,554
1906	18,533,974	.....	457,812	42,001
1905	17,264,474	.....	374,685	28,290
1904	13,553,483	.....	.....	

UTAH CONSOLIDATED MINING & MILLING CO. UTAH

Idle. **Office:** 424 Atlas Blk., Salt Lake City, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: S. S. Jones, pres.; H. S. Cutler, v. p.; Hart J. Fitzgerald, sec.-treas.; preceding, with Hon. Reed Smoot, A. N. Holdway and Hugh J. Cannon, directors, at last accounts.

Inc. March 10, 1907, in Utah. **Cap.** $250,000; shares 25c par; non-assessable. Shares listed on the Salt Lake and San Francisco Exchanges. Shares sold at ¾c to 2¼c in 1921.

Property: 6 claims, patented, in Tintic district, near the Sioux Consolidated and Colorado mines, developed by a 500' shaft, with 2 levels opened. Part of the property is worked by lessees, who secure a small production. No recent report.

UTAH COPPER CO. UTAH

Office: Deseret Bank Bldg., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake county, Utah. Works office: Garfield, Utah.

General office: 25 Broad St., New York City.

Officers: Chas. M. MacNeill, pres.; Daniel C. Jackling, 1st v. p. and managing director; Chas. Hayden, 2nd v. p.; with Spencer Penrose, E. A. Guggenheim, H. F. Guggenheim, W. C. Potter, Stephen Birch, W. P. Hamilton, R. C. Gemmell (asst. managing director and gen.mgr.), W. Hinckle Smith, J. K. MacGowan, R. A. F. Penrose, Jr., Thos. Cochran and Theo. Schulze, directors.

W. E. Bennett, v. p.-asst. sec.; C. V. Jenkins, tres.; A. J. Ronaghan, sec.; J. W. E Ridgway, asst. sec.-asst. treas.; D. A. Crockett, asst. treas.; L. S. Cates, asst. sec.; Chadbourne, Babbitt & Wallace, gen. counsel.

Operating officials: L. S. Cates, asst. gen. mgr.; H. B. Tooker, traffic mgr.; C. T. S. Parsons, cashier; J. D. Shilling, gen. supt.; J. D. Shilling, Jr., supt. of mines; D. D. Moffatt, cons engr. of mills; F. G. Janney, gen.

supt. of mills; Roy Hatch, supt. Arthur plant; H. C. Goodrich, chief engr. of mines and milling.

Inc. June 4, 1903, and reorganized April 30, 1904, in New Jersey. **Cap.** $25,000,000; shares $10 par; originally, $4,500,000; capital successively increased October, 1905, to $6,000,000; February, 1907, to $6,600,000; January, 1908, to $7,500,000; January, 1910, to $25,000,000; issued, $16,244,900. The new stock issue, 1910 amounted to $8,282,240, of which $3,100,000 in stock was given for the property of the Boston Consolidated Mining Co.; $4,445,120 or 445,512 shares, were given for 1,000,500 shares of Nevada Consolidated Copper Co.; $734,370, or 73,437 shares, were sold for cash, at a premium of 400% for $50 per share, and 275 shares were issued for the conversion of $5,500 of bonds at par. Shares are listed on the New York, Boston and Paris Stock Exchanges. D. A. Crockett, 120 Broadway, New York, and American Trust Co., Boston, transfer agents; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, registrars. Annual meeting, fourth Friday in April.

Range of shares during 1920 was $80¾ high and $44⅛ low. Sales on N. Y. Stock Exchange totaled 552,800 during 1920; range in 1921 was high $66¾ and low $41⅛, with sales of 801,900 shares.

In February, 1921, company took an 8.2% interest, $5,280,000 total amount, in the Copper Export Association's $40,000,000 8% bond issue.

In 1921 there was a deficit after dividends of $1,714,318 first quarter, and $1,256,475 for second quarter.

Comparative General Balance Sheet: Utah Copper Co. and Bingham & Garfield Ry. Company.

Assets.

Year	Property & Equipment	Def. Chgs. to Operations	Investments	Copper in Transit	Other Current Assets	Total
1914.....	$24,777,736	$5,385,204	$5,061,008	$3,755,997	$1,285,954	$40,265,899
1915.....	25,359,919	6,444,346	5,087,899	8,675,199	6,777,122	52,344,485
1916.....	26,900,172	7,619,430	5,438,174	15,838,979	17,970,858	73,767,613
1917.....	32,021,458	8,300,040	5,904,002	13,166,995	25,855,942	85,248,437
1918.....	36,159,976	8,943,524	5,922,119	8,709,791	30,308,254	90,043,664
1919.....	36,715,924	9,156,712	5,691,641	1,195,780	32,786,192	85,546,249
1920.....	36,582,773	9,855,749	5,837,860	354,731	26,849,196	79,480,309

Liabilities.

Year	Capital Stock	Current	Reserve for Deprec.	Surplus from sale of Sec't's	Earned Surplus	Total
1914.....	$16,244,900	$1,056,794	$1,125,349	$8,290,620	$13,522,736	$40,265,899
1915.....	16,244,900	2,228,252	1,796,970	8,290,620	23,783,743	52,344,485
1916.....	16,244,900	3,529,395	2,499,515	8,290,620	43,203,183	73,767,613
1917.....	16,244,900	8,780,729	3,385,759	8,290,620	48,546,429	85,248,437
1918.....	16,244,900	10,115,975	4,542,125	8,290,620	50,850,044	90,043,664
1919.....	16,244,900	6,040,381	5,587,395	8,290,620	49,382,953	85,546,249
1920.....	16,244,900	4,093,208	6,289,408	8,290,620	44,562,173	79,480,309

Comparative Income Account.

Year	Operating Revenue	Operating Expenses	Net Optg. Profit	Total Income	Total Deducts	Balance Dec. 31
1914....	$16,222,456	$10,230,293	$5,992,163	$8,730,422	$5,403,667	$13,035,408
1915....	27,155,944	12,132,109	15,023,835	17,920,443	7,457,778	23,498,074
1916....	50,280,074	16,532,334	33,747,740	39,738,675	20,083,675	43,153,137
1917....	48,797,423	24,886,646	23,910,777	29,985,125	24,844,734	48,293,528
1918....	44,525,129	30,717,827	13,807,302	18,945,780	16,744,900	50,494,408
1919....	19,554,541	14,864,669	4,689,872	8,252,395	9,746,940	48,999,864
1920....	18,902,925	15,526,271	3,376,654	4,924,498	9,746,940	44,177,423

Earnings and Dividends on Stock, Per Share

1908....	....	$1.00	1913....	$5.37	$ 3.00	1918....	$11.35	$10.00
1909....	$2.93	2.00	1914....	5.34	3.00	1919....	3.08	6.00
Year	Earned	Paid	Year	Earned	Paid	Year	Earned	Paid
1910....	3.46	3.00	1915....	11.03	4.25	1920....	3.09	6.00

Year	Earned	Paid	Year	Earned	Paid	Year	Earned	Paid
1911....	3.96	3.00	1916....	25.46	12.00	1921....		2.50
1912....	5.35	3.00	1917....	17.66	14.50			

Total dividends paid to end of 1920	$111,509,662
Paid during 1921	4,061,225
Total to Jan. 1, 1922	$115,570,887

Holdings.

The company controls the Nevada Consolidated Copper Co., owning slightly more than 50% of the outstanding stock, having exchanged its own stock on the basis of 1 share of Utah for 2¼ shares of Nevada. The company owns, through stock ownership, the Bingham & Garfield Railway Co., described later. During 1910 the Utah Co. absorbed the Boston Consolidated Mining Co. and the Shawmut Consolidated Copper Co.

History: The mining property now embraced in the holdings of the Utah Copper Co. had been knewn to be copper-bearing for many years, but was supposed to be too low-grade to pay and was not taken up for active development until the organization of the original Utah Copper Co. in 1903. Previous to that time, any work done was in hunting for the rich copper fissures and fault planes. In the spring of 1903, the Utah Copper Co. acquired control of the property, and began the construction at Copperton of a 300-ton experimental concentrating mill.

Property: the Utah Copper Co. has the second largest developed orebody in the world, being only exceeded by that of the Chile Copper Co. The entire mineralized area of the property is covered by a thickness of about 115' of low-grade and oxidized material that cannot be profitably treated by standard methods of concentration. At the inception of development, it was determined to remove the oxidized over-burden entirely, leaving the sulphide ore uncovered, so that it could also be handled by steam shovels at a very low cost. This work, commenced August, 1906, has been prosecuted vigorously so that by the end of 1920, there had been removed from the property 53,044,034 cubic yards of capping and 90,476,900 dry tons of ore.

The largest amount of capping and ore ever handled in one day was 84,229 tons, and the maximum ever handled in any one month was 2,526,858 tons. The daily output increased from 300 tons a day in July, 1904, to an average of 37,500 tons daily in 1917, with a record of 47,000 tons of ore.

Geology: orebodies consist of an altered silicious porphyry, containing small grains of sulphides, very uniformly disseminated throughout the mass, both in fracture seams and in the body of the rocks, and the ore averaging about 1.37% copper, 0.10 oz. silver and 0.012 oz. gold. The primary copper mineral is chalcopyrite, but as a result of the oxidization of this mineral and the secondary deposition of others, practically all of the sulphide minerals of copper are now present, the predominating one being chalcocite. There are three zones in this deposit, as follows: the oxidized zone, about one-tenth of which contains carbonates of copper in sufficient quantity to render the material payable by leaching with a dilute solution of sulphuric acid; second, the zone of secondary enrichment, in which is found all of the concentrating sulphide ore of commercial value; and third, the zone of primary material, which is too low-grade to be profitable by any methods of handling and treatment now known.

Total area of lode mining claims in Bingham is 851 acres, lying on both sides of Bingham canyon above the town, and including the mine. within the boundaries of this tract development has shown that at least 226 acres contain mineralized porphyry of commercial value. The entire porphyry area has not yet been developed, and the maximum thickness of the orebody in the 226 acres has not been fully demonstrated, but calculations show that previous to January 1st 1920, there had been developed in

the property, 454,607,700 tons of ore, averaging 1.355% copper, of which quantity 270,000,000 tons were classed as fully developed, and 184,607,700 tons as partly developed. There was mined from the entire property prior to January 1, 1921, a total of 90,476,900 tons of ore, averaging 1.374% copper; total reserves remaining, 364,130,800 tons averaging 1.35% copper.

Development: in making the calculations to determine the tonnage of ore and its average assay, there were used 113,274 assays, representing 34,490′ of diamond drill and churn drill holes, 291,449′ of drifts, raises and winzes, and 140,565 linear feet of steam shovel cuts, or a total of 466,504′ of development work. The orebody, as at present developed, has a maximum length of a little over one mile, and a maximum width of more than one-half mile. Further development of the property will undoubtedly add materially to its ore reserves.

The total area of land other than lode claims owned by the company, December 31, 1920, is 11,204 acres, consisting of 1,201.87 acres near the mouth of Bingham Canyon, part of which was formerly used in connection with the operation of the Copperton plant, 675.69 acres in Utah and Davis counties, and 9,326 acres at the Magna and Arthur plants. The lands to be used solely for impounding tailing from the concentrating plants aggregate about 6,000 acres.

The porphyry deposit on the westerly side of the canyon is worked by steam shovels. There are 19 steam-shovel levels from Sub "A" to "V" inclusive; intermediate levels "B," "C," "D" and "E" have also been cut out. The main level is called "A" and the one below, it, Sub "A." Each of these levels above "A" is connected with the bottom or main level, with standard gauge tracks constructed on maximum 4% grades, so that the steam-shovels load the ore directly into railroad cars which are hauled by 50-ton saddle tank and 76-ton side tank engines to the main yard and assembled into trains to be transported to the mills. From Sub "A" to "V" level, the difference in elevation is 1,446′, and from Sub "A' level to the top of the mountain it is 1,600′. The high face of the ore extending from "A" to "F" level, across which the intermediate levels have been cut out, has a vertical height of about 240′. From "F" to "V" level the difference in elevation between the levels varies from about 68′ to 100′, depending upon certain topographical conditions which control the elevations of the stripping lines extending from the steam shovel levels to the waste dumps.

No work has yet been done on the easterly side of the canyon except development by drifts, raises, cross-cuts and churn drill holes, with a small amount of underground stoping.

Equipment: at the mine at the end of 1920 included 94 4-yard narrow gauge dump cars; 95 6-yard standard gauge wooden dump cars; 110 12-yard all steel Oliver dump cars; 50 30-yard all steel Clark dump cars; 6 narrow gauge 4-wheel flat cars; 4 narrow gauge 8-wheel flat cars 8 standard gauge flat cars; 21 standard gauge steam shovels; 45 standard gauge switching locomotives; 8 narrow gauge switching locomotives; 1 engine tender; 3 passenger coach; 1 combination crane and shovel; 1 wrecking crane; 2 Jordan Spreaders; 1 tool car; 4 Star and 7 Keystone drills, and 7 air compressors, having a combined capacity of 12,000 cubic feet of free air per minute.

The stripping is removed from the ore and carried to waste dumps in adjacent gulches, and the ore loaded into railroad cars to be tranported to the mills. The rock is broken by blasting before removal by the steam shovels, holes being bored by piston drills operated by air. The holes are sprung and prepared ahead of the steam shovel operations, and are loaded and shot at such times as are required by the individual shovels on the different levels. An average of 1 pound of powder has been required to break down about 5 tons of rock ready for the steam shovel to load. There are 52.87 miles of standard-gauge track in and around the mines, 2.61 miles of narrow-gauge

and 1.57 of three-rail track, a total of 57.05 miles, all owned by the Bingham & Garfield Railway Co.

The shovels and locomotives at the mine are operated by steam, but extensive use is made of electric power received from the Utah Power & Light Co. Buildings at the mine include machine and carpenter shops, car repair shops, compressor buildings, storehouses, office buildings, club house, boarding houses and other minor structures.

Mills: company had three mills, one at Bingham canyon, now dismantled, and two at Garfield, 20 miles from the mine. The 900-ton Copperton mill at Bingham canyon, the first concentrator put up by the company, is fully described in Volume VIII, Copper Handbook. It was closed permanently August 1, 1910, and all machinery that was suitable was sent to the Arthur mill for use there.

The finely disseminated copper glance necessitates fine crushing with the formation of slime and a tailing loss of about 0.25% copper. Concentration is about 18 into 1.

Magna Plant.

The Magna mill was the first large plant of the porphyry copper concentrators to be built and is located near Garfield, 4 miles E. of the Garfield smelter, and about 1 mile E. of the Arthur mill of the Utah Copper Co. It is connected with mine and smelter by the Bingham & Garfield, and the Denver and Rio Grande railways.

The main building is 500'x600', and contains two 10,000-tons units of 6 sections each, each unit being 300'x500' in size and the whole mill occupying a site of about 20 acres. Milling was begun in June, 1907, with two sections and the consecutive sections were put into service as finished, the twelfth, or final section of the mill, being started in November, 1908.

In 1918 the Magna mill treated an average of 18,150 tons daily. It is divided longitudinally into three departments for coarse| crushing, fine crushing and concentrating work. Additions to this plant have increased its capacity to 20,000 tons daily.

Coarse Crushing Department: consists of 2 units, having a capacity of 24,000 tons of about ½" size per 24 hours. Ore is received from the mine in 69-ton drop-bottom steel cars and is discharged into a 12,000 ton bin from which both 8" oversize and 2¼" undersize are delivered to units Nos. 1 and 2.

Unit No. 1 is equipped with two No. 7½ gyratory crushers and 4 sets of 54"x20" Garfield rolls; and unit No. 2 with two No. 7½ gyratory crushers, 4 sets of 72x20" and 4 sets of 54"x20" Garfield rolls, and 4 screening towers with 16 Mitchell vibrating screens. Each unit is equipped with four 36", one 42" and two 30" belt conveyors to distribute ore in fine bins, and with a 15-ton, 3-way motor crane.

Fine Crushing and Concentrating Departments.—The fine bin (13,000-ton capacity) is equipped with twelve 72" steel apron ore feeders, each supplying one of 12 similar sections. Each section consists of: Two 37½" x15" Garfield rolls and one 24" elevator equipped with 6 Colorado impact screens for dry crushing to approximately 10 mesh; three 6' Chilean mills, twelve 4'x12' Garfield roughing tables, four No. 5 Wilfley finishing tables, two 36" elevators, one 8' primary and one 6' secondary drag classifiers and three 7'x10' tube mills for wet grinding to approximately 48 mesh; four 5-compartment Richards-Janney classifiers, 20 Callow settling cones and ninety-six 6' Johnston vanners. Five-ton, 15-ton and 50-ton, 3-way motor cranes serve the rolls and Chilean mills, elevators and tube mills respectively.

Miscellaneous buildings at the Magna plant consist of machine shop, boiler shop, blacksmith shop, carpenter shop, tin shop and electric shop, all thoroughly equipped for making any necessary repairs. Pump stations, a large warehouse, transformer houses, ice house, main office, time office, dormitory, mess-houses and cottages for officials also exist.

The Leaching Plant.

This plant, located near the Magna mill, completed during 1917, treats the oxidized and partially oxidized capping overlying the sulphide ore, which carries approximately 15 pounds of copper per ton, of which about 12 pounds are soluble in sulphuric acid.

Ore from the mine at Bingham is discharged in crusher building where it is reduced to 15% on ½" mesh screen by two No. 6 Gates gyratory crushers, style "K," and two 72"x20" Garfield rolls. A noticeable feature in the crushing plant is the absence of any elevators; all intermediate crushing products being handled on incline conveyors.

The crushed ore is charged from loading bridge into twelve 100'x50'x18' deep mastic lined concrete leaching vats equipped with suitable filters in bottoms.

The vats of ore are leased in rotation with a sulphuric acid solution containing a maximum of 1½% free acid.

The leaching solution is handled and circulated by means of 6" centrifugal antimonial lead pumps and air lifts. The leaching solution, containing from .2% to .3% free sulphuric acid, and the copper, in the form of sulphate, is run to three 7'x10' tube mills, placed in series, where the copper is precipitated on scrap iron. The cement copper is discharged into settling launders, drained and shipped in cars to the smelter. The solution before wasting is circulated through precipitation launders for final cleaning. The tailing is discharged from the vats by an unloading bridge equipped with a 10-ton grab bucket into 30-yard dump cars and hauled away by locomotives to the waste dumps.

Arthur Mill.

The Arthur mill was built by the Boston Consolidated Mining Company at a cost of upwards of $1,500,000. It was remodeled to a capacity of 7,800 tons of ore daily in 1916, by replacing the Nissen stamps with rolls and Chilean mills to correspond to the practice at the Magna mill. Later additions have increased this capacity to 16,000 tons daily.

The ore is brought to the head of the primary crushing department by railroad cars of 69 tons capacity, which are spotted on a car dumper by a mule haulage system; this equipment having a capacity of 30 cars per hour.

The railroad delivers the railroad cars in the electric mule haulage yard which is constructed on a 1.50% down grade. The car riders uncouple the cars and drop them down the grade beyond the mule pit, where they are spotted on the dumper by the mule haulage system. The loaded car, as it is spotted on the dumper, kicks off the empty car which runs down a grade back of the dumper and up a kick back track, where it reverses its direction and continues on down into the empty yard located opposite the car dumper and mule haulage tracks. Four men are required to ride these cars from the mule haulage tracks across the dumper and back again.

The dumper discharges over a grizzly which separates in plus and minus 6" product, the over-size going to a No. 27 gyratory crusher, the largest type made. The undersize and crusher product are conveyed to the secondary coarse crushing department by two 60" conveyors, fed by four 60" pan feeders. The above department contains a 60-ton crane, with 10-ton auxiliary hoist.

The secondary coarse crushing plant consists of three No. 8 gyratory crushers, six sets of 72"x20" Garfield roughing rolls, two elevators, twelve conveyors for circulation and transporting the ore to the fine crushing department, and 25-ton crane. The capacity is 16,000 tons of approximately ⅝" size. Adjacent to this department is a 9,000-ton coarse ore bin, with overhead tracks, which is used when the primary crushing plant is down for repairs. This bin has six conveyors and one hundred and two steel apron feeders for transferring the material to the secondary coarse crushing department.

The fine crushing department has a 12,500-ton capacity ore bin, equipped with 26 steel apron feeders. In this department the ore is crushed dry to approximately 10 mesh by 25 sets of 37-½"x15" and 1 set of 54"x20" Garfield rolls. Screening and circulation is done with the help of 63 impact screens, 6 whip-tap screens, 6 Mitchell vibrating screens and 13 elevators. It is then crushed wet to approximately 48 mesh by 26 Chilean mills and twenty-eight 7'x10' tube mills; 26 elevators; 26 drag classifiers; fifty-two 4-compartment and fifty-two 5-compartment Richard Janney classifiers. The concentrate department has Garfield roughing tables, No. 5 Wilfley finishing table and two-hundred-eight 6' vanners.

Miscellaneous buildings at the Arthur plant consist of substations, machine shop, boiler shop, oil house, compressor building, warehouse, carpenter shop, foundry, pattern storage building, general offices, telephone and emergency hospital building, dormitory, mess house, lumber shed, heating plant, assay office, time office, scale house, and houses for officials.

Initial Water Supply: Water sufficient for all mill operations can be received from either of two separate sources of supply known as the main supply and the auxiliary or emergency supply.

The main water supply is brought through the Utah and Salt Lake canal from Utah Lake, 40 miles from the plant; 100 sec. ft. is delivered through this canal to pumping station No. 2, in the Magna mill yard at the canal terminus. The equipment in this plant consists of two 10,000 gal. and one 5,000 gal. capacity single stage centrifugal pumps, all pumping direct into the Magna 5,500,000 gallon concrete-lined reservoir above the Magna mill through 700 ft. of 30" wooden stave pipe against a 30' static head; three 5,000 gal. and one 3,000 gal. capacity single stage centrifugal pumps, all pumping direct to the Arthur mill, 2,000,000 gallon reservoir through 6,300 ft. of 30" and 42" wooden stave pipe lines against a 135' static head. The capacity of this plant is 25,000 gallons per minute for Magna mill and 18,000 gallons per minute for the Arthur mill, a total of 43,000 gallons per minute.

The auxiliary or emergency supply consists of numerous springs located at pumping station No. 1 and a system of storage lakes located approximately 6 miles East of the Magna plant; the water is delivered to pumping station No. 1, which is also located at the Magna plant. The equipment in this plant consists of three 10,000 gal., two 5,000 gal., two 4,500 gal., one 3,500 gal. and one 2,500 gal. capacity single stage centrifugal pumps, all pumping direct to the Magna plant reservoir against a 235' static head; and one 3,000 gal. and two 1,500 gal. capacity, two stage centrifugal pumps, all pumping direct to the Arthur mill reservoir. The capacity of this plant is 61,000 gallons per minute. Under this system, water can be relayed from the Magna plant reservoir through pumping station No. 2, to the Arthur plant reservoir.

It is believed that the water supply for the Utah Copper Co. for milling purposes is such as to make practically impossible any combination of circumstances that would necessitate the closing down of the mills or even any reduction in their capacity because of water shortage.

Bingham & Garfield Railway

Inc. July, 1908, in Utah. **Cap.** $6,515,000; $100 par. Controlled by the Utah Copper Co., through ownership of the entire share capital.

The mileage at the end of the year 1920 is shown in the table below:

Main line and branches between and in the vicinity of	
Garfield and Bingham	34.49 miles
Yard and siding tracks, including all the terminals	50.91 "
Additional tracks leased to Utah Copper Co.	48.87 "
Total length of tracks	134.21 "

Production from Concentrates:

Year	Tons Treated	Cost per Ton—Mine Cts.	Mill Cts.	Total Dollar (a)	% Cu.	% Rec'd
1911	4,680,801	44.79	41.68	1.1725	1.51	69.53
1910	4,340,245	40.97	46.63	1.1738	1.54	66.55
1912	5,315,321	42.33	41.58	1.1239	1.36	66.32
1913	7,519,392	32.88	36.76	0.9761	1.25	63.95
1914	6,470,166	32.32	35.36	0.9550	1.42	66.04
1915	8,494,300	24.41	34.02	0.8624	1.43	64.13
1916	10,994,000	27.81	37.82	0.9355	1.43	62.34
1917	12,542,000	44.46	69.30	1.4170	1.34	61.10
1918	12,160,700	53.70	92.77	1.7630	1.23	65.11
1919	5,538,700	49.00	1.21	2.0000	1.26	78.46
1920	5,556,800	48.23	1.25	1.9900	1.16	81.38
1921*	1,202,700	.....	....	.....	1.16	83.87

*Three months.

	% Cu. in Conc.	Lbs. Cu. Rec'd p. t. Ore	Net Prod'n Lbs. Cu.	Cost-Cts. per Lb. (b)	Sell. Price Cts.
1910	27.28	20.51	85,644,511	8.069	12.818
1911	25.62	21.03	98,436,224	7.865	12.434
1912	20.75	18.09	91,366,337	9.024	15.839
1913	17.31	15.95	113,942,834	9.498	15.337
1914	18.19	18.82	115,690,445	8.131	13.256
1915	19.17	18.39	148,397,006	7.56	17.679
1916	18.71	17.90	186,915,000	8.116	23.926
1917	16.61	16.33	194,612,365	11.940	25.805
1918	16.08	15.97	184,460,168	15.347	24.662
1919	19.86	19.72	103,773,188	14.266 (c)	18.834
1920	16.45	18.83	99,902,028	15.124 (c)	18.327
1921	.....	19.46	22,726,411	.....	.....

(a) Includes transportation, all fixed, general and maintenance charges. (b) After making allowances for smelter deductions, and crediting value of gold and silver recovered, but not including miscellaneous income. (c) Excluding Federal taxes, and without credit for gold, silver or miscellaneous income. In 1919, ore delivery cost 30.40¢ per ton and in 1920, 25.91¢.

Copper is sold through the new selling agency of Guggenheim Bros. Precious metals in 1919 were 28,907 oz. gold and 263,721 oz. silver and in 1920; this production was 27,411 oz. gold and 257,516 oz. silver.

Monthly Output: gross

Month	1920	1919	1918	1917
January	9,151,144	10,500,000	12,613,380	13,913,811
February	9,211,806	10,335,000	11,994,960	13,459,829
March	8,894,596	8,366,000	16,179,831	15,512,676
April	9,313,227	9,420,000	16,690,883	17,231,512
May	9,829,781	9,125,000	17,294,291	19,262,856
June	9,554,119	9,528,000	17,779,609	19,909,097
July	8,734,899	8,405,863	16,021,766	18,127,154
August	8,482,970	8,640,000	19,920,947	18,796,012
Sept.	7,522,865	8,220,092	17,369,230	17,839,378
October	7,487,313	9,525,700	18,643,472	18,022,665
Nov.	8,717,218	9,482,451	16,443,042	16,468,323
Dec.	7,717,050	9,005,591	13,217,178	16,311,805

Production for 1921 was copper 24,513,894 lbs., gold 7,043 oz.; silver, 66,388 oz.; lead 22,380 lb.

Total amount of capping removed in 1920 was 2,938,299 cu. yds. The total area upon which stripping operations have been conducted was 261.68 acres and the actual area stripped was 146.34 acres.

The average cost of mining concentrating ore, including the proper apportionment of all fixed and general charges for the year 1920, Federal charges excepted, was 48.23¢ per ton, of which 12.50¢ represents charges for stripping. The actual direct cost was 35.73¢ per ton, 24.52¢ representing all charges at the mine and 11.21¢ the fixed and general charges.

Utah Copper suspended all operations on April 1, 1921, but because of its strong financial condition, it has continued to make disbursements to its stockholders, though on a reduced scale, and in spite of a shut down expense of about $100,000 per month.

Utah Copper is still the brightest star in the Hayden-Stone-Jackling galaxy, and its aggressive and brilliantly competent management promises to keep the company in its present enviable position.

UTAH IDAHO MINING CO. **UTAH**

Mine address: Oakley, Idaho.

Officers: Ephraim Jensen, pres.-treas., F. E. Cluff, sec.; I. A. Kaufman and T. H. Southwork, directors.

Inc. in Utah. **Cap.** $50,000; par 20¢.

Property: in N. W. corner of Boxelder county, Ashboro distric, Utah, shows silver ore in replacement deposits in limestone. In December, 1921, compressor and power plant were erected, and development work started. Mine adjoins the Vipont, an old producer.

UTAH LEAD & COPPER CO. **UTAH**

Address: care H. M. Stonemetz, v. p., 53 State St., Boston, Mass. Mine office: Bingham Canyon, Utah.

Officers: Carl Brandt, pres.; Harry M. Stonemetz, v. p.; I. P. McDonough, sec.; J. H. Turnbull, treas., with Geo. E. Davis, directors.

Inc. Dec. 24, 1912, in Maine, as the successor of the Bingham Copper Co. **Cap.** $500,000; shares $1 par; outstanding, 262,000 shares. Debentures $100,000, 6% convertible; outstanding, $37,750. Federal Trust Co., Boston, transfer agent; Paul Revere Trust Co., registrar.

Property: 13 claims, patented, about 102 acres, on the eastern slope of Carr Fork Canyon. Company also owns a one-half interest in the Diamond Extension, and one-half in the Diamond claims adjoining.

The property shows 3 fissure veins, several bedded deposits of silver-lead ore and a fissure vein of copper ore of less promise. A big outcrop near the W. end line is said to have yielded considerable high-grade gold and silver ore with lead carbonates, to former owner.

Development: by 2 tunnels, longest 1,200′, and 2 shafts on the Venice claim. There are about 3,000′ of workings, showing ore below commercial tenor generally, but with occasional streaks of ore assaying up to 70% lead and 15 to 30 oz. silver.

Equipment: includes a small air compressor.

Property has been under option since 1918, to the **Utah Cons. Mng. Co.**, which see.

UTAH LEASING CO. **UTAH**

Office: Room 707, Utah Savings & Trust Co. Bldg., Salt Lake City, Utah. **Mine office:** H. H. Adams, supt., Newhouse, Utah.

Officers: V. P. Strange, pres.; J. C. Dick, v. p.; D. R. Pingree, sec.-treas., with Herbert Salinger and F. W. Royer, directors. R. P. McDonald, auditor.

Inc. in Utah. **Cap.** $30,000; shares 10c par; assessable; 250,000 issued. Assessment of 1c a share due Dec. 19, 1921.

Dividends: $25,000 in 1916; $47,500 in 1917; $22,500 in 1918.

Property: a lease from South Utah Mines & Smelters, on about

1,000,000 tons of copper-gold-silver tailing at the old Cactus mine, Newhouse, Utah.

Equipment: one 20-ton steam shovel, 750-ton plant including two 8'x48", and one 6'x48" Hardinge mill, 2 Dorr classifiers and 2 Minerals Separation flotation units.

Electric power is obtained from the Beaver River Power Co., at 44,000 volts, stepped down to 2,200 and 4,400 volts.

Production: feed to the plant assays about .52% copper, which is claimed to be the lowest head assay in the country; concentrate assays 21% copper, 0.07 oz. gold, 2 oz. silver. In 1915, 15,530 tons ore milled produced 86,941 lb. of copper; in 1916, 160,420 gave 1,286,011; in 1917, 207,270 gave 1,575,347; and in 1918 205,000 tons ore gave 1,489,851 lb. copper.

In May, 1919, the Cactus tailings were exhausted, after 700,000 tons had been treated in 3½ years, and early in 1920, company was defeated by the lessor in a suit involving water supply.

UTAH METAL & TUNNEL CO. — UTAH

Mine office: Bingham, Utah.

Office: 85 Exchange St., Portland, Me.

Officers: Jas. E. Rothwell, v. p.; W. E. L. Dillaway, treas.-sec., with Walter B. Farmer, Wm. H. Coolidge, Henry G. Lapham, and L. E. Stoddard, directors. W. H. Hendrickson, mgr.

Inc. May 4, 1914, in Maine. **Cap.** $800,000; $1 par; increased from $500,000 to $725,000, to purchase **Bingham-New Haven C. & G. Mng. Co.**, again increased in April, 1919, to $800,000; 750,000 shares issued; 50,000 set aside for conversion of $375,000 7% ten-year bonds, of which $261,000 have been issued. Bond issue was authorized April, 1919 to take over the outstanding and due bonds of Utah Metal Mng. Co., at par for old and 95% for new bonds. During 1919, 50,000 treasury shares were sold at $4 per share.

Commonwealth Trust Co., Boston, Registrar & Transfer Co., New York, transfer agents. International Trust Co., Boston, and Empire Trust Co., New York, registrars. Annual meeting, first Monday in May. Company acquired **Bingham-New Haven C. & G. Mng. Co.**, by exchange of share for share.

Listed on Boston Stock Exchange; traded on New York Curb. Stock sold at $1 to $10.50 in 1915. Price range $1¼ to $3 in 1918; $1 to $5⅛ in 1919; 42¢ to $3 3/16 in 1920; $0.95 to $2.87 in 1921; $1 in Jan., 1922.

Company is a reorganization of the **Utah Metal Mining Co.**, itself a consolidation of the Bingham Central, Bingham Standard, and Bingham Metal companies.

A dividend of 50c. per share was paid in August, 1916; 80c. in 1917.

Comparative Balance Sheet, years ending December 31:

Assets.	1920	1919
Property account	$1,759,996	$1,773,754
Prepaid accounts	1,646	1,521
Cash	55,587	96,410
Supplies	40,241	51,665
Accounts receivable	6,323	22,137
Total	$1,863,793	$1,945,487

Liabilities.	1920	1919
Capital stock	$750,000	$750,000
Bonds	261,000	261,000
Accounts payable	7,519	19,601
Surplus	845,274	914,886
Total	$1,863,793	$1,945,487

Gross income in 1920 was $295,327, of which $271,803 was from ore sales. Expenses were: mining, $70,792; on surface, $59,368; smelter, $101,674; taxes and administration, $40,631; bond interest, $18,079; and development $58,258; total expenditures, $348,806. An operating loss of $53,479 and total net loss after depreciation of $69,672.

The apex rights controversy with the Utah Cons. Mng. Co., begun in 1917, was settled out of court early in 1919, resulting in Utah Metals receiving additional mineral ground and in disposing of certain claims for trespass. Company now has unrestricted right to follow all "beddings" found on westerly part of Bingham New Haven region, downward beneath Utah Cons. ground, regardless of apex.

Property: is extensive, covering 3,539 acres, including 139 acres timber land in Bingham district, adjoining holdings of Utah Cons. and Utah Copper Co. (Boston Con.), and extending across the range to Middle Canyon, on the Tooele side. The company drove a transportation and drainage tunnel, the Big Tunnel, 11,500′ through and 2,300′ below the crest of the range, from near Tooele to Bingham Canyon (Carr Fork). This gives direct short transportation to Tooele and Garfield and develops a large flow—2,000,000 gals. per day—of water, part of which is sold to the Utah Copper Co., the company having an income of $25,000 a year from this.

The Bingham or Carr Fork holdings include the Bingham Central & Bingham Standard groups, an area in which the various mineral bearing limestone beds of the camp are cut by the Saginaw-Burning Moscow and Nast veins and crossed by the Old Jordan fault. The claims on the Tooele side show similar limestones, cut by fissures, but the development work there has not thus far shown commercial orebodies, as it has on the Bingham side.

In November, 1914, the company started crosscut exploration from the big drainage tunnel at 8,200′ from the Tooele portal. In March, 1915, 1,300′ from the Bingham portal, the latter work encountered mineralized ground, and on upraising 70′, an orebody 25′ thick was cut. Drifting disclosed a second orebody E. of and above the first, and later a third orebody, already opened and mined by the Bingham New Haven Co., was cut. At present there are 10 productive orebodies on the combined properties.

The transportation tunnel is 8x9′ in the clear, double-tracked, with ½% grade. It develops the mineral bearing limestone and veins at depths of 375 to 900′ below any other workings.

Development: is by two main tunnels, one the Big Tunnel is a 11,4[illegible]′ transportation and drainage tunnel driven from the Tooele side. A second tunnel called No. 3, is 4,000′ long and cuts through B. & N. H. ground.

The ground already opened, and the orebodies found, indicate the existence of similar other deposits. A large amount of mill ore has been developed.

Equipment: includes a 450-ton mill using the Callow system of flotation.

Operations during 1919 were largely confined to development work awaiting lower costs and higher metal prices; this policy was continued in 1920, mainly in ground acquired from Utah Cons. In latter year, extensions amounted to 4,311′, costing $58,262.

Development: of **Bingham New Haven** ground, includes tunnels with a blind shaft starting 900′ from the portal of the lowest tunnel, there being a vertical distance of 1,200′ between the highest and lowest workings. Mine has several miles of workings with an aerial tram, connecting with loading bins on the Copper Belt railroad.

Equipment: includes electric power, air compressor and 450-ton mill, equipped with jigs, Wilfley and Deister tables, vanners and ball mill for fine grinding.

Some portions of property are operated by lessees, and company expects to finance itself from royalties and sale of ore from development, in immediate future.

Estimates of ore reserves are not made public, or are impracticable, but management is apparently convinced that more extensive exploration will discover "more and richer ore".

Production:

	Ore, Tons	Lead, Lbs.	Copper, Lbs.	Gold, Oz.	Silver, Oz.	Gross Value
1920.....	10,181	2,390,602	159,229	24	84,605	$ 271,003
1919.....	.....	1,173,366	64,246	291	32,702	94,521
1918.....	.....	1,187,114	207,059	940	61,502	190,516
1917.....	.....	5,348,610	659,127	4,612	242,003	884,688
1916.....	71,402	6,301,670	1,761,520	17,934	388,757	1,499,268
1915.....	.....	9,860,089	2,873,815	16,914	475,894	1,386,845

Average metal content of ore shipped in 1920 was 0.96% copper, 14.54% lead, 8.74 oz. silver and 0.07 oz. gold.

In October, 1917, a five years' contract was arranged with the International Smelting Co. for Utah Metal ore.

The Bingham-New Haven property includes 26 claims, 500 acres adjoining the Utah Consolidated on the S. E.

The ores are chalcopyrite, galena and sphalerite and the main supply is from 8 limestone beds, which strike E. W. and dip N.

UTAH METAL MINING CO. UTAH

See Vol. XI for description. Is now the Utah Metal & Tunnel Co., which see.

UTAH MINERALS CONCENTRATION CO. UTAH

Dead. Former address, H. Atkinson, mgr., Eureka, Juab county, Utah, with A. W. Parshall, supt.

Owned 250-ton custom concentrating mill for local ores. Company in hands of receiver in 1917, and presumably defunct.

UTAH MINING CO. UTAH

Mine address: Fish Springs, Juab county, Utah; A. F. Rynders, sec, 77 R. St., Salt Lake City.

Property: old Utah mine, 25 miles S. of Gold Hill, a large producer of high-grade silver ores in former days. The old dumps are estimated to contain 200,000 tons of ore. Present company has built a 200-ton mill to treat this ore. Details of operation not available.

UTAH MINING, MILLING & TRANSPORTATION CO. UTAH

See Vol. XIV for description. Went into hands of a receiver several years ago and its affairs are wound up.

UTAH NATIONAL MINES CO. UTAH

Dead. See Vol. XIV for complete description. Company defaulted in payment of taxes, a receiver was appointed and company's affairs wound up; property reverted to original owners.

UTAH-OREGON MINES CO. UTAH

Address: Price, Utah; John C. Forrester, pres. Levied an assessment of 1c a share, and expected to start operating its milling plant to treat a large tonnage of free-milling gold ore late in 1919.

Does not reply to requests for information.

UTAH ORE SAMPLING CO. UTAH

Office: 820 Newhouse Bldg., Salt Lake City, Utah.

Officers: O. Raymond Knight, pres.; E. P. Ellison, v. p.; R. E. Allen, sec.-treas., with J. W. Knight and W. Lester Mangum, directors. E. G. Jensen, gen. mgr.; Frank Burgner, gen. supt. at Murray.

Inc. Dec., 1909, in Utah. **Cap.** $300,000; par $1; 215,000 issued.

Company owns and operates two ore-sampling mills at Murray and one at Silver City, with combined daily capacity of 1,000 tons of ore.

UTAH PLACER MINING CO. UTAH

Address: Box 204, Garfield, Utah.

Officers: Harry Grass, pres.; Theo. Peterson, v. p. H. J. Butcher, sec.-treas.-mgr.; with Ed. Helmerich, G. C. Phillips, F. T. Toms and Ed. Pearse, Jr., directors.

Inc. Feb. 19, 1917, in Utah. **Cap.** $100,000; 10c par; 650,000 treasury shares; assessable. An assessment of ½c was levied April 20, 1921.

Property: 2 groups of 3 claims each, 880 acres, on Grand river, Grand county, between 7 and 22 miles S. of Cisco. Lower group is said to show 2,000,000 yards of bench gravel on sandstone bedrock with 28' average depth; carrying $1 in gold and 46c in platinum per yd. Gravel of upper group reported to show from 20 to 80c gold per yd. and some platinum.

Idle 1918-21, except for assessment work.

UTAH-RELIANCE MINING CO. **UTAH**

Office: 408 South State St., Salt Lake City, Utah. **Mine office:** Ibapah, Tooele county, Utah.

Officers: J. G. Bywater, pres.; D. B. Ralls, v. p.; Richard B. Shepard, sec.-treas. and gen. mgr., with W. A. Langford and Samuel Divett, directors.

Inc. 1908, in Utah. **Cap.** $5,000; shares 1c par; assessable; issued, $3,000, fully paid.

Property: 6 claims, unpatented, 120 acres, about 45 miles from a railway, showing porphyry and limestone.

Development: by a 175' tunnel and a 100' shaft, latter showing ore assaying up to 16% copper,, 4 oz. silver and 40c gold per ton.

Company doing assessment work only.

UTAH REVENUE MINES CORPORATION **UTAH**

Address: 527 5th Ave., New York .

Inc. in Delaware. **Cap.** $4,000,000; par $1; outstanding, 3,000,000 shares. Holds 220,000 shares of capital stock of East Hecla Mining Co.

Property: 66 claims, 22 patented, about 1,320 acres, in Pine Grove Canyon, Beaver county; also 13 claims, unpatented, 200 acres, in American Fork district. The Pine Grove group shows quartzite cut by fissure veins with lead-silver-gold ore. There is a series of parallel and intersecting fissures caused by strong E.-W. faulting.

Development: several tunnels, longest about 600', and shafts, deepest 200', said to show considerable ore mainly concentrating. Most of this work was done several years ago.

UTAH SILVER LEAD MINES CO. **UTAH**

Mail returned from Walker Bank Bldg., Salt Lake City. J. H. Garrett, mgr.

Cap. $250,000; 25c par; issued 600,000 shares.

Assessment of ½c a share, delinquent Oct. 13, 1921.

Property: 11 claims, 7 patented, in Morgan Argenta district, 7 miles from U. P. R. R. in Morgan county, said to have yielded lead-silver ore to value of several hundred thousand dollars in earlier years.

Present management has a bond and lease on property, from the Carbonate Hill Mng. Co., royalty paid to be applied on purchase price.

Development: Silver Zone and Blacksmith tunnels and extensive old workings now caved; new company has advanced the Silver Zone tunnel several hundred feet, and while doing this work shipped about 1,000 tons of ore assaying from 15.4% to 26% lead and from 3 oz. to 6.7 oz. silver. Management estimates 10,000 tons ore blocked out in this tunnel by present work. On the opposite side of the mountain from the Silver Zone tunnel, the Blacksmith tunnel, driven 1,000', will tap the Silver Zone deposit several hundred feet below present workings, and will be the main haulage tunnel of the mine.

Company sold $25,000 stock in 1918, to provide money for a 4,000' aerial tram from Blacksmith tunnel to a place down the mountain where it will be possible to load ore on wagons.

UTAH SILVER REEF MINING CO. **UTAH**

Controlled by The Alvarado Mng. & Mllg. Co., address, 347 Madison

Ave., New York City, or Frank C. Morehouse, pres., 681 So. Catalina St., Los Angeles, Calif.

Officers: Frank C. Morehouse, pres.; A. J. McQuatters, v. p.; Rich. F. Parker, sec.-treas.; with Alex. Coldbath and Thos. Homer, directors.

Inc. 1920, in Delaware **Cap.** $1,000,000; par $1; 150,000 shares issued.

Property: 114 claims, 2,300 acres, in Harrisburg district, Washington county, adjoining Silver Reef Cons. Claims cover about 4 miles of the ore-bearing sandstone (or reef) and include several mines that were early-day producers; ore exposures show 8 to 25 oz. of silver.

Reported September, 1921, that active development is contemplated in near future.

UTAH STANDARD MINES CO. **UTAH**

Address: H. C. Hansen, Logan, Utah.

Officers: H. C. Hansen, pres.; Oscar Borkman, v. p.; O. W. Hansen, sec.-treas.; with A. W. Hyer, Chas. G. Hyde, Wm. Cook and Chas. W. Hansen, directors.

Inc. Sept. 19, 1916, in Utah. **Cap.** $10,000; par 1c; 416,601 treasury shares; assessable, but only when sanctioned by 2/3 of outstanding shares. Transfers made at Logan. Annual meeting, 2nd Monday in June.

Property: 18 claims, 360 acres, in Cache county, 3 miles E. of Hyde Park and 6 miles N. of Logan, show silver-lead ore, in fissure veins and in limestone-quartzite contact, said to assay 75% lead, 25 oz. silver, $2 gold and 5% copper.

Development: by 2 tunnels, 200 and 1,000′ long, with maximum back of 250′.

Mine in development stage; $4,000 expended in 1920.

UTAH STEEL CORPORATION **UTAH**

Address: Midvale, Utah. M. S. Rosenblatt, gen. mgr.

Inc. 1914, in Utah. **Cap.** $5,000,000, increased from $2,500,000, Sept. 3, 1921; 50,000 shares preferred, par $100 and 50,000 shares common, par $100. New preferred stock offered at par, with bonus of one share common.

Company produced 6,000 tons steel monthly in 1921. Ore comes from mines in Iron county, 21 miles from Lund. Plant to be enlarged to yield 30,000 tons steel monthly, 1922, and railroad built from Lund to mines.

UTAH-UNITED COPPER CO. **UTAH**

Absorbed by **Beaver Copper Co.**, which see. Described in Vol. XIII.

UTAH ZINC CO. **UTAH**

Office: 312 Dooly Bldg., Salt Lake City. **Mine address:** A. A. Wetterstrom, mine supt., Tecoma, Nev.

Officers: F. C. Richmond, pres.; Jas W. Wade, v. p.-mgr.; L. D. Foreman, sec.; M. L. Sowles, treas.; with A. L. Hoppaugh, directors.

Inc. Dec. 1919, in Utah. **Cap.** $400,000; $1 par; 200,000 treasury shares; assessable. Bonds $250,000 authorized, increased in January 1921 from $125,000; $60,000 outstanding. Transfers made at company's office; McCornick & Co., Salt Lake City, registrar. Annual meeting 3rd Sat. in January. Assessments of 10c a share, delinquent, Dec. 19, 1921, and March 11, 1922.

Company owns a zinc-oxide plant at Murray, Utah, 6 miles S. of Salt Lake City, erected at a cost of $400,000 and ready to operate in fall of 1920. The Wetherill process is in use and present capacity is 40 tons per day.

Properties: a silver-lead-zinc mine under lease from the Tecoma Cons. Mng. Co., in the Tecoma district Elko county, Nev., 2½ miles from Tecoma on the S. P. R. R. Was first opened in 1860, and is said to have produced $1,000,000 of high grade silver-lead ore. Orebodies occur as replacements in limestone, and silver-lead ore carrying 30% lead with 8 oz. of silver, 3′ wide, is said to be exposed.

Present management is particularly interested in the lead-free zinc carbonate ores, averaging 20% zinc, which occur in connection with the silver-lead deposits.

Development: by tunnels, 650′ and 850′, with maximum back of 500′; total workings, 3,000′.

Company is also operating in the Erickson district, Tooele county, Utah, and, among other custom ores, will receive shipments of lead-free oxidized zinc ores from mine of the Scranton Leasing Co. at North Lucin, Utah.

Although advertised as buyers of zinc carbonate ores, production of zinc-oxide has not as yet begun.

UTANA MINING CORPORATION **UTAH**

Address: F. H. Evers, sec., 201 Felt Bldg., Salt Lake City, Utah. Assessment of 1c a share levied Jan. 3, 1922.

VALDASIA MINING CO. **UTAH**

Officers John W. Robinson, pres.; E. de Larry, v. p; Patrick J. Henry, sec.-treas., with Wm. Shea, directors.

Inc. in Utah. **Cap.** $25,000; 1¢ par. Columbia Trust Co., Salt Lake City, registrar and transfer agent.

Property: 22 lode claims, 2 patented, 400 acres, in Ohio mining district, Piute county, 5 miles S. W. of Marysvale.

Development: by 400′ shaft, 355′ and 600′ tunnels, said to expose 3 quartz veins. The main tunnel is to be lengthened to 1,200′.

VALLEY VIEW MINING CO. **UTAH**

Address: 4725 S. State St., Murray, Utah. Albert Glover, Jr., sec., Sandy, Utah. Levied an assessment of $2 per 1,000 shares, February 17, 1919.

VERDUN MINING CO. **UTAH**

Address: Box I, Park City, Utah.

Officers: W. J. Buck, pres.; J. L. Kearns, sec.; R. T. Kimball, treas., with C. F. Wherrit, and Geo. Evans, directors.

Inc. 1917, in Utah. **Cap.** $50,000; 5c par; issued 400,000 shares.

Property: 5 claims and lease and bond on three others in Park City district, said to show silver, copper, gold ore in a contact deposit, assaying 2% copper, and 2½ to 12 oz. silver per ton.

Development: 250′ tunnel. Property is a prospect.

VICKSBURG GOLD AND COPPER CO. **UTAH**

Mail returned from Milford, marked "Out of business." Mine was leased June, 1916, to United States Mines Operating Co.

Property: 5 claims in Star district, near Milford, Beaver county, covering 4,000′ of limestone belt cut by ore-bearing fissures.

VICTOR CONSOLIDATED MINING CO. **UTAH**

Inactive. **Mine office:** Eureka, Juab county, Utah.

Officers: J. S. Wells, pres.; A. W. McCune, v. p.; J. A. Groesbeck, sec.; W. S. McCornick, treas., with J. H. Brown, directors. Vivian McCune, gen. mgr.

Inc. 1903, in Utah. **Cap.** $375,000; shares 50c par; all issued; assessable, with 5 assessments levied and fully paid. Stock is listed on the Salt Lake Exchange. Prices; 3-3½c. in 1918; 3-10½c. in 1919; 3-3¼ in 1920, 2-2¾ in 1921, to June.

Property: 5 claims, 38 acres, patented, including the Victor and Ross Tweed mines, carrying gold and lead-silver-bearing copper ore, developed to depth of 800′. The mine has been in the hands of lessees since 1900. Shipments reported to run 7% copper and 8 oz. silver per ton. No recent reports. **UTAH**

VICTORIA CONSOLIDATED MINING CO.

Owned by **Bingham Mines Co**, which see. **UTAH**

VICTORIA GOLD MINING CO.

Care Mrs. R. S. Robertson, sec.-treas., 1706 E. 2nd South St., Salt Lake City, Utah. Dr. A. A. Kerr, pres.; E. W. Hall, v. p.

Property: 8 claims, patented, near Gemini mine at Tintic.

Development: 600′ incline shaft and 400′ tunnel opening up a large body of manganiferous iron ore carrying lead values.

Stockholders' meeting was held in December, 1918, for the purpose of increasing company's capitalization. In 1919, E. J. Raddatz obtained an option on the property and work was reported resumed with a few men.

Reported, fall of 1920, that drifting from bottom of shaft had begun.

VICTOR MINING CO. UTAH

Address: 168 K. St., Salt Lake City, Utah.

Officers: C. R. Greene, pres. and gen. mgr.; Lee Case, v. p.; C. Fred Greene, sec.-treas., with E. C. Davies, Jr., directors.

Inc. in Utah. **Cap.** $20,000; 5c par. Listed on Salt Lake Exchange.

Property: adjoins the Cardiff in the Alta-Cottonwood district. After driving a crosscut work was stopped owing to war conditions. In 1919, the company started development work through the Victor crosscut, to be continued (1921) to cut the limestone-quartzite contact.

Property: examined by J. Fewson Smith, R. M. Crocker and H. Hirst.

VIPONT MINING CO. UTAH

Address: W. A. Wilson, sec.-treas., 406 Dooly Block, Salt Lake City, Utah. **Mine address:** Oakley, Idaho.

Property under bond and lease to **Vipont Silver Mng. Co.**, which see for description.

VIPONT SILVER MINING CO. UTAH

Mine address: Frank Wardlaw, gen. supt., Oakley, Idaho.

Property: 52 patented claims, 920 acres, in Ashbrook district, N. W. corner of Boxelder county, held under bond and lease from Vipont Mng. Co. (q. v.), includes the old Vipont mine. The ore is a replacement deposit in siliceous black limestone, carrying native silver and sulphide, the latter predominating; ore is largely of milling grade. Mine has been known for over 50 years and has been a considerable producer.

Development: by a 1,600′ main adit and total workings of 10,000′. In 1921, new tunnel was 650′ long and expected to cut mineralized zone April or May, 1922, at 700′ depth, connecting with shaft being sunk from "A" level.

Ore Reserves: said to have a large tonnage of ore, assaying 20 oz. silver and $1.80 gold per ton.

Equipment: includes 300-h. p. engines, compressor 4,200′ aerial tram, etc. A flotation mill, built in 1919, is being enlarged to 175-tons daily capacity in 1922. Electric power is used; 250 men employed, 1921.

Production: in 1918, test shipments were made; none in 1919, as mill was under construction. Production for 1920 was approximately $500,000.

VOLUNTEER MINING CO. UTAH

Letters returned from last address. Milford, Beaver county, Utah.

Officers: W. C. Albertson, pres. and gen. mgr.; W. H. Havenor, v. p.; S. G. Cole, sec.; H. E. Havenor, treas., asst. sec. and engr., with Geo. Havecamp, directors, at last account.

Inc. in Utah. **Cap.** $50,000; shares 10c par; non-assessable; issued $25,550. Annual meeting, second Monday in May.

Property: 6 claims, unpatented, 600 acres, in the North Star district, seven miles from the Salt Lake Route. Claims show contact deposits between limestone and intrusive porphyry. The mine has only two 12′ pits and a 70′ tunnel. Company reported in 1916-17, operating a lease on the north end of the Lakeview Mining Co.'s property. No later information.

WASATCH BONANZA MINING CO. UTAH

Officers: Burdell Davis, pres., Provo, Utah; Wm. Davis, v. p.; Brigham Johnson, sec.-treas.; J. M. Buckner, Geo. A. Storrs, directors.

Inc. May, 1916, in Utah. **Cap.** $10,000; 1c par.

Property: 4 claims, the Mayflower group in Decker Canyon, near Charleston, Wasatch county, Utah. No recent information.

WASATCH MINES CO. UTAH

Office: 713 Judge Bldg., Salt Lake City, Utah. **Mine office:** T. W. Blake, supt., Alta, Salt Lake county, Utah.

Officers: A. H. Cowie, pres.; A. C. Ellis, Jr., v. p.; W. O. Williams, sec.-treas., with H. G. Williams, W. S. Cooper and L. K. Cowie, directors **Inc.** Feb. 8, 1913, as a merger of the Columbus Consolidated Mining Co., Flagstaff C. M. Co., and Superior-Alta Mining Co. **Cap.** $1,000,000; shares $1 par; issued 358,905 shares; assessable, limited to two 5c levies a year. Consolidation of these properties was effected on the basis of 160,000 shares for Columbus Consolidated Co., 100,000 shares for Flagstaff Co., and 40,000 shares for Superior-Alta. Stock is listed on the Salt Lake Stock Exchange. McCornick & Co., Salt Lake City, registrar. Annual meeting, second Thursday in June.

Property: 60 claims, 40 patented, about 900 acres, and millsites at Tanner's Flat and at the mouth of Little Cottonwood canyon, on the E. flank of the Wasatch mountains.

Geology: claims show a number of fissure veins cutting through limestone, shale and quartzite; also numerous bedded and contact deposits between limestone and quartzite. The bedded deposits contain the principal orebodies, which range from 30 to 100′ in width, several hundred feet long, and carry up to 11% copper, 18% lead, 15% zinc, 66 oz. silver and $4 gold per ton. Outside of the shoots the ore is generally pockety and mainly below payable tenor.

The Flagstaff group carries several ore channels, one of which is traceable 2,000′ and developed by 5,000′ Tom Moore tunnel. This tunnel also cuts 6 smaller veins and has a 450′ crosscut to the N. E., with about 13,000′ of workings. Other workings include the 500′ Burgess tunnel 1,200′ Burnswood tunnel, 1,200′ Flagstaff tunnel, and the 700′ Flagstaff shaft The mine was a notable producer of silver-lead carbonates in early days

The Columbus Consolidated group shows a vein, known as the Braine fissure, of about 12′ average width, opened by 2 tunnels, 1,250′ apart, on practically the same level.

Development: by long drainage tunnel costing several hundred thousand dollars and about 3 miles of workings, all above the tunnel level. Work above the tunnel level proved disappointing and the management has concentrated all energy on the deep drainage tunnel, which will make deep mining easy and profitable: the tunnel is from a few hundred up to 1,500′ below other properties in the district.

In 1920, a crosscut was driven from drainage tunnel for 500′ to intersect the Cardiff contact; from here a 140′ raise connects with the Columbus 400′ level, unwatering the workings. Reported that good ore was exposed at the contact.

Company, in June, 1920, sued the Cabin Mining Co., alleging that ore to the value of $15,000 had been illegally extracted by the latter from Wasatch ground.

A Pelton water wheel works under a head of 494′, developing 660-h. p. which is transformed into electricity and carried to the mine by a 4½-mile transmission line. At the mine there are four 25-h. p. hoists good for 600′ each, 10-drill Nordberg and two 5-drill Ingersoll-Sergeant air compressors, a machine shop and a sawmill.

The 150-ton concentrator is equipped with a Gates gyratory crusher, 2 sets of Rogers rolls, six 3-compartment jigs and 7 Wilfley tables, the mill putting about 4 or 5 tons into 1. A cyanide unit was installed in 1915

Small shipments were made in 1918 and 1919, but in 1920 only development work done; shipping regularly for first time in 1922.

Production:

	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb	Zinc, lb
1921.....	11.84	20,082	62,160	54,881	73,708

The gross yield was $23,536, with total expenditures, $25,244. Company derives sufficient funds to cover operating expenses from the

sale of electric power and compressed air to most of the mines in the district.

WASATCH UTAH MINING CO. **UTAH**

Dead. Company probably out of business as mail was returned, 1919 from former addresses: Kearns Bldg., Salt Lake City, and mine office, R. D. No. 4, Sandy, Utah. Fully described in Vol. XIV.

WEDGE GOLD MINING & MILLING CO., THE **UTAH**

Mine address: Marysvale, Utah.

Office: M. L. Grovenor, 1134 W. 7th South St., Salt Lake City, Utah.

Officers: E. P. Mowers, pres.-gen. mgr.; N. W. Sonnedecker, v. p.; M. L. Grovenor, sec.-treas., with E. J. Schenck and K. D. Schenck, directors.

Cap. $300,000; shares $1 par; all outstanding. Assessment No. 2, of ½¢ levied Dec. 10, 1920.

Property: near head of Bullion canyon, 10 miles S. W. of Marysvale, Piute county. Mine contains a gold-bearing quartz fissure vein in latite; dip 15° S. E., strike N. E.-S. W. Orebody varies from ½" to 20" in width. Mine has been developed and worked chiefly under lease. Workings include a shaft 400' adit and 200' of drifts. Shipments are of high-grade ore only.

Shipments of very rich gold ore were made by lessees in 1918 and 1919. No information since 1920.

WESTERN MINING & MILLING CO. **UTAH**

Is a subsidiary of the Homestake T. & C. Co., which see.

Officers: J. H. Hurd, sec., 219 Douglas Ave., Salt Lake City. Controlled by John B. Taylor, 521 Atlas Block, Salt Lake City, Utah. E. D. Haskins, v. p.

Inc. 1897, and reorganized 1905 in Utah. **Cap.** $300,000; shares $1 par; assessable, with 2 assessments levied; issued $200,000. Is a close corporation, having only 9 shareholders.

Property: 20 claims, 19 patented, 215 acres in the Pine Canyon section of the Bingham district, on the western slope of the Oquirrh Mountains. The claims are developed by numerous tunnels, and show the same limestone beds, cut by mineralized fissures, which have made the bonanza orebodies of the Utah Cons. and other properties on the east side of the range.

WESTERN MONITOR MINING CO. **UTAH**

Address: Salt Lake City, Utah. Assessment of ½¢ a share delinquent, Oct. 10, 1921.

WESTERN PACIFIC COPPER CO. **UTAH**

Office: care Wilson Bros., Brooks Arcade, Salt Lake City, Utah. **Mine office:** Callao, Juab county, Utah.

Officers: E. J. Yard, pres.; Jackson H. McChrystal, v. p. and gen. mgr.; Elroy M. Clark, sec.-treas.

Property: 320 acres, adjoin the Western Utah Copper Co., in the Willow Springs division of Deep Creek district, Tooele county, just over the Juab county line.

Development: by a shaft and 2 tunnels, 400' and 1,200' long, developing ore averaging 13% copper, 23% lead and 22% iron, with small silver and gold content. In 1914 a rich strike was reported in a south drift run from the bottom of the 250' shaft. The vein is said to be 15' wide and a 100-ton sample ran 24.4% copper. Occasionally small shipments of ore have been made.

Equipment: includes steam plant and air compressor.

WESTERN PACIFIC MINES CO. **UTAH**

Property: 12 claims at Crater Island, 25 miles S. of Lucin, said to show a 5' copper-gold-silver vein. Developed by several shafts, deepest 80'.

Examined, 1919, by A. G. Burritt, Salt Lake City.

WESTERN UTAH COPPER CO. **UTAH**

Office: Boston Bldg., Salt Lake City, Utah. **Mine address:** Owen F. Brinton, Gold Hill, Utah.

Officers: Edward W. McDuff, pres.; Louis Lescault, v. p.; Frank G. Rowley, treas., Room 92, 15 State St., Boston, Mass.; Geo. R. Ramsdell, sec., with Thos. H. Tarbox, Chas. G. A. Pfitsch, Wm. K. Tooele, Lucius H. Newell, Geo. A. Cumming and Max Wunsch, directors. Duncan MacVichie and Sam M. Soupcoff, cons. engrs.

Inc. 1906 in Nevada. **Cap.** $2,500,000; $1 par; all issued. Guaranty Trust Co., New York, transfer agent; Bankers' Trust Co., New York, registrar.

Property: 5 groups of claims, a mill site, and 360 acres ranch land, a total of 716 acres, covering the Gold Hill, Yellow Hammer, Calaveras, Tuolumne, and Ochre groups, and the Redding Springs ranch, valuable for water.

The properties are situated in the Clifton district, Tooele county, reached by the Western Pacific and Deep Creek railroads, about 167 miles S. W. of Salt Lake City. Examined in 1917 by F. R. Weekes.

Geology: the Gold Hill claims cover a granite-limestone contact, with replacement deposits in limestone, 10-80' wide and 300' long. See "Economic Geology" for June, 1918.

Development: 700' Gold Hill shaft recently sunk from 300' level. Ore on 300' level assays about 5½ oz. silver, 13% lead, and 2% copper. On the 700' level, the vein is 62' wide. Ore is mined by shrinkage stopes, 300' to 150' levels.

The Calaveras and Yellow Hammer groups commenced shipping in 1919. The product from these groups is gold-copper-silver ore, with considerable tungsten.

A 100-ton mill, erected at Gold Hill, a mile from the Gold Hill and 3 from the Yellow Hammer mine treats low grade ore. Smelter shipments averaged about 100 tons ore daily during 1919 and 1920.

Production: shipments of 300 tons a day were made in 1921, ore being largely scorodite, containing 2-3% lead and a few ounces of silver. Company has contract for 100 tons daily of silver-lead ore to go to A. S. & R. Co.

WESTERN UTAH EXTENSION COPPER CO. UTAH

Address: A. E. Custer, mgr., Walker Bank Bldg., Salt Lake City, Utah, or Gold Hill, Utah.

Officers: P. S. Chambers, pres.; D. A. Rees and A. R. Custer, v. p.'s; F. A. Duerr, sec.-treas., with John Pingree, directors. C. L. Glass & Co., Pittsburg, Pa., fiscal agents. B. T. Haywood, supt.

Inc. in Delaware. **Cap.** $2,500,000; $1 par. Stock transferred at company's office.

Financial statement for year ending June 24, 1918, showed total assets of $2,652,441, of which property and development comprised $2,518,615.

Property: 15 claims, about 250 acres, at Gold Hill, Utah, adjoining the Western Utah Copper mine, in the Clifton district, Tooele county. Examined in 1917 by F. R. Weekes. Mine is said to contain a well defined fissure in limestone and granite, over 5,000' long.

Development: by 2,500' tunnel work and 300' Moguf shaft, with good ore in drift on vein on 300' level.

WESTERN ZINC CO. UTAH

Probably dead. Was organized to operate a lease on the Lakeview Mining Co.'s property on Promontory Point, Utah, in 1916.

WEST MERCUR MINES CO. UTAH

Mine permanently closed and equipment removed. **Address:** E. J. MacNamara, pres., 11 Br adway, New York.

WEST TOLEDO MINES CO. UTAH

Office: 146 S .West Temple St., Salt Lake City. **Mine office:** Alta, Utah.

Officers: A. L. Hurley, pres.; J. A. Foley, v. p.; E. W. Hulse, sec.-treas., with A. O. Jacobson and P. M. Magregor, directors. J. A. Foley, mgr.

Cap. $50,000; 10c par; outstanding 452,000 shares; assessable. Assessment No. 13, of 1c, levied March 10, 1921. Listed on the Salt Lake Stock

Exchange. Shares 2c-11c in 1918; 3c to 14c in 1919; 2½-12c in 1920; 1¾-5c in June; 1¢ in Sept., 1921.

Property: 11 claims in the Little Cottonwood district, Salt Lake county.

Development: chiefly by the Superior and Frederick tunnels which are to be extended to cut several known mineralized veins. The Frederick tunnel is over 3,000′ long. Grade of ore so far found is reported to be low. Property is in a line with Cardiff and South Hecla in both of which the overthrust contacts have proven ore bearing.

WHIRLWIND CONSOLIDATED MINING CO. **UTAH**

Office: 400 W. 7th St., Salt Lake City, Utah; Harry Kreuse, supt., American Fork, Utah.

Officers: Chas. Tyng, pres.-mgr.; Frank K. Nelson, sec.

Inc. April 24, 1916, in Utah. **Cap.** $250,000; shares 25c par; 800,000 shares issued. Listed on Salt Lake Exchange. Shares 1c-5c in 1918; ¾c-2¼¢ in 1919; ¼¢ in 1920; ¼-¾¢ in 1921. Assessment, 3 mills a share, delinquent Nov. 15, 1921.

Property: 7 claims, unpatented, 110 acres, in the American Fork mining district, adjoining the Miller Hill on the West, 20 miles from a railroad. said to show silver-lead ore.

Development: by 2 tunnels; one 1,000′ long was reported to have cut some lead carbonate ore at 760′ in.

Installation of machinery and power was planned and stock offered public for 7c a share in May, 1916. No recent information, presumably inactive.

WHITE STAR MINING CO. **UTAH**

Dead. Merged with Selma Mines Co., Sept. 1921, shareholders receiving 2 shares Selma stock for each 3 shares White Star stock held.

Officers: J. C. Jensen, pres.; P. A. Sorensen, v. p.; Emma C. Shepard, sec.; Bernard Rich, treas., and Harry Rich, directors.

Inc. 1898, in Utah. **Cap.** $30,000; shares 10c par; assessable; with several assessments levied.

Property: 4 claims, patented, 80 acres in Tintic district, 3 miles from Eureka, the nearest rail point. The mine has a 100′ shaft and 100′ tunnel.

Company optioned a new property in the North Star district, Beaver county, on which a compressor, hoist and other electrically driven equipment were installed, 1917.

The White Star mine in the Silver Island district, Western Tooele Co., is near the Kentucky-Douglas, Western Utah and Gethin Leroy mines.

WIG MOUNTAIN MINING & MILLING CO. **UTAH**

Officers: George A. Storrs, pres., American Fork, Utah; George A. Brown, v. p.; J. W. Storrs, sec.-treas., John Curzon, and Jos. Thurgood, directors; F. Jardine, supt.

Inc. May, 1916. **Cap.** $1,000,000; shares 1c par.

Property: the Jumbo group, 7 claims, on Wig mountain. Is a lead-silver prospect which was being developed in August, 1917. No recent returns received.

WILSON CONSOLIDATED MINING CO. **UTAH**

Offices: 208 Brooks Arcade Bldg., Salt Lake City, Utah, and Wendover, Tooele county, Utah. Clyde H. Wilson, pres.; Frank L. Wilson, sec.-treas.

Property: located in the Clifton section of Deep Creek district, Tooele county, 45 miles from Wendover, was the only mine in the U. S. which shipped bismuth ore in 1914. Reported to have shipped one 25-ton lot of 8% bismuth ore carrying gold and silver. Ore was hand jigged to bring shipment up to 20%.

WILSON'S BINGHAM CONS. MNG. CO. **UTAH**

Address: Robert E. Mark, sec., Room 902, Kearns Bldg., Salt Lake City, Utah.

Shares made assessable by stockholders vote, Nov. 21, 1921; assessment of ½c a share delinquent, Dec. 22, 1921.

WOLF MOUNTAIN COPPER CO. UTAH

Office: C. A. Harker, 705 Eccles Bldg., Ogden, Utah.

Officers: C. A. Harker, pres.-treas.; P. M. Parry, v. p.; with C. R. Cole, R. A. Eliason, and A. A. Allen, directors. S. A. Holmes, sec.

Inc. Jan. 31, 1914, in Utah. **Cap.** $100,000; 10c par; assessable; 502,594 shares issued. Assessment No. 9, ½c a share, called, August, 1919.

Property: 640 acres, in Paradise district, 19 miles S. of Hyrum, Cache county, said to show a N.-S. fissure vein in quartzite, 45' wide, dipping 37°, and carrying ore assaying 4½% copper, 1 oz. silver, and .01 oz. gold per ton. Examined by W. F. Mitchell, Don Maguire, J. T. Bacon and J. G. Lind.

Development: by four tunnels totaling 930' of work; 33,000 tons of ore reported blocked out.

Small shipments of copper ore made in 1918; no later information; presumably inactive.

WOODLAWN COPPER MINING CO. UTAH

Office: Room 404, Boston Bldg., Salt Lake City, Utah. Mine near Brighton, Salt Lake county, Utah.

Officers: H. W. Lawrence, pres.; E. S. Hills, v. p.; George N. Lawrence, sec.-treas.; W. J. Lawrence, mgr., with C. R. Long, directors.

Inc. 1899, in Utah. **Cap.** $700,000; shares 10c par; assessable. Listed on Salt Lake Exchange. Assessment No. 4 of 1c, levied Oct., 1921.

Property: 7 claims, patented in the Big Cottonwood district, 18 miles from a railroad, show lead, zinc, silver and copper ore, whose value is mainly in lead.

Development: to 700' level, by main tunnel, 1,650' long. There are also several shorter tunnels. Various fissures cut by the main tunnel are explored by drift raises, etc., and good ore sacked and shipped.

During 1920, ore was followed on the 700' level, 200' below the main tunnel, and 3-6" of 405 oz. silver ore cut in fissure No. 2, in raise between 500' and 600' levels.

Production: was reported for 1918, 1919, 1920 and 1921. Bonanza ore reported, 1921, 3,929 lbs. yielding $698, and ore shipments started.

WOODMAN MINING CO. UTAH

Mail returned from Gold Hill, Tooele county, Utah.

E. F. Woodman, pres.; T. J. Midgley, sec.

Property: the Frankie group, 2½ miles S. of Gold Hill, said to show low-grade copper ore.

Ore: occurs in a granite-limestone contact, and the ore will, it is said, average 2% copper, $1.20 gold, 2 oz. silver.

Development: by extensive tunnel work and a shaft. In 1918, production was about 2,000 tons, and net production about $30,000; company was a producer in 1919 also.

Company also owns the Cane Springs mine S. W. of Gold Hill, and the Alverado group E. of the town. In both groups a gold-bearing calcite vein occurs in the granite-limestone contact. The two mines have, it is said produced $270,000. Seven men are employed at the Cane Springs mine.

YANKEE CONSOLIDATED MINING CO. UTAH

Office: 308 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county.

Officers: A. W. Vosburg, pres.; G. L. Bemis, v. p.; A. E. Canfield, sec.-gen. mgr. Lew Merriman, supt.

Inc. July 8, 1898, in Utah. **Cap.** $1,000,000, increased in 1908 from $500,000; shares $1 par; assessable; all issued; listed in Salt Lake City. Has paid dividends of $192,500; last dividend paid in February, 1913, 1c. per share.

Property: 134 acres on Godiva Hill, Tintic district, includes the Yankee, Mountainview and Lakeview mines, lying between the Beck Tunnel and Uncle Sam Consolidated on the south and May Day on the north.

Ore: silver-lead-zinc with some gold. Country rock is limestone and porphyry. For geology of Tintic District, see U. S. G. S., Folio No. 65.

Development: by tunnels and shafts, deepest 1,800′. Recent work has been mainly on the 1,500′ level. Lessees are working part of the property

Company does not reply to requests for information.

Shipments amounted to about 2,000 tons of ore in 1916; 1,500 in 1917 and in 1918, about 300 tons in first half of 1919.

No recent returns.

YELLOW CIRCLE MINING CO. **UTAH**

Address: Howard W. Balsley and John Hill, Moab, Utah; or C. W. Wright, mgr., Cane Springs, Utah.

Company owns a number of carnotite bearing claims showing unusually rich uranium content.

Property: in operation during summer of 1921 and shipping ore to Keystone Metals Reduction Co. of Pittsburg, Pa. A carload shipped in Jan. 1922, averaged 5% uranium oxide, returning $8,000, or at rate of $3.75 per pound for uranium content.

YELLOW JACKET MINING CO. **UTAH**

Address: F. B. Cook, sec., Columbia Trust Bldg., 125 S. Main St., Salt Lake City, Utah.

Assessment No. 2 of 1/10 of a cent per share levied, Dec. 29, 1921.

YOSEMITE MINES CO. **UTAH**

Controlled by **Bingham Mines Co.**, which see.

ZUMA MINING & MILLING CO. **UTAH**

Address: Eureka, Juab county, Utah.

Officers: P. J. Fennell, pres.; W. F. Shriver, v. p.; F. D. Kimball, treas.; H. D. Shriver, sec., with Jas. Knowles and Rasmus Nelson, directors. A. C. Nebeker, supt.

Inc. 1907, in Utah. **Cap.** $500,000; shares 50c par; 698,514 shares outstanding; assessable; last assessment, delinquent, March 28, 1921. Reported August, 1919, that company had spent $70,684 since starting operations, May 1, 1916. For the fiscal year ended July 14, 1920, total disbursements were $27,733; total indebtedness on this date was $22,309. Stock listed on Salt Lake Exchange.

Property: 6 claims, 4 patented, in the East Tintic district, near the Crown Point and Iron King mines, said to carry gold-silver-lead-zinc ore.

Development: by 1,200′ shaft and a 300′ winze from the 500′ level, also 1,000′ of tunnels. Extensions for 12 months up to July, 1920 were 898′, confined to the 800′ level.

Equipment: includes hoist, engine, and compressor.

VERMONT

No gold, silver, lead, copper or zinc ore, was mined in 1920, or 1921.

Production for the State in 1918 amounted to 49,772 tons copper ore yielding 4.02 oz. gold, 3,440 oz. silver and 1,116,384 lb. copper; in 1919, 22,320 tons yielded 18.24 oz. gold, 2,214 oz. silver and 582,561 lb. copper.

ELY COPPERFIELD ASSOCIATES **VERMONT**

Address: 30 E. 42nd St., New York. **Mine office:** West Fairlee, Vt.

Officers: H. W. Bennett, pres.; W. L. Hogg, v. p.; Tom W. Bennett, sec.-treas.; above are the directors. K. A. Schleifer, mgr.

Inc. March 1, 1917. **Cap.** $250,000; $100,000 pfd.; $150,000 common stock; $100 par; non-assessable; all outstanding.

Statement of February, 1919, gives $80,000 gross earnings during previous 6 months, and operating expenses of $75,000.

Property: the Copperfield or Ely mine, 1,200 acres at West Fairlee, Vt. This is the deepest mine in the State, discovered in 1821, and known for many years as the Vermont copper mine. Geo. Westinghouse acquired it

in 1899, and the present company bought it from the Westinghouse estate in 1917.

The ore consists of magnetic pyrite and chalcopyrite occurring in lenticular masses in hard quartz-mica schist. The orebody last worked by present management being 10′ to 20′ thick, 50′ to 100′ long, and opened for 500′ on its dip. The average assay was 4½% copper. The low grade material on the dumps said to assay 1.5-2% copper.

Development: by 4,500′ inclined shaft. A 100-ton flotation plant was erected in 1917-'18.

Production: 350,000 lb. of copper in 1918. The mine is idle at present and full of water, awaiting better prices and demand for copper.

ORANGE COUNTY COPPER MINE — **VERMONT**

Address: Strafford, Orange county, Vt. J. B. Reynolds, mgr. and principal owner, 55 N. Main St., Rutland, Vt. Lovat Fraser, engr.

Property: mining rights on 900 acres, near the Elizabeth mine, 13 miles from the Boston & Maine railway. Tract carries a lenticular orebody, conforming to dip of the country rocks, which include gneiss, under garnetiferous mica-schist and above hornblende-schist, with strike of west of north, and average dip of about 45°. The lens, of 40′ extreme width, but not mineralized for the full width, is traceable 4,000′ on the property. Ore carries chalcopyrite, disseminated in massive pyrrhotite, averaging 2% copper.

Development: by 110′ incline shaft, with about 70′ of laterals on the 100′ level.

Equipment: includes steam boilers, a 3-drill air compressor and several mine buildings. Geology is described, Bull. 455, U. S. Geol. Survey. Idle

PIKE HILL MINES CO. — **VERMONT**

Address: Corinth, Orange county, Vt.

Officers: John H. Allen, pres.; John J. Coakley, sec.-treas.; with C. A. Andrews, George Marshall and D. S. Conant, directors; H. G. Hunter, mgr.

Inc. Jan. 9, 1906, in Vermont. **Cap.** $200,000; $100 par; outstanding $160,300.

Property: 186 acres, freehold, in the Corinth district, 14 miles from the Boston & Maine railway, shows mica-schist carrying lenses of chalcopyrite disseminated in pyrrhotite, of 2% estimated average copper tenor. The mine was worked in a small way at intervals during the nineteenth century.

Development: by 500′ incline shaft and tunnels.

Equipment: hydro-electric power and 100-ton flotation plant.

Production: 131,911 lb. fine copper in 1905; 304,377 lb. copper and 1,698 oz. silver in 1906; 425,367 lbs. copper and 2,292 oz. silver in 1907. Inactive from November, 1907, until October, 1915, when experiments with the flotation process were started. Shipments from October, 1915, to January, 1916, about 210 tons, claimed to run 10% copper and 1 oz. silver per ton. In 1918, mine produced 509,654 lb. copper and 2,056 oz. silver.

The mine was closed early in 1919, after some concentrates had been shipped.

VERMONT COPPER CO. — **VERMONT**

Office: 50 E. 42nd St., New York. **Mine office:** South Strafford, Orange county, Vt. A. Heckscher, pres.; G. E. Parks, sec.; N. O. Lawton, gen. supt.

Inc. 1906, in Arizona. **Cap.** $1,000,000. Is successor of Elizabeth Copper Co., and later took over the Strafford Mining Co. and the Sharon Power Company. On account of low price of copper, operations ceased May 1, 1919, and company was put in hands of Ralph E. Pierson, Bethel, Vt., as receiver.

The property was purchased at bankruptcy sale, February, 1920, by the Anahma Realty Corp., 50 E. 42nd St., New York City, and presumably controlled by Heckscher interests.

Property: the Elizabeth and Foster copper mines, 9 miles from Pompanoosuc, Windsor county and 10 miles from Sharon, the nearest rail sta-

tion. The Elizabeth mine was opened 1793, to get pyrrhotite with which to make copperas and at one time had quite an extensive plant for roasting the ore, leaching and making copperas. Early in the nineteenth century the Vermont Copperas Co. operated the mine and is said to have made as much as 6,000,000 lb. of copper yearly, beginning with a small incidental production of copper about 1830, when it was found that the ore carried an average of about 3% copper as chalcopyrite disseminated in pyrrhotite. Six different smelters have been built on the property at various times, the last one in 1916, for pyritic smelting.

Geology: a lens of pyrrhotite ore, wedging out at the bottom, and followed by another lens, occurs in foliated quartz mica-schist. The orebody has been mined for 700′ and opened up for more than 2,000′ in length, ranging from 15′ to 60′ in width. Management estimates upwards of 500,000 tons of ore in sight, consisting of pyrrhotite carrying chalcopyrite, and with average assay of 2¼% copper. Diamond-drill borings, made 1909-1916 show ore in new lens at 250′ depth below the present workings.

Development: by 800′ tunnel with back of 225′, and an 810′ inclined blind shaft, with over 3,000′ of drifts. The dumps carry about 50,000 tons of discarded ore, a large part of it said to average 1.75% copper.

A 500-h. p. hydro-electric power station on the White river, transmits current 9 miles to the mine and works. There also is a small steam plant and an air compressor at the mine. Electric haulage is used underground.

After an idleness of several years the property was reopened in 1916, the smelter remodelled for pyritic smelting and the mill equipped for flotation work. Metallurgically, the smelter operated successfully under the supervision of Prof. George A. Guess of the University of Toronto, but operations were discontinued on account of the cost and trouble of hauling fuel and flux to the smeltery.

The flotation process worked successfully on this ore. The ore is a heavy pyrrhotite carrying disseminated chalcopyrite and assays about 2.25% copper The mill produced concentrates assaying 18 to 22% copper, with tails running from 0.2% to 0.3%. The daily capacity of the mill is 200 tons. Hardinge mills are used for grinding and Callow cells for flotation.

Production: in 1918, 300,000 lb. copper, and 35 oz. silver.

VIRGINIA

ALLEGHANY ORE & IRON CO. **VIRGINIA**

Address: care H. B. Spackman, pres., Buena Vista, Va.; Arcade Bldg., Philadelphia, Pa.; and Coatesville, Pa. The Lukens Steel Co. owns entire capital stock.

Inc. 1902 in Va. **Cap.** $1,000,000 6% pfd. and $2,000,000 com.; par $100; $875,000 pfd. and $1,225,000 com. outstanding.

Property: iron ore mines at Oriskany, Va., having an annual output of 125,000 tons. The iron furnaces have an annual output of 80,000 tons.

AMERICAN RUTILE CO. **VIRGINIA**

Address: 622 F. St., N. W. Washington, D. C. W. M. Slater, pres.

Inc. in Virginia. **Cap.** $100,000; $100 par; issued $97,500.

Property: 550 acres at Roseland, Nelson county. The rock is composed of feldspar, quartz and hornblende. As mined, it contains 4% rutile and 4% ilmenite. Opencut methods are used.

Equipment: includes power and milling machinery to handle about 100 tons daily, also a 2,500′ aerial tram. The mill is equipped with crushers, stamps, Dorr classifiers, tables, and a magnetic separator.

Production: 260 tons of rutile concentrate in 1918 was sold for $39,150, and 444 tons ilmenite concentrate for $11,100: in 1919 (to August) output was 102 tons of rutile concentrate carrying 94-96% titanic oxide, valued at $20,400, and 106 tons ilmenite concentrate, carrying 48-50% titanium oxide, valued at $2,120.

ARMINIUS CHEMICAL CO., INC VIRGINIA

Operated by the Grasselli Chemical Co.

Office: 1400 Guardian Bldg., Cleveland, O. **Mine address:** T. McGovern, mgr., Mineral, Louisa county, Va.

Officers: E. R. Grasselli, pres.-treas.; E. W. Furst, v. p.; E. R. Bailey, sec.

Cap. $10,000.

Property: an iron pyrite mine, showing a large lens of pyrite in ancient schistose rocks.

Equipment: 350-ton concentrating mill, steam power, hoist, compressors.

BERTHA MINERAL CO. VIRGINIA

Subsidiary of the New Jersey Zinc Co.

Office: 160 Front St., New York. **Mine addresses:** W. O. Borcherdt, supt., Austinville, Va.; L. B. Womelsdorf, supt., Cartersville, Ga. and Angel, Ala.

Officers: same as parent company.

Property: at Austinville, Wythe county, shows a disseminated deposit in limestone of zinc, lead and iron sulphides. Is equipped with a concentrator and zinc oxide furnaces.

Company also controls and operates surficial barytes deposits at Cartersville, Georgia and Angels, Alabama.

CABIN BRANCH MINING CO. VIRGINIA

Described in Vol. XIV. Closed down and equipment removed.

CRIMORA MANGANESE CORPORATION VIRGINIA

Office: Widener Bldg., Philadelphia, Pa. and Crimora, Augusta county, Va. Controlled by United Chemical & Industrial Co.

Directors: Geo. C. Allen, pres.; Geo. Burnham, Jr., v. p.; Walter Whetstone, sec.-treas.; A. M. Yonge, gen. mgr.

Inc. Sept. 29, 1914, in Virgina. **Cap.** $1,000,000; shares $100 par; all outstanding. **Transfer office:** Security Transfer & Registrar Co., New York. Annual meeting, last Monday in September.

Bonds: authorized and issued $500,000 1st mtge, 6% sinking fund gold bonds, due 1929.

Property: 946 acres, including the Crimora mine, 2 miles east of Crimora station, on the Norfolk & Western R. R. The mine was first opened in 1867 and acquired by present company in 1914. Deposit consists of manganese-ore masses of various sizes scattered through a clay basin, ½ mile long, several hundred yards wide and 200' deep. The ore is hard and consists of psilomelane and pyrolusite. Percentage of ore to clay varies considerably, from 2 to 20% of ore to the clay by volume. Ore assays 42 to 48% manganese. (See U. S. G. S. Bull., No. 427, pp. 58-61, pp. 101, 270.)

Development: formerly by underground workings, now done with two No. 36 Marion steam-shovels. Management claims 1,000,000 tons ore proven, with probable reserves of 3,000,000 tons.

Equipment: electric power, and a 200-ton mill, which started operating in June, 1916. Management anticipated a yearly production of 15,000 to 25,000 tons ore.

The property was closed down, March, 1919; operations were reported resumed, April, 1920. No production figures available.

Company was awarded $76,616, or 16% of their original claim, December, 1920, by the War Minerals Relief Commission.

In August, 1919, A. W. Blakemore, of 40 Central St., Boston, attorney for the minority bondholders committee advertised that those who wished to know what was being done and to understand the effect of the injunction against the present management, should communicate with him.

DURGY MINE VIRGINIA

Being operated by T. G. Pool and associates of Virgilina, Va.

Property: 1,500 acres in Person county, North Carolina, shows copper ore occurring as chalcocite and bornite in a fissure in greenstone schist.

Development: by 515′ shaft is reported to have blocked out 100,000 tons of 2% copper ore.

Equipment: includes hoist, compressor and pump with steam, air and electric power. Company reports having built 4½ miles of standard gauge railroad to property, and plans drawn for a 200-ton flotation plant.

GOONEY MANOR COPPER CO., INC. — **VIRGINIA**

Address: Front Royal, Warren county, Va.

Officers: Hugh E. Naylor, pres., gen. mgr. and purch. agt.; Lewis E. Cooper, v. p.; S. M. Chiles, sec.; Geo. H. Bowman, treas.; preceding officers, H. C. Sheetz, N. S. Waller, S. R. Millar, J. S. West, A. J. Sager, H. R. Kern, directors.

Inc. July 12, 1909, in Virginia. **Cap.** $500,000; shares $100 par; issued 3,763. Annual meeting, third Thursday in July.

Property: 84 acres, 5 miles south of Front Royal, reported to carry a fissure vein in porphyry and contact deposits between limestone and porphyry, with generally N. E.-S. W. strike and dip of about 55°. Main orebody is reoprted to average 7′ width, and to be traceable 800′, carrying a little malachite near surface, with chalcopyrite at depth, averaging 5% copper, 1 to 6 oz. silver and $2.50 gold per ton. Orebodies apparently are lenticular.

Development: by a 40′ open cut, a 65′ tunnel and by shafts of 250 and 228′ without laterals, estimated by the company to show 35,000 tons of ore.

Equipment: includes a 150-h. p. steam plant, with a 50-h. p. hoist good for 800′ depth, a 1-drill air compressor, ½ mile standard railroad, 3 complete quarry plants and pumps for water supply. Buildings include a smithy engine house, tool house and dwelling.

A 120-ton mill for crushing alumina was erected in 1917, equipped with crushers and 4 screens.

HELEN ZINC CO. — **VIRGINIA**

Idle. **Address.** S. L. Boggs, Ivanhoe, Virginia.

Property: a zinc mine and small mill near Ivanhoe, Wythe county.

HIGH TOP MINING CORPORATION — **VIRGINIA**

Is successor of the High Top Copper Mining Co. of N. J.

Mine address: Elkton, Rockingham county, Va.

Property: about 1,000 acres in Greene county, Virginia, 10 miles from Elkton, on the Norfolk & Western railway.

Development: by 140′ shaft, with a 30′ crosscut said to show 8′ of rock dotted with bornite and chalcocite, giving assays as high as 7% copper. There also is a 55′ shaft and several shallow pits and open cuts, proving mineralization of the outcrop 3 miles or the entire length of the property. According to J. Boardman Cann, the only money spent on the property since the company acquired it, was for the limited amount of exploration work noted above, plus considerable stripping, open cut and quarry work in an endeavor to prove that the tract is underlain by a mineralized stratum 60′ thick, carrying bornite. Property shows spots and bunches of copper ore and a few tons of selected ore have been shipped, but the mineralized zone as a whole is considered too lean to work at a profit. The property has been visited by various geologists and described in official government reports and the guarded warning given therein should be heeded.

Idle.

HOLLOWAY MINE — **VIRGINIA**

Idle. Owned by Wm. M. Pannebaker estate. Virgilina, Va.

Property: the old Holloway or Eustis mine, 3½ miles S. of Virgilina, Halifax Co., Va., on a spur of the Southern railway. Has a 460′ shaft, and levels at about 70′, 140′, 190′, 290′, 390′ and 445′. The vein is strong, persistent and 3 to 33′ wide, owing to lenticular expansions. The ore is chalcocite in quartz with epidote. About 20,000 tons of hand-picked ore have been shipped; 6,000 tons shipped about 1900, said to have averaged 12%

copper. Is described in detail by Weed in Bull. 455, U. S. Geol. Survey, p. 79, also in Virginia Geol. Survey, Bull. 14, p. 114.

IRISH CREEK TIN MINES, INC. **VIRGINIA**

Address: Wiley S. Young, treas., 200 Causeway St., Boston, Mass. Geo. W. Schultz, supt., Montebello, Nelson county, Va.

Inc. Sept., 1918, in Massachusetts. **Cap.** $100,000.

Property: 300 acres at Irish Creek, Rockbridge county, said to show tin, wolframite, and silver, in a fissure vein in granite. Greatest depth of development is but 40'. **Equipment:** includes 100-ton mill.

Reported in March, 1919, that according to an examination by the U. S. Bureau of Mines, the orebodies are so far disappointing, both as to size and metal content. Of 19 samples taken, 14 gave blank returns, and the remainder, an average of less than 1.5% tin.

KAY MINE SMELTING CO. **VIRGINIA**

Officers: at last accounts, Z. L. Kay, pres.-gen. mgr.; J. R. Wilbourne, v. p.; H. P. Wilder, sec.; H. J. Watkins, treas., and Jas. S. Sebree, directors.

Inc. Aug. 8, 1905, in South Dakota. **Cap.** $1,000,000; $1 par; 525,000 shares paid Z. L. Kay for property; 200,000 issued.

Property: 261 acres, comprising the Kay farm at the N. end of the Virgilina district, 9 miles from South Boston, in Halifax county, Virginia. The tract shows lenticular quartz veins enclosed in schistose rocks formed from old volcanic tuffs and andesite of the type characteristic of the Virgilina district. Veins consist of white quartz and carry primary copper glance below the water level with carbonates, oxides and some native copper in the oxidized zone. One vein varies from 3 to 6' in width and is said to be traceable 1 mile. A recent report tells of 2 veins 10' wide. The future of the entire district, including this property depends upon the use of some cheap method of concentration, which flotation may supply.

In July, 1917, 9 tons sent to Pueblo, Colo., carried 8% copper.

MT. TORY PRODUCTS, INC. **VIRGINIA**

Formerly Mt. Tory Mining Co.

Address: Lyndhurst, Va.

Officers: C. B. Cochran, pres.; C. D. Michalson, v. p.; G. G. Luhman, sec.-treas.; W. D. Cochran, asst. sec., with L. E. Melrin and C. L. Iverson, directors.

Inc. in South Dakota and Virginia. **Cap.** $1,500,000; $10 par.

Property: 8,975 acres in Augusta county, Virginia, said to have a deposit 200' deep, and of variable width, proven for length of 3,000'; manganese ore averages 42 to 45% manganese; manganiferous iron ore 10% iron and 38% iron.

Development: mainly by 7 open cuts, 150' to 900' long, and average width of 45'. Company claims 2,000,000 tons ore blocked out.

Equipment: includes steam hoist, and a mill, also hydraulic system for stripping overburden.

Output to date, 950' tons ore. Company claims to have spent $40,000 in 1918, preparing for 1919 operations, but work ceased on account of signing of Armistice. In March, 1921, mine and mill were reported in operation. The War Minerals Relief Commission awarded the company $11,008, or 25% of the original claim, December, 1920.

NORFOLK SMELTING CO., INC. **VIRGINIA**

Subsidiary of International Minerals and Metals Corp. (q. v.).

General office: 61 Broadway, New York. **Works address:** C. T. Barron, mgr., West Norfolk, Va.

Officers: Otto Frohnknecht, pres.; Jas. C. Colgate, v. p.; Benno Elkan, 2nd v. p.; Jas S. Dennis, sec., with Edw. W. Harden, directors. H. Scherf, treas.

Inc. in New York. **Cap.** $100,000; $100 par. Annual meeting, 2nd Monday in January.

Operates a copper smelter under lease on a royalty basis from the

Virginia Smelting Co., which see, for general description. Smeltery treats copper ores and other copper bearing material, and produces blister copper which goes to Eastern refineries and casting copper for the trade. Capacity is 500 tons of ore per day, with a maximum production of 1,000 tons of blister, or casting copper per month.

ROANOKE ORE & IRON CORPORATION VIRGINIA

Address: E. E. Francy, pres., 315 Stephen Girard Bldg., Philadelphia, Pa.

Capital outstanding, $1,220,000. Par, $1. U. S. Corporation Co., New York City, registrar and transfer agent.

Company, through a subsidiary corporation had a 99 year lease on the Catawba iron property, 8,000 acres of iron, coal and timber land in Roanoke and Botecourt counties, Virginia, the tract being 11 miles long and including the old Harvey iron furnace erected in the 18th century.

Stock originally offered at 70c., boosted on Curb to $1.50, was handled by Bergman, alias Morton, and The Caraher Co., Inc. Was a rank speculation in which the shareholder had little chance. Very unfavorably regarded.

SEABOARD COPPER CO. VIRGINIA

Idle. **Former office:** 77 South Market St., Boston, Mass. **Mine office.** Virgilina, Halifax county, Va.

Officers: Geo. R. Leghorn, pres.; Edward L. Pond, sec.

Inc. July, 1902, in New Jersey. **Cap.** $300,000; shares $1 par.

Property: the Dorothy and Bailey mines, 135 acres, in the Virgilina district, 3 miles from the Southern railroad, shows an 8′ fissure vein in schist, carrying bornite ore, estimated to average 3 to 4% copper, with combined gold and silver values of $1 to $1.20 per ton.

Development: by shafts of 30′, 265′ and 115′, and by 2 tunnels, of 165′ each, with a total of 840′ of workings. The ore occurs in well-defined shoots; the proportion of shipping ore is small, but mine might be profitably worked if flotation is used.

Equipment: includes a 275-h. p. steam plant, with a 25-h. p. hoist, good for 500′ depth, and a 5-drill compressor. There is a 100-ton mill and buildings include an engine house, bunkhouse and office. Company inactive since 1904, but still alive.

SULPHUR MINING & RAILROAD CO. VIRGINIA

Office: Virgilina, Halifax county, Va.

Officers: S. D. Crenshaw, pres.; A. R. Ellerson, v. p.; Thos Armstrong, sec.-treas.; P. H. Haskell, supt.; Mineral, Louisa county, Va.

Property: a pyrite mine whose ore carries low copper content. Has 600′ shaft with steam power, compressor, etc. Ore treated in 500-ton concentration mill. Company makes cement copper from its mine and seepage waters, but is primarily a producer of pyrite for sulphuric acid plants. Is controlled by Virginia-Carolina Chemical Co.

In August, 1919, the mill was making over 100 tons of concentrate daily. Little development was done in 1919, all the ore coming from old pillars as the deposit is nearly exhausted.

UNITED CHEMICAL & INDUSTRIAL CO. VIRGINIA

Address: Widener Bldg., Philadelphia, Pa.

Organized 1918 under a declaration and deed of trust as a holding company. Controls the Crimora Manganese Corp., which see.

UNITED STATES MANGANESE CO. VIRGINIA

Office: 50 E. 42nd St., New York. **Mine address:** Elkton, Va. D. F. Newman, supt.

Property: a tract of several hundred acres on or near Hances mountain, S. E. of Elkton, shows 5′ of manganese ore mostly psilomelane and pyrolusite, occurring disseminated and massive in yellow clay overlying quartzite. Mine has a washer and concentrating tables, and railway running from main plant to N. & W. R. R. No production figures available.

Mines and plant advertised for sale by Trustees at Harrisburg, Va., February 28, 1919.

VIRGINIA-CAROLINA CHEMICAL CO. VIRGINIA

General office: Richmond, Va. **Corporate office:** Jersey City, N. J.

Officers: C. G. Wilson, pres.; E. B. Addison, 1st v. p.; S. D. Crenshaw, v. p.-sec. with N. S. Meldrum, Henry Walters, Harry Bronner, B. Cutler, Lucien Oudin, H. M. Tucker, Alvin W. Krech, C. I. Stralem, S. H. Miller, and S. T. Morgan, Jr., directors. S. L. Carter, v. p.; E. E. Coles, treas.; E. T. Orgain, aud.

Inc. September 12, 1895, in New Jersey. **Cap.** authorized, $38,000,000 com, and $30,000,000 8% cumulative pfd.; increased May 12, 1914, from $20,000,000; shares $100 par; outstanding $27,984,400 com. and $21,568,573 pfd. The unissued preferred stock is reserved to provide for conversion of the 10-year 6% debentures. Annual meeting, first Wednesday in September. New York Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Listed on New York and Richmond Stock Exchanges.

Bonded debt: $11,400,000 first gold 5's dated November 2, 1908; due Dec. 1, 1923; $2,617,000 10-year 6% convertible gold debentures dated May 15, 1914, due May 15, 1924; $12,250,000 twelve year 7½% Sinking Fund Gold Debentures, dated Nov. 1, 1920, redeemable in whole or part at 105 and interest, on or before Nov. 1, 1932.

Company was formed to consolidate a number of manufacturers of fertilizers, acids, chemicals, and kindred products. It owns and operates large pyrite mines, producing a large portion of the pyrite used by it in manufacturing suphuric acid; in addition it has foreign potash, sulphur, and other properties. Controls the Sulphur Mining & Railroad Co. (which see), which owns pyrite mines in United States, and sulphur deposits in Mexico.

Also the Charleston, S. C., Mining & Manufacturing Co., which owns and mines phosphate rock in Florida, Tennessee, South Carolina, and Kentucky. Also the Southern Cotton Oil Co. and other subsidiary companies, directly or indirectly operated.

Comparative General Balance Sheet, Years ending May 31:

Assets.

	1921	1920	1919
Real Estate, Plants, etc	$51,235,093	$48,491,314	$46,352,081
Investments	7,198,678	7,484,912	8,241,625
Manufactured Products	15,534,370	21,189,109	18,594,077
Accounts and Bills Received	32,692,116	33,873,892	31,961,182
Other Current	7,689,727	9,344,842	8,672,130
Insurance, Interest, etc	2,393,759	856,274	833,425
Total	$116,743,743	$121,240,343	$114,654,520

Liabilities.

Capital Stock	$49,552,973	$49,451,191	$48,410,291
Bonds	26,667,000*	14,499,138	26,029,440
Current	29,033,052	27,529,423	23,102,650
Contingent	.....	238,748	1,445,022
Reserves	2,714,702	2,086,987	1,557,884
Surplus	8,776,016	27,434,856	24,109,233
Total	$116,743,743	$121,240,343	$114,654,520

* Includes $400,000 pfd. stock of a subsidiary of which dividends and principal are guaranteed.

General Summary of Results:

	Turnover	Repairs and Maintenance	Net Profits	Net profits to Turnover
1913-'14—	$60,863,107	$1,194,280	$ 2,550,377	4.19%
1914-'15—	62,218,078	1,476,125	3,714,208	5.97
1915-'16—	67,899,444	1,924,749	4,507,548	6.64
1916-'17—	83,774,580	2,145,830	4,656,386	5.56
1917-'18—	122,463,670	2,998,552	8,384,668	6.85
1918-'19—	136,379,925	3,696,400	6,665,256	4.89
1919-'20—	138,918,234	3,461,038	7,352,046	5.29
1920-'21—	87,058,974	2,787,609	15,634,356*	...

* Loss.

Dividends: present rate: 2% quarterly on pfd.; on common, 1% quarterly since July 31, 1918, with 2% extra October 1, 1918, and October, 1, 1919; on pfd, 8% in both 1920 and 1921 and on common, 6% in 1920 and 5% in 1921.

VIRGINIA CONS. CHEMICAL CORP. **VIRGINIA**

Probably dead. Fully described in Vol. XIII.

VIRGINIA COPPER MINE **VIRGINIA**

Office: care Richard Lamb, 90 West St., New York. **Mine address:** High Hill, Halifax county, Va.

Property: the High Hill mine, 617 acres, in the Virgilina district, developed by 8 shafts of 140 to 340' depth, with about ½ mile of workings. Mine shows 2 veins giving assays up to 5.9% copper, 2 oz. silver and 80c. gold per ton. Ores are highly silicious, the gangue containing about 87% silica, which precludes smelting and wet process concentrating. Property was formerly operated by the Virginia Copper Co., Ltd.

Equipment: includes a 350-h. p. steam plant. Idle several years.

VIRGINIA IRON, COAL & COKE CO. **VIRGINIA**

Offices: Roanoke, Va., and 40 Wall St., New York City.

Company owns and controls about 225,000 acres of iron ore, coal and timber lands in Georgia, Kentucky, Tennessee and Virginia.

Pig iron shipments amounted to 206,362 tons in 1918 and 125,969 tons in 1919.

VIRGINIA LEAD & ZINC CORPORATION **VIRGINIA**

Last address: Mineral, Va.

Officers: at last report, Berkeley Williams, pres.; W. M. Cary, v. p.; Norwood Bentley, sec.-treas.

Inc. November 30, 1915, in Virginia. **Cap.** $600,000, including $200,000 10% cumulative pfd. $5 shares, and $400,000 com. $5 shares. Debentures $200,000 3-year 6% convertible gold notes.

Property: 1,200 acres; the Valznico mine in Spotsylvania county and the Valcooper mine in Louisa county, under development during 1916.

The Valznico mine has a fissure vein in schist, dipping 75° S. E. and pitching N. 40° E. The ore is a complex sulphide, containing 4% lead, 12% zinc and silver, copper, gold and iron.

Development: by 250' vertical shaft and 2,400' of workings. **Equipment:** hoist, compressor, pump, steam plant and 50-ton concentrating mill.

Production: in 1916 was 2,300 tons of ore, averaging 4% lead and 12% zinc. Company does not reply to requests for information, and is presumably defunct.

VIRGINIA MINING CO. **VIRGINIA**

Controlled through stock ownership by **General Chemical Co.** Phillipstown, N. Y.

Operates the Gossan pyrrhotite mines at Monarat, Carroll county, Va. Edward I. Williams, supt.

Two mines are worked, the old Huey pit, 200' deep and the Bombarger,

both by open cut methods. They are located about 2,000' apart on the same vein which varies up to 60' in width and is enclosed in mica schist. The ore contains about ½% copper and 30% sulphur, and is shipped 48 miles to Pulaski, Va., where it is milled and the product burned to make sulphuric acid.

During 1918-'19 about 100,000 yards of overburden was removed, exposing a three-year ore supply. About 100 men are normally employed. Annual production is 75,000 tons of ore.

VIRGINIA SMELTING CO. **VIRGINIA**

Secretary's office 131 State St., Boston, Mass. **Works office:** West Norfolk, Norfolk county, Va.

Officers: W. E. C. Eustis, pres.; A. H. Eustis, v. p.; F. A. Eustis, secy.-treas.

Inc. November 10, 1909, in Maine, as successor of Eustis Smelting Works. **Cap.** $1,000,000; shares $100 par; in $500,000 preferred and $500,000 common stock. Annual meeting, first Tuesday in October.

Company owns the Eustis Smelting Works, or Norfolk smelter, on tide water, near Norfolk, with railroad facilities to all points. The situation is favorable for custom smelting; as more coal is shipped from this vicinity than from any other center in North America and traffic commands favorable freight rates on return cargoes. The location also insures the best coke for metallurgical use, on advantageous terms. Ore received from vessels is unloaded by machinery into standard railway cars, with facilities to set aside any desired portion into a sample car, standing on a separate track. The unloader has a maximum capacity of 1,000 tons in 24 hours. Loaded cars containing ore are hauled by locomotives upon trestles and ore and coke dumped into storage bins having capacity for 25,000 tons of ore.

The smelter has a single water-jacket blast furnace of 600 tons daily capacity. There are two stands of converters with a capacity of 1,000 tons copper per month, a Dwight-Lloyd sintering machine, a cupola, and a reverberatory furnace for treating scrap.

The converter gases are washed in a gas treating plant that produces liquid sulphur dioxide, which is sold to the chemical trade. The leaching and sintering plant for treating pyrite cinders, which formerly belonged to this company, has been transferred to the Virginia Industrial Chemical Co., which is a closely allied corporation.

The smelting department of the works is operated under a lease on a royalty basis, by the Norfolk Smelting Co.

VIRGINIA ZINC & CHEMICAL CORPORATION, LTD. VIRGINIA

Liquidated. Properties acquired by the Virginia Consolidated Chemical Corporation, also presumably dead.

WASHINGTON

The metal mining industry of Washington was at its lowest ebb in 1921, the decline being 70%.

The gold output of Washington increased from $120,860 in 1920 to $148,000 in 1921 and compared with $252,000 in 1919. Nearly all the gold came from the San Poil, Knob Hill and Surprise mines of the Republic district. The Boundary Gold Mountain mine in Whatcom county resumed production late in the year.

The silver output decreased from 199,678 ounces in 1920 to 132,000 ounces in 1921, compared with 259,380 ounces in 1920. Most of it came from the mines of the Republic, Nighthawk, Chewelah and Colville districts. Silver from copper ores was negligible as the Sunset mine at Index and the United Silver Copper Co. at Chewelah were only operated on a small scale.

The copper output decreased from 1,983,134 lb. in 1920 to about 402,000 lb. in 1921. The only producer was the United Silver Copper Co.

The output of lead decreased from 5,787,247 lb. in 1920 to 130,000 lb. valued at $6,073, in 1921, compared with over 2,000,000 lb. in 1919 and over 5,000,000 in 1918. Most of the product came from the Electric Point property, near Northport, in Stevens county, which was idle most of the year.

The only dividend paid by a metal mine in Washington during 1920 was that of the Electric Point mine, which amounted to $119,062.

ADDISON COPPER CO. **WASHINGTON**

Address: Keller, Ferry Co., Wash.

Officers: Geo. R. Hodges, pres.; R. B. Smith, v. p.; C. A. Gray, sec.-treas.-mgr., Empire State Bldg., Spokane, Wash., with Geo. F. Cohrs and Walter Stager, directors.

Inc. in Washington. **Cap.** $75,000; 5¢ par; assessable.

Property: 5 claims, unpatented, and a millsite, 4 miles N. E. of Keller, said to show a 4-12′ ledge with 15-18″ paystreak containing lead-silver-copper values.

Development: by tunnels and 150′ shaft. Company developing since 1919, and in 1921, started the Federal shaft in which at 37′, the 4½′ vein showed $76 ore. The Mammoth tunnel will connect with the Bunker Hill shaft where 6′ of rich silver-lead-copper ore is cut. Shaft is to be deepened to 600′, 1922.

Equipment: includes three-drill compressor and 40 h. p. boiler.

ADMIRAL CONS. MNG. CO. **WASHINGTON**

Succeeds Admiral Mng. Co.

Address: 402 Rookery Bldg., Spokane, Wash.

Officers: Arthur L. Hooper, pres.-mgr.; Wm. B. Sprague, sec.; R. E. Plath, treas.

Inc. 1920, in Washington. **Cap.** $200,000; bonds authorized and other indebtedness, $2,600.

Property: 420 acres, 300 patented, 2 miles S. E. of Valley, Stevens county, also timber holdings and water rights on Deer Creek. Ore occurs in vein 18″-6′ wide, said to have averaged 8.25% copper and 3 oz. silver per ton for 12 carloads. Management estimates 150,000 tons blocked out, assaying 3% copper and 3 oz. silver.

Development: by 6 tunnels, aggregating 3,200′ and 100′ shaft. Developing, 1921, by new tunnel to develop a vein showing 4′ of 6% copper ore on surface.

ADMIRAL MINING CO. **WASHINGTON**

Described in Vol. XIV. Now **Admiral Consolidated Mng. Co.**, which see.

ADVANCE MINING CO. **WASHINGTON**

Address: A. M. Campbell, 1138 Altamont Blvd., Spokane, Wash.

Officers: Frank Johnson, pres.; H. I. Parr, v. p.; A. M. Campbell, sec.-treas., with W. F. Johnson, C. G. Staples, M. V. Burr, all of Spokane; M. Kulzer, and W. H. Wiscombe, directors. O. F. Parmeter, supt., Daisy, Wash.

Cap. $2,000,000; $1 par; outstanding 1,000,000 shares, assessable.

Property: 9 claims in Beulah district, near Daisy, Ferry county. **Development:** by tunnels 400′ and 1,400′ long.

AICHAN BEE SILVER-LEAD MINING CO. **WASHINGTON**

Office: H. M. Howard, 401 Jamieson Bldg., Spokane, Wash. J. Currie, supt., Fruitland, Wash.

Officers: H. M. Howard, pres.-mgr.; H. Schwitzer, v. p.; Dr. B. F. Blosser, sec.-treas., with Dr. C. S. Kalb, directors.

Inc. August, 1, 1916, in Washington. **Cap.** $100,000; shares 10¢ par; 192,000 sold; 692,000 outstanding.

Property: 8 patented claims, 160 acres, in Deertrail district, Stevens county, 25 miles W. of Springdale. **Ore:** occurs as a contact deposit be-

tween limestone and granite. Three veins, 2-5′ thick, now under development, are said to give assays of about 16 oz. silver and 20% lead.

Development: by 477′ main tunnel, crosscutting property to depth of 225′. The tunnel has cut the Mother Lode, which is 20′ to 50′ wide on surface and shows iron stained quartz for several hundred feet. Ores carry zinc blende, galena, pyrite and some chalcopyrite. The Deertrail, a producing mine, lies 15 miles N. E. and the Queen and Seal and the Germania-Tungsten, equally near.

ALASKAN COPPER RIVER MINING CO. **WASHINGTON**

Probably dead. See Vol. XIV.

ALLIANCE MINING CO. **WASHINGTON**

Address: M. C. Hunter, 622 Old National Bank Bldg., Spokane, Wash.

Officers: M. C. Hunter, pres.; F. H. Hunter, v. p.; W. W. Gifford, sec.-treas., with J. M. Lloyd and S. S. Frantz, directors.

Inc. September 9, 1913, in Washington. **Cap.** $1,500,000, shares $1 par; outstanding $1,303,288; assessable, not exceeding 5 assessments of 5 mills each year. Bonds authorized $100,000, outstanding $32,400. In 1914 the company took over for $171,000, the property of the Anaconda Gold Mng. & Reduction Co., paying $120,000 in Alliance stock, and assuming an indebtedness of $51,000 for the remainder.

Property: 7 claims, 5 patented, 100 acres, in the Eureka mining district, Republic, Wash., adjoining the property of the Republic mine, and said to cover 3,500′ along the strike of the Republic vein, 12′ to 30′ wide, and the Princess vein, 2′ to 10′ wide.

Early development of the properties was done when only high-grade ore was shipped, and the Alliance Co. acquired the holdings of 4 different companies for the purpose of mining and milling the low grade ore. The veins are developed to a depth of 600′ by a 385′ tunnel and a 400′ winze, with total workings of 5,000′.

Equipment: includes gasoline hoist and a 3-drill compressor. No work reported since organization.

ALPINE MINING & MILLING CO. **WASHINGTON**

Address: Alaska Bldg., Seattle, Wash.

Officers: J. H. Starbird, pres.-mgr.; H. C. Ash, sec.-treas.; with M. R. Starbird and T. P. Revelle, directors.

Cap. $50,000; $100 par.

Property: four lode claims and one placer claim on Negro creek, Chelan county, said to show a vein 1½′ to 3½′ wide of free milling gold ore.

Development: several tunnels, 100′ to 200′ in length. Is a prospect.

AMALGAMATED GOLD MINES CO. **WASHINGTON**

Address: Central Bldg., Seattle, Wash. **Mine address:** Ernest Kirbe, supt., Blewett, Wash.

Officers: C. R. Hesseltine, pres.-mgr., 756 New York Block, Seattle, Wash.; G. W. G. Litherland, v. p.; J. E. Reynolds, sec.; G. W. Walker, treas.

Cap. $2,000,000; $1 par; assessable to 10c.

Property: the Blewett mine, 7 claims, and two millsites, on E. slope of Cascades, Chelan county, said to show well defined fissure veins in serpentine with gold ore, containing a small amount of silver.

Development: by the Meteor and Black Jack tunnels, with 7,000′ of work. **Equipment:** includes 20-stamp mill with compressor, water power, etc. Credited with past production of over $1,000,000.

Operations were resumed in 1920 and April, 1921, the mill handling 30 tons of ore daily, the concentrate running $150-$300 in gold-silver content. Shipments made regularly to Tacoma smelter, in 1921.

AMAZON MINE **WASHINGTON**

J. Oppenheimer, owner, Chewelah, Stevens Co., Wash.

Property: 3 claims, patented, 51 acres, 5 miles N. W. of Chewelah, said to show a vein uncovered for 2,200′. Ore said to assay about 2½ oz. silver, 2% copper, and up to 2½ oz. gold per ton.

Developed by several tunnels, to depth of 300' with 1,330' of workings. Production in 1918, 187 tons ore; total production, 725 tons. Idle.

AMERICAN FLAG MINE — **WASHINGTON**

Owned by Maurice Snyder, and W. D. Hoover, of Aberdeen, Wash. J. S. Stevens, supt., Republic, Wash.

Property: at Sheridan, Okanogan county, 11 miles W. of Republic, Ferry county, said to show silver-gold ore that assays 16 oz. silver, 10 oz. gold and 36% copper per ton.

Development: by tunnels and 100' shaft. A flotation plant was planned at last account.

AMERICAN MINERALS PRODUCTION CO. — **WASHINGTON**

Address: 528 Cont. & Comm. Bldg., Chicago, Ill.

Officers: Adolph Kurtz, pres.; H. N. Wallace, v. p.; Sidney Levy, sec.-treas., with Herbert Levy and F. F. Stevens, directors. H. F. Wierum, gen. mgr.; H. L. Griswold, supt., Valley, Wash.

Cap. $1,500,000; $1 par. **Dividends:** $30,000 in 1917; none since.

Property: in Stevens county, Wash., has a large bedded deposit of magnesite, dipping 40 to 70°. The enclosing rocks are slates, schists and quartzites; the deposits being replacements of dolomite by magnesite. These deposits of crystalline magnesite, a few miles west of Valley in Stevens county, discovered in the summer of 1916, excel in size and purity any known deposits of this material.

Development: by quarries. The crude magnesite is shipped to Irvin, Wash., where it is dead-burned, on toll, and shipped thence to steel works and refractories trade.

Company states there are 300,000 to 500,000 tons shipping grade in sight; quarries have a monthly capacity of 12,000 tons, and the calcining plant at Irvin, 6,500 tons monthly.

Production: in 1918, the company mined 67,855 tons of crude magnesite; total dead-burned shipped East amounted to 17,664 tons. During 1920, output was about 66,000 tons of crude magnesite. The depression in the steel market caused a complete shut down at end of 1920. Company is now manufacturing calcined magnesite used for composition flooring and stucco.

AMERICAN REDUCTION CO. — **WASHINGTON**

Address: Republic, Ferry county, Wash.

Inc. in 1915 by F. R. Clark, of Spokane; P. N. Clark and G. W. Sommer.

The property of the North Wash. Power & Reduction Co., which had been held by a receiver for 2 years, was purchased together with adjoining holdings.

Equipment: includes concentrator mill, and power plant. Idle several years.

AMERICAN TUNGSTEN CONS. CORP'N. — **WASHINGTON**

Address: c/o Judge Geo. Turner, Columbia Bldg., Spokane, Wash.

Company is a reorganization, (1912) of the Germania Mng. Co. **Cap.** $1,000,000; shares $1 par.

The Germania Co., composed principally of German investors, was organized 14 years ago to develop the Roselle mine, 25 miles west of Springdale, Stevens county. It is said that $500,000 was spent in driving tunnels, in the concentrator and buildings. In 1911 the company became involved in litigation, later going into bankruptcy.

In January, 1916, eastern interests, represented by F. T. Hamshaw, of Seattle, obtained a lease and bond on the properties held by the Corporation and started operations. Holdings include the Germania and Roselle mines. Development, consisting of a 200' shaft and 3 tunnels with 3,000' of work, is said to have exposed a considerable tonnage of ore. Property still held by Alien Property Custodian at last report.

APACHE MINING CO. — **WASHINGTON**

Address: 1620 Pioneer Bldg., St. Paul, Minn. **Mine address:** Beggs & Ostrowski, Nespelem, Wash.

Officers: F. A. Hoyt, pres.; M. H. Evans, sec.-treas., with J. C. Wilson and G. B. Hoyt, directors.

Inc. 1904, in Washington. **Cap.** $1,000,000; $1 par; issued 750,000.

Property: under lease and bond to Beggs and Ostrowski of Nespelem, Wash., consists of 6 unpatented claims, 90 acres, S. W. of Nespelem, Okanogan county. Claims show silver ore in a quartz vein in granite. Geology described in Bull. 23, Wash. Geol. Survey (1921), p. 207.

Development: by 400′ tunnel, 146′ incline winze, drifts and crosscuts with 2 levels, one 96′ below tunnel, 355′ long, the other 50′ deeper, 158′ long, with a winze in ore 46′ deeper. Employs 7 men.

The mine has been the most persistent silver producer of the Nespelem district, since 1911, shipments of ore averaging $12 per ton, going to the Great Metals mill.

APEX GOLD MINING CO. **WASHINGTON**

Dead. **Last address:** Jas. P. Blaine, supt., Chesaw, Okanogan county, Wash. Company formed to take a lease on one claim of the Ben Harrison Gold and Copper Mining Co.

Property: the Ben Harrison mine, in Meyers creek or Chesaw district, showing a 1-6′ quartz vein in schist, the ore carrying gold-silver-copper values. Developed by a 286′ shaft with gasoline hoist. Mine intermittently operated. In 1911, had 10-ton mill. No recent information. See Bull. 5, Washington Geol. Survey, 1911.

APEX GOLD MINING CO. **WASHINGTON**

Address: Wm. Priestly, Miller River, Wash., who has operated the property under lease and bond since 1917.

Property: the Apex gold-silver-arsenic mine in Miller river district, King county, contains a persistent vein in granodiorite, 2′-6′ wide, containing arsenopyrite, chalcopyrite, galena, etc., with high grade streaks 3″-15″ wide of $20 to $80 gold ore, mostly arsenopyrite. Ore shoot is 500′ long and mined 450′ vertically.

Development: by 2,500′ of work in 4 tunnels, the lowest not having yet reached the orebody.

Equipment: includes 6 mile railway to lower terminal tramline, 1,000′ below mine.

APOLLO CONS. GOLD MINING CO. **WASHINGTON**

Mine office: Republic, Wash.

Officers: H. D. Clark, pres.; E. C. M. Hall, sec.; H. B. Ives, treas.; all of New Haven, Conn. T. J. Howell, mgr.

Cap. $1,500,000; 50c. par.

Property: 9 claims, patented, 165 acres, in Ferry county, 10 miles S. E. of Republic, shows gold, silver, lead and zinc ore. Said to have made shipments totaling $200,000.

ARADIUM COPPER MINING CO. **WASHINGTON**

Probably dead; see Vol. XIV for description.

ARK MINES CO. **WASHINGTON**

A reorganization of the Ark Group Mng. & Milling Co., Ltd., described in Vol. XIII.

Address: Spokane, Wash. **Mine address:** Kettle Falls, Wash.

Officers: J. J. Budd, pres.-mgr.; W. P. Maurer, v. p.; O. L. Budd, sec.-treas.; directors, J. J. Budd, H. Karlsten, W. P. Maurer, and H. Hoffman.

Inc. 1918, in Washington. **Cap.** $375,000; par 25c; assessable in treasury 500,000 fully paid shares, and 400,000 paid up to 15c; 600,000 shares given for property.

Property: 18 claims, the Silver Queen group, 3 miles S. of Kettle Falls, Stevens county. Ore occurs in contact between granite and lime with N. W. strike and dip of 40°w. Vein reported to be from 3-20′ wide.

Development: by tunnels, longest 1,025′ and a 130′ upraise. This work has shown copper ore containing silver values in the Silver Queen ledge, said to be 50′ thick with same character of ore in face of tunnel as found on surface, 350′ above.

Equipment: steam power, 2 air compressors and air drills. The Silver Queen property has been under development for several years.

Company also owns 3 gold claims in the Kootenai district, British Columbia.

ARLINGTON SILVER MINING CO. **WASHINGTON**

Address: Sherwood Bldg., Spokane. Company was formerly the Arlington Mng. Co., but was reincorporated in March, 1918, under present name. **Mine address:** J. E. Stoolfire, supt., Okanogan, Wash.

Officers: H. E. Rhodenhamel, pres.; H. E. Stoolfire, sec.-treas.

Property: 10 claims, 7 miles from Conconcully, Okanogan county, Wash., shows a 4-5′ vein of milky quartz containing pay shoots with gray copper ore. Small shipments of rich lead-copper ore, containing gold and silver, were made to Tacoma smelter, 1920-21.

Development: by 990′ adit with 100′ winze having 2 levels.

Equipment: complete, with electric power, 4-drill compressor, etc.

Production: about 3,000 tons, since 1901, or 986 tons since 1916, that averaged 66 oz. silver, 1.15% copper and netted $31,145.

AURELIA CROWN CO. **WASHINGTON**

Fully described in Vol. XIV.

Succeeded by **Crown Power Molybdenum Co.**, which see.

AURORA COPPER MINING CO. **WASHINGTON**

Inactive. Conrad Wolfle, pres., Symons Block, Spokane, Wash.

AZURITE COPPER CO. **WASHINGTON**

Office: 159 E. 60th St., New York. **Mine address:** Twisp, Wash.

Officers: C. H. Ballard, pres.-mgr.; W. G. Hughes, v. p.; Wm. Tinson, sec.; W. T. Benhe, treas.

Inc. December, 1916, in Delaware. **Cap.** $3,000,000; par $1; 2,600,000 shares issued.

Property: 32 claims and a mill-site in Whatcom county, 18 miles south of the Canadian line, developed by 800′ of workings. Claims show gold ore. Eight tons of ore returned $400, and a half ton shipped to smelter, returned $135 per ton.

BEAD LAKE GOLD-COPPER MINING CO. **WASHINGTON**

Address: W. E. Allen, 617 Hyde Bldg., Spokane, Wash. C. H. Curtis, supt., Newport, Wash.

Officers: G. C. Geisler, pres.; C. C. Wilt, v. p.; W. E. Allen, sec.-treas., with C. M. Jacobson, directors.

Inc. 1910, in Washington. **Cap.** $3,000,000; $1 par; 2,000,000 shares issued. Bonds authorized, $30,000, first 6s, dated Jan. 1, 1920, due Jan. 1, 1925; issued $24,000.

Annual report for 1920 shows receipts, $73,911; expenditures, $71,979; balance, $1,932.

Property: 18 claims, 300 acres, in Newport district, Pend Oreille county, Wash. Ore consists of sulphides of lead, iron, copper and zinc in a quartz fissure vein in diorite, 2-12′ wide. In December, 1919, company bought the Conquest mine for $20,000. The Comstock mine had been previously acquired for $2,500.

Development: by over 7,000′ of tunnels and 300′ shaft. Equipped with 100-ton concentrator, moved from the Western Union mine in Idaho. The plant includes a flotation unit and should be in operation in 1922. Fifteen men employed.

BEECHER GOLD MINING CO. **WASHINGTON**

Address: Orient, Wash. Alex A. Anderson, mgr.

Property: the Beecher mine near Orient, Ferry county, in which gold-quartz ore occurs in stringers.

Idle since 1917.

BELCHER MINING CO. **WASHINGTON**

Address: c/o Jos. A. Anderson, pres., Symons Bldg., Spokane, Wash.

Property was reported to have been bought, 1918, by Frank Babcock, Ewan, Wash., for $50,000, payable in instalments over a period of two years.

Property: the Belcher claim N. of Republic, Ferry county, shows irregular replacement deposits of pyrite associated with garnet, epidote, tremolite and magnetite in marble and interbedded shale, etc., intruded and metamorphosed by monzonite porphyry dikes and sheets.

Development: by 3 tunnels showing sulphide orebody 5'-20' thick, on dip plane (see Bull. 550 U. S. G. S., 1914, pp. 167, 173, 179). Over 5,000' of work has been done.

A 1,000' aerial tram connects the tunnels with ore bins on the railroad. Water, brought 2,000' from Lambert creek, through a steel pipe, generates electric power, supplemented by a gasoline auxiliary plant.

Equipment: includes an air compressor and power drills.

Property, reopened May, 1911, shipped low-grade gold-bearing pyritic copper ore to Granby smelter. In 1917, reported to have shipped 3,000 tons ore, assaying 6% copper and $1 gold. Shipments continued during 1918; no later returns.

BENDER METALS MILLING CO. **WASHINGTON**

Probably dead.

Officers: Henry Bender, pres.; B. W. Johnson, sec.; Robt. Baur, treas., all of Toledo, Ohio. J. W. Douglas, v. p., Spokane, Wash.

Cap. $30,000; par $25. Early in 1918, the company finished converting an old stampmill in the Oroville district, Stevens county, into a flotation mill to treat ore from the nearby Rich Bar, and Kaaba mines. See **Kaaba Mines Co.**

BEN HUR LEASING CO. **WASHINGTON**

Dissolved. See Volume XIV.

BIG WEST (COPPER) SYNDICATE **WASHINGTON**

Address: W. S. Hawley, mgr., Hutton Bldg., Spokane, Wash. C. S. Gilbert, supt.

Property: in a new district, at the headwaters of the Quinalt river, in the Olympic Mtns., Southwestern Washington, at an altitude of 4,500'.

A tunnel is to be driven easterly to ascertain the size of the known orebodies, said to contain gold, copper, iron and maganese. Work was discontinued June, 1921.

BLUE LEDGE MINING & MILLING CO. **WASHINGTON**

Described in Volume XIV. Succeeded by Nineteen Nineteen Mining & Milling Co., which see.

BLUE RIDGE MINING CO. **WASHINGTON**

Address: H. A. Rodman, sec., Colville, Wash.

Officers: Thos. Taylor, pres.; Dr. Robt. Foster, v. p.; T. R. Roberts, treas.

Property: formerly owned by Aladdin M. Co., 14 miles S. W. of Northport, shows vein, proven for 1,200' on surface. Ore contains silver, lead and zinc. Developed by tunnel showing 5' vein with ore containing 40% lead and 20 oz. silver, with some zinc.

BLUE STAR MINING CO. **WASHINGTON**

Address: Fred W. Dickey, Chewelah, Wash.

Officers: S. M. McPherson, pres.; L. R. Neston, v. p.; H. C. McPherson, v. p.; Jos. McPherson, sec.-treas., with F. L. Rienoehl, C. M. Grove and F. H. Alm, directors.

Inc. 1906. **Cap.** $1,600,000; $1 par; 990,000 issued; assessable. Assessment levied, August, 1921.

Property: the Eagle group, 8 claims, 1 patented, 2 miles N. W. of Chewelah, Stevens county, said to carry silver-lead ore. Idle several years.

Production: $40,000 to date. Property bonded to A. J. Moore, M. E., in September, 1921.

BONANZA MINE **WASHINGTON**

Address: O. Jeldness, 2029 Second Ave., Spokane, Wash. **Mine address:** J. Veracke, supt., Bossburg, Wash.

Held under lease and bond by O. Jeldness and J. Verwacke, since 1918. C. C. Brown, sec., Castle Rock, Wash.

Property: 200 acres, located 3 miles from Bossburg, Stevens county, Wash. The mine, an old-time producer, is said to have had an output of $1,000,000. Idle for 15 years and reopened June, 1919.

Geology: galena with pyrite and a little sphalerite occurs in lenses 6'-8' thick and up to 100' long, in shear zone in schists, intruded by granitic rocks.

Developed: by 700' inclined shaft with 100' levels and a total of over 3,000' underground workings. All ore above 800' level has been stoped. See U. S. G. S. Bulletin 550, p. 63.

Shipments of dump material contained 5 oz. silver and 20% lead. Employs 8 men.

BOSTON-AMERICAN MINING CO. **WASHINGTON**

Officers: H. D. Cowden, pres., 606 Pantages Bldg., Seattle, Wash. C. A. Riddle, v. p.; L. E. Engel, sec.; F. W. Boston, treas., with J. H. Adams, P. E. Low, E. Garber and H. B. Cowden, directors. D. R. Kyes, supt.

Company is not a reorganization of the United Mining Co., Nevada, which see, but stockholders of the United Mining Co., with few exceptions, have more than an equal proportional holding in the Boston-American Mng. Co.

Inc. in 1913, in Washington. **Cap.** $2,000,000; $1 par; 1,600,000 common, 400,0000 preferred; 1,344,200 common and 293,450 preferred issued.

Financial statement, January 1, 1917, showed: receipts for 1916, $107,678; expenditures, $68,928; balance on hand, $38,750.

Property: 88 claims, 26 patented, and 4 patented mill sites, at Monte Cristo, Wash., said to show a dike of low-grade ore 300' wide, containing fissure veins with streaks of ore from a few inches to 4' in width. Ore said to contain gold, silver, copper, zinc and arsenic.

Development: total underground workings, about 19,600'.

Company's former literature considered grossly misleading. Fully described in Vol. XIV. No recent returns; probably dead.

BOUNDARY GOLD CO. **WASHINGTON**

Company out of existence. **Address:** Isaac D. Sperry, 4921 Gramercy Place, Los Angeles. Former secretary: Geo. G. Gilchrist, 747 Gas & Electric Bldg., Denver, Colo. See Volume XIV.

BOUNDARY RED MOUNTAIN MINING CO. **WASHINGTON**

Address: Reno, Nev. Mine address: Chilliwack, B. C.

Officers: Geo. Wingfield, pres.; E. A. Julian, gen. mgr.; C. F. Burton, sec.-treas. Stock is closely held. Control purchased June, 1916, by Geo. Wingfield and associates.

Property: in Whatcom county, is best reached from Chilliwack, B. C., 35 miles away. Claims show diorite with a fissure vein containing free gold in a quartz vein, averaging 2-3' in width, with 1.13 oz. gold per ton.

Development: carried on intermittently since 1889, is by 3 tunnels. A crosscut tunnel driven 500' below upper tunnel has a 500' drift on the vein, whose width and values are larger than above; ore shoot 520' long, 26" wide, averaged 1.13 oz. gold per ton.

Equipment: includes an hydroelectric plant and a complete 10-stamp mill.

Production: in 1916, 10,441 tons, having gross value of $148,578. Idle, awaiting better mining conditions. Is the most important gold property of western Washington, operated by Wingfield et al in 1916 and 1917. Costs were $3.78 for mining, $1.17 for milling and $1.15 general expense, or total, $6.10 per ton in 1917. Recovery was 89%.

BRUCE CREEK MINES CO. **WASHINGTON**

Company has discontinued operations at its Stevens county mine and is out of business. **Last address:** Bob Mabry, pres.-mgr., Hutton Bldg., Spokane, Wash. Described in Volume XIV.

BUNKER HILL MINING & SMELTING CO. **WASHINGTON**

Described in Volume XIII.

Mining property and other assets were purchased by the Western Copper Mining Co. in June, 1917 for 975,000 Western Copper shares, which

constitute the only asset of the B. H. M. & S. Co. The new company also assumed all liabilities outstanding against the property.

BUTTE-CHEWELAH COPPER CO. **WASHINGTON**

Dead. **Former address:** J. O. Gillice, pres., Paulsen Bldg., Spokane, Wash.; F. M. Bell, v. p.; P. L. Eberhardt, sec.-treas., with G. B. Harrington and R. J. Davis (gen. mgr.), directors, at last accounts.

Inc. March, 1913, in Washington. **Cap.** $1,000,000; shares $1 par; fully paid and non-assessable; 500,000 issued.

Property: 4 claims, 75 acres, in the Valley mining district, shows vein in sedimentaries close to a diabase intrusion; average strike N 25° E. and dip 60°. Ore contains chalcopyrite and gray copper in a gangue of quartz, calcite and spathic iron. At 100′ in depth the vein is said to be 6 wide and the ore to average 2 to 5% copper, 1 to 5 oz. in silver and 50 cents to $1 in gold per ton.

Developed by 100′ winze, reported all in ore, a 300′ shaft and 125′ tunnel. Equipment includes a hoist and air-compressor.

CAREY MINING & DEVELOPMENT CO. **WASHINGTON**

In receivership (1920).

Company had a lease and bond on the Phil Sheridan and other claims in Sheridan camp, Okanogan county, owned by P. J. McCormick, Republic, Wash., and said to show a vein of silver ore with some gold and copper. Developed by 400′ shaft and crosscut tunnel. Equipped with 50-ton concentrator and flotation plant. Mill feed averages 15 oz. silver per ton and concentrates 300 oz. silver. One shipment of silver concentrate made to Tacoma smelter in 1919.

CARL FREDERICK M. CO. **WASHINGTON**

Address: C. W. Quarrles, sec.-treas., Coeur d'Alene, Ida. **Mine address:** C. Bernhard, pres.-mgr., Conconully, Wash.

Property: in Conconully district, Okanogan county, contains silver bearing ore.

CASCADIA MINING & DEVELOPMENT CO. **WASHINGTON**

Mine office: Toledo, Wash.

Officers: E. A. Sessions, pres., 212 Abington Bldg., Portland, Ore.; W. A. Gray, v. p.; W. D. Scott, sec.-treas., with M. A. Poppleton, J. P. Finley, Geo. S. Reid, F. H. Dowler, directors. J. F. Hartley, asst. sec.

Inc. March 12, 1887, in Washington. **Cap.** $6,000,000; shares $1 par; $1,164,615 in treasury.

Property: 108 claims, 2,170 acres, 330 patented in St. Helens mining district on the divide at the head of the Toutle river in Cowlitz, Lewis and Skamania counties, includes the Polar Star and Minnie Lee groups. Properties show fissure veins in grano-diorite. The ore occurs in shoots, 2-12′ thick and 20-100′ long and is said to average 17.9% copper, 24.85% iron, 10.75% silica, 4% aluminum, 1.2% lime, 34.5% sulphur, 5.68% antimony, 0.8% zinc and 0.05% nickel.

Development: 5,000′ of work including 300′ to 700′ tunnels with about 1,500′ on ore. About 100,000 tons of shipping ore has been mined and put on the dump, waiting for cheaper transportation. The mines are 16 miles from a railroad over a heavy grade.

CASTLE CREEK MINING CO. **WASHINGTON**

Address: C. E. Cross, lessee, Republic, Wash.

Property: in Park City district, 20 miles S. W. of Republic, Ferry county. A 15-ton flotation plant was installed in 1920, to treat the silver ore of the mine dump.

CAYWASH MINING CO. **WASHINGTON**

Idle. **Address:** S. S. Callahan, sec., Twisp, Wash.

Officers: L. H. Prather, pres., Tacoma; W. R. Weisl, v. p., D. L. Taylor, treas., both of Kennewick, Wash., with W. Wood, directors.

Cap. $1,000,000; par $1; assessable to 10 mills.

Property: 3 claims on Methow river, and 5 claims on Goat creek, near Mazama, Okanogan county, shows silver and gold bearing copper ore. The

ore from the Goat Creek group said to assay $33 to $54, and that of the Methow, $8 to $32 in copper, with a little gold and silver.

Development: shallow shafts and 3 tunnels, longest, 250'.

CHATTERBOY MINING CO. **WASHINGTON**

Office: Davton, Wash. **Mine address:** Danville, Wash.

Officers: A. D. Monnett, pres.; Judge C. F. Melton, sec.-treas. J. E. Leopold, mgr.

Inc. 1919, in Washington.

Property: a lease and bond on the Lucille Dreyfus mine, including 2½ claims, 1½ miles S. of Danville, Ferry county. Ore is low-grade, with chalcopyrite, pyrrhotite and pyrite, carrying gold, silver and copper. **Development:** by 1,300' adit.

CHELAN CONSOLIDATED COPPER CO. **WASHINGTON**

Address: care of Michael J. Corcoran, Insurance, 180 Broadway, New York.

Operating office: 811 Lowman Bldg., Seattle, Wash. **Mine office:** Leavenworth, Chelan county, Wash.

Officers: F. D. Wilsey, v. p.; Thos. J. Higgins, sec.-treas., with Henry D. Bristol, Edw. W. Kuhn, A. T. La Vallette, J. S. Jurey and Louis Arndt Stein, trustees, at last report.

Inc. May, 1906, in Wash. **Cap.** $12,000,000; $10 par; issued, $5,779,140. Guaranty Trust Co., New York, registrar. Annual meeting, first Tuesday in June. Company absorbed the **Red Mountain Gold & Reduction Co.**, the **North Star Mng. Co.** and a large number of individual mining properties.

Property: 14 claims at Index, Snohomish county, and 130 claims at Red Mountain, Chelan county, Wash., 50 miles north of Leavenworth.

The Index mine has a 4' vein, opened by tunnels of 600' and 700' with about 2,000' of workings, showing a 6" paystreak of high-grade bornite and chalcopyrite ore.

The Red Mountain lands, 4 miles west of Phelps creek, 67 claims owned outright, and 58 additional claims held through the North Star Mining Co., controlled through stock ownership.

Development: by 2,000' main tunnel, supplemented by 600' of diamond-drill borings, showing a 5' vein carrying values in copper and gold, and 2 smaller veins.

Equipment: includes gasoline power, air compressor, and 7 buildings.

Company is inactive, as ore is low-grade and with low copper prices the mine cannot be operated profitably.

CHEROKEE MINING CO. **WASHINGTON**

Address unknown.

Incorporators: Wm. Rakestraw, M. E. Bennett, Lloyd Harris, C. G. Edwards, all of Wilbur, Wash., and I. Toner, of Spokane.

Inc. 1917, in Washington to develop the Cherokee group of claims. **Cap.** $1,500,000.

CHEWELAH COPPER KING MINING CO. **WASHINGTON**

Address: S. P. Dommer, former pres., Spokane.

Defunct. See full description of organization, etc., in Vol. XIII. Property bonded at various times to King Mng. Co., Copper King Mng. Co., and United Copper M. Co.

CHEWELAH GREY COPPER MINING CO. **WASHINGTON**

Dead, 1917. Formerly at Chewelah, Stevens county, Wash. See Vol. XII.

CHEWELAH SILVER MINING CO. **WASHINGTON**

Address: W. B. Stewart, mgr., Chewelah, Wash.

Inc. 1920 in Wash. **Cap.** $80,000 in 600,000 pfd. and 1,000,000 common shares, 5¢ par; assessable. Assessment of one mill per share quarterly authorized by stockholders, March, 1921.

Property: at Chewelah, Stevens county. A tunnel, 800' long, will cut the ledge at depth of 300'.

CHLORIDE HILL MINING CO. **WASHINGTON**

Officers: R. B. McClary, sec.-treas., Spokane, Wash.

Cap. $1,000,000; $1 par; outstanding 600,000 shares.

Property: formerly owned by **Santiago Mining Co.**, 2 miles S. of Hunters, Stevens county, shows a 5½' vein in which some 80 oz. silver ore was found.

Development: 90' shaft and 240' tunnel. Small shipments made in 1917. Idle and probably dead.

CHLORIDE QUEEN MNG. CO. **WASHINGTON**

Directors: J. C. Haas, pres., Wellington Apts., Spokane, Wash. Paul Le Plant, supt., with H. J. Doolittle, C. H. Preston, Chas. H. Case, and Earl T. Gates. D. E. Zent, mgr.

Property: 5 claims, 14 miles N. E. of Colville, said to cover a ledge, 25-30' wide, for a distance of 3,000', showing streaks of rich galena ore, reported to run from $22-$80 per ton.

Development: by 75' shaft, 135' winze and tunnel, with 5,000 tons of $22 ore reported on the tunnel dump. A new crosscut tunnel, in 640', Sept. 1921, is being driven 180' vertically below No. 1. Eight men employed.

CLEVELAND MINING CO. **WASHINGTON**

Described in Vol. XIII. Reorganized as **Santa Rita M. & M. Co.**, which see.

COLUMBIA COPPER CO. **WASHINGTON**

Probably dead. Former officers were C. M. Carroll, pres., Alex. Robinson, v. p.-mgr.; Oscar Olson, sec.-treas., all of Spokane, Wash. T. J. Vaughan Rhys, cons. engr.

Property: a 10-year lease and bond, for $100,000 on the **High Grade S. & C. Mining Co.** claims in Deertrail Mining district, formerly owned by Carson Bros., of Reardon, Wash. Company sold property to the Granby Cons. of B. C. for $120,000, but the High-Grade Co., controlled by Carson Bros., refused to sign deed, claiming failure to carry out contract. The High Grade Co. resumed control and was working the mine at last report. The Columbia brought suit against the High Grade Co. for damages and secured judgment for a small sum.

COLUMBIA SILVER MINING CO. **WASHINGTON**

Address: Dr. A. D. MacIntyre, Old Nat'l. Bank Bldg., Spokane, Wash.

Directors: L. G. Bayley, E. R. Percival, Dr. A. D. MacIntyre, Frank Phillips and S. R. McClinton.

Inc. 1920, in Washington. **Cap.** $150,000; 5¢ par; 1,200,000 shares in treasury.

Property: 17 claims, 3 patented, in Ninemile district, on the S. half of the Colville Reservation, about 14 miles N. E. of Keller, Ferry county.

Development: by 500' of tunnels, 125' shaft and 65' winze, said to have opened up two veins, containing lead-silver values.

Management plans installation of 5-drill water-driven compressor and continuation of No. 4 tunnel.

CONSOLIDATED COPPER CO. **WASHINGTON**

Address: Valentine W. Brasch, sec.-gen. mgr., Turk, via Fruitland, Wash.

Inc. 1913, in Washington. **Cap.** $1,500,000; shares $1 par, assessable. Annual meeting, January. Company is a reorganization of the Togo Mining & Smelting Co.

Property: about 240 acres, 160 patented, in Cedar Canyon district, near Springdale, Stevens county. Ore occurs principally as copper pyrite in slate, serpentine and quartzite with a N.-S. strike and 40 to 60° dip. One ore-body, developed by tunnels, with about 2,000' of workings, reported by management to average 3 to 5' in width, in upper levels, and to carry 8% copper, 3½ to 5 oz. silver and a trace of gold. Upper levels said to show bornite, copper glance and a little native copper.

Equipment: includes gasoline engine and hoist. The mine has been closed down for several years.

CONSOLIDATED FIRST THOUGHT MINES CO. **WASHINGTON**

Idle. Succeeds First Thought Mining Co.

Address: Orient, Stevens county, Wash.

Officers: M. B. Grieve, pres., Old Natl. Bank Bldg., Spokane, Wash.; O. J. Smith, sec.-treas., with J. E. Pickerell and S. Eslick, directors.

Inc. 1919, in Washington. **Cap.** $1,000,000; $1 par.

Property: 94 acres of gold-silver bearing claims in Pierre Lake district, near Orient.

Ore occurs in fracture zone in latite lava, near intrusive granite. Zone is 100′ wide and known for 700′. Ore is pyrite with gold, occurring where cross fissures intersect main zone.

Development: by 3 adit levels and 130′ winze; bottom level shows 5′ of $12 ore.

Equipment: includes a 6-drill compressor, hoist, 2½ mile aerial tram, assay-office, and complete mining plant.

Production: 1904 to 1910, 35,627 tons averaging $16.88 per ton. Idle since 1914.

CONSOLIDATED MINES CO. **WASHINGTON**

Address: Jas. Keeth, 311 Hyde Block, Spokane, Wash.

Property: in Cedar Canyon district, Stevens county, 25 miles from Springdale, includes the Elephant and Deer Trail silver mines. The Deer Trail has been idle since 1919 owing to litigation.

Production: in 1919, 48 cars of ore were shipped from old dumps and fills. A new orebody, of low grade ore, reported cut, 1921.

COPPER BUTTE MINING CO. **WASHINGTON**

Orient, Ferry county, Wash. J. D. Gumpper, pres.; H. J. Miller, sec.; Willis Townsend, gen. mgr.

Inc. December, 1905, in Washington. **Cap.** $1,000,000; shares $1 par.

Property: 4 claims, patented, in the Pierre Lake district, south of Orient, shows 2 veins in open cuts, 14′ and 15′ wide, respectively.

Development: by 300′ shaft with drifts on the 100′ level shows copper-gold ores, but not in commercial quantity. A 1,000′ tunnel was expected to cut the ledge at a depth of 430′ below the surface. Work was reported resumed in 1921 and a crosscut begun in the main tunnel, 600′ from portal, following a well defined vein.

COPPER CLIFF COPPER MINING CO. **WASHINGTON**

Inactive. Probably dead. **Mine office:** Chewelah, Stevens county, Wash.

Officers: T. F. Wilson, pres., treas., and gen. mgr.; J. O. Blair, v. p.; L. C. Dougherty, sec.

Inc. February 24, 1912, in Washington. **Cap.** $1,000,000; $1 par; issued $62,000.

Property: 60 acres and 40 acres timber lands, held under bond and lease, in the Chewelah district, shows contact deposits between altered granite and limestone. Ores are mainly copper, with small silver and gold values.

Development: by tunnels, longest 1,026′, giving depth of 800′.

COPPER HOARD MINING CO. **WASHINGTON**

Address unknown.

Property: the Lookout claim, formerly under bond to the Chewelah Grey Copper Mng. Co.

COPPER KING MINING CO. **WASHINGTON**

Address: Chewelah, Wash. F. M. Jarvis, receiver.

United Silver Copper Mining Co. had $75,000 bond on group but relinquished control, 1919.

The receiver advised stockholders, in June, 1919, that company owed $65,000, including bond issues of $31,396, and suggested that company be reorganized.

The United-Silver Copper Mining Co. did considerable development, both underground and by diamond-drilling, said to have disclosed large

bodies of low-grade ore, which, however, can not be worked profitably with present mill equipment. The plan to reorganize, block out ore, and built a flotation mill seems the logical solution of the company's difficulties.

In 1921 a consolidation was planned with the United Silver-Copper Mng. Co., that owns adjacent claims.

Property fully described in "Metal Mines of Washington," p. 131, Bull. No. 23 of Washington Geological Survey, Seattle, Wash.

COPPER KNOB MINING CO. **WASHINGTON**

Address: Laurier, Wash.

Officers: Burt A. Purchase, pres., Spokane, Wash.; with W. W. Stevens, trustee, J. S. Meyers, J. T. Brunskill, Laurier, Wash.; J. E. Winters, and E. O. Conner, Spokane, directors.

Cap. $100,000; par 10c; non-assessable.

Property: 7 claims, unpatented, near Laurier, said to show copper ore, with small precious metal content.

Development: by 60′ shaft and 35′ crosscut said to show 28′ of ore. Only assessment work done in recent years. Operations to be resumed in near future.

COPPER QUEEN MINING CO. **WASHINGTON**

Property taken over by Copper King Mining Co.

COPPER WORLD EXTENSION MINING CO. **WASHINGTON**

Address: Nighthawk, Okanogan Co., **Head office:** Columbus, Ohio.

Officers: Walter A. Boyle, pres.; Edw. H. Caylor, v. p.; Alfred F. Carman, sec.-treas.

Property leased to **Dempster Mines Co.**, New York. (R. C. Dempster, supt.), who are said to have spent $95,000 for equipment and development work to end of 1920.

Inc. Jan. 11, 1904, in Washington. **Cap.** $1,500,000; $1 par.

Property: 8 claims, 160 acres, on Palmer mountain, in the Wannicut lake district. The ore is sulphide containing 2½ to 4% copper and occurs in lenticular masses in a contact between schistose and highly silicified andesite formation.

Development: by a 335′ 2-compartment shaft, with total workings of 2,000′. Some diamond-drilling done in 1920.

In 1917-18, shipments amounted to 3,500 tons ore, assaying 4% copper, 0.6 oz. silver, and 0.025 oz. gold per ton.

Equipment: includes steam plant, with 40-h. p. hoists and 4-drill air-compressor. A 2-mile Riblet aerial tram was completed in 1919, capacity, 400 tons in 24 hours. Employs 14 men.

COPPER WORLD GOLD MG. & SM. CO. **WASHINGTON**

Office: 401 Columbia Bldg., Spokane, Wash. **Mine office:** Loomis, Okanogan county, Wash. Jerome L. Drumheller, pres. and mgr.; John Wentworth, v. p. and supt.; S. A. Child, sec.-treas.

Inc. in Washington. **Cap.** $3,000,000; shares $1 par, non-assessable.

Property: Copper World and Copper King claims, patented lying between the Copper World Extension on the east and the Leadville mine on the west, on Palmer mountain, 6 miles N. E. of Loomis. **Ore:** a heavy sulphide containing 3-5% copper, occurs in a contact zone 100′ wide, and is proven by surface work for 3,000′.

Development: the mine has several short tunnels and shallow shafts and a 135′ two-compartment incline shaft, having a 125′ crosscut. Work shows several lenses, 8′-13′ wide. This and the adjoining property, Copper World Extension (which see), are under 10-year lease to Dempster Mines Co., from Sept. 1, 1917.

CRESCENT MINING CO., LTD. **WASHINGTON**

Company is a reorganization of the Crescent C. Mng. Co.

Office: 101 Horace St., Norwood, Manitoba, Can. **Mine office:** Twisp, Okanogan county, Wash.

Officers: D. C. McFee, pres.; Robt. Albright, v. p.; D. Munroe, sec., with J. H. Sutherland, F. J. Car, Alex. Munroe, W. H. Plumer, W. J. Nillaron, directors.

Cap. $3,000,000; unsubscribed stock, $1,291,786; $1 par.

Property: 48 claims, about 960 acres, and a mill-site on the east side of Cascade Range, in Okanogan county, about 100 miles S. W. of the Granby. Ore occurs in fissure veins, carrying chalcopyrite, bornite and quartz. Main development by tunnel over 900′ long. A good deal of graphite is mixed with ore.

Equipment: includes a turbine, electric plant, air drill, saw-mill, mine buildings and miners' lodgings.

CROWN POWER MOLYBDENUM CO. **WASHINGTON**

Succeeds Aurelia Crown Co.

Address: P. O. Box 187, Seattle, Wash.

Officers: O. Robt. Dahl, pres.-treas.-gen. mgr.; H. C. Kohl, v. p.; Calvin Dier, v. p.; John B. Van Dyke, sec.; L. A. Dahl, asst. sec.-asst. treas., with Albert Dobbertin and George C. Whipple, directors.

Inc. 1916, in Wash. **Cap.** $5,000,000; par $5; all issued.

Property: 6 claims, 120 acres, and 1 millsite of about 5 acres, 16 miles west of Lucerne, Chelan county, Wash. Property includes gold, copper, silver-lead and molybdenite mines.

Development: by 8 tunnels, of about 1,400′ aggregate length, and several open cuts. The Crown Point molybdenum mine has 3 tunnels, said to develop 9,000 tons of ore. Tunnel No. 3, on the copper vein, shows 4 ore shoots, of 4 to 8′ width, carrying ore said to give average assays of 15.5% copper and $8.65 gold and silver per ton. Management estimates "6,500,000 tons ore explored assaying 2% copper and $6 per ton in gold and silver."

Equipment: includes hydraulic plant, air-compressor, machine shop, engine house, saw-mill, warehouse and 3 cabins. The mill has 2 crushers, rolls and a concentration mill with flotation equipment, to treat 50 tons molybdenite ore daily, in 1922.

Geologic features described by A. R. Crook in Bull. Geol. Soc. Am., Vol. 15, pp. 283.

CRYSTAL MINING CO. **WASHINGTON**

Address: Capt. John Gray, No. 214 Third St., Spokane, Wash. **Mine address:** Miles, Wash.

Property: 40-acres 35 miles W. of Lincoln, in Lincoln county. Developed by 200′ shaft.

Reported under option, 1919, to E. S. Campbell and associates for $200,000.

CUPRITE MINING CO. **WASHINGTON**

Address: Frank Scanislawski, gen. mgr., Bossburg, Wash.

Property: bond and lease on the Young American mine, near Bossburg, Stevens county. Shows lenses of high grade silver-lead-zinc ore in limestone. Lenses vary from 6′ to 30′ in width, 75-100′ long and 10′ high.

Development: by 4 tunnels.

Equipment: includes 15-ton mill with crusher rolls, Overstrom tables, etc.

DEER TRAIL CONS. MNG. CO. **WASHINGTON**

Address care: Clarke Bros., Paulsen Bldg., Spokane, Wash.

Company owned an interest in the Deer Trail group of the **Cons. Mines Co.**, which see.

DEER TRAIL MINES **WASHINGTON**

Address: Jas. Keeth, 311 Hyde Block, Spokane, Wash.

Property: in Cedar Canyon district, Okanogan county, was a well known producer 25 years ago. New owner of north end of group, including claim from which most of shipments were made 25 year ago (totalling

$3,000,000), is to complete the mill as soon as a proper flow sheet has been worked out.

DEMPSTER MINES CO. **WASHINGTON**

Office: care C. Dempster & Sons, New York City. **Mine address:** Reginald C. Dempster, supt., Nighthawk, Wash.

Operates the Copper World mine, under bond and lease since 1918, and Copper World, 1921, planning to do diamond drilling 1921-22. Properties described under respective titles. Ore is a heavy sulphide, in demand by smelters as a flux. Producing, 1917-19.

DIAMOND R. MINING CO. **WASHINGTON**

Address: A. H. Kroll, Realty Bldg., Spokane, Wash. **Mine address:** C. L. Wickstrom, mgr., Metaline, Wash.

Officers: Wm. Kroll, pres.; A. H. Kroll, v. p.; E. S. Campbell, sec.-treas.

Cap. $100,000, 10c par.

Property: 6 claims, patented, in Pend Oreille county, one mile from Metaline. The ore occurs as irregular bunches and seams of galena.

Development: by tunnel, crosscuts and winze. **Equipment:** 25-ton mill and air-compressor. Concentrate averages 60-72% lead, 2-9 oz. silver and 1-4% zinc.

DOMINION SILVER LEAD CO. **WASHINGTON**

Officers: W. H. Linney, pres.-mgr., 2805 Summit Blvd., Spokane; Chas. P. Lund, v. p.; R. R. Rogers, sec., all of Spokane; W. L. Johnson, treas. and trustee.

Inc. 1915, in Washington. **Cap.** $100,000; par $10; non-assessable. Owing to litigation, property was idle for several years.

Property: Old Dominion and Ella groups, 10 miles E. of Colville, said to show high-grade silver-lead ore. Mine first opened in 1885, produced 3,061 tons of ore worth $602,536, mostly within 100' of surface.

Development: by tunnel cutting vein of rich silver ore at 2,150' from portal, at depth of 600'. A drift on vein opened 2½' of $1,000 ore, persisting for 40' to 50' upward, at last report. Ore carries 10-54% lead, some copper and gold and 737 to 1,409 ounces silver per ton.

Equipment: includes small plant and power drills.

DOUBLE EAGLE MINING CO. **WASHINGTON**

Officers: M. Kulzer, pres., Valley, Wash.; W. S. Rose, v. p.; F. F. Edwards, sec., Valley, with J. L. Dirks, W. H. Button, and A. Morrison, directors.

Cap. $1,000,000; $1 par. No debts and $4,000 cash reported in treasury, March, 1921.

Property: 4 claims, and 200 acres leased land in Stevens county, 12 miles W. of Valley, said to show silver-lead-copper ore.

Development: by tunnels to depth of 700', and 4 adits. A 300' adit is being driven on the bottom level, where the ore shoot widened out from 6-18", following the tunnel for 50'. Shipments reported to average $75 per ton.

The American Refractories Co. has a 10-year lease on a large magnetite deposit on Double Eagle ground.

The ground has been explored by diamond drill and 3 kilns, ore bins and a $20,000 gravity tramway installed.

DOUBLE HEADER MINING CO. **WASHINGTON**

Adress: care L. C. Shuff, Nespelem, Wash.

Officers: Geo. M. Quinn, pres.; L. C. Shuff, sec.-treas.; with E. Moore, C. J. Kennedy, and E. Smith, directors. Reported in November, 1918, that property was being operated by a close corporation, the Jenkins-Hammond Co., with Frank C. Hammond, mgr.

Inc. 1914, in Washington. **Cap.** $1,500,000; $1 par; 1,174,326 issued. Annual meeting, first Tuesday in June.

Property: 7 claims, 120 acres, 1½ miles S. of Nespelem, Wash. Ex-

amined by A. O. Ingalls and others. Claims cover a quartz vein in granite, dipping 38° N. E., with N. W.-S. E. course.

Development: by 80′ vertical shaft, 180′ incline and 390′ adit. Shipments made at irregular intervals, reported sent to the Great Metals M. & M. Co. mill in 1920.

DUTCH MILLER MINING & SMELTING CO. **WASHINGTON**

H. P. Fogh, pres. and agent for majority stockholders, 1403 Howell St., Seatlle, Wash. Geo. H. Law, sec.-treas.

Cap. $2,000,000; shares $1 par: all issued; 1,000,000 shares in escrow for 5 years. Majority of stock is held by an ore contract association which made a 5 year contract for output, the Dutch Miller to get 40% of earnings as royalty, one-half to apply on 500,500 shares optioned to the association.

Property: 2 patented claims, on summit of range, 12 miles south of Skykomish. Wash., formerly worked by the Seattle-Boston Copper Co. Claims show an orebody in a vein in granodiorite. Ore is chalcopyrite with tourmaline and quartz, and is high-grade. Mine lacks transportation facilities and rope tramway must be installed to get ore to the wagon-road

Examined by W. H. Weed. Inactive for several years, but company still alive.

EAGLE PEAK COPPER SPRINGS MINING CO. **WASHINGTON**

Mine office: Longmire, Pierce county, Wash. **Main office:** Tacoma, Washington.

Officers: R. H. Wheelock, pres., Ashford, Wash.; J. E. Walker, v. p.-mgr.; M. A. Long, sec.-treas., with G. W. Anderson and A. Lundin, directors.

Inc. 1908 in Washington. **Cap.** $150,000; $1 par; issued, 130,000. Annual meeting, September 10.

Property: 40 acres in Cascade mining district, 14 miles from railroad, in the heart of the Tatoosh range, near Mt. Tacoma. Claims show fissure veins in granite, 6″-5′ wide, carrying bornite, chalcopyrite, pyrite and arsenopyrite.

Development: by 600′ tunnels. **Equipment:** includes 25-h. p. power plant, air compressor and aerial cableway. A small amount of development work is done each year.

ECLIPSE CONS. MNG. & INV. CO. **WASHINGTON**

Fully described in Vol. XIV. Succeeded by **Virginia-Agenda Co.,** which see.

ELECTRIC POINT MINING CO. **WASHINGTON**

Address: Northport, Wash. C. D. Belser, supt.

Officers: Roy A. Young, pres.-gen. mgr.; Henry Broderius, v. p.; F. M. Turner, sec.; H. M. Waddell, treas., with L. C. Jesseph and A. V. Downs, directors.

Cap. $1,000,000; $1 par; 793,750 shares issued. Financial statement shows operating loss in 1920 of $18,390, as compared with $55,933 in 1919 and $30,166 in 1918.

Balance sheet to Dec. 31, 1921, shows current assets, $43,640; total assets, $521,525; current liabilities, $6,988.

Dividends: initial on Jan. 31, 1916; $7,935 in 1916; $158,700 in 1917; $87,230 in 1918; $47,580 in 1919; $142,740 in 1920. The total is $444,185, or 56¢ per share.

Property: 13 claims, 245 acres, unpatented, 20 miles E. of Northport, Stevens county, and 13 miles from Boundary, the shipping point. Mine is on top of a mountain, 4,000 to 5,000′ high.

Geology: the ore occurs in 5 large, egg-shaped replacement chimneys in magnesium limestone. The chimneys are nearly vertical, 30 to 50′ across and 100′ to 600′ deep. Ore consists of limonitic clay holding cerussite, galena nodules and remants of a dike of very basic igneous rock. See Metal Mines of Washington Bull. 23, Wash. Geological Survey, Seattle.

Development: 10,000', including 800' shaft and 1,000' tunnel on 300' level.

Equipment: includes a 2½ mile aerial tram, from mine to Leadpoint, and another section to be built to Wood Spur; ore bins and suitable mining plant.

Production: in 1920, 1,420 tons of high grade sulphide, 7,013 tons of first class carbonate and 2,315 tons of second class carbonate ore were mined. In 1917, shipments totaled 16,310 tons ore; in 1918, 8,214 tons were shipped, returning $241,138; in 1919, ore sales amounted to $62,598; and in 1920 to $265,074. Shipments made to Northport and Midvale smelters.

The future of the mine seems to depend more on the possibility of finding a market for the ore, than on the amount of ore. Property closed down since January, 1921, pending higher metal prices.

Company furnishes most of lead produced in Washington.

ELIZABETH GOLD HILL MINING CO. **WASHINGTON**

Address: care Frank X. Nagler, Yakima, Yakima county, Wash.

Officers: L. L. Matterson, pres.; P. J. Eschbach, v. p.; Frank X. Nagler, sec.-treas., with Jos. Feser, Thos. Hope, E. P. Sanford and Rudolph Mayer, directors.

Inc. 1900, in Washington. **Cap.** $1,000,000; $1 par. Annual meeting, second Monday in March.

Property: 14 claims, unpatented, 200 acres, adjoining the Blue Bell mine on the north, about 65 miles N. W. of North Yakima, in the Summit district, shows a number of orebodies in granite, carrying gold-silver-lead copper ores with 1,600' of workings.

Ore reserves: estimated by management, 150,000 tons of ore, with 100,000 tons blocked out for stoping, averaging $40 per ton, which figures are excessive.

Equipment: includes steam and water power and a small sawmill, with material for a 10-stamp mill on the ground. Idle since 1917.

EMPIRE MOLYBDENITE M. & M. CO. **WASHINGTON**

Address: M. B. Le Page, sec., 621 S. Adams St., Spokane, Wash.

Officers: I. Le Page, pres.; D. J. Whelan, v. p.; Fred Le Page, treas., with A. G. Clark, directors.

Cap. $100,000; shares 10c par.

Property: 8 claims, unpatented, on Molybdenite peak, Metaline district, Pend Oreille county, 11 miles from Ione. Claims carry molybdenite ore that has been worked in a small way for several years, and some shipments made.

FAVORITE GOLD & COPPER MINING CO. **WASHINGTON**

Probably dead. See Vol. XII.

Mine at Nighthawk, Okanogan county, Wash.

F. H. & C. GOLD MINING CO. **WASHINGTON**

Address: J. J. Hennessy, Old Bank Bldg., Spokane, Wash.

Officers: S. A. McCay, pres.; M. L. Luby, v. p.; J. J. Hennessy, treas.-mgr; Mary Hennessy, sec., with Martin Woldson, directors, all of Spokane.

Cap. $250,000; shares 25c par.

Property: 53 acres, 2½ miles N. W. of Rockcut, Ferry county, has gold-silver ore.

Development: 170' shaft, with about 1,000' of workings. **Equipment:** includes gasoline hoist and compressor. Small shipments were made to Granby smelter in 1918. No later information.

FIRST THOUGHT GOLD MINES, LTD. **WASHINGTON**

Succeeds First Thought Mining Co.

Office: Empire State Bldg., Spokane, Wash. **Mine address:** Orient, Stevens county, Wash.

Officers: M. B. Grieve, pres.; W. J. C. Wakefield, v. p.; Jos. McCarthy, treas.; O. J. Smith, sec.

Inc. 1919, in Washington. **Cap.** $500,000; par 25c; 500,000 treasury shares. **Bonds:** $200,000 8s authorized, 1921.

Property: 9 patented claims, 141 acres, in Pierre Lake district, 2½ miles from Orient, shows a brecciated zone, 10 to 110′ wide, in porphyry-quartz-latite contact, with minor cross faults. Richer ore shoots occur at intersections; ore is gold-bearing; high grade averaging $15.50 gold and ½ oz. silver per ton; low grade about $6 per ton.

Development: by 200′ shaft with winze to 7th level; levels at 50′ intervals. No. 4 being 600′ long with 75′ crosscuts at every 50′; workings total 6,000′. Reported to have 400,000 tons of $6 ore in reserve. The possibility of finding other ore shoots exists.

Equipment: includes 6-drill compressor, hoist 2½ mile aerial tram, assay-office, and complete mining plant. Ore is said not to be amenable to amalgamation or concentration, but shows a 92% extraction with cyanide.

Production: between 1904 and 1910, totals 38,180 tons of $612,000 gross value. Idle since. Property to be sold, or failing this, attempt will be made to place bonds, 1922.

FIRST THOUGHT SILVER MINING CO. — **WASHINGTON**

Address: Ernest N. Patty, lessee, Okanogan, Wash.

Property: in Ruby-Conconully mining district, Okanogan county, 12 miles N. W. of Okanogan, reopened in 1921 after an idleness of 30 years duration.

Sulphide ore occurs in a marginal quartz vein in granite and schist, 5-40′ in width, with N.-S. course and dip of 75° E. Assays reported to be 5-70 oz. silver; 1-6% lead; 1% copper.

Development: by tunnels to depth of 500′, with over 5,000′ of workings.

Production: one shipment of 27½ tons assayed 47 oz. silver, 1% copper and 30c. gold per ton.

FLORENCE-RAE COPPER CO. — **WASHINGTON**

Address: Index, Snohomish county, Wash.

Property: on Copper mountain, about 4 miles E. of Index, has a tunnel showing a 10′ paystreak of chalcopyrite in the Margurite vein and assay of 400 lb. sample taken across 6′ of the vein averages 12 oz. silver, 18.5½% copper, 29.6% iron, 7.2% silica, and 35.8% sulphur. Mine was operated in 1918 by Cascade Mng Co. and several shipments made.

FOUR METALS MINING CO. — **WASHINGTON**

Address: R. S. Grant, pres.-mgr., Nighthawk, Wash.

Property: 1½ mile S. W. of Nighthawk, Okanogan county, contains a silver-bearing fissure vein, 2-12′ wide, in granodiorite, with N. W. course and dip of 32° W. Ore contains argentiferous galena, chalcopyrite and pyrite.

Development: by shafts and crosscuts. **Equipment:** includes a 50-ton concentrator erected in 1921 that contains ball mills, two jigs, five tables and flotation machines.

FRANK MINING CO. — **WASHINGTON**

Address: Chewelah, Wash.

Officers: A. C. Weary pres.; W. R. Stuart, sec.-treas.-mgr., with Wm. Thompson, directors.

Cap. $80,000; 5c par.

Property: 4 claims, 80 acres, near Chewelah, said to show copper-lead ore in quartz vein. Developed by 120′ shaft. A prospect.

FRISCO-STANDARD MINING CO. — **WASHINGTON**

Address: J. T. Burcham, sec.-treas., Sherwood Bldg., Spokane, Wash. **Mine address:** New Boundary, Wash. J. Astloford and W. E. Hightower, of Northport, lessees.

Property: in Northport district, Stevens county, 1½ miles from the International border. Ore occurs in a quartz vein, 2-4′ wide, containing tetrahedrite and galena.

Developed by drifts and stopes. Smelter shipments reported to have contained 49 oz. silver, 7% lead and 3% copper.

GALENA FARM MINING CO. WASHINGTON

Address: Dr. W. J. Keyes, sec.-treas., 202 Fernwell Bldg., Spokane, Wash.

Directors: Sam Kailin, pres; David O'Neil, Chas. McSperrin, Dr. Ben Kailin, W. H. Keough, Elmer J. Miller and W. J. Keyes. W. H. Keough, mgr.

Property: 8 claims, in Stevens county, 16 miles S. E. of Northport, said to show lead-silver ore, averaging 11 oz. per ton in silver.

Development: by open-cuts and 200' tunnel. All work was discontinued during the war, but it is to be resumed on a 70' shaft.

GALENA HILL MINING CO. WASHINGTON

Address: Reardon, Wash. W. S. Bliss, mgr., Orient, Wash.

Officers: W. L. Shearer, pres.; V. A. Finrow, sec.-treas.

Inc. 1911, in Washington.

Property: Kettle River mine, 5 claims and a fraction, on Kettle river, 10 miles N. of Orient, Stevens county. Ore occurs in a vein, averaging 3' in width, containing galena, sphalerite, pyrite and chalcopyrite.

Development: by 270' double-compartment shaft, 80' winze and 1,000' of drifts and crosscuts. Developing since 1918 with a force of from 5-10 men.

GENERAL COPPER MINING CO. WASHINGTON

Address: care Dr. Robert Bell, pres., Paulsen Bldg., Spokane, Wash.

Officers: Robt. Bell, pres.; Arthur L. Hooper, sec.-treas., with A. C. Johnson, A. G. Rudeen, Dr. Peter Reid, Dr. J. H. Thompson and J. V. Campbell, directors.

Property: 1 mile N. of the Admiral mine, near Valley, Stevens county, said to show 4' of 6% copper ore, containing 5 oz. per ton of silver. Company plans exploration and development work in 1922.

GIANT SILVER MINING CO. WASHINGTON

Address: Fruitland, Wash.

Property: a lease and bond on the holdings of the Red Cloud Mining Co., in Deer Trail district, Stevens county.

GLADSTONE MOUNTAIN MINING CO. WASHINGTON

Address: W. J. Nichols, 201 Sherwood Bldg., Spokane, Wash. **Mine address:** Dan Dodd, supt., Leadpoint, Wash.

Officers: T. S. Lane, pres.; W. J. Nicholls, v. p.-treas., with J. A. Welch, F. R. Wolfle and Jesse M. Hall, directors. M. R. Luhn, sec.

Inc. August, 1916, in Washington. **Cap.** 1,500,000 shares; 10c par; non-assessable; 351,556 outstanding.

Property: 16 claims, 11 surveyed for patent, 291 acres, situated 20 miles E. of Northport, adjoining the Electric Point mine, the claims almost surrounding that property.

Geology: vertical chamber or so called "chimney" deposits in limestone. Ore contains lead as carbonate, 1 oz. silver, trace of gold. Nine sulphide chimneys were opened in 1919.

Development: by Setting Sun shaft 275' with 450' work on 4 levels that show pay-shoot 120' long of carbonate lead ore. Also has 120' Long Star shaft with ore.

Equipment: 15-h. p. gasoline hoist. Seven men employed.

Production: in 1917 shipped 22 cars of 15 to 18% lead ore netting $12,000. Closed down in 1917, owing to lack of funds, but was reopened in 1919 and by October, carbonate and sulphide ore had been found carrying up to 79.3% lead. Six cars of ore shipped in 1920 averaged 77.5% lead, amounting to $19,217.

GORRIEN MINING CO. WASHINGTON

Name changed 1922 to **Washington Black Rock Mining Co.**, which see.

GRANT CONSOLIDATED COPPER MINING CO. WASHINGTON

Officers: at last accounts, C. H. Clodins, pres., Ritzville, Wash.; J. MacDonald, v. p.; J. A. MacLean, sec.-treas., S. 714 Oak St., Spokane.

Inc. 1907, in Washington. **Cap.** $1,650,000.

Property: 14 claims, on Copper mountain, 9 miles from Chesaw, Okanogan county, developed by an open cut and tunnel planned to be driven 1,500′, cutting 2 strong veins carrying medium-grade chalcopyrite in considerable quantities. Shipments said to have returned about 6% copper and $3 gold per ton.

Equipment: includes two 80-h. p. boilers and an air compressor. Letters neither answered nor returned. Presumably idle.

GREAT METALS MINING & MILLING CO. **WASHINGTON**

Address: Almira, Lincoln Co., Wash. E. C. Williamson, mgr.; Albert Nelson, supt.

Property: 46 claims on Mineral Hill, 2 miles west of Nespelem, also bond on Cabin property.

Development: 200′ Cabin shaft with levels at 85′ and 200′ opening shear zone containing quartz calcite veinlets with zinc-lead sulphides.

Equipment: includes a 60-ton custom mill with gravity concentration and flotation. Concentrate carries 200-400 oz. silver per ton and is shipped to the Tacoma smelter. Idle since 1920 owing to shortage of water.

GREAT NORTHERN MINING CO. **WASHINGTON**

Address: Jos. Rosslow, Hyde Bldg., Spokane, part owner in 1918.

Property. 4 patented claims, on San Poil river, Ferry county, 15 miles from Keller, said to show gold-copper ore, with some nickel and cobalt. Workings totaled 1,850′ at last accounts.

GWINN MINING CO. **WASHINGTON**

Property acquired by **Hall Creek Mining & Milling Co.**, which see.

HALL CREEK MINING & MILLING CO. **WASHINGTON**

Address: Rosalie, Wash.

Officers: M. W. Merritt, pres.; W. F. Bing, v. p., with S. Lamley, L. S. Kimm, H. Mondt, Sr., and Geo. Barley directors. Peter Proff, Jr., sec.-treas.-mgr., Rosalie, Wash.

Inc. in Washington. **Cap.** $1,000,000; shares $1 par. Annual meeting, 3rd Wed in April.

Property: 240 acres including the Gwinn mine and group of claims, shows a fissure vein carrying silver-gold-copper ore, developed by 400′ shaft and 1,000′ underground work.

Equipment: includes steam plant and water power, hoist and 4-drill Fairbanks compressor. Has a 75-ton concentration mill, driven by electric power.

Idle, 1921.

HAMMOND MINING CO. **WASHINGTON**

Address: Geo. C. Fisher, sec., Billingham, Wash.

See Vol. XIII for details.

HECLA COPPER MNG. CO. **WASHINGTON**

Address: care J. C. Argall, San Marco Apts., Spokane, Wash.

Out of business. Fully described in Volume XIV. Mine, near Chewelah, reported sold to the **International M. & M. Co.** of Idaho, which see.

HIGH GRADE SILVER & COPPER MINING CO. **WASHINGTON**

Address: Henry Carstens, 906 Fairview St., Spokane; J. A. Hansen, treas.

Inc. July, 1909. **Cap.** 1,500,000 shares, assessments of 9 mills levied to date.

Property: 3 claims, about 3 miles N. E. of Chewelah, Stevens county, shows a granite intrusion in lime with mineralization along contact. **Ore:** high-grade copper with silver and lead values.

Development: by 125′ shaft and a new 60′ shaft being sunk on a body of oxidized iron ore. **Equipment:** includes hoist, boiler, pump, etc.

See Columbia Turk Copper Co., for lawsuit, etc. Geology of district shown on map, p. 122 of Bull. 23, Geol. Survey of Washington, 1921.

No production reported since 1916.

HOLDEN GOLD & COPPER MINING CO. **WASHINGTON**

Address: O. A. Hoag, sec., Spokane, Wash. **Mine address:** W. Y. Williams, mgr., Lake Chelan, Wash.

Officers: J. H. Holden, pres.-mgr., Chelan, Wash.; A. W. Lachapelle, v. p.; O. A. Hoag, sec.-treas., with Chas. N. Boon, directors.

Cap. $250,000. Company has no debts and no earnings to date.

Property: 3 claims, 60 acres, on Railroad creek, near Lake Chelan, 87 miles N. of Wenatchee on the G. N. R. R., shows gneiss and schist cut by granite with a vein of 40′ average and 185′ claimed maximum width.

Development: by 6 tunnels, No. 2 and 3 being connected by a blind shaft with about 2,000′ of workings on 3 levels and several hundred feet of diamond-drilling. There also are numerous open cuts. Mine shows ore said to assay from 7 to 10% copper, 2 oz. silver and $5 to $10 gold per ton. Idle, except for annual assessment work.

HOMESTEAD COPPER CO. **WASHINGTON**

Address: W. H. Angel, mgr., Colman Bldg., Seattle, Wash.

Officers: C. Dell Floyd, pres., Chehalis Wash.; Mrs. Peter McLane, v. p.; Peter McLane, treas., with W. H. Angel (mgr.), directors. Agnes W. Floyd, treas.

Inc. in Washington. **Cap.** $1,000,000; par $1.

Property: 9 claims, 180 acres, 6 miles from Index, Snohomish county, said to show copper ore. Workings amount to only 200′ of tunneling. Is a prospect.

ILLINOIS COPPER & SILVER MINING CO. **WASHINGTON**

Address: J. C. Davis, Keller, Ferry county, Wash.

Officers: J. C. Davis, pres. and gen. mgr.; J. D. Nighbert, v. p.; R. Shoemaker, supt.; Edwin Johnson, sec.; J. D. Hess, treas.

Inc. in Washington. **Cap.** $2,000,000; $1 par; in $1,000,000 preferred and $1,000,000 common stock.

Property: 10 claims, in the San Poil district, and "a ⅛ interest in 160 acres of granite", 21 miles N. of Keller.

Development: by 3,000′ of tunnels, exposing zinc-copper ore with silver values.

Equipment: includes $5,000 worth of machinery, all well housed.

No recent returns, presumably idle.

INSURGENT GOLD MINING CO. **WASHINGTON**

Address: G. B. Dennis, Knickerbocker Apts., Spokane, Wash.

Inc. in Washington. **Cap.** $500,000; $1 par.

Property: 1 claim and fraction, adjacent to the Hope mine of the Northport S. & R. Co., at Republic, Ferry county, controlled by the Day Bros.

Development: by 540′ shaft, opening a 15′ vein.

In 1919, the Days started suit against the Insurgent and Lone Pine-Surprise Consolidated, claiming $100,000 damages for ore alleged to have been wrongfully removed by these companies. The Insurgent company compromised the suit by selling out to the Northport Co., while the Lone-Pine Surprise fought and won the suit brought against them.

Production: to 1918 amounted to 12,000 tons of $19.76 gold ore.

INTERNATIONAL GOLD MINING CO. **WASHINGTON**

Head office: Dr. Peter Reid, Empire State Bldg., Spokane, Wash.

Officers: Peter Reid, pres.; D. F. Kizer, v. p.; G. H. Walters, sec.; C. L. Russell, treas., with H. L. Williams, directors.

Cap. $1,000,000; shares, $1 par.

Property: 6 claims in the Orient district, Ferry county, developed by tunnels and equipped sufficiently for a small mine.

INTERSTATE-SULLIVAN MINING CO. **WASHINGTON**

Officers: Dennis Sullivan, pres., Rockford, Wash.; H. F. Phillips, v. p.; A. E. Barnes, sec.-treas., Hyde Bldg., Spokane; Jack Ashley, Jr., supt.

Cap. $100,000; shares, 5c par.

Property: Hidden Treasure group, 6 claims, on Goat mountain, N. of Clark's Fork, Wash., said to show a fissure vein with silver-lead ore.

A 3-drill compressor had been added to equipment, and a tunnel was being run to cut the vein at a depth of 800', at last account.

IRON CREEK MINING CO. **WASHINGTON**

Address: Keller, Wash.

Officers: J. R. Abraham, pres.; John W. Duncan, v. p.; J. E. Angle, sec.-treas.-supt.; with J. E. Kennedy and H. Phil Brandner, directors. Rich. Marsh, cons. engr.

Inc. 1914, in Washington. **Cap.** $1,500,000; par $1.

Property: 15 claims, unpatented, on Iron creek, 12 miles N. E. of Keller, in Ferry county, said to show silver-lead ore in 5' fissure vein, averaging $20 per ton.

Development: 1,400' of workings, mainly tunnels.

Equipment: 2-drill compressor, boiler and engine. A 20-ton experimental mill and cyanide plant reported under construction, June, 1921. Ten men employed.

IROQUOIS MINING CO. **WASHINGTON**

Address: Chas. E. Bisbee, receiver, Rookery Bldg., Spokane, Wash., appointed in May, 1918.

Company presumably forfeited its charter. Described in Volume XIV.

IVANHOE MINING CO. **WASHINGTON**

W. B. McChesney mgr., Oroville, Wash.

Property: on Palmer mountain, 7 miles from Oroville, Okanogan county, developed by 4,400' tunnel to vertical depth of 1,559', where the main orebody was intersected.

JUMBO COPPER MINING CO. **WASHINGTON**

Office: Everett, Wash.

Inc. 1920, in Wash.

Property: the Jumbo group near Darrington, Snohomish county, shows rich gold-copper ore.

JUNO-ECHO COPPER CO. **WASHINGTON**

Address: Albert I. Kulzer, Chewelah, Wash.

Officers: Dr. C. A. Hauber, pres.; C. T. Winslow, v. p., with H. R. Spedden of Colville, F. L. Reinoehl, Chewelah and F. H. Alm, directors.

Inc. in Washington. **Cap.** $150,000; par 10c., assessable up to 3c. a share; 1.3c levied to date.

Property: the Juno, Echo and Ibex lode claims, 2 miles N. E. of Chewelah and adjacent to Security Copper Co. and Standard Chewelah Co. holdings. Is a reorganization of the Juno Echo M. & M. Co.

Development: by 320' shaft with levels at 150' and 300', exposing veins of copper ore carrying molybdenite. Equipped with compressor, hoist and pumps. Idle several years owing to high cost of labor and materials. Property has shipped two carloads of high-grade ore.

Reported 1921 to have absorbed Chewelah Standard Mng. Co., issuing 250,000 shares of which 100,000 went to creditors and balance to stockholders of C. S. M. Co. New property has 500' shaft, with good ore on 200' level.

JUPITER LEAD CO. **WASHINGTON**

Address: Northport, Wash., or care Albert Baker, Spokane, Wash.; Chris Knutson, Wm. Bynan, C. Basler, and others, of Northport, Wash., lessees.

Cap. $300,000; par $1.

Property: the Last Chance group, 6 miles S. E. of Northport, which during 1908-10 produced about 1,400 tons of lead ore, valued at $65,000. Idle until Norman Mines Co. took bond on property for $30,000. Several carloads of ore were shipped, assaying 60% lead and zinc. Option was relinquished in October, 1916, and mine was idle until late in 1918.

Management reported taking out lead ore at depth of 500' in the 1,000' tunnel, early in 1920. Twelve men employed.

JUST TIME MINING CO. WASHINGTON

Office: F. C. Descent, 326 Rookery Bldg., Spokane, Wash.

Officers: F. C. Descent, pres.; A. Anderson, sec.; with D. Hamerson, directors, all of Spokane, Wash.

Inc. 1917, in Washington. **Cap.** $300,000; par $1.

Property: 2 unpatented claims, in Stevens county, 3 miles from Electric Point mine, said to show silver-lead ore in a 70' shaft. No recent report.

KAABA MINES CO. WASHINGTON

Address: S. Barghoorn, sec.-treas., Symons Bldg., Spokane, Wash. J. W. Douglas, pres.-mgr., Oroville, Wash.

Property: 1 mile S. W. of Nighthawk, Okanogan county. Ore occurs in quartz fissure vein in granodiorite, averaging 1' in width, and containing argentiferous galena chalcopyrite, pyrite and marcasite.

Development: by 240' double-compartment shaft, with 800' of drifts, said to have partly blocked out 100,000 tons of low grade ore.

Production: in 1918, 1,800 tons of ore shipped to the Bender mill at Nighthawk, averaged $8 per ton. Only development work being done 1921.

KANKAKEE MINING CO. WASHINGTON

Address: c/o Wm. Barnard, Nespelem, Wash.

Officers: J. M. O'Neil, pres.; F. M. D'Camp, v. p.; W. Barnard, sec.-treas., with Geo. M. McDonald, H. L. Mayberry, J. R. Sanders and E. Christensen, directors.

Inc. in Washington. **Cap.** $850,000; $1 par.

Property: 11 unpatented claims, and a millsite in Okanogan county, 3 miles W. of Nespelem, has zinc-copper ore with silver and a little gold. Said to have 15,000 tons of ore blocked out.

Development: by 100' shaft and 20' drift in 3' of ore averaging 11-12 oz. silver, with lead, copper and zinc. Small shipments reported made to Great Metals M. & M. Co. mill in 1920.

KEYSTONE LEAD MINING CO. WASHINGTON

Address: 324 Fourth Ave., Pittsburg, Pa. Jesse M. Hall, mgr., Panken Bldg., Spokane, Wash. Dan D. Dodd, supt., Leadpoint, Wash.

Officers: Robt. J. Coyle, pres.-treas.; J. M. Hall, v. p.; J. W. Cree, Jr., John D. Reilly and R. W. Hanan, trustees. Chas. V. Griffith, sec., Pittsburg, Pa.

Inc. May, 1921, in Wash. **Cap.** $150,000; par 10c.; 500,000 shares in treasury.

Property: 12 claims adjoining the Electric Point mine on the E., in Stevens county, 20 miles S. E. of Northport, reported under development, July, 1921. Contains lead deposits in limestone, in a chimney of ore, 30' by 60', opened to a depth of 100'.

KING MINING CO. WASHINGTON

Dead. See Copper King Mining Co.

Described in Vol. XIII.

KNOB HILL MINING CO. WASHINGTON

Office: 622 Old National Bldg., Spokane. **Mine office:** Republic, Wash. J. E. Daley, supt.; Horace Mason, mine supt.

Officers: John Byrne, pres.; Chester Shoudy, v. p.; with T. A. Wallis, H. V. Chamberlain, H. Kreysler, Mrs. John Byrne, and J. E. Daley, directors. O. A. Broyles, sec.-treas.

Cap. $1,000,000; shares $1 par; all issued. Stock listed on Spokane Exchange. Annual meeting, January.

Profits in 1916 were $33,812; in 1917, ore sales totaled $102,143 net. In 1918, ore sales were $33,933; total income, $37,330; expenses, $40,546; cash on hand, $336; operations resulting in a loss of $9,216.

Dividends: resumed in March, 1917, after a 3-years' lapse, paid $34,784 in that year, bringing total dividends to $105,000.

Property: 3 claims patented, viz: the Knob Hill, Mud Lake and Alpine claims, at Republic, Ferry county, Wash. The Knob Hill is developed

by shafts and crosscuts. **Geology:** quartz veins in latite porphyry. Knob Hill vein 3'-5' thick with pay shoot 300' long and 2'-3' of ore on Alpine vein stoped for 2½' wide and 400' long.

Development: several thousand feet of workings, with 600' shaft. In 1921, stoping above 600' level yielded shipments returning $25 to $35 per ton, being best ore in mine.

Equipment: 50-h. p. distillate engine, 5-drill compressor, etc.

Production: several thousand tons of ore shipped in 1918 and in 1919, said to have averaged $15 per ton; total output, 50,000 tons, yielding between $700,000 and $1,000,000.

Late in 1921, company was working 10 men and making regular shipments to Trail smelter.

KROMONA MINING & MILLING CO. — **WASHINGTON**

Office: F. M. Williams, 615 Peyton Bldg., Spokane, Wash. **Mine address:** Sultan, Wash.

Officers: C. B. Krom, pres.-treas.; J. F. Krom, v. p.-gen. mgr.; W. Y. Sanborn, sec., with J. P. Shattuck, directors.

Inc. 1916, in Washington. **Cap.** $1,500,000; $1 par. Annual meeting, fourth Tuesday in January.

Property: 9 claims, 180 acres, in Sultan district, Snohomish county, about 18 miles from Sultan, Wash., showing a vertical vein in granodiorite, the ore stringers 1-10', containing chalcopyrite, bornite, pyrrhotite and flakes of molybdenite.

Development: by 85' adit. Management plans to install complete equipment, including compressor, and to do extensive exploration and development work.

LA FLEUR MOUNTAIN COPPER CO. — **WASHINGTON**

Described in Volume XIV. Company absorbed in 1920 by La Fleur-St. James Mng. Co., which see.

LA FLEUR-ST. JAMES MINING CO. — **WASHINGTON**

A consolidation of the La Feur Mountain Copper Co., Washington, and St. James M. Co., Ltd., of Idaho.

Address: Colville, Wash. **Mine address:** Danville, Wash.

Officers: W. A. Acorn, pres.; I. J. Lasswell, sec.-treas., with J. L. Lasswell, Markus Lies, Theresa James, W. H. Glunt and John Kuder, directors.

Inc. August, 1920, in Washington. **Cap.** $2,000,000; 5 cents par; $1,437,000 outstanding.

The **La Fleur** group consists of Comstock and Walla groups of 6 claims and 4 fractions, on La Fleur mountain, Ferry county, 1½ miles from rail. The ore consists of bornite, chalcopyrite and pyrite, disseminated through a quartz sericite ledge, which varies from 2' to 5' in thickness. Ore contains 3-5% copper. Developed by two prospect shafts, 37' and 50' deep.

The **St. James** mine comprises the Ula and Try Me claims on Sunset peak near Wallace, Shoshone county, Idaho. Ore carries lead, silver and zinc. No. 2 tunnel, started Nov., 1915, cut vein at 300', showing 8' of milling ore. The lower tunnel is 1,200' long. A 20' vein was cut in the upper tunnels.

LAKINA COPPER CO. — **WASHINGTON**

See same title under Idaho mines.

LAST CHANCE MINE — **WASHINGTON**

Address: C. W. Jackson, lessee, Okanogan, Wash.

Property: an old producer in the Ruby Hill district, Okanogan county, owned by Jonathan Bourne, Jr., Portland, Ore. Ore occurs in a quartz vein in granite, 8-20' in width; a pay shoot 2-4' wide and 200' in length, contains steel-galena, chalcopyrite, pyrite, tetrahedrite and sphalerite.

Development: by 650' drift on the vein and 300' old shaft, with 800' easterly crosscut. The mine was re-opened in 1920 and old workings unwatered.

Production: hand sorted shipments reported to average 30 oz. silver, 17% lead and 4% copper.

LAURIER MINING CO. WASHINGTON

Bankrupt. E. K. Erwin, receiver, Spokane, Wash.

Mine office: Laurier, Ferry county, Wash.

Officers: Dayton H. Stewart, pres.-mgr.; Grant A. Stewart, v. p.-supt.; E. K. Erwin, sec.-treas., with J. S. Talkington and Guy P. Linville, directors; G. A. Stewart, supt.

Inc. October 22, 1908, in Washington. **Cap.** $1,000,000, increased later to $1,500,000; shares $1 par; all issued.

Property: 7 claims unpatented, about 120 acres, at Laurier, Ferry county, in the Curlew district. Developed by 140′ shaft and several tunnels, showing a vein of pyrrhotite ore said to show copper, silver and gold values.

Equipment: includes a 2,900′ aerial tramway connecting the mine with a railroad siding and gasoline compressor.

Shipments: commenced in 1915, were sent to the Granby smelter; about 500 tons of copper-silver ore from development work averaged 4.16-7.66% copper and 2 oz. silver, netting $30 per ton.

In 1916, 1,200 tons shipped, reported to have averaged 4% copper and 3 oz. silver per ton, netting $30 per ton. Small shipments made in 1917-18. Shipped to Tacoma smelter early in 1920. Idle and without funds, November, 1921. Reported under lease to C. A. O'Neill.

LEAD TRUST MINE (INCORPORATED) WASHINGTON

Address: Leadpoint, Wash. **Head office:** Wenatchee, Wash.

Officers: J. A. Scaman, pres.; F. C. Scaman, v. p.; D. A. Shiner, sec.; F. N. Mintzer, treas, with J. C. Gollehon, trustees.

Inc. in Washington, August, 1909. **Cap.** $1,000,000; $1 par; 417,433 shares outstanding.

Property: 5 claims, 100 acres, on Gladstone mountain, Stevens county, 2½ miles from Leadpoint, said to have rich lead-silver ore in a chimney in limestone. Ore is galena, 6′-14′ wide, 60′ long, of unknown depth and will average 10-15% lead.

Development: by 2 tunnels, total workings about 1,200′.

Equipment: includes 75-ton concentrator, compressor, and steam power. Total output, about 200 tons.

LEAD & ZINC CO. WASHINGTON

Controlled by L. P. Larsen and Jens Jensen of Metaline Falls, Wash.

Property: the Josephine mine, at Metaline Falls, Pend Oreille district, once one of the biggest zinc producers in the State. Operated under lease by Butte & Superior Mining Co. In December, 1917, company filed a petition in bankruptcy, as a result of litigation with the B. & S. Co. In 1918, surface equipment, including the 175-ton mill was sold at public auction.

LIBERTY COPPER MINING CO. WASHINGTON

Office: Spokane, Wash. **Mine office:** Bluecreek, via Chewelah, Wash.

Officers: J. H. Reser, pres.; C. Oldfather, v. p.; A. Haas, sec.; S. G. Neff, treas, and gen. mgr.; R. E. McVicar, trustee.

Inc. in Washington. **Cap.** $1,000,000; shares $1 par.

Property: 6 claims, well watered and timbered, on Bluecreek, about 1½ miles from Bluecreek station, and 6 miles N. W. of Chewelah. The main vein, developed by 4,000′ of tunnels, is about 18″ wide, carrying auriferous and argentiferous copper and lead ores.

Equipment: includes steam hoist, 100-h. p. boiler and an air compressor. The mine was under development from 1906 to 1915 and made its first carload shipment March, 1909. Reported that capital would be increased to $1,500,000 to provide money for resuming work, at last account.

In January, 1922, company sued for $1,600 on labor liens at Colville.

LITTLE COVE MINING CO. WASHINGTON

Address: Republic, Wash.

Officers: John W. Lloyd, pres.-gen. mgr.; F. W. Cleator, v. p.; W. W. Montieth, sec.-treas.

Inc. in April, 1918. **Cap.** $100,000; par 10c.

Property: a lease and bond on the Little Cove and Mammoth claims in Eureka gulch, Republic district. Owned by Jonathan Bourne, Jr., and operated many years ago. Developed by 150′ shaft exposing ore said to assay $14.50 per ton. No recent returns.

LONE PINE & SURPRISE MINES — **WASHINGTON**

Address: Day Bros., Wallace, Idaho. Mine at Republic, Wash.

Property: operated 1921, shipping about 30 tons daily.

LONE-PINE SURPRISE CONS. MINING CO. — **WASHINGTON**

Address: Hyde Block, Spokane, Wash.

Officers: Chas. P. Robbins, pres.-mgr.; W. J. C. Wakefield, v. p.; Chas. Theis, sec.; J. E. Hopper, asst. sec.; E. E. Sizemore, supt.

Cap. $3,500,000; $1 par; 3,126,000 shares issued.

Property: Last Chance mine, at Republic, Ferry county said to show an 8″ vein carrying $13 ore for 360′ along drift on 500′ level. Developed by a 650′ two-compartment shaft with 127′ crosscut to vein on 650′ level and 170′ drift in shipping ore. Reserves equal to several thousand tons milling ore. Equipped with a 514 cu. ft. compressor, hoist, and boiler.

Production: in 1918, tonnage mined was 16,535; in 1919, output was 9,995 tons.

In August, 1919, the Day Interests (Northport M. & S. Co.) started suit against **Lone Pine-Surprise** and the **Insurgent** companies, claiming $100,000 damages for ore removed by them from the Hope vein. The Insurgent company compromised by selling out to the Northport Co. The Lone Pine-Surprise Co. fought and won the suit, Nov. 2, 1920. The mine has been closed down since the filing of this suit in 1919.

LONE STAR COPPER MINING CO. — **WASHINGTON**

Officers: Oscar De Camp, pres.; Wm. S. Thyng, sec. and engr., Securities Bldg., Seattle, Wash., and R. C. Rimertsen, directors.

Inc. April, 1910, in Washington, practically as a reconstruction of the Copper Hill M. & Milling Co. **Cap.** $1,500,000; shares $1 par. Owns sundry claims, including the Copper Hill mine, near Newport, Stevens county, developed by several shallow shafts and tunnels. Mine has an 18′ vein carrying chalcopyrite, disseminated in pyrrhotite. There is no machinery. Idle several years, except for annual assessment work.

LOON LAKE BLUEBIRD COPPER CO. — **WASHINGTON**

Address: H. H. Shallenberger, Peyton Bldg., Spokane, Wash. **Mine address:** Loon Lake, Wash.

Officers: H. D. Trunkey, pres.; H. H. Shallenberger, v. p.-mgr.; Jas. McCarthy, sec.-treas., with J. C. Haas, all of Spokane and A. R. Ammundsen, directors.

Inc. 1918. **Cap.** $375,000; 25c. par.

Property: four claims, 6 miles N. of Loon Lake and adjoining Loon Lake Copper Co. on E., in Springdale district, Stevens county, said to show a quartz vein, 5-10′ wide and several hundred feet long, containing chalcopyrite, pyrite and a little malachite.

Development: by 200′ shaft, drifts and crosscuts. **Equipment:** includes a boiler, hoist and compressor. Developing.

LOON LAKE COPPER CO. — **WASHINGTON**

Office: 43 Leon St., Boston, also 801 Old Natl. Bank Bldg., Spokane, Wash. **Mine address:** W. L. Zeigler, mgr., Loon Lake, Wash. In receivership, 1920.

Officers: Jas. C. McCormick, pres-treas.; F. W. Dewart, v. p.; R. L. Flanders, sec., with C. S. Kalb, J. W. Brock, J. H. MacAlman, and Alfred De Voto, constitute board of trustees.

Inc. January, 1916, in Washington. **Cap.** $375,000; shares 25c par; $355,000 issued.

Bonds: authorized $90,000; outstanding, about $45,000. **Dividends:** 1c a share monthly declared July, 1917; $43,352 in 1917, none since.

Property: the Kemp-Komar and O. K. mines, 310 acres, on Grouse creek, 6 miles N. of Loon Lake, Stevens county, on the Great Northern R. R., said to carry a well-defined fissure vein 4'-20' wide, containing bornite, chalcopyrite, malachite, azurite and cuprite in quartz.

Development: by 500' incline shaft with 1,587' of work on 300 and 500' levels. Between 200 and 300', oreshoot is 70' long, 35' high and 5' wide. On the 500' level, orebody is 90' long, 8' wide and averages 2% copper. There are also two tunnels, the 320' O. K., and the 300' Chapple tunnel.

Equipment: a well designed 100-ton concentrator with Ziegler flotation machines, was completed in 1919; other additions include a new generator set, 6-drill compressor, and 50 h. p. hoist. Mill feed averages 2% copper and a few ounces silver. Concentrates average 25% copper and 10 oz. silver per ton.

Production: company is the third largest copper producer in the state. In December, 1919, work was suspended, and J. W. Hancox was appointed receiver on the petition of several creditors, whose claims amount to $20,000, while wages due amounted to $5,000.

MANILA MINING & MILLING CO. **WASHINGTON**

Idle and probably defunct. Fully described in Vol. XIV. Formerly operated near Keller, San Poil district, Ferry county.

MELROSE MINING CO. **WASHINGTON**

Address: S. Edelstein, Fernwell Bldg., Spokane, Wash. **Mine address:** O. M. Mathews, New Boundary, Wash.

Officers: Jos. Cohn, pres.; O. M. Mathews, v. p.-mgr.; Sam Edelstein, sec.-treas., with J. W. Smyser, and F. M. Nudell, directors

Inc. February, 1918, in Washington. **Cap.** $500,000; 50c par; issued 275,000 shares.

Property: 2 claims, including the Maple Leaf mine, near New Boundary, Stevens county.

The vein, encased in schist, dips 45° E. and carries shoots of copper and lead ore. **Development:** by tunnels 500' and 950' in length.

Production: 75 tons of ore shipped by present management returned $8,000.

METALINE ORIOLE MINING CO. **WASHINGTON**

Address: Metaline, Pend Oreille county, Wash. Fred N. Davis, pres. and gen. mgr.; Stella M. Davis, sec.

Inc. December, 30, 1910, in Washington. **Cap.** $2,000,000; shares $1 par; assessable. Total calls to end of 1920, $40,000.

Lands: 7 claims, 140 acres, and a 5-acre millsite, unpatented. Ore occurs in irregular lenses, 2-3' thick, carrying argentiferous galena, sphalerite, chalcopyrite and pyrite, in a quartz gangue. A carload of ore shipped in 1917 assayed 0.25 oz. gold, 42.1 oz. silver, 15.3% lead, 21.9% zinc, and 1.1% copper.

Development: by 200' shaft and tunnels of 50', 400' and 750'. A 100' incline shaft sunk on the vein from the lower tunnel shows ore throughout a 50' drift.

Equipment: a 50-ton concentration mill, steam power, with small hoist, 3-drill compressor, and a 75-ton mill.

Property idle since 1918 owing to lack of funds, but refinancing underway in 1921, expected to permit renewed operations.

METHOW GOLD & COPPER MINING CO. **WASHINGTON**

Office: W. D. Scott, 419 C. of C. Bldg., Spokane, Wash. **Mine address:** Winthrop, Okanogan county, Wash.

Officers: W. D. Scott, pres. and mgr.; J. N. Tewinkel, sec.-treas., with F. S. Dow, W. G. Traub and N. O. Baldwin, directors, at last accounts.

Inc. 1899, in Washington. **Cap.** $2,500,000; $1 par; 2,400,000 issued.

Property: 8 patented claims near Winthrop, Okanogan Co., on west

fork of Methow river, show fissure veins in Algonkian rocks. Ore said to assay 9% copper, 2 oz. silver and $5.50 gold per ton.

Development: includes 3 tunnels, longest 564', with openings of 1,200' to depth of 500'. Has available water power and timber. Idle, except for annual assessment work, on account of lack of transportation.

MICHIGAN GOLD MINING CO. **WASHINGTON**

Officers: Cornelius Dow, Jr., pres.; T. Otto, v. p.; T. B. Furnival, sec.; A. B. Frost, treas., with H. J. Gorke, directors, all of Syracuse, N. Y.

Cap. $1,500,000; shares, $1 par. Majority of shares said to be held by Orient Metal M. & S. Co.

Property: 4 claims, 2½ miles from Orient, Stevens county, and adjoining First Thought mine.

MINERAL CREEK COPPER CO. **WASHINGTON**

Address: E. J. Durrwachter, sec., Cle-Elum, Wash.

Inc. in Washington. **Cap.** $150,000; 10c par; 600,000 shares held by Durrwachter Bros. of Grant, Montana; 100,000 shares sold at 25c. in Ellensburg, Wash., in 1920.

Property: Mineral Creek and Copper Queen groups, 2 miles above Little Kachess lake, Kittitas county, in the Cascade mountains. Examined by Chas. Goodsell of Spokane. The Mineral Creek group shows shear zone in diorite 20'-40' wide, with network of small veinlets of quartz pyrite and copper pyrite. The Copper Queen shows neck of poorly mineralized rhyolite breccia, containing chalcopyrite and pyrite.

Development: at Mineral Creek, by tunnels and about 3,000' of workings, attaining a depth of 450'. Ore will be extracted by an open-cut for the present. Shipments to smelter returned 6% copper.

Equipment: includes 25-ton mill with Ziegler flotation plant, Forester rod mill and Wilfley tables, run by water-power. Tests have shown an 85 to 92% recovery.

MINORCA-HOMESTAKE MINES CO. **WASHINGTON**

Address: Samuel Glasgow, pres., Hutton Bldg., Spokane, Wash.

Officers: above with M. C. Hunter, v. p.; V. P. Adams, mgr.; L. K. Armstrong, and W. H. Ludden, directors.

Property: 23 claims, on north half of Colville Indian reservation, in Stevens county, about 10 miles from Bossburg.

Development: by 40' shaft, said to show 4' of ore assaying $14 gold, $4 silver and ½% copper. The shaft is to be extended to 100' and drifts run both ways on the vein.

MT. ELINOR MANGANESE M. & S. CO. **WASHINGTON**

A. Kelly, mgr., Seattle, Wash. **Mine address:** Lake Cushman, Wash.

Property: a lease on the Apex manganese mine, 6 miles above Lake Cushman, Mason county, said to show an orebody 15' wide and opened to depth of 30', running 29 to 35% metallic manganese.

MOUNT ST. HELENS CONS. MINING CO. **WASHINGTON**

Office: 516 Selling Bldg., Portland, Ore. **Mine office:** Spirit Lake, Skamania county, Wash.

Officers: Thos. Prince, pres.; J. P. Tamiesie, v. p.; J. M. Bell, sec.; E. L. Harmon, treas.; Dr. Henry Waldo Coe, principal shareholder; Andrew Olson, supt.; Geo. W. Lilly, engr.

Inc. 1902, in Oregon. **Cap.** $1,800,000; shares $1 par.

Property: 63 claims, patented, 1,200 acres in Mt. St. Helens district, Skamania Co., Wash., includes the former holdings of the **Sweden Copper Co., Calumet Copper Mng. Co., Bronze Monarch Mng. Co., Chicago Mng. Co., Yellow Metal Mng. Co., Earl Mng. Co.** and **Cascade Copper Mng. Co.** The company also owns a three-fourths interest in the **United mines.** In addition to copper ores the tract contains gold veins, an ochre bed, a granite quarry and a deposit of pumice stone.

Claims are said to show syenite, diorite and slate with fissure veins carrying about 20 orebodies ranging from 5 to 100' in estimated width. The

ores carry chalcocite, bornite and chalcopyrite, and vary from 2 to 25% copper, some lead, 2 to 50 oz. silver and $1 to $40 gold per ton.

Development: by 5,500' of workings, 5 tunnels, longest 2,300', and 50' shaft, estimated by the management to show 125,000 tons of medium and high-grade ores with a greater tonnage of milling ore.

Lands are owned outright and the company has no bonds or debts, but the property has been practically idle for some years awaiting the construction of a much-needed railway. Mines fully described Vol. XI, Copper Handbook, the predecessor of this book.

MULTNOMAH MINING, MILLING & DEV. CO. WASHINGTON

Idle. **Office:** 405 Kuhn Bldg., Spokane, Wash.

Officers: M. J. Hills, v. p.-sec.; Dr. F. O. Hudnutt, asst. sec.-gen. mgr.

Inc. 1901, in Washington. **Cap.** $2,000,000; shares $1 par.

Property: about 600 acres, near Nespelem, Okanogan county, including the River group, 260 acres, patented, carrying placer gold; the Mineral Hill, Ramsey and Multnomah groups.

Development: by a tunnel of about 1,100', said to cut a 15' vein, showing argentiferous lead ore. There are 5 buildings, and a dam built across the Nespelem river.

NATIONAL LEAD-SILVER CO. WASHINGTON

Office: C. D. Muxen, Symons Bldg., Spokane, Wash.

Officers: C. D. Muxen, pres.; E. D. Weller, v. p.; E. H. Pattison, sec.-treas. and mgr. trustee; J. E Orr, asst sec., and G. F. Ingraham, directors.

Inc. 1915, in Washington, as successor to the Phoenix G. & C. M. & M. Co. **Cap.** 2,000,000 shares; 5c par; assessable. Annual meeting, third Tuesday in November.

Property: 9 claims, known as the Panama group, and mineral rights to 159 acres, about 2 miles N. of Curlew, Ferry Co., said to show 4 veins carrying gold-silver-lead-copper ore in replacement deposits, carrying quartz, lime and iron carbonate. The country rock is fine-grained syenite with large dikes of porphyry with strata of lime lying parallel, running nearly N. and S., with dip of 80° W. Ore was encountered on 3 different contacts in the first 500' of the tunnel. The first vein, about 40' wide, was intersected 600' from the portal of the tunnel. A second vein cut at 820' proved to be 5' wide.

Development: consists of 1,200' main lower tunnel, 225' Panama, and several shorter tunnels, numerous open cuts and prospect shafts. Property being worked in 1921.

NEW CRYSTAL MINING CO. WASHINGTON

Address: care John Gray, 3-4 Fall City Blk., Spokane, Wash. **Mine address:** M. H. O'Connell, supt., Miles, Wash.

Officers: M. H. O'Connell, pres.; Mrs. O'Connell, v. p.; C. Bugard, sec.-treas., with John Gray, C. C. Lantry, Old Nat'l. Bank Bldg., Spokane, directors.

Inc. in Wash. **Cap.** $150,000; 10c par; assessable; 1,000,000 shares outstanding. Annual meeting, first Monday in May.

Property: 40 acres, patented, an old-time producer, in the Deer Trail district, near Miles, Lincoln county. Claims show a contact fissure between limestone and granite, that contains an ore mass 400' long, 4-8' wide, said to assay $17 to $80 per ton.

Development: by shaft to 400' depth, with 300' of workings. **Equipment:** includes 35 h. p. hoist, compressor, pump, steam plant, etc. **Ore reserves:** estimated at 48,000 tons blocked out, and 1,000 tons on the dumps.

NEW CURRENCY MINING CO. WASHINGTON

Organized to take over the property of the **Jay Gould Mining Co.**, at Chewelah, Stevens county, Wash., but apparently never functioned.

NEW ERA IRON & STEEL CORPORATION WASHINGTON

Has built a smelter to handle black sand and iron ore, near Sedro Wooley, Skagit county.

NEW YORK-SEATTLE COPPER MINING CO. **WASHINGTON**

Inactive, but still has interest in a mine near Index, Wash. Described in Copper Handbook, Vol. XI.

NINETEEN-NINETEEN M. & M. CO. **WASHINGTON**

Successor to **Blue Ledge M. & M. Co.**

Office: 355 Head St., Station L, San Francisco, Calif. **Mine office:** Keller, Wash.

Officers and directors: Geo. W. Steele, pres.; G. Alfred Steele, v. p.; Chas. L. Granger, v. p., Wm. R. Rae, sec.-treas., Horace Sovereign, asst. sec., Keller, Wash.

Inc. Jan. 28, 1919, in Wash. **Cap.** $175,000; 10c par.

Property: 5 claims, 3 patented in Ferry county, 4½ miles E. of Keller, said to show silver bearing copper ore in a 2′ to 6′ vein that outcrops for 600′.

Development: by two quarries and open cuts, opening a body of low-grade zinc ore. Idle.

NORMAN MINES CO. **WASHINGTON**

Out of existence. Described in Vol. XIII.

NORTHPORT MINING CO **WASHINGTON**

Address: John Gorien, sec.-treas.-mgr., Northport, Wash.

Property: 280 acres, adjoining the Last Chance mine, in Northport district, Stevens county.

Development: by two quarries and openculs, opening a body of low-grade zinc ore. Idle.

NORTHPORT SMELTING & REFINING CO **WASHINGTON**

Office: Northport, Stevens County, Wash.

Officers: J. J Day, pres; E. R. Day, sec.; with Edw. Boyce, E. H. Knight and F. M. Rothrock, directors; R. W. Marston, mgr.

Cap. $1,000,000; shares $1 par.

Controlled by Hercules Mng. Co., of Idaho, which owns 500,000 shares, and by Tamarack & Custer Consolidated Mining Co., which holds the remainder. Both of these are controlled by the Days.

Property: the Northport smelting plant, the Lone Pine, Surprise and Pearl claims, acquired at receiver's sale in 1916, and the Hope mine at Republic. The Hope mine, acquired in April, 1918, has over a mile of tunnels and other workings, developing a gold-silver vein. The mine is between the Lone Pine and Surprise mines, whose workings connect with it. Ore from these mines is used by the smelter as a flux.

Equipment: the Northport smelter is an up to date plant, remodelled 1916, to treat lead ore and concentrate from the Hercules and Tamarack-Custer mines in the Coeur d'Alene district. The plant contains 3 lead furnaces, 42″ wide and 16′ long, of 300 tons daily capacity; also a Cottrell electric fume-precipitator, costing $100,000, and a drossing plant. The lead bullion is refined by the Pennsylvania Smelting & Refining Co. at Pittsburgh. Electric power is supplied from Canada.

An apex suit brought against the Lone Pine Surprise Cons. M. Co., was decided in favor of that company, Nov., 1920. The case was appealed by the Day family.

Owing to increased freight rates, the smelter closed down, April 1, 1921.

NORTHWESTERN IRON & STEEL CO. **WASHINGTON**

Address: Fred M. Williams, pres., 411 Fernwell Bldg., Spokane, Wash.

Officers: above with H. M. Shallenberger, v. p.; Frank K. Eddy, sec.-treas. **Operating staff:** E. C. Owen, supt., 626 Rookery Blg., Spokane; A. R. Moore, sales mgr.; Guy Langdon, auditor.

Inc. 1921, in Washington. **Cap.** $500,000; $1 par.

Property: 300 acres of iron bearing land on Republican creek and 60 acres of timber land, at Leadpoint, 10 miles from Boundary, Stevens county, on a branch of the Great Northern R. R. A ledge 60′ wide has been traced 4,500′, the ore averaging 56.79% metallic iron.

Management attempting to raise $50,000 for erection of a 30-ton electric pit furnace unit.

NORTHWEST MAGNESITE CO. **WASHINGTON**

Address: Crocker Bldg., San Francisco, Calif.
R. B. Rogers, gen. supt., Chewelah, Wash.

Officers: Roy M. Bishop, pres.-gen. mgr.; B. L. Thane, v. p.; S. F. B. Morse, treas.; R. A. Morton, sec.

Cap. $1,000,000.

Property: 480 acres, 5½ miles W. of Chewelah, Stevens county, has large deposits of magnesite which occur in beds, several hundred feet thick. The mineral is a replacement of lenses of dolomite in sedimentary rocks. Surrounding rocks are slates, schists, and quartzites. It is quarried in open cuts. Drilling to depth of 300' has revealed about 1,000,000 tons.

Equipment: short aerial tram, crushing plant, making 2 in. size, compressor, 5½-mile aerial tram, 800-ton bins, crushing rolls making 10 mesh product which is mixed in proportion of 2,000 lb. of magnesite to 40 lb. of high-grade magnetite and calcined in six 125 by 7½' rotary kilns fired by a Bonnet pulverized coal plant. Each kiln can produce 70 tons of dead burned magnesite daily. About 2.2 tons of raw material is used to make 1 ton of finished product. The calcine is ground by rolls into sizes required by the trade.

Production: capacity is 9,000 tons of calcined magnesite per month, equal to 35% of the total output of the United States. An average of $29 per ton has been received at the plant for the product. Costs are $24 per ton. Shipments in 1920 amounted to 90,000 tons of ferro-magnesite. Employs 400 men.

Operations ceased December, 1920, owing to lack of demand and competition from Austrian producers.

NORTHWEST MINES DEVELOPMENT CO. **WASHINGTON**

Dead. Described in Volume XIV. Is a Spokane promotion that formerly operated near Keller, Wash.

NORTHWEST MINING ASSOCIATION **WASHINGTON**

Address: 415 Chamber of Commerce Bldg., Spokane, Wash.

Officers: Oscar Cain, pres.; Frank M. Smith, v. p.; F. C. Bailey, sec.-treas., with G. B. Dennis, F. A. Ross, L. E. Nicholls and W. H. Linney, directors.

The Association conducts no operations, but its purpose is to aid and protect the mining industry in Idaho, Washington, Oregon, and British Columbia, generally known as the "Northwest," and "The Inland Empire."

OLD DOMINION MINING & MILLING CO. **WASHINGTON**

Address: W. H. Linney, 2805 Summit St., Spokane, Wash.

Officers: at last accounts, G. B. Dennis, pres.; Paul Blackmar, sec.

Inc. 1891. **Cap.** $5,000,000.

Property: 10 claims, patented, including Old Dominion mine, 8 miles from Colville. The mine was discovered in 1885, and considerable high-grade silver-lead ore was shipped in the succeeding decade.

Development: to 800' depth, with 17,000' of workings. On lowest level a fault cut off the ore and work was discontinued in 1907. Has been worked in a small way since then by lessees.

In 1915, property was bought at a tax sale by Linney, but title was disputed by Peck interests, and Supreme Court of the State is said to have cancelled the sale, though Mr. Linney still controlled and worked the mine at last report.

O-LO-LIM COPPER CO. **WASHINGTON**

Office: 310 Hyde Block, Spokane, Wash.

Officers: Jas. Keeth, pres.-mgr.; F. T. McCormick, v. p.; D. R. Riegel, sec.-treas.

Inc. May 11, 1917, in Wash. **Cap.** $100,000; shares 10c par; assessable. 675,000 outstanding. Annual meeting, first Tuesday in December.

Property: 160 acres in the Spokane Indian Reservation, Stevens county, leased for 25 years from the Government; 10% of net smelter returns to be paid the Government. Lands were opened to leasers in May, 1916, and work started on company's ground in January, 1917.

A quartz vein, 2-8′ in width, contains chalcopyrite and pyrite in ore of milling grade, encased in shale near a granite contact.

Development: by 220′ shaft and 100′ drift on 200′ level.

Equipment: an engine, compressor and pump.

Total shipments, about 350 tons, averaging 8.5% copper and 1.4 oz. silver. Ore is hauled 26 miles to Davenport, but a new road under construction 1921, will shorten the distance.

ORIENT GOLDEN ROCK MINING CO. **WASHINGTON**

Office: 205 Hyde Block, Spokane, Wash. Mine at Orient, Ferry county, Wash.

Officers: C. E. Gray, pres. and gen. mgr.; Thos. R. L. Harris, v. p.-treas.; C. E. Ficks, sec.

Inc. 1917. **Cap.** $1,500,000; shares $1 par.

Property: the White Elephant mine, 6 claims, 3 miles from the Canadian border. The mineral zone, 75′ wide, between diorite and andesite, contains gold-copper ore.

Development: by a 225′ incline on the vein. Workings on the 100′ level show ore carrying $3 to $6 per ton in gold with shoots of copper ore.

Equipment: includes steam plant, compressor, sawmill, etc.

Idle several years.

ORIENT GOLD MINES, LTD. **WASHINGTON**

Property sold, November, 1915, to settle labor liens. See **Orient Golden Rock Mng. Co.**

ORIENT METALS MINING & SMELTING CO **WASHINGTON**

Bankrupt. Described in Volume XIV. Formerly controlled Michigan Gold Mng. Co. and held claims near Colville, Stevens county, Wash.

OROVILLE COPPER CO. **WASHINGTON**

Address: J. P. Gormely, supt., Oroville, Wash.

Officers: Theo. Wonder, pres.; H. D. James, sec.-treas.

Inc. in 1918. **Cap.** $1,000,000.

Property: the O. K. mine on Kruger mountain, 4½ miles N. W. of Oroville, Okanogan county. Ore occurs in irregular lenses and bunches of quartz, 6-10′ wide, in a shear zone, containing chalcopyrite, with some bornite, pyrite and tetrahedrite.

Development: by shaft and drifts.

Production: 19 cars of ore said to have averaged 7% copper, 6 oz. silver and $2 gold.

PANAMA SILVER MINING CO. **WASHINGTON**

Address: H. P. Dickinson, pres.-mgr., Nespelem, Wash.

Property: 2 claims, on Mineral hill, Nespelem district, Okanogan county, contain a replacement deposit of silver ore in fracture zone 2′-8′ wide, in granite. Ore contains argentite, stephanite and native silver.

Development: by 2 tunnels; 12 tons picked ore shipped Nov., 1919, averaged 56.8 oz. silver and 9.32 ounces gold per ton.

Is a promising, if small, prospect.

PHOENIX GOLD & COPPER MNG. & MILL. CO. **WASHINGTON**

Curlew, Ferry county, Wash.

Succeeded by **National Lead-Silver Co.**, which see.

PUGET SOUND COPPER CO. **WASHINGTON**

Address: 101 Main St., Urbana, Ill. Nicolai Aall, supt., Darrington, Wash.

Officers: C. N. Clark, pres.; C. F. Cook, v. p.; W. H. de Long, v. p.; C. B. de Long, treas., with J. H. Thornburn, J. W. McCoy, Frank Lindley, J. S. Christman and A. B. Knowlson, directors.

Inc. June 21, 1916, in Arizona. **Cap.** $2,000,000; $10 par; outstanding

64,000 common and 26,919 pfd. shares. Balance sheet dated Sept. 9, 1920, showed cash and notes receivable, $4,997; acct's receiv., $17,030; acct's pay., $2,116; mortgage, $450,000; surplus, $1,664,241.

Property: 600 acres, partly patented, at Darrington, Snohomish county. The group shows schists cut by andesite and diorite dikes, with veins paralleling the dikes. Ore occurs as bands, shoots and impregnations, and is said to contain 2-5% copper, with gold and silver.

Development: by 4 tunnels, to depth of 400', with about 5,000' of workings. **Equipment:** includes hydro-electric power plant and compressor.

PYRARGYRITE MINING CO. **WASHINGTON**

Successor to Ruby Mining Co.

Office: Oroville, Okanogan county, Wash.

Officers: S. Brumbaugh, pres.; J. M. Adams, v. p.; A. B. Lee, sec.; Wm. Esselburn, treas., with Chas. A. Andrus, and J. M. Adams, directors.

Inc. November 5, 1902, in Washington. **Cap.** $1,500,000; shares $1 par; non-assessable; issued, $1,175,000. **Bonds:** $100,000 authorized, at 7% maturing 1915; issued, $35,100. Annual meeting, second Tuesday in June.

Property: 5 claims, patented, 80 acres, with 46 acres miscellaneous freehold lands, on Mt. Chopaca, near Similkameen river, in Okanogan Co., 3 miles south of the international boundary and within 600' of the Great Northern railroad.

Geology: claims shows syenite, cut by veins containing lenticular orebodies running N. W.-S. E. and dipping at 47°. The vein under development is about 4' thick, traceable for 1,000', and carries mainly gold and silver values, with a little zinc and a trace of copper.

Development: by 3 crosscut tunnels with drifts on the vein. The main working tunnel, 300' below the old workings and about 350' below the outcrop, is 1,110' long, and has 550' of drifting on the vein and an equal amount of drifting run from a 100' upraise. An inclined shaft sunk on the vein from the lower tunnel has short levels at 100' and 200' depth.

Equipment: includes a 15-h. p. electric hoist and 5 buildings.

A 50-ton mill with 2 flotation machines operated 20 hours a day in 1921. Product is a highgrade, argentiferous concentrate which is shipped to the Tacoma smelter. Working steadily with a small force.

Q. S. COPPER CO. **WASHINGTON**

Mail returned from former office, 229 North Division St., Spokane, Wash.

Mine office: Q. S. Ranch, Cuess, via Loomis, Wash.

Officers: A. M. Dewey, v. p.-gen. mgr., 4042 Arcade Bldg., Seattle, Wash.; J. P. Heckert, sec.; A. F. Suksdorf, treas.

Inc. April 10, 1914, in Washington. **Cap.** $2,000,000; shares $1 par. Is successor of the Q. S. Mining Co. Property was purchased by the new corporation, which paid all the debts, amounting to more than $25,000, and issued stock at 2c a share to the old stockholders; forfeited stock was left in the treasury, which gave the corporation a majority of the stock. Bad management in 1912 wrecked the former company and led to a receivership, no annual meeting being held that year. Property was sold for taxes, but sale set aside by the courts when the receiver was appointed. Litigation involving ownership pending.

Property: 13 claims, with 10 acres of mill sites, and water rights on Sinlahekin creek, about midway between Loomis and Conconully, along the flank and crest of Aeneas mountain, in the Salmon River district. The property shows fissure veins in diorite carrying mainly low-grade copper ores. The company claims an orebody 300' wide at surface, which has been crosscut for 238' at a depth of 800' below the outcrop without reaching the wall, and traced by stripping for 6,000' on surface, showing a ledge of 212' width at the north, 300' in the middle and 285' at the southern end of the property.

Development: begun 1897, is by 2 open cuts at either end, a pit of 50x150' in the middle, and a tunnel 1,063' long cutting the vein at depth of 800', with another tunnel, intended for the main avenue of extraction, 540' long, planned to cut the orebody at depth of 2,000'. One tunnel shows chalcopy-

rite ore said to give assays of 11.4% copper and estimated to average 2 to 4% copper, with small and variable silver values and about $1 gold per ton. The company claimed an average ore value of $14 per ton from several hundred assays.

Assessment work only done by new company. No recent information; probably idle, or out of business.

Q. S. MINING CO. — **WASHINGTON**

Succeeded by Q. S. Copper Co., which see.

QUILP GOLD MINING CO. — **WASHINGTON**

Address: Republic, Wash.

Officers: Jas. Hutchinson, pres.; W. G. C. Lanskail, sec.-gen. mgr., with G. V. Alexander, H. J. Lycett, and John Stack, directors. S. H. Richardson, cons. engr.

Cap. $1,500,000; par $1; 1,498,000 shares outstanding.

Property: 1 claim, the Quilp mine at Republic, Ferry county, adjacent to the Insurgent, Last Chance and Surprise mines. The Quilp was located in 1896 and operated intermittently by several companies. It paid five dividends, totaling $67,500; last payment in 1912. Mine was reopened in 1914 after lengthy litigation with the defunct Republic Mines Corporation; and again opened in 1918. In 1919 and 1920, the Quilp mine was the largest gold and silver producer in the district. Shipments made to smelters at Tacoma, Northport and Trail, B. C. Ore carries gold and silver.

Development: by over 6,000′ of workings to depth of 800′. Recent results at 800′ have been good.

Equipment: steam power, hoist, 7-drill compressor, drills, bins, and regular mining plant.

Production: from 1900 to end of 1920 amounted to 57,334 tons of ore, containing 30,210 oz. gold and 241,525 oz. silver, giving smelter returns of $720,938.

RATHFON REDUCTION WORKS — **WASHINGTON**

Officers: A. L. Bradley, pres., Danville, Wash.; D. W. Rathfon, gen. mgr., Republic, Wash.

Cap. $500,000; $1 par; 400,000 shares common stock, assessable up to 50 cents.

Property: company in 1913 acquired the famous Republic mine and one other claim in Ferry county, at one time operated by New Republic Mining Co., and before that by Patrick Clark, of Spokane. Said to have produced $2,000,000 in gold. Ore was shipped in 1918. November 22, 1919, the Republic mine was sold at sheriff's sale to satisfy a judgment of $43,406 in favor of Fred Keibaum, J. T. Hollis and Frank Babcock.

REARDON COPPER CO. — **WASHINGTON**

Directors: Oscar Carstens, T. J. Carstens, Henry Carstens, all of Reardan, Wash., and A. H. Kenyon.

Cap. $50,000; par 5c. A close corporation.

Property: near Turk, Stevens county, includes the High Grade mine.

Ore occurs in lenticular lenses, 6′ thick, containing chalcopyrite, malachite and pyrite with gold and silver values.

Development: mainly by tunnels. Shipments were made in 1918, and in 1919 shipped 137 tons of ore up to September. Exploration work only being done, (1920-21).

REBECCA MINING CO. — **WASHINGTON**

Address: Nespelem, Wash.

Officers: H. J. Neely, pres.-mgr.; J. McCarthy, sec.-treas.

Property: about 10 miles S. E. of Nespelem, Okanogan county, developed by opencuts and 800′ of drilling. Ore contains sulphides of pyrrhotite, chalcopyrite and sphalerite, dump samples assaying 2.68 oz. silver and 5.15% copper per ton. Diamond drilling at last account.

RED CLOUD MINING CO. — **WASHINGTON**

Address: Hatton, Wash. **Mine address:** A. H. Anderson, mgr., Fruitland, Wash.

Officers: J. K. Fields, pres.; A. J. Railsback, sec.-treas.

Property: a group of claims, 2 miles S. E. of Turk, in Deer Trail district, Stevens county, under lease and bond to Giant Silver Mining Co.

RED TOP MOUNTAIN M. & M. CO. **WASHINGTON**

Address: Carl Fluegel, Nrrthport, Wash.

Inc. 1920, in Wash. **Cap.** $100,000; par 10c.; 750,000 shares in treasury.

Property: the Red Top group, 3 claims, unpatented, with several veins, 6 miles from Leadpoint, Stevens county, in Northport district, said to carry rich silver-lead ore. **Development:** by 200' of crosscuts, etc.

REDWOOD COPPER MINING CO. **WASHINGTON**

Dead. Mine at Chewelah, Stevens county, Wash. Developed by 400' tunnel with several hundred feet of raises and winzes expected to expose copper at greater depth. Operations ceased in April, 1912, and property was lost under foreclosure of mortgage. Present owners are Chas. Stevens and others, of Robinson Straus & Co., St. Paul, Minn.

REPUBLIC CONS. MINES CORPORATION **WASHINGTON**

Property now owned by the Northport Smelting & Refining Co., which see. Vol. XIII contains details of the corporation's checkered career.

RESERVE SILVER MNG. CO. **WASHINGTON**

Reported organized in 1920 by H. P. Dickinson and W. W. Greenwood of Seattle and C. S. Cradock of Vancouver.

Property: a bond and lease on Panama group, Moses mining district, Okanogan county. Ore occurs in a fissure vein, 12' wide, with gold-silver values of milling grade.

Development: by crosscuts and shallow shafts.

RIES MINING CO. **WASHINGTON**

Address: Newport, Pend Oreille county, Wash.

Officers: A. L. Reis, pres.; E. L. Sheldon, sec.; F. W. Vawter, treas., with C. F. Bell, directors.

Inc. in Washington. **Cap.** $100,000; $1 par.

Property: 4 claims near the Pend d'Oreille river, 2 miles N. of Newport, on the Washington side of the State border, about 30 miles E. of Chewelah. Ore occurs in a 5' quartz vein in diorite, containing argentiferous galena, chalcopyrite and pyrite.

Development: by 215' shaft and crosscuts. Operated irregularly in a small way. Mine is favorably situated and seems to warrant further development.

ROYAL COPPER MINING & MILLING CO. **WASHINGTON**

L. J. Winslow, pres. **Mine address:** Chewelah, Stevens county, Wash.

Property: 7 claims said to show 3 parallel ledges having slate and granite contacts.

Development: by 400' tunnel said to carry copper, lead, silver, and gold, with small amounts of copper. Company probably dormant, as letters are returned unclaimed.

ROYAL DEVELOPMENT CO. **WASHINGTON**

Address: Jay Lonergan, mgr., Wenatchee, Wash.

Property: 5 claims on Red Mtn., 25 miles N. of Leavenworth, Chelan county, reported to contain a large body of copper-silver-gold bearing ore.

RUBY MINING CO. **WASHINGTON**

Nighthawk, Okanogan county. Succeeded by the Pyrargyrite Mining Co., which see.

SANTA RITA MINING & MILLING CO. **WASHINGTON**

Address: F. C. Merriam, Wallace, Idaho.

Officers: John H. Hemphill, sec.-treas., Peyton Bldg., Spokane, Wash.

Inc. 1918, in Delaware to take over property of Cleveland Mining Co. **Cap.** $500,000; par $1. In August, 1919, control passed to First National Bank of Devils Lake, North Dakota.

Property: 10 claims, including the old Cleveland mine, 18 miles W. of Springdale, Stevens county, discovered nearly 30 years ago. The ore is a complex lead-zinc-silver sulphide, containing antimony and bismuth, and dif-

ficult to treat profitably. Mine is developed by a 265′ shaft and tunnels. The Cleveland company started operations several years ago, but lack of capital caused a shutdown after a concentrator had been built.

Development work was reported underway, July, 1921.

SEATTLE-BOSTON COPPER CO. **WASHINGTON**

Idle since 1916. Company owns water-rights of 40,000 est. h. p. and a charter for a railway to open large timber tracts and reach the Dutch Miller mine, described under title of Dutch Miller M. & S. Co. The former mine holdings of the Seattle-Boston C. Co. are described in Vol. VIII, Copper Handbook.

SECURITY COPPER CO. **WASHINGTON**

Address: 720 Peyton Bldg., Spokane, Wash. **Mine office:** Chewelah, Stevens Co., Wash.

Officers: L. K. Armstrong, pres.-gen. mgr.; M. C. Hunter, v. p.; W. W. Gifford, sec.-treas., with F. H. Fulton, directors.

Inc. 1913, in Washington. **Cap.** $1,500,000; shares $1 par; 1,200,000 outstanding; assessable. Total expenditures, $275,000.

Property: Security group, 200 acres at Chewelah; Copper Butte group, 80 acres, and Chamokane group, 600 acres, 16 miles W. of Springdale. The first-named shows fissure veins cutting shales and schists; the Chamokane group has 5 veins, from a few feet to over 100′ in width, and the Copper Butte has one vein, over 50′ wide. All the groups carry argentiferous copper ore. Five cars shipped from the Copper Butte are said to have averaged 3.8% copper.

Development: on Security group by about 1,150′ of workings on a series of six veins by 550′ shaft, levels, and tunnel. The Copper Butte has about 500′, and the Chamokane 1,000′ of workings.

Equipment: includes a gasoline hoist and a 3-drill air-compressor on the Security.

Refinancing was arranged in August, 1919 and operations reported underway, June, 1921.

SHIPPER GOLD MINING CO. **WASHINGTON**

Address: Chesaw, Wash.

Officers: J. P. Blaine, pres.-mgr.; H. L. Mooney, v. p.; A. C. Blaine, sec.; W. A. Harry, treas.

Inc. May 31, 1916, in Washington. **Cap.** $1,000,000; $1 par; 600,000 issued.

Property: 3 claims, unpatented, 56 acres, located one-fourth mile north of Chesaw, contains at 3½′ flat quartz vein running E.-W., with 22° dip. **Ore:** contains gold values with pyrite, and is said to average $20 per ton.

Development: 700′ of work, including 110′ shaft, connected with 380′ tunnel, blocking out 1,000 tons of $20 ore.

Production: 1,200 tons of $40 ore. Company owns 25-ton mill. No recent information; probably idle.

SILVER ANTIMONY MINING CO. **WASHINGTON**

Address: Uniontown, Wash.

Officers: J. J. Welle, pres.; Jos. Kuntz, v. p.; H. J. Hoefer, sec.-treas; with Albert Carbuhn, directors.

Inc. January 16, 1916, in Washington. **Cap.** $1,500,000; par $1; assessable.

Property: one claim, one mile from Chewelah, Stevens county, said to show a quartz vein in serpentine, containing streaks of sulphide ore carrying gold-copper-antimony ore that averages $4.80 gold, $11.40 silver and $22 in copper. Had a shaft 170′ deep and 2 short tunnels, at last accounts.

SILVER BASIN MINING CO. **WASHINGTON**

Address: Davenport, Wash. C. S. Turner, pres.; W. A. Wilson, sec.-mgr.

Cap. $1,500,000; par $1; non-assessable.

Property: unpatented claims in Deer Trail district, Stevens county, said to have silver ore. Total production to 1918 reported as 7,500 tons, worth $200,000. Holdings presumably include Silver Queen and Seal groups,

acquired at receiver's sale in 1920 and producing steadily in July, 1921. Shipments made to Tacoma smelter.

Development: by shafts and crosscuts. **Equipment:** includes boiler, 3 drill compressor and a pump.

SILVER BELL MINING CO. — **WASHINGTON**

Address: E. H. Belden, 1208 Old National Bank Bldg., Spokane, Wash.

Officers: E. H. Belden, pres.; R. F. Blackwell, v. p.; with W. R. Dwyer, J. M. Fitzpatrick and J. C. Broad, directors. E. F. McCabe, sec.-treas.

Inc. November, 1916, in Washington. **Cap.** $1,500,000, $1 par; 1,000,000 issued. Expenses in 1918 were $5,000.

Property: 8 claims, 160 acres, 5 miles S. E. of Loon Lake, Stevens county, and 35 miles N. W. of Spokane, Wash.

Development: by 125′ shaft, and 300′ of drifting, shows 4½′ quartz vein in granite. Ore said to contain 25 oz. silver per ton, with gold up to $4. Sinking is to be continued.

Equipment: 16 h. p. gasoline hoist. Is a silver prospect.

SILVER CREEK MINING & MILLING CO. — **WASHINGTON**

Company dead and property, the Gold Cord mine, sold for taxes. Bought in by Steil and company reorganized as Gold Cord Mining & Milling Co., Keller, Wash., also dead.

See operations, 1904-1912, described in Vols. VIII and IX of Copper Handbook. Property favorably reported on by Wm. J. Elmendorf.

SILVER LEDGE MINING CO. — **WASHINGTON**

Office: Waterville, Wash. L. H. Markham, mgr., Methow, Wash.

Officers: Wm. Dunn, pres.; A. L. Maltby, sec.-treas.

Property: on Gold Creek, Methow district, Chelan county, 20 miles from Pateros, the nearest railroad point. The main or North Star vein, 2-3′ wide, contains gold and silver values.

Development: by 150′ incline, 970′ crosscut, drifts and raises. A prospect.

SILVER MOUNTAIN MINING CO. — **WASHINGTON**

Mine address: Daisy, Wash.

Officers: P. E. Seelye, pres.-mgr.; J. R. Nevers, sec.-treas., 2414 2nd Ave., Spokane, Wash.

Property: the Silver Mountain, or Daisy mine, 4 miles E. of Daisy, Stevens county, and 18 miles from railroad, said to show several quartz veins in hornblende diorite, from 10″ to 6′ in width, containing sphalerite, chalcopyrite, marcasite and pyrite.

Development: by 600′ Terry tunnel and 1,000′ Seelye tunnel to depth of 125′. Five men employed.

SILVER TRAIL MINING CO. — **WASHINGTON**

Idle and probably dead.

Officers: A. Julian, pres.; G. B. Gilfillan, v. p.; J. H. Ferguson, J. J. McLean, P. D. Roberts and H. R. Sanderson, directors. M. S. Davys, engr.

Inc. January 15, 1910, in Washington. **Cap.** $1,000,000; shares $1 par; 615,862 issued. Bonds, $700,000 of 7%.

Property: the Lake Side mines, 557 acres, Skagit county, Wash., also the Hewitt and Lorna Doone mines in Slocan district, B. C. No recent information.

SILVER TRAIL MINING CO. — **WASHINGTON**

Officers: J. R. Brown, pres.; A. L. Hooper, sec.; W. S. Haish, treas.; with Robert Bell, A. J. Bell, Peter Reid and M. S. Peters, directors, at last account.

Inc. 1915, in Washington. **Cap.** $125,000; shares 10c par.

Property: the old Clungstone mine, 8 miles E. of Evans in Colville mining district, opened in early '90s by Col. I. N. Peyton.

Development: tunnels, the lower one 700′, with 400′ drift on a 2-6′ vein of silver-lead ore. Shipments made to Trail, 1916.

No recent information. Probably dead.

SOUTHERN MINNESOTA & WASHINGTON MINES CO. **WASH.**

Address: H. W. Holly, mgr., Oroville, Wash.

Officers: E. A. Williams, pres.; F. B. Sangers, sec.-treas.

Property: Lone Pine mine, 21 claims, 10 miles from Oroville district, near International boundary, Okanogan county, contains a quartz vein, 1-6' thick, with silver lead ore containing some gold. Ores contain galena, chalcopyrite, pyrite, covellite and bornite. Company also has a 5- year bond for $250,000 on the Submarine property near Nighthawk.

Development: by 300' upper and 1,000' lower tunnel. Developing since 1918, but mill construction held up until title was confirmed in October, 1921.

SPOKANE CONS. TUNGSTEN CO. **WASHINGTON**

Officers: F. E. Parks., pres., Deer Park, Wash.; E. N. Robinson, v. p.; with A. M. Winston, O. F. Kelly and A. M. Wood, directors.

Cap. $625,000; non-assessable. Company is a merger of the **Deer Park Mng. Co., Spokane Tungsten Co.,** and **Beard & Meyers** mining leases.

Property: about 360 acres, held under 30-year lease from the State, 12 miles N. of Deer Park, Stevens county, said to show tungsten ore. Shipments by former owners reported as $30,000. Present company commenced work in 1918 and planned erecting a 50-ton mill. No recent information.

SPOKANE COPPER CO. **WASHINGTON**

Dead. Fully described in Volume XIV.

SPOKANE TIN MINES CO. **WASHINGTON**

Address: C. P. Robbins, Hyde Bldg., Spokane.

Officers: C. P. Robbins, pres.; Richard Marsh, v. p., 1727 E. 11th St., Spokane, Wash.; Chas. Theis, sec.-treas., with W. J. C. Wakefield, director.

Inc. 1907, in Washington. **Cap.** $1,500,000; shares $1 par.

Property: 312 acres, 8 miles S. of Spokane, said to show tin and tungsten ore in pegmatite dikes in granite and schist. It was first worked in 1907, when a shaft was sunk 165', several hundred feet of work done, a little ore extracted, and the property closed down. Mine was bonded during part of 1918, for $75,000 to F. C. Bailey, of Spokane, who organized the Spokane Tin and Tungsten Co. About $3,500 worth of prospecting was done and a new orebody discovered. All work ceased with the signing of the Armistice.

SPOKANE TIN & TUNGSTEN CO. **WASHINGTON**

Dead. Had a lease on the Spokane Tin Mines company's holdings near Spokane.

STANDARD CHEWELAH MINING CO. **WASHINGTON**

Address: 1112 Paulsen Bldg., Spokane, Wash.

Officers: F. R. Clark, pres.; Thos. Bowers, v. p.; R. N. Clark, sec.-treas., with G. W. Sommer, and F. F. Jarvis, directors.

Inc. in Washington. **Cap.** $1,500,000; shares $1 par; 853,620 issued.

Property: 5 claims, 91 acres, 2 miles east of Chewelah, said to show silver-copper ore, assaying about 5 oz. silver and 2 to 15% copper. Developed by a 20' shaft and 600' of workings. Mine was reported purchased in 1921 by Juno Echo Copper Co., purchase price given as 250,000 shares of Juno Echo stock, 100,000 shares going to the creditors and the balance to the Standard Chewelah stockholders.

STERLING SILVER-LEAD CO. **WASHINGTON**

Officers: Dr. J. W. Cosford, pres., 919 Nora St., Spokane, Wash.; B. C. Gochenouer, sec.-treas.; R. O. Campbell, v. p.; with Carl Anderson, B. J. Lindsay, all of Spokane, Wash.; E. Pearson and F. W. Brennan, directors.

Cap. $2,000,000; shares $1 par.

Property: 12 claims, patented, near Metaline, Pend d'Oreille county, said to show silver-lead-zinc ore. **Development:** by tunnels. In 1918, a small force was working. No later report.

SUNSET COPPER CO. **WASHINGTON**

Address: L. C. Smith Bldg., Seattle, Wash. **Mine address:** Index, Washington. J. G. Shepherd, supt.; E. C. Morse, mill supt. Company is

a close corporation, with E. A. Sims, pres. and manager. Dr. J. H. Shepard of Coeur d'Alene, Idaho, v. p.

Property: the Sunset mine, near Index, Snohomish county, on G. N. R. R. The mine has two parallel lodes, the Sunset and the Copper King. The first named has a 16′ lode with lenses of copper ore and a considerable tonnage of low-grade ore that can be treated profitably. It is stoped for 5′-10′ wide, yielding 2-6% ore. The Copper King, 475′ north of the Sunset lode is like it and is quite as large and rich.

Development: for horizontal range of 1,400′ and vertical 900′, with adit cutting lode at 290′ depth. Main adit is 400′ below outcrop.

Equipment: 125-ton concentrator completed 1918 and full mine equipment.

The mine is one of the largest copper producers of the State. During 1920 company operated the mine for 10 months to December. Shipments made to Tacoma smelter.

SWAUK MINING & DREDGING CO. **WASHINGTON**

Office: Yakima, Wash. **Mine** address: Frank Bryant, mgr., Liberty, Wash.

Officers: Mark Pennington, pres.; D. J. Bryant, sec.; M. Bernard, treas.

Operates a dredge of 1,000 cu. yds. daily capacity at Liberty, Kittitas county, near the junction of Williams and Swauk creek. Operations were started, September, 1920.

TACOMA SMELTER **WASHINGTON**

The plant was formerly operated under name of Tacoma Smelting Co.

Office: American Smelters Securities Co., 120 Broadway, New York. **Works office:** Tacoma, Wash.

Officials: H. Y. Walker, mgr., Box 1605, Tacoma, Wash.; C. E. Little, asst. mgr.; R. F. Barker, supt.

Property: a smelting plant with a 52-acres site, 6 miles from Tacoma, on Puget Sound. Property is well located for receipt and dispatch of materials, and has extensive wharves, with ore bunkers and automatic devices for unloading cargoes.

The smelter has 2,500 tons daily capacity, and treats copper, silver, gold ores and concentrates, from the entire western coast of North America, and a considerable tonnage of South American ores.

Equipment: 3 blast and 1 reverberatory furnaces. The 575′ stack is one of the highest in the world. The converter department has a capacity of 300 tons of blister copper daily.

The electrolytic plant capacity is 8,500 tons per month.

Electric power is received at 40,000 volts and stepped down to 100 volts for use, the works requiring about 6,000 h. p. Fuel is petroleum, brought in tank steamers from the oilfields of southern California.

The Tacoma smelter is one of the most important custom plants on the Pacific coast, the management is progressive, and the metallurgical practice excellent. In addition to copper, the products are arsenic and liquid sulphur dioxide.

TEMPEST MINING CO. **WASHINGTON**

Mine address: Daisy, Wash.

Officers: F. H. Schindler, pres.; C. W. Hill, sec.-treas.

Property: 6 claims, ½ mile S. of the Daisy mine in Kettle River district, Stevens county. Ore occurs in quartz veins in diorite, carrying sphalerite, chalcopyrite and pyrite, with chief values in gold and silver.

Development: by 2,500′ of tunnels.

TENAS MINING CO. **WASHINGTON**

Idle. **Office:** 320 California Bldg., Tacoma, Wash. Mine near Keller, Ferry county, Wash.

Officers: J. R. Turner, pres.; P. J. Sweeney, v. p.; C. E. Peterson, sec.; D. McPherson, treas.; with John W. Brechtel and F. W. Heide, directors, all of Tacoma, Wash.

Inc. Sept., 1910, in Washington, succeeding the Iconoclast Consolidated

Mines Co., whose property was sold for debt. **Cap.** $10,000; shares $1 par; fully paid and assessable up to 25% per year; issued, 3,448. Assessments to 1916, 71 cents per share.

Property: 5 claims, 80 acres, relocated 1912, 2 miles N. of Keller, shows 3 contact deposits with an orebody 30′ in maximum width, giving average assays of 3.6% copper and 2 oz. silver per ton with some gold.

Development: by 325′ main shaft and 3 tunnels with claimed total length of 514′. Annual assessment work only has been done since 1908. Company is a holding corporation, awaiting an opportunity to sell or bond the property.

THUNDER CREEK MINING CO. **WASHINGTON**

Henry S. Volkmar, gen. mgr.

Property: 9 claims on Thunder Creek, 2 miles N. W. of Park Creek Pass, in Skagit county, said to show lead-silver ore in a well-defined fissure vein. Developed by a 700′ tunnel at an elevation of 4,600′. No recent report; probably idle.

TILLICUM DEVELOPMENT CO. **WASHINGTON**

Probably dead. Letters returned unclaimed.

Was the successor of the Palmer Mountain Tunnel Co., inc. Aug., 1912, in Washington.

Fully described in Volume XIV.

TRINIDAD MINING & SMELTING CO. **WASHINGTON**

Office: Tonasket, Wash.

Officers: Jos. Coleman, pres.-mgr.; E. F. McNall, v. p., T. W. Brown, sec.-treas.

Inc. Dec. 1, 1911, in Washington. **Cap.** $1,000,000; shares $1 par; 714,300 issued.

Property: the Central group, 12 unpatented claims, 240 acres, in the Galena district, Okanogan county, 10 miles S. W. of Tonasket. Ore contains galena, pyrite, chalcopyrite and sphalerite. A 30-ton shipment averaged $12 per ton in gold and silver.

Development: by shafts, trenchings and open cuts, with a total of 1,200′ of workings. The owners are doing all work by hand mining.

UNITED SILVER-COPPER MINING CO. **WASHINGTON**

Name changed in 1919 from United Copper Mining Co.

Office: 217 Symons Bldg., Spokane, Wash. **Mine office:** Chewelah, Stevens county, Wash.

Officers: Conrad Wolfle, pres.; W. G. Collins, v. p.; E. C. Blanchard, sec.-treas., with Daniel Hoch and J. H. Griffith, directors.

Operating staff: E. A. Wolfle, mgr.; H. D. Quimby, mill supt.

Inc. July, 1906, in Washington. **Cap.** $1,000,000; shares $1 par; fully issued; assessable by majority vote. Last assessment Sept., 1914, ½c a share. Annual meeting, Jan. 28. Company and Guaranty Trust Co., New York, transfer agents; Registrar & Transfer Co., and Spokane & East Trust Co., Wash., registrars. Listed on New York Curb, May 1, 1917; stricken from listing, May 27, 1920.

Treasurer's Report for years ending December 31st showed:

	1919	1918	1917
Operating revenue	$236,649	$282,966	$354,372
Operating expenses	233,281	234,291	240,699
Net operating profit	24,716†	*18,174	113,672
Net indebtedness	.....	39,879	61,577
Dividends	None	None	100,000

*After deducting depreciation charges and taxes.

†Operating loss.

Dividends: total to date, $150,000. None since 1917.

Property: 16 claims, patented, 103 acres, 4½ miles N. E. of Chewelah; claims show a 6′ vein cutting through shale and schist. Ore contains

chalcopyrite, with streaks of gray copper ore on both walls. In 1921, a high-grade ore-shoot 4 to 5' wide was found in sinking a winze 200 below the 1,250' level; about one foot of this was rich silver ore, and the remaining 3 to 4' was good milling ore assaying 20 oz. silver and 5% copper.

This ore is opened by 65' drift on 1,400' level and for 25' below it in winze.

Development: by shafts to 1,200' depth, a winze to 1,400' and 5,000' tunnel. The mine has over 40,000' of workings. Report of Raymond Capen, cons. engr., in March, 1919, estimated ore reserves at 50,850 tons above the 1,000' level, and below this level, 45,173 tons positive, 47,241 tons probable and 30,658 tons possible ore; grade about 1.35% copper and 3 oz. silver.

Equipment: includes electric hoist, air-compressors, capacity 1,300 cu. ft., 11 power drills, 2 pumps, and an electric lighting plant. Electric power is obtained from the Stevens County Power & Light Co. The mill uses flotation and has a maximum capacity of 350 tons per 24 hours, with a reported recovery of 85%. Employs about 50 men.

Production: 1910, 608 tons, $5,878; 1911, 1,134 tons, $11,184; 1912, 13,865 tons, $240,798; 1913, 14,938 tons, $171,617; 1914, 18,527 tons $90,356.

	Tons mined	Value	Copper lb.	Silver oz.
1919	52,542	$236,649	922,227	131,861
1918	66,181	315,448	907,422	130,914
1917	59,600	354,371	1,147,014	147,573
1916	40,000	372,296	1,179,178	159,271
1915	25,000	145,632	650,995	103,195

During first quarter of 1921, nine cars of ore shipped to the Tacoma smelter, ran 40-50 oz. silver and 10% copper per ton, netting $1,200 per car.

Company reported to plan a consolidation with the Copper King Mining Co.

VALLEY MAGNESITE CO. **WASHINGTON**

Mail returned from former office and company out of business. See Volume XIV.

VALLEY MINING CO. **WASHINGTON**

Officers: W. R. Tuttle, pres.; A. L. Hooper, sec.-treas., City Hall, Spokane, Wash., with H. M. Ross, V. P. Adams, and S. Van Hook, directors, all of Spokane, Wash.

Property: 3 unpatented claims, locally known as the Edna mine, 9 miles W. of Valley, Stevens county. Idle for 12 years, but in September, 1917, mine was unwatered to 400', and levels have been driven at 100, 200, and 300' depth. Copper-silver ore exposed is said to have a value of $200,000.

Equipment: includes a hoist and 3-drill compressor.

VIRGINIA-AGENDA CO. **WASHINGTON**

Succeeds **Eclipse Cons. Mng. & Inv. Co.**

Address: P. O. Box 187, Seattle, Wash.

Officers: O. Robert Dahl, pres.-treas.; John S. Lutes, v. p.; John B. Van Dyke, sec., with Dr. C. E. Fawcette, F. W. Libby and I. A. Dahl, directors. Calvin V. Dier, asst. sec.

Inc. 1916, in Washington. **Cap.** $15,000,000; $5 par; all issued.

Property: 16 claims, 1,310 acres, unpatented, including Virginia mine and Winter Coon arsenic mine, a talc mine, and a mill site.

Mine has 3 tunnels and a shaft on a fissure vein in slate, carrying mercury, gold and silver, claimed to assay $61.50 per ton. Workings total 1,825'. Management estimates 90,000 tons ore blocked out, March, 1919. Water power from the Stillaguamish river develops 830 h. p. by turbine. The concentrator, rated at 300 tons daily capacity, has tank room for cyanide treatment. A compressor of 600 cu. ft. capacity has recently been added.

Company holds interest through subsidiaries in the Crown Point Molybdenite and C. P. Copper mines (see Crown Power Molyb. Co.), in Aurelia Crown Mines, and in saw mill and water power and timber enterprises.

Development: by 7,975′ of underground tunnel work with one shaft, developing 787,500 tons of milling ore.

Equipment: a hydro-electric plant, 300-ton concentrator, new 150-ton flotation plant, and full mining equipment.

It is said that $448,560 had been spent to 1921, on equipment and development work.

VIRGINIA MINING CO. — **WASHINGTON**

Property: Virginia mine in Danville district, Ferry county. Made small shipment of gold ore containing silver and copper in 1918.

VULCAN MINING CO. — **WASHINGTON**

Office: A. O. Stuberg, Symons Bldg., Spokane, Wash. Mine at Orient, Stevens county, Wash.

Officers: H. M. Gibson, pres.; P. Lewis, v. p.; A. O. Stuberg, sec.; P. Larsen, treas., with J. D. Grimes, directors.

Inc. July, 1914, in Washington. **Cap.** $1,500,000; par $1; assessable.

Property: 7 claims, 4 miles N. E. of Rock Cut at 3,850′ elevation, shows 3 veins with gold ore; also some silver.

Development: by several hundred feet of tunnels and shallow shafts.

Present owners have spent over $20,000 on development. Probably idle.

WALLA WALLA COPPER MINING CO. — **WASHINGTON**

Office: Walla Walla, Wash. Mine office: Keller, Ferry county, Wash.

Officers: J. G. Mutinga, pres.; W. H. Meyer, v. p.; W. P. Lathrop, sec.-treas., with H. Osterman, Wm. Pfeifler, Geo. Bradbury, C. M. McKinney, all of Walla Walla, and J. T. Leonard, directors.

Cap. $1,000,000; par $1.

Property: 10 claims, 2 unpatented, and a millsite, 1 mile N. E. of Keller, shows a 30′ vein of lowgrade gold-copper ore, developed by an open-cut, shaft, and tunnel. Developing.

WASHINGTON BLACK ROCK MINING CO. — **WASHINGTON**

Address: John Gorrien, pres.-mgr., Hastings Hotel, Minneapolis, Minn. **Mine address:** P. F. McGovern, Northport, Wash.

Inc. 1921. Is a close corporation.

Property: 8 claims, and mining rights on 160 acres, including the Maki group in E. side valley, Deep Creek, 6 miles from Northport, on county road, near the Last Chance and Great Western Mines. Claims showed 5′ of high grade zinc carbonate ore, shipments made to Mineral Point plant of Empire Zinc Co. in 1920, averaging as high as 47% zinc.. Ore occurs in a vein, 6½′ wide, on which shaft has been sunk; vein runs N. 20° E., dip 60°. At 200′ depth, ore changed to sulphide assaying 62-66% zinc. Lenses of lead ore were found in a blanket deposit cut in the shaft between the 100 and 200′ levels.

Development: by 300′ shaft and 280′ tunnel that connects with shaft at 175′ below apex of orebody. Shaft to be deepened to 400′ level, 1922.

Equipment: hoist, 2 drill compressor, gasoline engine, etc. Employs 8 to 12 men.

Production: 50 to 100 tons a day; shipments started March, 1922.

WASHINGTON COPPER MINES DEV. CO. — **WASHINGTON**

Officers: P. H. Nester, pres.; J. L. Linn, v. p.; J. N. Hart, sec., all of Portland, Ore. **Cap.** $500,000; par $1. **Property:** 9 claims, unpatented, in Bald Mt. district, Skagit county.

Ore carries copper, gold and silver. In 1918 company was milling about 30 tons of ore daily.

WASHINGTON-IOWA COPPER MINING CO. — **WASHINGTON**

Idle since 1917. W. D. Gibson, pres.; P. R. Screven, sec., both of Seattle.

Property: on the eastern fork of Silver creek, 2 miles above Mineral, adjoins the Edison Mining & Development Co., under same management. Claims show 5 veins, carrying complex ore, consisting of chalcopyrite, galena, sphalerite and pyrite, with quartz gangue.

Development: by the 1,200′ Bonanza crosscut tunnel.

WASHINGTON TUNGSTEN MINES CO. **WASHINGTON**

Address: Miller Bldg., Yakima, Wash.

Officers: D. B. McMahon, pres.-treas., Seattle, Wash.; J. Lenox Ward, sec., with Geo. Kerr, E. P. Sanford, E. G. Tennant, and J. J. Miller, directors.

Inc. November, 1915, in Washington. **Cap.** $350,000; $1 par.

Property: 15 unpatented claims, in Bumping Lake district, 50 miles N. W. of Yakima, Yakima county, said to show gold-copper-tungsten ore. Idle.

WASHOUGAL GOLD & COPPER MINING CO **WASHINGTON**

Mail returned from former address: Washougal, Clarke county, Wash.

Officers: F. A. Mabee, pres.; John Scharboarer, v. p.; J. B. Jordan and T. A. Altman, secretaries; Dr. Otta Sutter, treas., at last accounts.

Inc. 1902, in South Dakota. **Cap.** $1,000,000; shares $1 par.

Property: 560 acres, held on a 30-year lease, from the State, near Mt. St. Helens, in the Bald Mountain district. Shows several vertical fissure veins in granite, one of which, averaging 6′ thick, is developed by an 1,800′ tunnel exposing ore, said to contain 5% copper, 15% lead and zinc, 2 to 70 oz. silver and $1 to $15 gold per ton.

Equipment: includes gasoline hoists, 25-ton concentrating mill, and a 3-drill Sullivan air compressor. No recent information available.

WENATCHEE GOLD MINING CO. **WASHINGTON**

Officers: J. P. Bonar, pres.; W. H. Kneemyer, treas.; both of Waterville, Wash.; M. P. Spencer, sec.

Cap. $1,000,000; shares $1 par.

Property: 80 acres of State land, held under 30-year lease, in Entiat valley, Chelan county, said to show free gold ore.

Development: over 500′ of tunnels and shafts.

Equipment: includes a 2-stamp mill. Total shipments reported to have yielded about $170,000. In 1918 mine was reported under a 2-year lease. No recent returns.

WESTERN COPPER MINING CO. **WASHINGTON**

Office: 229 W. 42nd St., New York. **Mine office:** Reiter, Wash.

Officers: John A. Powers, pres.; W. J. Weller, v. p.; Edw. Woram, treas.; M. A. Boldt, sec., with Frank K. Fairchild, E. T. Christensen, W. N. Wilkinson, Thos. A. Mead, and Geo. Wohlfahrt, directors.

Inc. April 25, 1917, in Maine. **Cap.** $2,000,000; $1 par; 1,300,000 issued. Bonded indebtedness of $97,850 is to be retired by conversion into stock in 1921. Annual meeting, first Tuesday in April.

On June 6, 1917, company purchased assets of the Bunker Hill Mining & Smelting Co. for a stock consideration and assumed B. H. debts of $84,973, consisting of bonds and notes, which have since been paid.

Property: Copper Bell mine, 20 claims, 15 patented and 1 millsite patented, 371 acres at Reiter, 5 miles W. of Index, Snohomish county, Wash. Examined by Cory Wright, T. E. Brown, E. M. Simonds and V. V. Clark. Claims said to show fissures in granite, syenite and diorite, dipping 45°, with N. 40° W. course.

Ore: is mainly chalcopyrite, associated with magnetite. On account of this latter mineral, the consulting engineer considered that prospecting with a dipping needle should find additional copper deposits. The Bell shoot has been followed to 500′ depth and the Jumbo to 100′.

Development: by incline shafts, 86 and 500′ deep and tunnels, the longest 2,700′. To depth of 1,200′ workings total 6,100′. Diamond drilling cut a parallel body to the Bell at 497 to 526′, assaying 6.99% copper. This hole is to be followed by a shaft. Exploration cost $112,927 to the end of 1916.

Equipment: to December, 1916, cost $72,195, covering 300-h. p. hydro-electric plant, 100-ton obsolete concentrator, 50-ton smelter, compressor, tramway, diamond drill, steam engine, hoist, etc.

Property is well equipped for production if ore is developed.

WEST HILL MINING CO. **WASHINGTON**

Out of business. Fully described in Vol. XIII.

WEST VIRGINIA

CLARKESBURG CLINKERING CO. **WEST VIRGINIA**

Subsidiary of American Metal Co., Ltd.

Operations discontinued in 1920; is being dissolved.

GRASSELLI CHEMICAL CO., THE **WEST VIRGINIA**

Address: Meadowbrook and Clarksburg, W. Va.

Two zinc smelters, that at Clarksburg including an acid plant. See company under U. S. section.

WISCONSIN

Wisconsin produces normally about 50,000 tons of zinc and 4,500 tons of lead per annum from the treatment of over 2,000,000 tons of ore. Most of this ore is milled and the product smelted at Illinois plants. The production centers named in their order of importance are: New Diggings, Benton, Livingston, Mifflin, Shulsburg, Hazel Green, Highland, Cuba City, Platteville, Potosi, Linden and Dodgeville.

During 1921, twelve concentrators were in operation, but only one continuously. The mine output was but 24,981 tons of crude concentrate compared with 122,948 in 1920, with shipments of 11,082 tons finished concentrate to smelters, compared with 63,057 in 1920.

In 1920 only 1,742,000 tons of crude ore was mined, compared with 1,826,200 in 1919. The low price for lead and zinc reduced the value of the output to $4,843,690 compared with $6,398,374 in 1919 and $9,746,234 in 1918.

In 1920, the tonnage of green concentrate was 122,948 compared with 164,731 in 1919. In the former years, 32 mills and 5 separating plants were operated more or less continuously, but nearly all were idle at end of the year.

Unlike western vein deposits, the Wisconsin orebodies do not lie between regular walls, but form large, often highly irregular bodies, on a single floor in the so-called Galena limestone. The bottom of the ore is nearly always on a flat, generally well-defined clay seam, a few inches thick, which marks the junction of the base of the Galena lime and the top of the next formation, the Trenton lime. Above the clay bed, the orebodies make the unique "pitch" and flat formation described by Chamberlain. Theoretically, we should find two "pitches", one on either side of the top crevice, diverging as they go down, with the final flats a considerable distance apart on the clay bed. The area between, known locally as core ground, should thus constitute a single, well defined orebody, with the richer portions near the pitches and the leaner portion in the center of the core. Practically one finds few examples of this perfect orebody; almost invariably one pitch is better defined than the other, and often the opposite pitch may be totally lacking, or is marked by a faint line of fracture showing stronger mineralization than the wall rack.

Recent developments in the rich New Diggings field indicate that the "pitches" often assume a horseshoe or crescent shape, the richer ore being in the heart of the crescent, and the pitches showing less mineralization as they extend outwards. The length of the orebody may be several thousand feet, the height varying from 10 to 60′ and the width from 60 to 250′. In fact, on the core side, there is no definite end of the ore. The mineral deposit simply gets thinner and thinner, and the limit of working depends on the cost sheet and the profit from the recovery.

The mines are worked almost universally with underhand (breast) stoping, using a room-and-pillar method for carrying the ground. In most cases, a

drift is carried along the edge of the ore in advance of the stopes and new stopes are opened up on the pitch as needed. These open stopes are frequently of great extent, sometimes 40 to 80' high and 40' wide between pillars.

The Mineral Point Zinc Co., Wisconsin Zinc Co., Vinegar Hill Zinc Co., and Frontier Mining Co., produced 77% of all the zinc concentrate and 60% of the lead output of the state in 1920-'21.

AMERICAN ZINC ORE SEPARATING CO. **WISCONSIN**

Subsidiary of Am. Zinc, Lead and Sm. Co., which see

Address: Platteville, Wis.

Company owns and operates a plant using the Huff electrostatic process to remove iron from mill concentrates carrying 16 to 40% zinc and pyrite.

BARABA MINING CO. **WISCONSIN**

Office and mine: Mellen, Ashland county, Wis. Nelson Baraba, Sr., pres.; Nelson Baraba, Jr., sec.

Inc. 1906. **Cap.** $1,000,000; shares $1 par. Has a shallow shaft showing ore assaying 2.8% copper, with traces of gold and silver.

Idle since 1917.

BERKSHIRE MINING & DEVELOPMENT CO. **WISCONSIN**

Address: W. J. Wheeler, sec., 415 Palladio Bldg., Duluth, Minn.

Mine address: Mellen, Wis.

Property: Berkshire iron mine, near Mellen, at the western end of the Gogebic range.

BIG BEND MINING CO. **WISCONSIN**

Address: C. M. Treat, Cuba City, Wis.

Inc. in September, 1919. **Cap.** $60,000; shares $1 par. Will develop and operate leases in the Cuba district.

BLOCKHOUSE MINING CO. **WISCONSIN**

Address: Kistler & Stephens, Platteville, Wis.

Property: the Schroeder mine and mill and the Goke mine, both on same E.-W. range. In 1921, company combined with the McGuire-Sally Waters interests. Extensive deposits of smithsonite occur on 60' level and blende at 110' in 4 "blankets."

The Goke lease having been proved by drill and shaft, was opened 1921 and a 200-ton mill taken from the Climax mine was put up here.

B. M. & B. MINING CO. **WISCONSIN**

Address: Jos. Wilson, supt., Mifflin, Wis. Company owned various zinc mines in the Mifflin district. The Squirrel mine was reported sold in 1920 to the **Fearless Mining Co.**, which see.

BURR MINING CO. **WISCONSIN**

Address: Wat Nalen, supt., Galena, Wis.

Reopened and mill overhauled, late 1921.

CAHOON MINE **WISCONSIN**

Address: A. W. Rohn, mgr., Baraboo, Wis.

Property: a tract of 140 acres, one mile S. W. of Baraboo, underlain by iron ore, opened and mined by shafts and extensive workings.

CLEVELAND MINING CO. **WISCONSIN**

Office: 625 Bank & Insurance Bldg., Dubuque, Iowa. S. W. Barbard, mgr.; H. L. Jones, supt.

Property: 40 acres, includes the Cleveland and Hazel Green mines at Hazel Green, Grant county. Lead-zinc ore occurs in flats and pitches in limestone.

Development: several 150' shafts with 1,500' of workings said to block out 100,000 tons of ore.

Equipment: includes a 75-h. p. electric hoist, a 6-drill air-compressor, a 250-ton concentrating plant. Concentrate is sold to Mineral Zinc Co. under contract; employs normally 160 men on double shift. Closed down, 1920-21.

COMMONWEALTH IRON CO. **WISCONSIN**

Address: E. W. Hopkins, mgr., Ironwood, Mich. Property has not been worked since 1910.

CONNECTING LINK MINING CO. **WISCONSIN**

Office: Curt M. Treat, mgr., Cuba City, Wis. Robt. A. Fox, supt.

Offices: Anton Zwack, pres.; T. S. Hingtgen, v. p.; Curt M. Treat, sec.; Theo. E. Buechele, treas., with E. J. Gibbs, Henry Schmieden and J. F. Galligan, directors.

Inc. 1917, in Wisconsin. **Cap.** $300,000; increased 1920 from $100,000; $1 par; 180,000 issued.

Dividends: two, equal to 20%, were paid in 1918.

Property: 300 acres, includes Connecting Link No. 2 mine, in Cuba City district, Lafayette county.

Equipment: includes electric power, a 150-ton mill, on the Dall land, and a new No. 1 concentrator completed 1920. Company was the largest producer in the Cuba district from 1918-20.

CONSOLIDATED LEAD & ZINC CO. **WISCONSIN**

Address: Charles Lawyer, mgr., Benton, Wis. Company had a lease on the Charles Smith tract, a mile S. of Benton. Drilling was completed and shaft sunk late in 1918.

DODGEVILLE MINING CO. **WISCONSIN**

Address: Dodgeville, Wis.

Erected a new mill in 1920.

FEARLESS MINING CO. **WISCONSIN**

Address: Sam Altenberg, supt., Platteville, Wis.

Inc. 1919. **Cap.** $100,000.

Property: the Optimo Mng. Co. holdings, in the Linden district. Mine has an orebody 60′ wide and 9′ thick, carrying high-grade jack. Concentrates carry 30-40% zinc.

Equipment: includes a 100-ton mill, making 55% zinc concentrate by jigging.

In 1920, company acquired the Squirrel mine, a producer in the Mifflin district, formerly owned by the B. M. & B. Mng. Co., and the Nightingale mine S. E. of Benton, under development at last account.

FIELD MINING & MILLING CO. **WISCONSIN**

Office: 2200 Insurance Exchange, Chicago, Ill. **Supt.'s address:** R. F. D. No. 7, Scales Mound, Ill.

Officers: Robt. W. Hunt, pres.; Jas. C. Halsted, v. p., with L. V. Rice, gen. mgr.; C. C. Whittier ,directors. C. B. Nolte, sec.-treas.

Inc. 1908, in Illinois. **Cap.** $100,000; shares $100 par; $65,000 outstanding. Annual meeting, 1st Tuesday in May.

Property: the Thompson mine near New Diggings, Wis., an important lead-zinc producer, developed to depth of 225′ by vertical shaft. Ore occurs in fissure veins and disseminations traversing dolomite. Management estimated ore reserves at 350,000 tons in May. 1917.

Equipment: includes electric power, 50-h. p. hoist, 600′ elec. compressor, centrifugal pump, 800-ton mill, equipped with jigs and tables.

Produced zinc, lead, and pyrite averaging 45% zinc, 75% lead, 31% sulphur, 16% iron, respectively. Operations suspended in December, 1918.

FLINT MILL & FURNACE CO. **WISCONSIN**

Company operated a 20-ton Fink furnace at Wauwatosa, treating lead concentrates from the Wisconsin fields.

FLORENCE IRON CO. OF WISCONSIN **WISCONSIN**

Address: F. A. Vogel, gen. mgr., Room 337, 25 Broad St., New York City; E. A. Thiemann, asst. mgr.; Florence, Wis. Ed. Larson, supt.; M. A. Hanna & Co., sales agents.

Property: the Ernst mine at Commonwealth, Wis. and Florence mine at Florence, both mines on the Menominee range. **Ore:** non-Bessemer hematites, carrying 50% iron and 0.24% phos., mined by milling methods to depths of 500 and 700′. The Bates and Youngs mines are also operated.

Production: the Ernst mine produced 70,416 tons in 1917; 173,145 tons in 1918; 77,990 tons in 1919, a total of 561,642 tons; the Florence mine produced 47,193 tons in 1917; 97,322 tons in 1918 and 61,888 tons in 1919, a total of 3,410,569 tons in all.

FRONTIER MINING CO. **WISCONSIN**

Offices: 413 Fletcher Trust Bldg., Indianapolis, Ind.; Galena, Ill. and Benton, Wis.

Officers: J. H. Billingsley, pres.; C. R. Hinkle, v. p.; C. L. Rost, v. p.; W. C. Haueisen, sec.-treas.; preceding with C. W. Craig, G. A. Schnull and L. G. Deschler, directors.

Cap. $125,000; $100 par.

Dividends: begun April, 1916, are 2% the first of each month, and 10% on the 15th.

Property: the Middie and Grotkin mines at Benton, Wis. Ore is zinc sulphide in pitches and flats in limestone.

Production: the mines when in full operation average about 800 tons of 36 to 42% zinc concentrate weekly.

GRUNOW MINING CO. **WISCONSIN**

Address: Herman Grunow, supt., Mifflin, Wis.

Company operates zinc mines in the Mifflin district.

HARMONY IRON CO. **WISCONSIN**

Address: 808 First Nat'l. Bank Bldg., San Jose, Calif. **Mine address:** Robert King, supt., Ironwood, Mich. **Officers:** E. A. Hayes, pres.; W. P. Lyon, sec.

Inc. in California. **Cap.** $1,000,000; $25 par; all issued.

Property: Germania iron mine at Hurley, Wis.

HAY CREEK MINING & PROSPECTING CO. **WISCONSIN**

Address: M. L. Bacon, sec., 601 5th Ave., Antigo, Wis. Mine at Augusta, Wis.

HERCULES MINING CO. **WISCONSIN**

Property: leases 400 acres of farms, 2 miles E. of Cuba City, on which drilling revealed rich zinc and lead ore. A 100-ton mill was to be erected. Idle and probably dead.

HOLMES MINING & MILLING CO. **WISCONSIN**

Idle. Mellen, Ashland county, Wis.

Officers: John Holmes, pres.-mgr.; A. D. Barnes, v. p.; Thos. A. Humphrey, sec.; F. P. Simmonds, treas., with Edw. Bekken, A. D. Wilson and A. D. Hill, directors.

Inc. Jan. 9, 1902, in Wisconsin. **Cap.** $150,000; shares 25c par.

Property: 160 acres in the Penokee iron range, about 1 mile N. of Bad river, shows fissure veins in greenstone, diorite and slate with E.-W. strike and dip of 70°. Three orebodies are claimed, of which one, said to be 40' wide and traceable one-half mile by a strong gossan, with slate footwall and diorite hanging, is reported to have chalcopyrite in a quartz gangue. Ore gives assays up to 9 oz. silver and $3 gold per ton.

Development: by 150' and 188' shafts.

Equipment: includes a 16-h. p. hoist.

IMPERIAL MINING CO. **WISCONSIN**

New Diggings, Wis.

INDIAN MOUND MINING CO. **WISCONSIN**

Mine controlled by **Lawrence Mines Co.**, which see.

KLAR PIQUETTE MINING CO. **WISCONSIN**

Address: W. H. Doyle, sec., Platteville, Wis.

Company operated zinc mines in the Platteville district, at last account.

LA RUE MINE **WISCONSIN**

Address: W. F. LaRue, owner, Alworth Bldg., Duluth, Minn.

Property: an iron mine at North Freedom, Wis., operated by the owner.

LAWRENCE MINES CO. **WISCONSIN**

Address: Dubuque, Iowa; or New Diggings, Wis.

Property: the Indian Mound mine at Benton and leases in New Diggings district. The Lawrence mine at Hazel Green was abandoned in 1918. The Indian Mound was a regular producer, 1918-'21.

LINDEN ZINC CO. **WISCONSIN**

Address: 404 Telephone Bldg., Indianapolis, Ind. **Mine address:** Augustin P. Craft, Galena, Ill.

Company said to own and operate the Frontier mine and operates a roasting and separating plant at Cuba City, Wis.

LITTLE PLATTE MINING CO. **WISCONSIN**

Address: Raymond Piquette, mgr., Platteville, Wis. Had a lease on James Tracey land, 6 miles W. of Platteville. A 50-ton mill was erected in September, 1918, and shipments made.

LUCKY FIVE MINING CO. **WISCONSIN**

Address: Mr. McKinley, supt., Dodgeville, Wis.

Property: a lease on Davis and Thomas lands, in Dodgeville district near Cuba City, Grant county, Wis. A small producer of high-grade lead-zinc concentrates. Developed by 100′ shaft.

Equipment: includes steam plant and 50-ton concentrator.

LUCKY SIX MINING CO. **WISCONSIN**

J. N. Vail, supt., R. R. No. 2, Livingston, Wis.; or Mifflin, Wis.

Property: in Mifflin district, Iowa county, developed by two shafts, and equipped with a 150-ton mill.

LUCKY TWELVE MINING CO. **WISCONSIN**

Address: L. N. Dana, mgr., Benton, Wis.

Company operated zinc mines in the Benton district.

M. & P. MINING CO. **WISCONSIN**

Address: Shullsburg, Wis.

Property: the Pacquette mine, opened and first shipments made late 1921.

MACKAY MINING CO. **WISCONSIN**

Address: D. and W. Mackay, Platteville, Wis. Acquired property of the Ross Mining Co. in Linden district, in 1919, and resumed mining and drilling in November. Operated and shipped concentrate in 1920.

McMILLAN ZINC CO. **WISCONSIN**

Offices: Platteville and Hazel Green, Grant county, Wis.

Officers: A. C. McMillan, pres.; Henry Hornischfeger, v. p.; H. B. Morrow, sec.-treas., with L. C. Dagenhardt and C. M. Echols, directors; L. C. Dagenhardt, supt., Hazel Green.

Inc. August 3, 1914, in Wisconsin. **Cap.** $100,000; $1 par. Annual meeting, August 14.

Property: 100-acre lease, at Hazel Green, said to show zinc and lead sulphides occurring in a disseminated deposit in the Galena limestone formation.

Development: 180′ vertical shaft.

Equipment: includes steam hoist, 300 cu. ft. air-compressor, pumps and a mill capacity 400 tons per 20 hours.

In February, 1918, mine was closed temporarily, due to high costs and heavy flow of water. Although fully equipped, more capital is needed to bring property to producing basis.

MINERAL POINT ZINC CO. **WISCONSIN**

(Subsidiary of the New Jersey Zinc Co.)

Address: 160 Front St., New York City. T. H. Garnett, supt.

Properties: the Marsden-Black Jack mine at Galena, Ill.; Coker No. 1 and No. 2 mines at Livingston, Wis.; Highland mine at Highland, and the Penna-Benton and Hoskins mines at New Diggings, Wis. The last named was the largest producer of galena and sphalerite in the district in 1919.

Geology: in the Black Jack mine there are two "pitches" to the ore-body; one contains heavy black jack, and has a smooth hanging wall; the other "pitch" contains ore heavy in marcasite and without any definite

wall. In the Coker mines the orebodies are of great length and determined by drill holes for a length of 6,900'. No. 1 orebody is 7,500' long if the mines of the Vinegar Hill Zinc Co. be included.

Equipment: at Mineral Point, Wis., company has a roasting and separating plant, including a multihearth roaster of 150 to 200 tons daily capacity and magnetic separators to remove pyrite from jig concentrates, whose zinc content is raised from 37 to 59%. Recovery is about 90% at cost of $2 per ton. Also, a 4-block zinc oxide plant of 12 double compartments each. At the Black-Jack mine, there is a 600-ton mill and at Depue, Ill., company operates a 9,068 retort zinc smelter with acid plant.

Reported that the zinc carbonate orebodies at Highland have been exhausted and company is to abandon this district.

MONMOUTH ZINC MINING CO. **WISCONSIN**

Office: C. G. Norton, sec.-treas., Hazel Green, Wis.

Officers: C. E. Cornell, pres.; John A. Allen, v. p., with R. E. Treaham, Hugh Marshall and D. W. O'Connor and Andrew Elvod, directors.

Cap. $235,300; $10 par; $117,650 issued. Annual meeting, first Tuesday after first Monday in February.

Property: 200 acres at Hazel Green, Lafayette county, Wis. Deposit is a fissure or "pitch" in "blue" rock, with "horseshoe" course, characteristic of the district. Ore assays 40% zinc, 15% iron, and 2.5% lime.

Development: by 220' shaft and 260' tunnel. **Equipment:** 75-h. p. motor-driven hoists, 2-drill compressor, pumps (one deep-well of 2,500, one sinker of 800, and one station of 800 g. p. m.), 400' tram from shaft to mill, and 150-ton mill employing 3 jigs of 7 cells each.

The mine was operated under lease by Vinegar Hill Zinc Co. to December 18, 1920.

Operations will be resumed when the metal market improves.

MONTREAL MINING CO., THE **WISCONSIN**

Office: A. C. Bishop, sec., 1208 Hanna Bldg., Cleveland, Ohio.

Officials: E. W. Hopkins, range mgr., Ironwood, Mich. O. M. Schaus, supt.; F. B. Goodman, gen. supt.; J. M. Price, asst. supt. at Hurley; Oglebay, Norton & Co., sales agents. W. K. Carter, Ironwood, Mich., pur. agt.

Property: the Montreal and Ottawa mines on the Gogebic range, near Hurley, (Montreal), Iron county, Wis., both opened in 1886. Ores are similar, namely, soft, red, granular, Bessemer and non-Bessemer hematites, assaying 55% iron and 0.045% phosphorus in the Montreal, and 49% iron and 0.054% phosphorus in the Ottawa. The shipping grades are 51% iron and 0.033% phosphorus and 53.04 to 56.90% iron and 0.063 to 0.079% phosphorus, respectively. The mines are worked by sub-level and caving to 2,300' in the Montreal and stoping to 1,300' in the Ottawa.

Production: for 1919 and 1920 totaled 6,072,094 tons from the Montreal and 2,209,441 tons from the Ottawa.

NATIONAL ZINC SEPARATING CO. **WISCONSIN**

Address: R. B. Keating, mgr., Platteville, Wis. **Works address:** Cuba City, Wis.

Works: company operates a roasting and magnetic-separating plant, capacity 275 tons of crude zinc concentrate in 24 hours, at Cuba City, Grant county, Wis. A Cottrell precipitator was installed in the works in 1918. The sulphuric acid plant can make 100 tons daily. Most of the supply comes from mines operated by the Vinegar Hill Zinc Co. The raw concentrate carries 23 to 46% zinc, and the final product 60%. This is sold to the Illinois Zinc Co., Grasselli Chemical Co., and the American Zinc Co., of Hillsboro, Ill.

NORTHWESTERN IRON CO. **WISCONSIN**

Described in Vol. XIII. Mine now owned by the **Steel & Tube Co. of America,** which see.

but were resumed in September, and shipments made at the rate of 3-5 cars per week.

ODANAH IRON CO. WISCONSIN

Address: Cleveland, Ohio.

Property: the Windsor iron mine at Hurley, Wis.

OGLEBAY-NORTON CO. WISCONSIN

Address: O. M. Schaus, mgr., Hurley, Wis. See under Minnesota.

OLIVER IRON MINING CO. WISCONSIN

Main office: Wolvin Bldg., Duluth, Minn. **Works office:** Shullsburg, Wis. Operates a 300-ton roasting and separating plant. See this title under Minnesota for full description.

OPTIMO MINING CO. WISCONSIN

Office: 1127 State Life Bldg., Indianapolis, Ind.

Property: at Linden, Iowa county, Wis., was the main producer of lead-zinc concentrates in the Linden district in 1917-18. Operated by Fearless Mining Co., at last account.

PEACOCK MINING CO. WISCONSIN

Address: Henry Ovitz, supt., Mifflin, Wis.

Company operated zinc mines in the Mifflin district.

PENI MINING CO. WISCONSIN

Address: H. C. Holtz, supt., Mifflin, Wis. Owns a zinc mine in the Mifflin district.

PICKANDS, MATHER & CO. WISCONSIN

See description in Minnesota section of this Volume.

Address: Cleveland, Ohio.

Property: the Cary, Superior and West Cary mines at Hurley, Wis.

REPUBLIC IRON & STEEL CO. WISCONSIN

See general description elsewhere in this Volume. **Address:** Youngstown, Ohio.

Property: the Hennepin iron mine at Pence, Wis.

RODHAMS McQUITTY MINING CO. WISCONSIN

Address: Shullsburg, Wis.

Was a regular shipper of zinc concentrate in 1920. Operations resumed late 1921 and 150 tons lead "ore" shipped in first week of October. Company operates mill and tram.

ROSS MINING CO. WISCONSIN

Property: acquired October, 1919, by the **Mackay Mining Co.**, which see.

RUDOLPH LAND CO. WISCONSIN

Idle. Mine near Gordon, Douglas county, Wis.

Inc. 1905, as successor of Minong Range Copper Co.

Property: 12 miles from Gordon, on the southern fold of the Keweenawan syncline.

Development: by two shafts, deepest 350', sunk at an angle of 36°, on a dark amygdaloidal trap bed carrying small quantities of native copper.

Equipment: includes a 6-stamp mill. Property fully described under title of Minong Range Copper Co., Vol. XIII, Copper Handbook.

ST. CROIX CONSOLIDATED COPPER CO. WISCONSIN

(For description see Vol. XII.)

Out of business. Holdings reported divided between Lake Superior Copper Co. and Superior Cons. Copper Co. No record of operations.

SAVAGE MENKE MINING CO. WISCONSIN

Address: Platteville, Wis.

Has developed a mine on Dixon range, and installed power, pumping and mill machinery, 1921.

SHAMROCK MINING CO.. WISCONSIN

Presumably dead. Fully described in Volume XIV.

SPRING VALLEY IRON & ORE CO. WISCONSIN

Address: Spring Valley, Wis.

Property: the Cady iron mine at Elmwood, Wis.

STEEL & TUBE COMPANY OF AMERICA **WISCONSIN**

Office: 1st National Bank Bldg., Milwaukee, Wis. J. H. Means, manager in Wisconsin; A. D. Chisholm, manager in Michigan.

Inc. 1918 in Delaware. **Cap.** 972,628 shares com. (nominal par value $2), and $17,500,000 7% cum. pfd., $100 par.

Property the Mayville mine at Mayville, Dodge county, Wis. Also the Keweenaw, Newport and Anvil mines on the Gogebic range and the Isabella mine, Marquette county, Michigan.

	Iron%	Phosp.%	Mang. %	Output (Tons) 1919	1920	Total
Mayville.....	41.45	1.05	0.10	94,673	83,700	1,472,493
Keweenaw.....	54.87	0.083	0.44	152,674	299,532	963,978
Newport.....	54.14	0.42	0.38	1,035,686	1,153,482	16,768,848
Anvil.....	54.67	0.83	0.52	5,536	10,869	920,058
Isabella.....	54.68	0.83	0.42	38,805	118,530	[illegible]

SUPERIOR COPPER MINES CO. **WISCONSIN**

Address: Superior, Wis.

Officers: J. B. Arnold, pres.; T. A. Merritt, v. p.; F. L. Bernard, sec., and H. M. DeLanoie, treas.

Inc. Nov. 14, 1916, in Wisconsin. **Cap.** $1,000,000; all outstanding. Security Transfer & Registrar Co., transfer agent. Stricken from listing on N. Y. Curb, December, 1920.

Property: in Douglas county, Wisconsin. Ore carries native copper.

TIFFANY MINING CO. **WISCONSIN**

Letters returned from former address, 925 Postal Telegraph Bldg., Chicago, Ill., and company probably dead. See Vol. XIV.

VINEGAR HILL ZINC CO. **WISCONSIN**

Owned by Steel & Tube Co. of America, Conway Bldg., Chicago, Ill.

W. N. Smith, gen. mgr., Platteville, Wis.; J. A. McCulloch, supt., Baxter Springs, Kans.; S. H. Davis, mgr.; J. G. Trewartha, supt.

Company operates a number of mines in the Wisconsin-Illinois and Oklahoma-Kansas districts; also controls a large acreage in the latter district on which mines are operated under sub-leases.

The North Unity mine near Day Siding was operated 1921.

The Dale mines and the Yewdall in the Livingston district resumed operations Nov., 1921, after a year shut-down, employing 50 men at each mine, the mill shipping 350-400 tons concentrate weekly to the National Separators at Cuba City.

Company, also has mill at the Field Meloy property, New Diggings.

WEST HILL MINING CO. **WISCONSIN**

Probably dead. See Vol. XIV.

WINSKILL MINING CO. **WISCONSIN**

Operated in Shullsburg district in 1920.

Is a subsidiary of the **Wisconsin Zinc Co.**, which see.

WISCONSIN STEEL CO. **WISCONSIN**

Address: W. H. Dye, auditor, Harvester Bldg., Chicago, Ill.

Property: the Illinois iron mine at North Freedom, Wis. For description of Minnesota and Phillipine Island operations, see Minnesota.

WISCONSIN ZINC CO. **WISCONSIN**

Address J. J. Stevenson, gen. mgr., Platteville, Wis.

Subsidiary of the **American Zinc, Lead & Smelting Co.**, which see.

Operates the Champion plant of the Wisconsin Zinc Co., at New Diggings, Wis.

ZINC HILL MINING CO. **WISCONSIN**

Address: Charles Wolf, pres.-mgr., Platteville, Wis.

Cap. $1,000,000; increased August, 1920, from $300,000.

Property: formerly known as the Little Dick and Big Dick. Drilling exposed good ore, and a 50 to 100-ton mill was erected in June, 1918. Operations were suspended in March, 1919, on account of market conditions, but were resumed in Sept. and shipments made at the rate of 3-5 cars p.week.

Company is doing extensive exploration and development work on adjoining properties and also operates a sulphuric acid plant at Cuba City. Shut down 1921 until December, when mine was unwatered.

WYOMING

The mountainous regions of Wyoming contain numerous widely scattered mineral deposits, most of them but sightly developed. The short lived "boom" of the Encampment district, on the Colorado border, bred so many "wild cats' that the mining industry of the state has suffered loss of prestige ever since.

No gold, silver, copper or lead was produced by the mines of this state in 1920.

The normal metal output, exclusive of iron, is relatively small, that of 1919 being but 798 tons of ore yielding a total of $84 gold, 151 oz. silver, 139,909 lb. copper, and in 1920, 131 tons of $28.12 chromite ore. The 1919 output of copper amounted to 124,816 lb.

The entire iron production and most of the copper produced in the state comes from the Sunrise mines in Platte county, owned by the Colorado Fuel & Iron Co. In 1919, the mine produced 446,446 tons of hematite and 806 tons copper; in 1920, 24,256 lb. copper.

ACME CONS. GOLD & COPPER MINING CO. **WYOMING**

Inactive. See Copper Handbook, Vol. XI.

AETNA MINING CO. **WYOMING**

Idle. **Office:** Merrill, Wis. Mine near Riverside, Carbon county, Wyo. See Copper Handbook, Vol. XI.

AMERICAN FIREPROOFING & MINING CO. **WYOMING**

Probably dead. Former address: care Investment Clearing House, Fin. Agts., 513 Denham Bldg., Denver, Colo. A. E. Minium, pres.; S. E. Coyler, mgr., at last accounts.

Inc. 1913. **Cap.** $10,000,000; shares 10c par. Stock was offered some years ago at 2c with a guarantee of refund attached, should the company's statement not be vertified. Officers of the company and it's promoting stockbrokers have come in contact with Federal authorities at various times, while attempting to transfer large blocks of stock without revenue stamps.

Property: 8 and a fraction claims, 200 acres, in the South Pass mining district, 35 miles from Lander, Fremont county, Wyo., the nearest railroad, comprising the Jerry Dain and Hidden Hand Fraction group, a bond and lease on the Bobtail, Denver and Bluebird claims, near Lewiston, and control of 120 acres of partially developed mineralized land.

Ore: quartz, with gold in fissure veins, 15-24" wide, said to average better than $100 per ton in gold.

Development: includes shafts 40-70' deep, including 500' of underground workings on the Bobtail claim.

Equipment: shaft-house, blacksmith shop, pumping station, engine, boiler, crusher, electric plant, and other machinery. A new mill was ready for operation in May, 1919.

Company has presumably devoted its energies toward selling stock, in preference to working the mine.

ANCHORIA COPPER MINING CO. **WYOMING**

Idle several years.

Office: Room 3, Algoma Bldg., Oshkosh, Wis. **Mine office:** Copperton, Carbon county, Wyo. H. O. Granberg, sec.-treas.

Inc. April, 1901, in Wyoming. **Cap.** $1,000,000; shares $1 par.

Lands: 4 claims, 1 patented, 80 acres, in the Battle Lake district, developed by a 200' shaft and tunnels of 45' and 60', showing an orebody estimated at 45' width, giving specimen assays of 17% copper, and from a trace

to $5 gold per ton. Has a 40-h. p. steam plant, with hoist good for 500', three power drills and four substantial mine buildings of logs.

ANNIE MINING CO. **WYOMING**

Inc. 1903, in Wyoming. **Cap.** $250,000; shares $1 par.

Property: 100 acres, near Jelm, said to show two 4' contact veins between granite and schist, opened by a 140' shaft and a 138' tunnel, showing copper carbonates and bornite, assaying up to 20% copper and $40 gold per ton. Idle since 1907, except for assessment work performed each year.

ATLAS COPPER MINING CO. **WYOMING**

Address: Tie Siding, Albany county, Wyo.

Development work was carried on in 1918-'19, a few hundred tons of ore being shipped to the Omaha smelter in 1918.

AZURITE MINING CO. **WYOMING**

Idle. **Office:** Room 3, Algomah Bldg., Oshkosh, Wis. Arthur [illegible], v. p.; H. O. Granberg, sec.-treas. and gen. mgr.

Inc. Dec. 17, 1904, in Wyoming. **Cap.** $1,000,000; shares $1 par; issued $624,650.

Lands: 5 claims, 63 acres, in the Battle Lake district, near [illegible], in Carbon county, showing 3 fissure veins, in gabbro, of 15 to 20' estimated width, opened by 305' of work, including a 65' shaft and 70' tunnel.

BIG FIVE COPPER CO. **WYOMING**

Company dissolved. Fully described in Vol. XIII.

BOSTON & WYOMING COPPER MINING CO. **WYOMING**

Idle. **Office:** care Jas. A. Shinn, Leadville, Colo. **Mine Office:** Esterbrook, Albany county, Wyo.

Inc. January, 1903. **Cap.** $500,000.

Property: the oldest in the district, includes 120 acres mineral lands and 120 acres miscellaneous lands, taken over from Esterbrook Mining Co. The Esterbrook mine has a 4' fissure vein, traversing diorite, schist and granite, carrying cuprite, chalcopyrite, cerussite and galena, estimated by former owner to average 2 to 4% copper, 25 to 30% lead, 2 to 4 oz. silver and $1 to $2 gold per ton, developed by 2 short tunnels, and 3 shafts, deepest 335'.

CARISSA MINE **WYOMING**

Address: Atlantic City, Wyo. Mine kept unwatered in 1920; no returns for 1921.

COLOWYO GOLD MINING CO. **WYOMING**

Succeeds Park Gold Mng. Co.

Address: Box 589, Laramie, Wyo. **Mine office:** Centennial, Wyo. Chas. V. Garnett, mgr., B. F. Majors, supt.

Officers and **directors:** Henry Sachs, pres.; E. H. Joslyn, v. p.; C. B. Garnett, sec.-treas.; with C. M. Balkan.

Inc. in Wyo. **Cap.** $2,000,000; $1 par; 1,410,154 shares issued. Stock being sold at 25¢, April, 1921.

Property: 14 lode claims, 320 acres and 1 placer claim, in the Medicine Bow range, Albany county, 4 miles by wagon road from Centennial. The mine is at an elevation of 9,294'. Ore occurs as quartz and hornblende in 3 veins, from 5-22' wide and reported exposed by surface workings for 4,000' in length. Values mainly in gold.

Development: by 1,000' tunnel and 1,200' of workings to depth of 400'.

Equipment: includes 32 h. p. gas engine and compressor.

The tunnel is being extended and crosscuts driven on the middle vein. Management plans to patent the claims, has asked the Federal Power Commission for a permit to develop 100-h. p. water power on Middle Fork of Laramie river in Albany county, and is to put up a mill.

COMMERCIAL GOLD MINING CO. **WYOMING**

Office: Centennial, Wyo.

Officers: P. A. Peterson, pres., Canon Falls, Minn.; P. L. Holtum, sec.; B. Holtum, mgr., Centennial, Wyo.

Inc. 1909, in Wyoming. **Cap.** $1,000,000; $1 par; 350,000 outstanding. **Transfer Office:** Centennial. Annual meeting, second Tuesday in August.

Property: 2 patented claims of 96 acres in Centennial mining district. The formation is similar to that of the district, granite, schist, porphyry, quartzite, etc., with N. E.-S. W. trend.

Idle since 1918.

CONGO MINING CO. **WYOMING**

Owns property in Battle Lake district; idle for several years on account of lack of transportation. No recent information.

CONTINENTAL-MORRIS COPPER MNG. CO. **WYOMING**

Office: Morris, Ill. Mine near Encampment, Carbon county, Wyo.

Officers: J. H. Rogers, v. p.; Dr. G. A. Leach, sec.-treas., with I. F. Hatcher, U. C. Davis, W. A. Thomas, E. R. Joyce, B. C. Hitchcock and W. F. Buck, directors.

Inc. March, 31, 1908, in Wyoming, as a merger of the Continental Copper Mining Co. and Morris Mining Co. **Cap.** $2,250,000, increased later to $5,000,000; $1 par; issued, $1,750,000. Annual meeting, first Tuesday in February.

Property: 7 claims, patented, 120 acres, in the Battle Lake district, carrying about 50 acres of good pine timber. Claims show schist, with 4 veins, of 31 to 40′ estimated average width, traceable 1,500 to 3,000′, carrying carbonate and sulphide ore, estimated to average 1 to 8% copper, with small gold and silver values.

Development: includes several shafts and 1,400′ of tunnels. **Equipment:** includes a steam hoist, good for 500′, and 2 buildings. Idle, but resumption planned as soon as property can be refinanced.

COPPER BOTTOM MINING & MILLING CO. **WYOMING**

Address: Inez, Converse, Wyo. Henry Metz, Sr., pres.; Fred Metz, sec.-treas.

Property: the Copper Bottom mine, in the Muskrat Creek district, Goshen county.

Development work done, 1920.

DAN JOE MINING CO. **WYOMING**

Address: 1708 Pioneer Ave., Cheyenne, Wyo.

Inc. in Wyo. Stock $1 par; offered at 25¢ per share in 1920.

Property: in Silver Crown district, 20 miles from Cheyenne, the nearest R. R. Station.

Company advertised stock for sale, but has not published a record of actual mining work done.

DEER CREEK CHROMITE MINE **WYOMING**

Idle. Owned by the **Vindicator Cons. G. M. Co.** (Colorado), which see.

EAGLE MOUNTAIN MINING CO. **WYOMING**

Developing a property near Hecla, Laramie county.

ELECTROLYTIC COPPER CO. **WYOMING**

Offices: 232 Wickham Blk., Council Bluffs, Iowa, and Albany, Wyo.

Officers: E. J. Stoll, pres.; J. M. Dow, v. p.; Frank R. Vierling, sec.-treas., with J. L. Fisher, H. M. Nichols, J. R. Sullivan and O. P. Wyland, directors. Wm. Benton, mgr.

Inc. November, 1917, in Wyoming. **Cap.** $1,500,000; $1 par; 763,747 shares issued.

Property: company controls the Iron Blossom, Mountain Rest and Rambler groups, near Albany and Fox Park, in Albany county (21 claims, 420 acres). The Iron Blossom Mng. Co. holds title to the mine of that name, but leases it to the Elec. C. Co.

Development: by 2 shafts, 155′ and 185′ deep and 3,450′ of drifts and crosscuts. In 1920 company discovered the faulted northern continuation of the Rambler vein. The ore is said to average 0.32 oz. gold, 2.57 oz.

silver, 0.211 oz. platinum, 0.2460 oz. palladium and 12.55% copper.

Equipment: includes double-cylinder hoist, boilers, pumps, drills, blacksmith shop and dwellings.

Production: the Electrolytic, better known as Rambler mine, is credited with a total production of $500,000 under former ownership. Shipments amounting to 3 tons daily, begun September, 1921.

ELENOR MINES CO. **WYOMING**

Address: O. M. Beck, Atlantic, Wyo.

Officers: O. M. Beck, pres.; Nate Wilson, v. p.; F. V. Marsh, sec.-treas.

Inc. 1917, in Wyoming. **Cap.** $150,000; shares 50c par.

Property: 12 claims about 4 miles N. W. of South Pass and 28 miles south of Lander, show a well-defined vein carrying copper, gold, and silver values.

ELKHORN COPPER MINING CO. **WYOMING**

Property: the Elkhorn mine in the Elkhorn Mountain district, near Overland, Carbon county, said to carry a 7′ vein of sulphide ore, averaging 7 to 8% copper, with considerable ore in sight. Mine has a shaft and a 460′ tunnel, with about 1,000′ of drifts.

Developing and small shipments made during past few years.

EMERALD MINING CO. **WYOMING**

Idle. Wheatland, Laramie county, Wyo.

Property: the Cooney Hill mine, formerly owned by the Cooney Hill Gold & Copper M. & M. Co., and the Emerald mine, on Slate creek, showing a prominent gossan outcrop in schist. The Emerald has a 60′ shaft in ore, and a 100′ shaft bottomed in a gossan showing traces of copper sulphides. No recent report received.

FERRIS-HAGGARTY COPPER MINING CO. **WYOMING**

Inactive. Owns, or did own, the copper mine of this name at Rudefeha, Carbon county, Wyo. Company also owned $375,000 of the Penn Wyoming bonds, but as its stock is practically all owned by the Penn Wyoming, its corporate officers and affairs are of no public interest, save as the only valuable mining asset of the chain of bankrupt corporations, controlled by the Penn Wyoming and its alleged and equally rotten successor, the United Smelters, Railway & Copper Co. See under **Penn Wyoming Co.**, in Vol. XIV, also Vol. X, Copper Handbook.

FERRO ALLOY CO. **WYOMING**

Office: 603 Symes Bldg., Denver, Colo.

Property: near boundary line of Converse and Natrona counties, 16 miles S. W. of Glenrock, shows chromite in serpentine in a granite-schist contact. The deposit is 2-5′ wide for a length of 150′ and carries 35 to 44% chromic oxide. Discovered in 1908, but little work was done until under present ownership in 1918. Produced 131 tons of ore of an average value of $28.12 p. t. in 1920. See same title under Colorado.

GOULD MILLING AND LEASING CO. **WYOMING**

B. A. Lathrop, mgr., Centennial, Wyo. Company had a lease on the property of the **Utopia M. & M. Co.** (which see) in the Centennial district.

HAGGARTY COPPER MINING CO. **WYOMING**

Probably dead. Mine at Rudefeha, Carbon county, Wyo. L. N. Pennock, former pres.

Cap. $10,000, increased Nov. 9, 1908, to $1,500,000; shares $1 par. Controlled and owned by the **United Smelters, Railway & Copper Co.** Is a companion of the **Ferris Haggarty Co.**, but like all its sister companies, owned by the U. S .R. & C. Co. Only a lawyer can tell which of the two owned the copper mine that has been the bait for so many "investors."

See Vol. XIV, also Vol. X of "Copper Handbook," under **Penn-Wyoming Copper Co.**

HECLA CONSOLIDATED MINES CO. **WYOMING**

Mail returned from last address: care Henry Schwartz, pres., 308 Masonic Bldg., Denver, Colo. Mine at Hecla, Laramie county, Wyo.

Probably dead. Fully described in Vol. XIV.

HENLEY CONSOLIDATED COPPER MINES — **WYOMING**

Property: 25 claims, 550 acres, 25 miles S. W. of Cheyenne, Laramie county, Wyo.

Same management as the Hecla Cons. Mines Co., fully described in Volume XIV.

HOME RUN COPPER MINING CO. — **WYOMING**

Office: Rooms 17-18 Postoffice Bldg., Colorado Springs, Colo. Mine near Rudefeha, Carbon county, Wyo.

Officers: A. L. Bohrer, pres.; J. F. Humphrey, v. p.; Adolph Fehringer, treas.; Wm. C. Robinson, sec., at last accounts.

Cap. $1,500,000; shares $1 par.

Property: 180 acres, partly patented, known as the Copper Bell group, near the Ferris-Haggarty mine, having a 350′ tunnel showing a vein with copper, gold, and silver values. Idle many years.

IMPERIAL COPPER & GOLD MINING CO. — **WYOMING**

Office: 423 Caswell Block, Milwaukee, Wis. Jacob Best, sec.-treas.

Property: 6 claims, 113 acres, patented, near the Penn-Wyoming mine, on Upper Cow creek, 12 miles west of Encampment, said to show 2 veins, 1 of 26 to 32′ estimated width, being a schist dike. Mine has about 500′ of tunnels, developing ore giving assays of 6 to 14% copper, with small gold and silver values. Idle since 1915.

INDEPENDENCE MINING CO. — **WYOMING**

Successor of Leighton-Gentry Mining Co.

Idle. **Office:** Algoma Bldg., Oshkosh, Wis.

Officers: E. E. Meeleus, pres.; Wm. Middlecamp, v. p.; H. O. Granberg, sec.-treas. and gen. mgr.

Inc. June 28, 1904, in Wyoming. **Cap.** $1,000,000; $1 par.

Property: 6 claims, patented, 120 acres, 2 miles north of Dillon in the Battle Lake district, shows eruptive metamorphic country rocks, carrying an 11′ contact vein between quartzite and diorite.

Development: by 200′ incline shaft and 250′ tunnel, showing occasional stringers of 3 to 12″ width, carrying a little chalcopyrite assaying 12% copper, with small quantities of nickel and cobalt and traces of silver and gold. Has steam power, a hoist and several small mine buildings.

INTER-MOUNTAIN MNG. & DEV. CO. — **WYOMING**

Promoted by Campbell, Graham & Co., 128 Water St., New York, who are no longer at that address. Shares were listed on Boston Curb. Stock offered at 25¢.

Property: reported to have a lease on holdings of **Quin B. Mining Co.**, which see.

IRON BLOSSOM MINING CO. — **WYOMING**

Office: S. C. Downey, pres., Conners Blk., Laramie, Wyo. **Mine office:** Albany, Wyo.

Officers and directors: E. J. Stoll, v. p.; Wm. Benton, sec.-treas. and mgr., Albany, Wyo.

Inc. August, 1914, in Wyoming. **Cap.** $100,000; 10c par; $75,000 issued; 250,000 shares in treasury. Paid dividends of 40% during 1918. Company has no debts.

Property: 5 claims, 500 acres, in Albany county, includes the Amazon, Rambler (or Electrolytic), Iron Blossom, Rochester Placer and Beulah mines, all situated 2 to 9 miles from Albany.

The **Amazon** mine with two claims, 40 acres, has a 1,000′ tunnel giving a back of 200′. Ore occurs in fissure veins in diorite at 200′ and 600′ from portal. Two lots of ore shipped to the Grant smelter, Denver, gave returns (1) 11% copper, $6.40 gold and silver; (2) 15.40% copper, $12.60 gold and silver.

The **Beulah** property has a 65′ shaft with a 30′ crosscut from which ore was mined that yielded 11.20-15.6% copper, $3.40 and $5.60 gold and silver.

Ore carries 40% iron making it a good flux. A 2,200' tunnel is being driven on vein through Amazon property towards Beulah shaft to drain ground and allow larger production at lower cost. Tunnel 965' long, December, 1919.

Electrolytic, or Rambler mine, 9 miles W. of Albany, consisting of 12 patented lode claims, 234 acres, is credited with a past production of $500,000. The mine was purchased by Wm. Benton in October, 1919, and deeded to the Iron Blossom company, 1920; it is operated under lease on a royalty basis by Electrolytic Copper Co., which see.

ITMAY COPPER MINING CO. — WYOMING

Idle. Address, at last acounts, Rawlins, Wyo. Mine near Rambler, Carbon county, Wyo. I. C. Miller, mgr.; Albert Bryle, supt., at last accounts.

Property: 4 miles S. of Rambler, is said to have a 20' vein, carrying a paystreak of high-grade ore, apparently undeveloped, and another vein up to 8' in width carrying sulphide ore.

Development: by 300' shaft. Mine has been unprofitable to date.

JACK POT MINING & MILLING CO. — WYOMING

Idle. **Office:** Room 3, Algoma Bldg., Oshkosh, Wis.

Officers: H. Thorsgaar, v. p.; H. O. Granberg, sec.-treas.

Inc. Dec. 23, 1903, in Wyoming. **Cap.** $1,000,000; shares $1 par.

Property: 9 patented claims, 180 acres, in the Battle Lake district, showing fissure veins in diorite and chlorite schist, and 2 contact veins, between diorite and porphyry, carrying carbonate and sulphide ores. Two veins, slightly developed, are said to average 14' to 60' in width. The smaller vein has averaged 8% copper and $3 to $12 gold per ton, the larger vein showing very low-grade copper ore.

Development: 75' tunnel, 100' shaft and 8 pits of 20 to 36' depth, with 411' of workings. Though inactive for many years, company is still in existence and taxes paid.

KIMBALL MINING CO. — WYOMING

Idle. **Address:** Kimball, Neb. B. A. Lathrop, pres. and supt., Centennial, Carbon county, Wyo. G. W. Forsling, v. p.; A. J. Hull, sec.-treas.

Property: 19 unpatented claims, near Centennial, developed by 800' of tunnels opening a quartz vein with gold and silver-bearing copper ore. No recent returns.

LEIGHTON-WYOMING MINING CO. — WYOMING

Probably dead. **Former address:** 417 Seventh St., Milwaukee, Wis.

Officers: M. H. Yewdale, pres.; Herman Pereles, v. p.; H. E. Dankoler, sec.; Spencer C. Yewdale, treas.; with A. G. Weissert, S. P. Bjorklund and C. W. Hendricks, directors, at last accounts.

Inc. 1906. **Cap.** $1,000,000; shares $1 par; issued, $810,000.

Property: 2 patented claims, about 1 mile north of the Ferris-Haggarty mine in the Battle Lake district.

Development: by a 186' tunnel and a 65' shaft.

Equipment: includes a sawmill and small machinery plant.

LORIMER MINERALS CO. — WYOMING

Address: M. Lorimer, Lusk, Wyo.

Property: near Lusk, Niobrara county, has been under development since 1918. The ore is a quartzitic sandstone, stained black, yellow and green. Shipments made to the Radium Co. of Colo., carried more than 4% uranium.

LOST CABIN MINING CO. — WYOMING

Address: A. O. Heyer, sec., Shoshoni, Fremont county, Wyo.

Cap. $150,000.

Property: the Lost Cabin group, in the Boyeson section, said to carry the Summit vein. Gold, silver and copper ore occurs in quartz veins. Since 1909 assessment work only has been done.

MAGGIE MURPHY COPPER CO. **WYOMING**

Office: care Chas. S. Ashley, pres., New Bedford, Mass. Mine near Douglas, Converse county, Wyo.

Inc. August, 1904, in Wyoming. **Cap.** $1,000,000; shares $1 par.

Property: 12 claims. 180 acres, and a 60-acre millsite in Horseshoe canyon, in the Laramie Peak district. Claims show granite, with gneiss and schists, carrying 7 veins between gneiss and mica-schist, one of which ranges 30 to 60′ in width and shows covellite, bornite and chalcopyrite, with pyrrhotite ores assaying 1 to 6% copper, 2 to 9 oz. silver and 40 cts. to $4.50 gold per ton.

Development: includes 114′ shaft and various shallow workings. Company has kept up necessary annual assessment work, but has done no development, as far as can be ascertained.

MCKINNEY MINE **WYOMING**

Address: Cokeville, Wyo. This mine in Afton district, 30 miles N. E. of Cokeville, was under development in 1920, and copper ore was found.

NATIVE COPPER MINING CO. **WYOMING**

Tie Siding, Albany county, Wyo.

Company did development work on its mines near Tie Siding throughout 1920. Company sinking shaft from 125′ down to 300′ in 1921, but hampered by water.

NORTH LARAMIE PEAK COPPER MINING CO. **WYOMING**

Office: care L. V. Saul, sec., Esterbrook, Wyo. **Mine office:** Douglas, Converse county, Wyo.

Officers: H. C. Saul, pres.; W. A. Saul, treas.

Inc. 1908, in Wyoming. **Cap.** $2,000,000; shares $1 par; fully paid and non-assessable; 500,000 shares in treasury.

Property: 29 claims, 440 acres, patented, in the North Laramie Peak district, show pre-Cambrian schists bordering granite contacts, on which 1,000′ of diamond-drill work has proven existence of a flat body of disseminated chalcopyrite ore 40′ wide. A shaft has been sunk 100′ on a chimney of chalcopyrite ore said to assay 27% copper, 6 oz. silver and $2 gold, for a total width of 5′.

Equipment: includes 80-h. p. boiler with hoist, pump, steam power and a 3-drill compressor. Is a close corporation, entirely owned and financed by Messrs. Saul. No recent returns.

OCCIDENTAL GOLD MNG. & MLG. CO. **WYOMING**

Idle.

Property: 12 miles from Beulah, idle at last accounts. Roads were built and flumes and pipe laid as part of assessment work in 1918.

OSHKOSH-WYOMING MINING CO. **WYOMING**

Idle. **Office:** 3 Algoma Bldg., Oshkosh, Wis. Mine near Dillon, Carbon county, Wyo.

Officers: O. A. Koch, pres.; E. E. Meeleus, v. p.; H. O. Granberg, sec.-treas. and gen. mgr.

Inc. June 20, 1904, in Wyoming. **Cap.** $1,000,000; shares $1 par.

Property: 11 claims, 220 acres, in the Battle Lake district, is said to carry fissure veins in gabbro, of 22′ estimated average width, opened by shafts of 32′ and 72′ and a 22′ tunnel, showing chalcopyrite and oxide ores of copper.

OTEGO MINING CO. **WYOMING**

Hecla, Wyo. Out of business. Described in Volume XIV.

PARK GOLD MINING CO. **WYOMING**

Fully described in Vol. XIV. Succeeded by **Colowyo Gold Mining Co.**, which see.

PENN-WYOMING COPPER CO. **WYOMING**

For full history, see Vol. X of this Handbook, published in 1911, as "The Copper Handbook."

In January, 1919 it was announced that Morse Bros. Machinery & Sup-

ply Co. of Denver had purchased from the Bondholders Protective Committee, the entire assets of the Penn-Wyoming, including all the assets of the various subsidiary companies whose bond issues totaled $3,600,000. Production from properties totals 6,414,011 lb. of copper recovered from 59,000 tons of ore equivalent to 5.4% copper.

Property: was the Ferris-Haggerty mine. The aerial tram connecting this mine with the smelter at Encampment 16 miles long, was a costly attempt to solve the transportation problem. An unsuccessful effort was made by the new owners to operate the mines. The smelter and concentrators at Encampment were dismantled and sold. Only production has thus far come from a clean up of dump material.

The geologic features of the district are described by A. C. Spencer, in Professional Paper No. 25, of the U. S. Geological Survey, 1904.

PLATINUM MINING & MILLING CO. **WYOMING**

Merged with Rambler Copper & Platinum Co. into Rambler Consolidated Mines Corporation, which is dead, its property being now owned by the **Iron Blossom Mining Co,**. and operated under lease by the **Electrolytic Copper Co.** Fully described in Vol. XIII.

PLUTO GOLD & COPPER MINING CO. **WYOMING**

Idle. **Office:** 3 Algoma Bldg., Oshkosh, Wis. Mine near Dillon, Carbon county, Wyo. H. Thorsgaard, v. p.; H. O. Granberg, sec.-treas.

Inc. Dec. 15, 1902, in Wyoming. **Cap.** $1,000,000; shares $1 par.

Property: 11 claims, patented, 220 acres, and a 40-acre millsite, in the Battle Lake district, near the Ferris-Haggerty mine, said to show both fissure veins in quartzite and contact deposits between diorite and quartzite, ranging from 2 to 30′ in width, and carrying copper ore, with average assays of 1% copper, a trace of silver and $3 gold per ton.

Development: by numerous pits of 10 to 20′ depth, 5 shafts of 55 to 100′ depth, and a tunnel of 1,004′ with about 2,000′ of underground workings.

Equipment: includes a 40-h. p. steam plant and 3-drill air compressor. Inactive since 1908.

PORTLAND CONSOLIDATED COPPER CO. **WYOMING**

Address: care Myer Newberger, H. W. Hellman Bldg., Los Angeles, Calif.

Officers: Herbert Frankenberger, pres.; Myer Newberger, v. p.; David Sherman, sec.-treas.; with I. S. Robinson and W. H. D'Esterre, directors.

Inc. 1916, in Wyoming. **Cap.** $2,000,000; shares $1 par; 1,378,263 shares outstanding. Security Transfer & Registrar Co., New York, registrar; company office, transfer office. Stock listed on New York Curb.

Property: formerly owned by the West Virginia Wyoming Copper Mining Co. and the Portland Copper Mining Co., comprises 203½ acres, 153¾ acres patented, at Encampment, Carbon county, said to cover over a mile along a mineralized zone of diorite and limestone. The Portland group is reported to be traversed for 1,800′ by a system of veins, which runs westerly into and through the West Virginia Wyoming for 1,800′, veins said to vary from 12″ to 40′ in width, and to average 5% copper and some gold. Minerals are chiefly pyrite, chalcocite, bornite and malachite.

Development: 2,600′ of workings, of which 1,650′ are on the Portland, consisting of an 1,150′ tunnel, drifts and 610′ main shaft. Management estimates ore reserves at 300,000 tons probable smelting ore, containing 2 to 3% copper and 40c gold; and 50,000 tons probable smelting ore, containing 10 to 25% copper and $1 to $6 gold per ton. Further development necessary to prove value of the property.

Closed down awaiting change of conditions in mining industry.

POVERTY MINING CO. **WYOMING**

Address: Laramie, Wyo.

Property: 6 claims, near the head of Sheep creek, on the western flank of the Laramie mountains, at an elevation of 8,000′, and 38 miles by road

from Medicine Bow on the U. P. R. R.

Geology: manganese ore—manganite and pyrolusite—occurs in two beds of chert a few feet apart, from 1 to 8' thick, which are intercalated in beds of pink and maroon limestone and thin sandstone. Ore carries 40% Mn. See Bull. 715-C. (1920) of U. S. G. S., by E. L. Jones, Jr.

Development: by tunnel, 190' drift and 25' shaft.

QUIN "B" MINING CO. **WYOMING**

Inc. 1916, in Arizona. **Cap.** $500,000; $1 par.

Property: 5 claims, 100 acres in Carbon county, Wyo., developed by 275' tunnel and said to show gold-copper bearing ore. A New York broker published a prospectus in 1920 giving a fictitious Baltimore address for the company and also considerable doubtful geological data. The stock was offered at 50¢ a share.

A new brokerage concern at the same address later advertised the Inter-Mountain M. & Dev. Co., as lessees of the Quin B. property.

Both companies look suspiciously like stock-jobbing enterprises of questionable character.

RAMBLER CONSOLIDATED MINES CORPORATION **WYOMING**

A merger of the Rambler Copper & Platinum Co. and Platinum Mining & Milling Co.

Office: 912 Otis Bldg., Chicago, Ill.

Officers: A. A. McKinley, pres.; R. M. Ayres, v. p.; J. W. Runkin, treas., with F. S. Sheldon, J. K. Blist, and J. M. Stager, directors.

Cap. $2,500,000; $1 par; 1,275,000 issued. Bonds authorized, $500,000; entire issue placed in 1919.

Property: the Rambler mine, was acquired in 1919 by Wm. Benton for the Iron Blossom Mng. Co., and is now operated under lease by **Electrolytic Copper Co.**, which see.

Rambler Cons. is presumably dead.

RAMBLER COPPER & PLATINUM CO. **WYOMING**

Fully described in Vol. XIII. Dead. Merged with Platinum M. & M. Co. into Rambler Consolidated Mines Corporation, also dead. See **Iron Blossom Mng. Co.**

RICH CHARTER OAK COPPER CO. **WYOMING**

Address: G. P. Elmen, sec., Lincoln, Neb.

Property: formerly owned by a British corporation, is situated 7 miles N. W. of Encampment, the nearest rail point.

Development: by 7 shafts, deepest 425', and 2,000' of lateral work, said to have exposed copper-gold-silver ore. Main shaft is to be sunk to 1,000'.

Equipment: includes hoist, compressor, assay office, camp buildings, and 60-ton mill.

Resumption of operations planned for summer of 1921.

SHAWNEE COPPER MINING CO. **WYOMING**

Owned by J. M. Bovee, and A. H. Ikenberry, formerly of Shawnee, Okla.

Property: 5 claims, unpatented, in Medicine Bow Mts., French Creek district, Carbon county, Wyo., near New Rambler mine, shows granite and schist cut by a fissure zone 200' wide, carrying $4.10 gold ore.

Development: by 160' and 210' shafts. Examinations have been made by H. C. Beeler, J. J. Hinton, and other engineers. Ample assessment work is done each year.

SNAKE RIVER CONSOLIDATED MINING CO. **WYOMING**

Offices: 401 Jacobson Bldg., Denver; and Columbine, Routt Co., Colo.

Officers: L. A. Pease, pres., treas. and gen. mgr.; M. M. Belshe, sec.

Inc. April, 1906, in Wyoming. **Cap.** $5,000,000; $1 par; 3,400,000 issued. Annual meeting, first Wednesday in July.

Property: 13 lode claims, 2 patented, 180 acres, and 520 acres of placer claims, unpatented, in Three Forks district, 24 miles S. W. of Encampment, the nearest rail point.

Geology: claims show granite and diorite, reported by management to have veins carrying auriferous galena, with strike of N. 25° W., and cross veins carrying copper striking at nearly right angles, the galena vein system having an extreme width of 77', with length of 4,500', the paystreak varying from 10" to 54" in width. The galena ore is said to average 10% lead, free from zinc, with 12-20 oz. silver and $2 gold. The copper veins are undeveloped, but show a variety of oxidized ores at surface.

Development: by pits and shafts, and numerous short tunnels, from 30 to 500' in length, nearly all openings showing ore. The management estimates 5,000 tons of ore blocked out for stoping. Plan raising necessary funds for proper equipment and small concentrating plant. Annual assessment work being done.

SUNRISE MINE — **WYOMING**

Address: Colorado Fuel & Iron Co., Denver, Colo.

Mine in Platte county, is a large producer of iron ore, in which copper also occurs.

UNITED SMELTERS, RAILWAY & COPPER CO. — **WYOMING**

Dead. The property claimed by company is described under the title of the Penn-Wyoming Copper Co., which apparently was the legal owner, and full particulars regarding the entire chain of rotten promotions, including this company, are given in Vol. X, Copper Handbook, under Penn-Wyoming Copper Co.

Judgment against company for $2,500,000 was secured by Continental & Commercial Trust & Savings Bank, Chicago, December, 1913. Bank had loaned money to company taking a mortgage on the property. Several years of litigation were thus ended and the properties of the United Sm., R'y. & C. Co. and its subsidiaries were sold at forced sale, being bought in by the bank.

On January 1, 1919, the property was purchased by the Morse Bros. Machinery Co. of Denver, who will build a mill for the treatment of the old smelter slag dump.

UTOPIA MINING & MILLING CO. — **WYOMING**

Address: Centennial, Wyo.

Officers: Lee Van Voorhis, pres.; Jas. McCune, v. p.; P. L. Loltum, sec.; Bernards Loltum, gen. mgr.

Inc. 1898, in Wyoming. **Cap.** $1,000,000; shares $1 par; non-assessable; issued, $875,000. Annual meeting, third Tuesday in August.

Property: 2 claims, 30 acres, unpatented, in the Centennial district, Albany county, shows contact veins between diorite and schist, one of which, averaging 5' in width, is reported to have given assays of 3% copper, 4 to 20% zinc, up to 63 oz. silver and $44 gold per ton. Ore averages $15 per ton.

Development: by tunnels of 250', 600', 175', 300', and 1,200', with about 2,600' of workings, all showing ore.

Equipment: includes a small electric installation, with electric drill, and 6 buildings. Leased in 1915 to the **Gould Milling & Leasing Co.** A 50-ton mill costing $20,000 was to be remodeled, and mine and mill operated by lessees, at last report.

WESTERN SULPHUR CO. — **WYOMING**

Address: Douglas, Wyo.

Officers: W. F. Cox, pres.; G. W. Metcalf, v. p.; C. D. Zimmerman, sec.-treas.; with P. I. Rothwell, directors. H. C. Austin, supt.

Inc. in Wyoming. **Cap.** $15,000,000.

Property: 430 acres at Thermopolis, Hot Springs county, Wyo. Examined by Chauvenet of St. Louis and McClave of Denver.

Sulphur occurs disseminated through altered limestone, that carries from 60 to 99.7% S. Mining is to be by steam shovels. Diamond drilling under way at last report. Idle, 1921. A spur line is contemplated, also a refinery.

WILLIAMS LUMAN MINING CO. **WYOMING**

Address: care W. J. Thom, cashier First Nat'l Bank, Buffalo, Wyo. **Mine office:** Depass, Wyo. L. R. Vanhouten, pres.

Inc. May 2, 1918, in Wyoming. **Cap.** $2,500,000; $1 par; issued 2,385,000 shares.

Property: 9 claims, patented, 130 acres, 16 miles from a railway, in the Copper Mountain district, Fremont county, shows 8 fissure veins in granite, diorite, and altered schist. The main vein zone, 50-60′ wide, traceable 3,400′, in much altered, crushed and fissured diorite, has a 2′ paystreak carrying free gold, and native copper in thin sheets and nuggets, ore minerals being cuprite, melaconite, malachite and chalcocite. Ore is reported to assay 10% copper, 5 to 10 oz. silver, and $2 to $8 gold per ton.

In 1918, company bonded the McGrath claims from D. I. Darr, of Basin, Wyo.

Development: by an 820′ shaft, showing sulphides on the 800′ level, with 2,000′ of workings. There also are tunnels of 513′ and 300′.

Equipment: includes an 80-h. p. gasoline plant, with a 15-h. p. hoist and a 2-drill compressor. A concentrator was erected in 1918.

The company is operated as a close corporation, money for development having been furnished by a few shareholders only.

WINONA GOLD-COPPER MINING & MILLING CO. **WYOMING**

Office: 111 Market Ave., S. Canton, Ohio. **Mine office:** Painter, Big Horn county, Wyo.

Officers: L. Cavanah, pres. and gen. mgr.; Geo. House, v. p.; Dr. J. H. East, 2nd v. p.; Wm. H. McAloney, sec.-treas., at last accounts.

Inc. 1903, in Wyoming. **Cap.** $5,000,000; shares $1 par; fully paid. Management was changed and company practically reorganized, December 12, 1905.

Property: 25 claims, unpatented, 440 acres, in Park County, the Sunlight basin, about 12 miles E. of the Yellowstone National Park. Claims show 6 fissure veins in granite, porphyry and andesitic breccia, carrying shoots of low-grade copper ore, reported to average 7 to 8% copper with about $3 gold per ton. The Bluff, Malachite and Greenhorn veins are in andesite. The Bluff, 25′ wide, with a 12′ paystreak of low-grade copper ore, 1½′ wide at surface, increasing with depth.

Development: by two tunnels, the lower or main working tunnel, 804′ long. Total workings, 1,032′. **Equipment:** includes steam and electric power plants and 10 buildings. No recent returns; presumably inactive.

WYOMING COPPER & GOLD MINING CO. **WYOMING**

Office: Alma, Kan. C. B. Henderson, pres.; Al Rohr, v. p.; J. R. Henderson, sec.-treas.

Inc. Sept. 3, 1903, in Arizona. **Cap.** $1,500,000; shares $1 par; non-assessable.

Property: 9 claims, of the Metal Chief and Jessie group, in Hog Park, in the upper Platte district, 12 miles from a railway, show granite and gneiss, cut by 2 fissure veins with S.-E. strike, reported by management to average 28 to 35′ in width, and to carry copper oxide and carbonate ores, with average assay of 3 to 15% copper, a little silver and $1.63 to $3.29 gold per ton.

Development: 105′ Metal Chief shaft and the 175′ Jessie shaft, which shows 5 to 10% copper tenor with small gold and silver values.

Equipment: includes a small steam plant with a hoist, steam pump, and 3 buildings.

No recent returns; presumably idle.

WYOMING COPPER MINING CO. **WYOMING**

Idle. **Office:** 303 Detroit Free Press Bldg., Detroit, Mich. **Mine office:** South Pass City, Wyo.

Officers: Charles K. Skinner, pres.; C. F. Remington, treas.; Jas. MacFarlane, v. p. and supt.; C. A. Spalding, sec., with Chas. F. Murphy, and Chas. D. Ridgway, directors.

Inc. 1905, in Wyoming. **Cap.** $2,000,000; $1 par; issued 1,375,000; 135,500 shares sold for $16 the lot at public auction in New York on Dec. 22, 1920.

Property: 12 quartz claims, 240 acres, and a 30-acre placer claim, in Fremont county, in South Pass district of Wind River mountains. Claims show a contact zone between granite and metamorphic rock, proven by prospect pits for one-half mile.

Development: 500′ incline shaft, and several hundred feet of crosscutting. The vein is reported to show sulphide ore at depth of 72′, that runs 2 to 6% copper, with an average of 1 to 2 oz., and maximum of 20 oz. silver, and $3 to $4 gold per ton.

Equipment: includes an 80-h. p. boiler and a 40-h. p. hoist, with several buildings.

CANADA

The mining companies of Canada are arranged alphabetically by provinces:—Cobalt, Porcupine, etc., are therefore, described under Ontario. The Pas district, the new copper district of Canada is in Manitoba and the great number of mineral properties of the Pacific Coast region are described in the British Columbia section.

Newfoundland being an independent Crown Colony is in a separate section.

ALBERTA

ATHABASCA MINING CO.

Inc. in Alberta, Can., April, 1914. **Cap.** $1,000,000. Hon. G. H. V. Bulyea, Gov. of Alberta, Hon. Chas. R. Mitchell, E. J. Taylor and C. L. Freemann, directors, all of Edmonton.

Property: assets and properties of the Athabasca Mng. Syn. consisting of 800 acres of nickel claims, 160 acres iron claims, on and near Lake Athabasca, near Edmonton, Alberta, Canada. Assays of surface samples showed 1½ to 5% nickel, iron samples ran 66.7% iron, 2.12% silica, .014% phosphorus and .013% sulphur. Copper occurs as bornite.

BRITISH COLUMBIA

The mining companies of this province are arranged alphabetically. Readers interested in British Columbia mines should consult the yearly reports of the Provincial Mineralogist, issued as Annual Report of the Minister of Mines, obtainable free from the Minister of Mines, Victoria, B. C.

A. B. C. METALS CO. BRITISH COLUMBIA

See **Alaska British Columbia Metals Co.**

ABERDEEN MINES SYNDICATE BRITISH COLUMBIA

Address: 1411 Broadway, W., Victoria, B. C., or Neil MacKay, mgr., Merritt, B. C.

Property: Aberdeen group, on Brown creek, Nicola division, Yale district. Ore is copper-gold-silver.

ALAMO CONCENTRATOR BRITISH COLUMBIA

Located at Alamo, on the Kaslo-Nakusp Ry. Owned by Clarence Cunningham, and built by General Engineering Co., of Salt Lake City. Mill has a daily capacity of 150 tons and was built to treat ore from the Queen Bess, Wonderful Sovereign, and Idaho-Alamo mines, operated by Cunningham. Power is obtained from a 225-h. p. Pelton wheel. Mill started operating about August, 1, 1919.

ALASKA BRITISH COL. METALS CO. BRITISH COLUMBIA

Office: Alaska Bldg., Seattle, Wash. **Eastern office:** 135 Broadway, New York.

Officers: S. I. Silverman, pres.-mgr.; C. S. Cohen, v. p.; H. H. Hanson,

treas.; with H. M. Keith, W. Smith, I. L. Meyers and Morris D. Leehey, directors. N. W. Parker, sec.

Inc. 1916, in Washington. **Cap.** $3,500,000; increased from $2,500,000, July, 1921, in 2,500,000 common and 1,000,000 pfd. shares. All common stock is issued and $300,000 in bonds. Par value increased from $1 to $10 and stock exchanged on that basis. Preferred stock offered stockholders at $8.50 per share. U. S. Corporation Co., New York, transfer agent and registrar. Stock listed on New York Curb. Quoted at $2 in 1920; 29c. in Aug., and $3¾ ($10 shares) in Nov., 1921.

Corporation is a holding company whose chief interests are in the Dewdney, or Indian Chief, mine of the **Tidewater Copper Co.**, and in the **Forty Nine Mining Co., Ltd.** (which see). Also controls the Stikine Mining Co. and the Glenora Mining Co., both idle.

ALASKA MINING CO. **BRITISH COLUMBIA**

Address: Jos. P. Kelly, lessee, 1126 Riverside Ave., Spokane, Wash. **Mine address:** Beaverdell, B. C.

Property: the Buster claim in Wallace Mtn. section, Greenwood division, shows a vein up to 3′ wide carrying quartz-sericite ore with lead, zinc and copper minerals. One shipment assayed 81 oz. silver, 3.1% lead and 11.2% zinc.

ALGUNICAN DEVELOPMENT CO., LTD. **BRITISH COLUMBIA**

Office: Monadnock Bldg., San Francisco, Calif.

Mine address: W. A. Meloche, mgr., Stewart, B. C.

A Belgian corporation with head office at 16 Rue de Turin, Brussels. Jean Vanophem, pres.

Property: a bond on the Cobalt group of 3 claims, the Northern Light group of 10 claims, the Spider group of 3 claims, the Fitzgerald group, and the Woodbine group of 2 claims, all in the Salmon River section, Portland Canal division. Some high-grade silver ore was reported opened on the Spider claims, and on the Woodbine, milling ore 100′ long and 70′ wide.

Development: by tunneling and diamond-drilling.

Equipment: oil engine, compressor and camp. Work was discontinued in 1921 owing to lack of necessary capital.

Company also controls the **Jualin Alaska Mines Co.**, in Alaska.

ALICE ARM HOLDINGS CO. **BRITISH COLUMBIA**

Address: 614 Pender St., Vancouver, B. C. **Mine address:** Alice Arm, B. C. P. N. Anderson, mgr.

P. W. Racey, cons. engr., 717 Vancouver Blk., Vancouver, B. C.

Property: Bellevue mine in Illiance river section, Skeena division, said to contain an orebody 40′ wide and traceable for 3,500′. Pay ore occurs in small, rich stringers of galena and zinc blende with high gold and silver content.

The provincial government is completing a trail along the Illiance river to the mine.

ALICE ARM LA ROSE MINING CO., LTD. **BRITISH COLUMBIA**

Address: Prince Rupert, B. C. **Mine address:** Miles G. Donald, mgr., Alice Arm, B. C.

Property: La Rose mine, 2 claims in the Nass River division, 2 miles N. of Alice Arm and 2 miles from the Dolly Varden railway. The vein is quartz, carrying blende, galena, pyrite, grey copper, argentite, and native silver.

Development: by 125′ tunnel and shallow shaft. A shipment of 22 tons early in 1920, yielded 3 oz. gold, and 6,157 oz. silver at the Trail Smelter. The property is worthy of extensive exploration.

ALICE ARM SILVER MINING CO. **BRITISH COLUMBIA**

Address: James McAleenan, mgr., Alice Arm, B. C.

Property: the North Star claim, adjoining the Dolly Varden on the N., in Kitsault river section, Nass River division. Some tunneling was done during 1919, exposing 4′ of good ore, showing ruby and native silver.

Production: in 1919, was 27 tons of ore containing 968 oz. silver.

AMERICAN BOY MINING CO. **BRITISH COLUMBIA**

Stockholders, 1918, Maurice Oppenheimer, A. W. Siegel, Sam Hammer, and N. E. McCall, of Spokane, and C. D. Bibbins, Oakland, Calif. Reported in 1918 that Chas. F. Caldwell and Eastern associates had taken a 3-year lease and bond on property of the company for $100,000. Mine had been idle for 10 years.

Cap. $1,500,000; par $1.

Property: 4 claims, adjoining the Last Chance, on Reco Mountain, near Sandon, Slocan district, said to show silver-lead ore. There are several thousand feet of workings; considerable ore was shipped when the property was operating.

ANDERSON LAKE MNG. & MLG. CO. **BRITISH COLUMBIA**

Address: S. Gibbs, sec., Lillooet, B. C.

Property: Skeena-Yukon group, 2 claims, at Anderson Lake, Lillooet division. Ore carries gold. Except that required by assessments, but little work has been done.

ARGO MINING & TUNNEL CO., LTD. **BRITISH COLUMBIA**

Address: Box 54, Greenwood, B. C.

Officers: Ole Lofstad, pres. and gen. mgr.; A. S. Black, sec.-treas.; with John Williamson, Jerome McConnell and Oscar Hartman, directors.

Inc. June 10, 1909, in British Columbia. **Cap.** $125,000; shares 25¢ par.

Property: the Argo mine, near the Greenwood smelter, developed by 1,150′ tunnel, at a vertical depth of 500′, with portal about 500′ from track of the Canadian P. Ry. A vein of milling quartz, 10′ wide, contains a 4′ band of concentrating ore. Idle 1919 and 1920.

ASHCROFT COPPER CO., LTD. **BRITISH COLUMBIA**

Address: 610 Hutton Bldg., Spokane, Wash. **Mine address:** Ashcroft, B. C.

Officers: Frederic Keffer, pres.; J. C. Haas, v. p.; E. H. Knight, treas.; with S. Dilsheimer and C. W. Alders, directors. Chas. G. Hall, sec.

Inc. 1921, in Washington, to take over the holdings of the Highland Valley M. & D. Co. **Cap.** $150,000; 10¢ par; assessable; 1,288,872 shares of the old company outstanding will be replaced by equal number of new shares. Assessment of 1¢ per share levied September, 1921. Bonds outstanding, $60,000, 7%.

Property: the Chataway and Sanson, or Tamarac, groups, 15 claims, about 600 acres, 28 miles S. E. from Ashcroft, a station on the C. P. R. Company paid $50,000 for the Chataway group and has the Sanson group of 11 claims under bond.

Copper ore with small silver and gold values occurs in a contact vein between granite and quartz-feldspar porphyry. Vein is from 3 to 17′ in width, and an orebody has been opened by a drift for 400′. Ore carries chalcopyrite in a micaceous gangue. Average assays are 5% copper, with about 25c. in gold and silver.

Development: by 500′ tunnel and shaft to depth of 195′. Total work amounts to 1,700′ of drifts and tunnels, with 400′ raises and stopes. Reserves comprise about 8,000 tons above the lower level, where 100′ of drifting is in 5 to 6% ore. Development done in 1920 proved the ore to extend to lower, or 195′ level, retaining its average width and grade with unchanged character.

Equipment: includes 1,000′ tramway and 50-ton mill using flotation and making a 90% extraction.

Production: in 1917, 48 carloads of concentrate and 4 of crude ore netting $106,584 at smelter.

The mine has been idle since 1918, save for development operations. Additional funds are necessary to clear remaining indebtedness and provide funds for further development and enlargement of mill; should this development prove satisfactory, better transportation will also be provided.

ASPEN GROVE AMAL. MINES, LTD. **BRITISH COLUMBIA**

Address: Merritt, B. C.

Officers: J. E. Bate, pres.; M. L. Grimmett, v. p.; M. R. Durland, sec.-treas., with Jos. Walters, and J. J. Gillis, directors.

Inc. in British Columbia. **Cap.** $1,000,000; par $1.

Property: 75 claims, in Aspen Grove district, Nicola mining division, which show low-grade copper ore. At last report property was under bond and lease to Jas. Errington and associates, and was being explored by drilling.

AUFEAS MINES, LTD. **BRITISH COLUMBIA**

Dead. Formerly at Hope, B. C. See Vol. XII.

BABINE BONANZA M. & M. CO. **BRITISH COLUMBIA**

Mine address: New Hazelton, B. C.

Officers: Jas. Cronin, pres., 924 S. Maple St., Spokane; Chas. Theis, v. p., with Wm. Huntley, J. F. Cronin, all of Spokane, Wash., and A. H. MacNeal, Vancouver, directors.

Property: a group of claims, 300 acres, at the head of the Tuchi river in the Babine range, Omineca division, 22 miles by trail from Smithers, on the Grand Trunk Pac. R. R. Orebodies occur on contact of granite porphyry and altered sediments, and in fissure veins, 1 to 3′ wide, in the porphyry. Average assays show 20 to 60 oz. silver, 11 to 56% lead, 10 to 34% zinc. A large tonnage is reported to be available for a mill.

Development: several tunnels, longest 400′, and shafts, deepest 105′. A 1,000′ crosscut tunnel started in 1920, had in October reached a 12′ vein containing high grade ore.

A promising prospect, but handicapped by its remoteness.

BANNOCKBURN MINES, LTD. **BRITISH COLUMBIA**

Address: A. W. B. Allen, sec., 1138 Burdette Ave., Victoria B. C. **Mine address:** Kaslo, B. C.

Property: Bannockburn mine on Hall creek, Ainsworth division, W. Kootenay district, covers a limestone-schist contact showing silver-lead ore. Developed by tunnel.

BARAMBA MINING CO., LTD. **BRITISH COLUMBIA**

Address: C. J. West, sec., Capilano, North Vancouver, B. C. **Mine address:** Hotham Sound, B. C.

Property: the Baramba mine on Hotham sound, Vancouver division, has been developed by 2 tunnels, 90 and 150′, said to show a 6′ vein assaying 4% copper.

BAYONNE GOLD MINING CO. **BRITISH COLUMBIA**

Address: Bert N. Sharp, 317 Cleveland St., Spokane, Wash.

Property: Bayonne mine, W. of Sheep Creek, in Nelson division, reopened in October, 1921.

B. C. EXPLORATION CO. **BRITISH COLUMBIA**

Address: Northwest Bldg., Vancouver, B. C. **Mine address:** K. D. Woodworth, Pacific, B. C.

Property: the Independence group of 3 claims in Legate creek section of Omineca division, under bond and lease. Claims show a well defined shear zone in andesite with a 10′ vein. The ore is andesitic rock and quartz carrying chalcopyrite, pyrite and arsenopyrite. Developed by shallow workings, and drilling performed in 1920.

B. C. SILVER MINES, LTD. **BRITISH COLUMBIA**

Was financed and controlled by British Canadian Silver Corporation, Ltd., but in Feb. 1922, control is said to have passed to Premier Gold Mng. Co., Ltd.

Reg. office: 612 Pacific Bldg., Hastings St., W. Vancouver, B. C. **Mine office:** Stewart, B. C.

Directors: Chas. A. Banks, pres.; H. L. Hunt, H. A. Gould, G. Mahood, H. J. Bush and N. Burdick.

Inc. Oct. 3, 1919. **Cap.** $1,500,000; $1 par.

Property: 17 Crown-granted claims in 2 groups, adjoining Premier mines on N. & S., in Salmon River section, Portland Canal division, Cassiar district, about 14 miles from Stewart.

Development: recently confined to surface trenching and diamond drilling.

BELMONT-CANADIAN MINES, LTD. **BRITISH COLUMBIA**

Described in Vol. XIII. Property taken over by **Belmont Surf Inlet Mines, Ltd.**, which see.

BELMONT SURF INLET MINES, LTD. **BRITISH COLUMBIA**

Office: 500 Bullitt Bldg., Philadelphia, Pa. Operating office: Surf Inlet, B. C.

Officers: C. A. Heller, pres.; W. M. Potts, v. p.; C. B. Taylor, gen. counsel, with E. A. Cleveland, M. B. Cutter, J. C. Fraley, Geo. Tyler and T. W. Synnot, directors. J. K. Kitto, sec.-treas.; B. G. Hawkins, asst. sec.; C. Ducheneau, comptroller. Frederick Bradshaw, gen. mgr.-supt.; G. H. Garrey, cons. geologist; C. P. Seale, mine supt.; F. H. Penn, supt.; E. W. Hawkins, auditor.

Inc. in British Columbia. **Cap.** $2,500,000; shares, $1 par. Inc. by the Tonopah Belmont Development Co., of Nevada, to take over property of **Belmont-Canadian Mines, Ltd.**, and **Surf Inlet Power Co.**, two British Columbian corporations, owned by the Tonopah Belmont, which controlled the mine during the construction period. The mother company owns 80% of the total capital and 20% is held by the Surf Inlet Mines. Up to the end of 1918, the Tonopah Belmont Co. had spent $1,294,706 on this property, a sum which has since been repaid by Belmont Surf Inlet.

Balance sheet for Dec. 31, 1920, shows total assets, $2,822,091, including property and equipment, $2,187,313; Surf Inlet Power Co. investment, $200,000; deferred account, $43,808; current assets and supplies, $169,393; concentrates on hand, $26,069; ore stock on hand, $11,868; accounts receivable, $83,841; cash $99,796. Liabilities include current, $52,910; reserve for tax, $16,844; total surplus $252,336. Income account showed $866,929 from operations; miscellaneous income, $68,248; operating expense, $603,885; net income, $212,103; depreciation, $16,844; balance to surplus, $195,258.

Dividends: initial of 5 cents a share, equal to $125,000, was paid in April, 1919; total in 1919, $250,000; in 1920, $250,000; in 1921, $125,000.

Property: 9 claims, including some of the oldest locations in the Coast section of Skeena division, 6 miles from the head of Surf Inlet, Princess Royal Island, B. C. The company is developing the Pugsley mine under a working option and expended $39,794 on the property to end of 1920.

Geology: a quartz vein lies in two well-defined shear-zones in gneissoid granite, the main fracture, in which the main tunnel was driven, splitting into the two, 300′ S. of the quartz bodies. They occur in lenticular bodies, varying in width up to 40′, and averaging 10′. The ore is a pyritized quartz carrying gold, silver and copper.

Development: by the present company totals about 27,500′ to the end of 1920, on 9 levels, all through tunnels. The winze below the main haulage-level is now a fully equipped three-compartment shaft with electric hoist, etc.

On January 1, 1921, reserves were reported as 234,327 tons, compared with 489,258 tons, Jan. 1, 1920.

Equipment: is very complete, including 750 k. w. hydro-electric plant, 5.65-mile transmission-line, compressors, machine-drills, conveyor-bridge, and 300-ton mill (started Sept., 1917), containing ball-mills, concentrators, and flotation machines. Concentrate is sent to smelter. A modern township has been provided and dwellings erected for employees.

Production:

	Tons	Gold, oz.	Silver, oz.	Copper, %	Value per ton	Total realized	Recovery	Cost
1920.....	107,976	0.448	0.206	0.317	$10.61	$1,146,441	91.88	$5.74
1919.....	103,927	0.480	0.284	0.347	11.38	1,183,013	...	5.58
1918.....	83,142	0.481	0.311	0.261	11.12	740,090	93.13	5.012
1917-'18...	33,207	0.501	0.354	0.199	11.11	325,549	92.30	7.131

The 1918 figures are for 10 months, and those for 1917-'18 for 6 months, two broken periods. Mine is now a regular dividend payer.

BIG MISSOURI MINE. **BRITISH COLUMBIA**

Address: Lindeborg Bros., Stewart, B. C. Mine formerly worked under lease and bond by the Pacific Coast Exploration Co., controlled by Sir Donald Mann. Now owned by Daily Mines Co., Ltd., which see.

Property: 20 claims on Cascade creek, in Salmon River section, Portland Canal division, just N. of property of Premier Gold Mining Co., 12 miles N. of Stewart. Claims show low-grade complex ore, opened by a series of open-cuts, which prove the ore for a width of at least 1,000'. Hundreds of samples from the cuts average 60c. in gold, $1.05 in silver, 2.16% lead, 0.5% copper, 5% zinc, 14.3% iron, 75% silica. Later work disclosed bodies of high-grade silver ore that will assay, in places, over $100 per ton in a width of 20'. Diamond drilling, stopped 1919. If further development shows continuation of such a large low-grade orebody, experimental work will doubtless find a method to treat the complex ore. The high-grade ore is an additional asset.

BLACK PRINCE MINE **BRITISH COLUMBIA**

Operated under lease by J. A. Tipping, Slocan City, B. C.

Property: 4 claims in the Slocan City division, 9 miles E. of Slocan, at an elevation of 6,000'. The ore is a fine grained mixture of galena, zinc blende and iron pyrites, with a little grey copper and native silver in a quartz gangue.

Development: by tunnels, crosscuts and drifts. A small shipment of very high grade ore was made in 1919.

BOWENA COPPER MINES, LTD. **BRITISH COLUMBIA**

Office: C. M. Oliver, mng. director, 420 Rogers Bldg., Vancouver, B. C. **Mine office:** Bowen Id., B. C.

Inc. May, 1913, in British Columbia. **Cap.** $300,000; $1 par; outstanding, 287,020. Annual meeting, December 13.

Property: 3 claims, 150 acres, Crown-granted, on the east side of Bowen Island, 12 miles west of Vancouver, said to show disseminated copper ore assaying 1.9% copper and containing gold and silver.

Development: by main drift-adit, 230' long, 50' crosscut, shallow shaft and opencuts.

Equipment: water and steam power, compressor, 100-ton mill, flotation plant, etc.

Property leased, July, 1918, to C. W. Tipping for 5 years, company to receive 40% of net profits. The lease has been transferred to Mine Operators, Ltd. and extended to July 8, 1930. Lessees expect to put property on a producing basis when the copper market improves. Idle in 1920.

BRITANNIA MNG. & SMELTING CO. **BRITISH COLUMBIA**

All stock acquired by the **Howe Sound Co.**, and described thereunder.

BRITISH-ALBERTA MINING CO. **BRITISH COLUMBIA**

Address A. J. Flood, pres., Vulcan, Alberta; W. R. Allen, sec., Nelson, B. C.

Property: St. Patrick group, 4 claims, 6 miles N. of Argenta, at head of Kootenay Lake, Ainsworth mining division. Said to show a 36' vein with lead-silver-zinc ore in streaks 6 to 18" in width. Developed by tunnel and a 90' shaft. A few men employed and small shipments made.

BRITISH-AMERICAN COPPER MNG. & SM. CO. **B. C.**

Probably dead. See Vol. XIV.

BRITISH AMERICAN MNG. CO., LTD. **BRITISH COLUMBIA**

Probably dead. Described in Volume XIV.

BRITISH CANADIAN SILVER CORP'N., LTD. **B. C.**

Address: C. A. Banks, 615 Pender St. W., Vancouver, B. C. **Mine office:** Stewart, B. C.

Directors: R. C. C. Hockley, chm., E. H. Dunning, C. A. C. Wood and C. A. Banks (mng. dir.-cons. engr.). R. E. Bayliss, sec., 19, St. Swithin's Lane, London, E. C. 4, England.

Reported to have acquired from the **Selukwe Gold Mng. & Finance Co.**

(Rhodesia), control in the **B. C. Silver Mines Co., Ltd.** and **Bush Mines, Ltd.** and an interest in the **Salmon Bear River Mng. Co.** (now Premier Gold Mng Co., Ltd.), which see.

Inc. March 26, 1921. **Cap.** £400,000; 5s par; 1,000,007 shares issued; 800,000 shares paid the Selukwe company for the Canadian holdings.

Early in 1922, it was reported that control of B. C. Silver Mines Co. had been transferred to the Premier company.

BRITISH COLUMBIA COPPER CO., LTD. **BRITISH COLUMBIA**

Fully described in Vol. XII. See **Canada Copper Corporation.**

BRITISH COLUMBIA IRON CO., LTD. **BRITISH COLUMBIA**

Address: G. A. M. Young, mgr., Kitchener, B. C.; P. G. Ebbert, sec., Creston, B. C.

Organized in summer of 1919, to develop Great War Group, 40 claims, in Nelson mining division, about 3 miles W. of Kitchener.

Management states that the holdings show a large body of hematite, running from 50 to 60% iron, and that diamond drilling will be done to ascertain its commerical possibilities.

BRITISH COLUMBIA MANGANESE CO. LTD, **B. C.**

Address: C. H. Dickie, pres.; E. J. Miller, sec., Duncan, B. C.

Inc. 1919, in B. C.

Property: the Hill 60 group of 3 claims, staked in 1918, near the summit of a mountain 2,000′ high and 5 miles E. of Cowichan lake, and 4 miles by trail from a branch of the Esquimalt and Nanaimo Ry., Vancouver Island. Deposits of manganese, from 21 to 60″ thick, carrying from 15.88 to 55.46% Mn., occur in a belt of cherty, jasperized rock. Open-cuts have been driven, and in 1919, 530 tons of 50% Mn. and 19% silica ore was sent to the Bibrow Alloys Co. at Tacoma, Washington, to be made into ferro-manganese.

An aerial tramway, 4,750′ long, was completed in 1920, from the mouth of the tunnel to the railroad.

BRITISH COLUMBIA PHOENIX CO., LTD. **BRITISH COLUMBIA**

Described in Vol. XIII. Presumably dead.

BRITISH COLUMBIA SILVER MINES, LTD. **BRITISH COLUMBIA**

See **B. C. Silver Mines, Ltd.**

BUCKEYE MINES CO. **BRITISH COLUMBIA**

Officers: Geo. C. Mercer, pres., Lodi, N. J.; W. C. Dalglish, v. p.; E. L. Larkin, treas.; T. C. Larkin, sec., all of 291 Broadway, New York; J. J. Harris, H. G. Glennon, directors.

Inc. in Delaware. **Cap.** $1,000,000; par $1. U. S. Corporation Co., transfer agent and registrar.

Property: 67 acres in Ainsworth division. Ore is silver-lead-zinc.

Development: two 40′ shafts and 200′ tunnel.

BULLION MINING SYNDICATE **BRITISH COLUMBIA**

R. T. Ward, mgr., Bullion, B. C.

Property: over 1,200 acres, 600 held under a 25-year government lease, 600 acres Crown-granted, in Quesnel section Cariboo division. The property was formerly the largest hydraulic gold mine in British Columbia, but was tied up by litigation for several years, which is said to have been settled in 1919.

In June 1921, 30 men were reported employed driving a 500′ tunnel.

BULLOCK GOLD MINES, LTD. **BRITISH COLUMBIA**

Address: Poplar Creek, B. C. R. H. Graves, mng. director; J. H. Wilson, supt.

Organized in September, 1919.

Property: Bullock mine on Cascade creek, in Lardeau mining division, shows 9 veins carrying free milling gold. Also claims in the Ainsworth division, including the Kelly Telluride group; on the latter a narrow quartz vein carries high gold values. All holdings are near Poplar Creek.

Development: by 400′ crosscut and shaft to depth of 300′.

Equipment: 10 ton mill, compressor and drills.

BURNIERE NELSON GOLD MINES, LTD. BRITISH COLUMBIA

Address 314 Meridian Life Bldg., Indianapolis, Ind. J. A. Darragh, mgr., Camborne, B. C.

Property: the Burniere and Nelson claims, on Scott creek, Lardeau division, W. Kootenay district.

BUSH MINE **BRITISH COLUMBIA**

See **Premier Gold Mining Co.**

BUSH MINES, LTD. **BRITISH COLUMBIA**

Address: O. B. Bush, pres., Vancouver, B. C. M. D. Leehey, sec., 620 Alaska Bldg., Seattle, Wash. H. Tanner, supt., Stewart, B. C.

Inc. in 1919. **Cap.** $1,000,000; $1 par.

Property: 6 claims just N. E. of the Premier silver mine, N. of Stewart in Salmon River section. Portland Canal division.

Development: by open-cuts, 2 short tunnels and crosscuts. Developing with a small force.

Reported to be under control of British Canadian Silver Corp.

BUTTE & ROCHER DE BOULE COPPER CO. BRITISH COLUMBIA

Company controlled by **Delta Copper Co.,** which see.

Officers at last accounts: Samuel McConnell, pres.; C. J. Stone, v. p.; J. W. McLane, sec.-treas., with Paul Ozanne and P. J. Jennings, directors.

Inc. 1912, in Arizona. **Cap.** $1,000,000; $1 par; fully issued.

Property: the Highland Boy group adjoining, but 1,000′ above the Rocher de Boule mine and covering 400 acres on Juniper Basin, Rocher de Boule mountain, Omineca mining division, 3 miles from New Hazelton and 4 miles from the Grand Trunk railroad. Claims show the extension of the Rocher de Boule veins, 2 of which have been opened by tunnels and open cuts. Ore occurs in fissure veins following intrusive dikes of porphyry in granite. Samples from veins 18″ to 5′ wide, assayed from 1.5% to 5.7% copper; with 0.5 to 0.8 oz. silver and slight gold values.

Property considered promising and worthy of further development.

CALIFORNIA-CARIBOO GOLD DREDGING CO. **B. C.**

Address: 401 Markwell Bldg., Long Beach, Calif. **Mine address:** Quesnel, B. C.

Officers: E. L. Pilling, pres.-mgr.; J. E Platt, treas.; H. H. Paul, sec.; W. W. Wishon, engr.

Inc. in California.

Company reported to own dredging rights on the lower Cottonwood river, Quesnel section Cariboo division.

CALIFORNIA MINING CO., LTD. **BRITISH COLUMBIA**

Head office: Nelson, B. C.

Officers: J. R. Cassin, pres., 431 Exchange Bank Bldg., Spokane, Wash.; W. R. Orndorff, sec.-treas.; W. H. Turner, mgr.

Cap. $400,000; shares 20c.

Property: California, Exchequer and Athabasca groups, 13 claims, 650 acres on Bird creek, 3 miles S. of Nelson, shows a strong quartz-filled fissure in schist near granite. The first named group was acquired from the Record Mng Co.

Development: to depth of 500′ by tunnels, No. 3, 1,200′ long, is 170′ vertically below No. 2, which is 627′ long. It followed a barren vein for 1,200; then cut the California vein, which is from 3 to 5′ wide. Ore is said to average $17 per ton. On No. 2, the vein has been followed for 200′. Five cars of ore assayed from $17 to $26 gold per ton.

Equipment: 50-ton mill and flotation plant.

CANADA COPPER CORPORATION, LTD. BRITISH COLUMBIA

Office: 42 Broadway, New York. **Mine office:** Allenby, B. C.

Officers: August Heckscher, chm.; L. W. Mayer, pres.; A. J. Ronaghan, v. p.; with Allen H. Rogers (cons. engr.), C. I. Stralem, E. L. Gruver, Newman Erb, Colgate Hoyt, directors. R. H. Eggleston, sec.-treas.; H. R.

Van Wagenen, gen. mgr.; and F. S. Norcross, Jr., supt. of mines, British Columbia.

Inc. Nov. 15, 1920, in Canada. **Cap.** $10,000,000; $5 par; increased August, 1917, from $5,000,000; outstanding 1,088,209 shares. **Funded debt:** $2,500,000 1st sinking fund convertible gold 6s dated January 1, 1918, due January 1, 1928. Convertible any time into stock at $3 a share. A sinking fund of 15c. per dry ton of ore, not less than $150,000, shall be paid each year to the Trustee.

Debentures: $710,000 five year 6% gold debentures issued October 1, 1919, subject to call at $105 and interest, and offered stockholders pro rata at par with a bonus of 100% par value of stock to provide funds to complete and start plant.

Equitable Trust Co., New York, transfer agent. Empire Trust Co., New York, registrar. Stock listed on N. Y. Curb. Annual meeting, 3rd Friday in April.

Company is a reorganization of a Virginia Corporation of some name (See Mines Handbook 1920).

Under the plan and agreement of readjustment, dated July 1, 1920, there were issued 1,088,209 shares of stock. Stockholders paying 50 cents a share exchanged their stock on an even basis for new shares, while those not paying this assessment received one share of new stock for every three shares deposited before Sept. 1, 1920.

Comparative Balance Sheet, years ending December 31:

Assets

	1918	1919
Properties	$6,059,323	$7,986,203
Equipment for future delivery at contract prices	258,920	74,380
Metal & Smel. Products, Supplies, etc	346,054	257,849
Copper on hand and in transit	106,309	.....
Insurance, taxes, etc	22,098	31,681
Investments	211,539	29,767
Cash	542,906	257,841
Profit and loss	229,864	280,677
Total	$7,777,073	$8,918,398

Liabilities.

	1918	1919
Capital stock	$4,729,295	$5,441,045
Bonds—10-yr., 6% accrued interest	2,575,000	2,510,650
6% debentures	.....	710,000
Liberty Bonds—deferred installments	45,361	73,681
Equipment contracts	209,578	171,404
Accounts payable	203,811	11,618
Reserve for sundry Liab	14,028	.....
Total	$7,777,073	$8,918,398

Dividends: $615,399 paid prior to 1913; none since.

Property: the company acquired (in 1917) the property of the British Columbia Copper Co., Ltd., consisting of 1,250 acres, partly owned in fee and partly under option, located at Greenwood, B. C., and in the State of Washington, comprising the Mother Lode, Wellington Camp, Oro Denoro, Napoleon, Queen Victoria, Lone Star and Washington mines; property near Nelson, B. C., and a group of claims comprising 3,000 acres of mineral and other land in the vicinity of Copper Mountain, 9½ miles from Princeton, B. C., known as the Copper Mountain Group. The company owns certain claims on Kennedy Mountain, and others are under option. Company also owns $813,180 capital stock and $329,642 bonds of the New Dominion Copper Co., Ltd. (see appended statement).

The company smelter at Greenwood, B. C., was permanently shut down November 26, 1918, owing to depletion of ore reserves, and low grade of remaining ores in that district, and in 1920 was offered for sale. The Boundary creek properties are described in Vol. XIII.

Copper Mountain Properties:

The company's future depends on the newer and larger holdings of 3,006 acres of mineral and other land at or near Copper Mountain, British Columbia, 9.5 miles due south of Princeton, British Columbia, and 182 miles by rail east of Vancouver. A 13-mile branch of the Kettle Valley R. R. connects Princeton and Copper Mountain.

Geology: Copper mountain consists of monzonite-porphyry and granodiorite, intruded by a system of light-colored porphyry dikes.

The ore consists of finely disseminated chalcopyrite, bornite and pyrite in altered porphyry and granodiorite the ore carrying recoverable values in gold and silver.

Development: property has been developed in a systematic manner by a large amount of diamond drilling and underground work. Over 118,500′ of diamond drilling, 31,738′ of surface trenching, 18,000′ of drifting, 15,000′ of of raising, and 900′ of sinking has been done to block out ore. Ore is taken out through the 2,900′ main haulage tunnel. There is a difference in elevation of 800′ between this tunnel and the next nearest workings; a 2-compartment hoistway, and a zigzag ore pass connecting the tunnels.

All ore thus far developed occurs above the level of the Similkameen River which passes along the base of Copper Mountain at an elevation of approximately 2,500′. Underground work 1919-21 consisted of timbering the main shaft and stations; enlarging haulage levels and timbering; completion of main ore pass from surface to 4,073′ level; constructing dumping stations and loading chutes; raising and drifting.

Ore reserves: estimated at 10,000,000 tons of developed ore and 2,000,000 tons of probable ore, having an assay value of 1.74% copper, and approximately 35c. per ton in gold and silver. Careful geological study suggests the possibility of eventually doubling the present tonage of assured ore. Company in addition owns several other promising prospects in the locality.

The average grade of ore has been determined from bulk samples drawn from the underground workings, and these areas have been thoroughly checked both by drill and groove sampling.

Treatment of ore: a 40-ton flotation test mill erected at the property has given very satisfactory results. Since there is a marked absence of oxidized material in the ores, a recovery of 90% of the copper is expected in regular operations; actual savings very close to this figure on extended experimental runs have already been obtained. Concentrates assaying 25% copper were maintained with a concentration ratio of approximately 17 into 1.

For the purpose of estimating earnings, a recovery of 27.4 lb. of copper per ton of ore was assumed after allowing for a certain amount of dilution by waste rock. As the wall rock is generally light colored dike material, the ore admits of clean mining.

The cost of producing copper is estimated at 9½c. per lb. when operating on a basis of 3,000 tons per day. Approximately one-half of the present ore reserves will be extracted by open-cast mining methods, and all of the ore will be drawn from the mines by means of tunnels.

Equipment: includes compressors, head-frame, hoist, concrete powder magazine, machine shops, telephone system, primary crushing plant, conveyors, surface tramways, pumping plant on Similkameen river, water lines for industrial, domestic and fire purposes, 400 h. p. steam heating plant, assay office, laundry, dwellings; dining hall, etc. Power is furnished by the West Kootenay Power & Light Co., which constructed a 100-mile transmission-line under a contract to supply 5,000 h. p.

Reduction Works—Company owns a mill at Allenby, B. C., capable of

reating 3,000 tons of ore per day. Construction was completed in 1919, but considerable delay resulted in starting the operations at company's properties in the Princeton district, due to labor difficulties among the forces of the Kettle Valley Ry. This plant began operations on Oct. 18, 1920, but was shut down on Dec. 12, 1920, owing to the low price of copper. At the time of the shut-down 1,200 tons of ore were being treated daily.

Production:

Year	Gold, Oz.	Silver, Oz.	Fine Copper, Lb.	Year	Gold, Oz.	Silver, Oz.	Fine Copper, Lb.
1905....	26,226	95,410	5,601,309	1912....	25,863	142,025	11,146,811
1906....	20,238	82,193	5,820,651	1913....	26,640	137,052	8,296,902
1907....	24,967	101,114	8,643,133	1914*...	14,442	63,501	4,110,190
1908....	13,597	58,204	5,567,355	1915....	5,417	23,002	1,734,385
1909....	18,244	64,234	6,325,000	1916....	12,366	49,928	5,196,239
1910....	24,962	84,180	7,143,456	1917....	9,592	46,356	4,247,316
1911....	31,144	134,266	9,944,987	1918....	12,663	60,495	2,813,993

* January 1 to August 23.

In 1916, mine produced 5,196,000 lbs. copper.

No detailed information obtainable as to the success of the Reorganization Committee.

CASSIAR CROWN COPPER CO. **BRITISH COLUMBIA**

Office: 601 Empire State Bldg., Spokane, Wash. **Mine office:** Telkwa, British Columbia.

Officers: A. C. Mason, pres.; W. C. Miller, v. p.; J. V. Pohlman, sec.-treas.; Geo. Dungate, mgr.

Inc. in 1916. **Cap.** increased from $1,000,000 to $1,500,000; $1 par; 268,000 shares in treasury.

Property: five 50-acre claims on Grouse mountain, in Omineca division, 18 miles S. E. of Telkwa and Aldermere, and 260 miles from Prince Rupert on Grand Trunk Pac. R. R., said to show zinc-copper-silver ore.

Development: mainly by tunnels, longest in over 750'. Mineralized area as indicated by surface workings is a sheeted zone 10 to 12' wide. There are several shallow shafts and pits all showing more or less copper. Average assay of all ore exposed in workings is claimed to exceed 7% copper and $3 gold.

For geology see Canadian Geological Survey of Cassiar Crown group for 1915, by J. D. McKenzie.

COAST COPPER CO., LTD. **BRITISH COLUMBIA**

Head office: Trail, B. C.

Officers: J. J. Warren, pres., Toronto, Ont.; T. W. Bingay, sec.-treas.; with S. G. Blaylock, W. M. Archibald, M. W. Bacon and W. E. Cullen, Jr., directors; W. M. Archibald, mgr.; Wm. Clancy, supt., Quatsino, B. C. Company is successor of Quatsino Copper Co. and is controlled by the Consolidated Mining & Smelting Co.

Inc. September 15, 1916, in British Columbia. **Cap.** $1,000,000; $5 par. 200,000 shares issued; 110,000 shares owned by Cons. M. & S. Co., Ltd.

Property: the old Sport mine, at Elk mountain, Quatsino division, Vancouver Island. Ore shoots carry argentiferous chalcopyrite in magnetite in fissures with dip of 40° that cut through diorite. The vein is 3,000' long on the surface. The Idaho and Sport veins were cut by new adit 250' below bottom of winze and a 600' drift run on the Idaho vein.

Development: by 2 adits, crosscutting the vein, the lower 2,200' long and 500' below the upper adit. Workings total 6,193', plus about 7,000' of diamond-drilling. Work in 1920 amounted to 1,900' of drifting and crosscutting and 192' of diamond drilling.

Equipment: 6x8' single drum hoist, 300 cu. ft. compressor and water power.

CONSOLIDATED HOMESTAKE M. AND D. CO., LTD., THE B. C.

Address: 807 Credit Foncier Bldg., Vancouver, B. C. **Mine address:** Major Crighton, Alice Arm, B. C. A. C. H. Gerhardi, cons. engr.

Officers: R. Helme, pres.; Geo. J. Smith, v. p.; Chas. M. Houghton, sec.-treas., with D. A. McCaskill and P. L. Simpson, directors.

Inc. in B. C. **Cap.** $500,000; $5 par

Property: Homestake group, 6 claims, in Kitsault section, Nass River division, 23 miles N. of Alice Arm, shows a fissure vein in andesite, containing 5.02% copper, 0.56 oz. gold and 2.14 oz. silver per ton.

Development: by three tunnels, 143', 460' and 750' long. Is being developed by Mineral Claims Devel. Co., Ltd. (q. v.), which has had a bond and lease on property since 1919.

CONS. MNG. & SMG. CO. OF CA. LTD., THE B. C.

Office: 707 Drummond Bldg., Montreal, Que. **Works office:** Trail, B. C.

Officers: J. J. Warren, pres.; Geo. Summer, v. p.; with Sir Edmund B. Osler, Chas. R. Hosmer, H. S. Osler, W. L. Matthews, J. C. Hodgson, Henry Joseph, and J. K. L. Ross, directors. J. E. Riley, sec.; W. S. Rugh, sales mgr.

Operating officials: S. G. Blaylock, gen. mgr.; W. M. Archibald, mgr. of mines, and staff consisting of A. B. Ritchie, assistant; F. S. Peters, supt. at Rossland and White Bear; E. G. Montgomery at Sullivan and St. Eugene; M. M. O'Brien at Rock Candy; R. M. Macauley at Emma; W. Clancy with Coast Copper; Geo. H. Kilburn at Sunlock and at Blue Grouse; field operations under direction of J. K. Cram and G. H. Kilburn; T. W. Bingay, comptroller; James Buchanan, smelter supt.; G. E. Murray, assistant; B. A. Stimmel, supt. of zinc plant; J. J. Fingland, in charge of refineries; H. R. Motherwell, assistant; R. W. Diamond, supt. of concentration and testing; G. F. Chapman, construction eng.; A. L. MacCallum, supt. of acid plants; F. E. Lee, W. H. Hannay, research engrs.; G. Cruickshank, F. S. Willis, H. Woodburn, department superintendents in zinc plant; D. G. Bissett, chief chemist; R. K. Blois, supt. of smoke plants.

Inc. January 1, 1906, in Canada as Canadian Consolidated Mines, Ltd. **Cap.** $15,000,000; $25 par; issued $10,533,700, increased from $5,500,000 in 1909 to $7,500,000, and again in December, 1915, to present amount. Annual meeting third Tuesday in December. Listed on Toronto and Montreal Exchanges. Transfer agents; Toronto General Trusts Corporation, Toronto, and Royal Trust Co., Montreal.

Bonds: $3,000,000 7% debentures authorized December, 1918, and convertible after January 1, 1924, into stock at par.

Cons. M. & S. controls the West Kootenay Power and Light Co., Ltd., a dividend-payer that supplies electric current to mines in this region.

Financial Statement years ending Sept. 30 to 1918, then Dec. 31:

Assets.

Year	Property and investments	Mining and reduct'n w'ks	Ore and products	Supplies	Accounts receivable	Cash and advances	Total
1920..	$10,160,767	$6,244,586	$3,336,463	$1,486,921	$356,316	$96,069	$21,681,122
1919..	9,360,854	5,289,740	2,987,297	1,251,842	939,257	9,195	19,866,739
1918..	7,884,564	4,589,608	2,828,416	1,183,183	542,826	71,325	17,099,923
1917..	7,303,443	4,867,505	2,615,664	970,954	1,152,801	83,199	16,994,569
1916..	6,964,885	4,072,680	2,682,934	803,356	282,094	208,278	15,014,228

Liabilities.

Year	Capital Stock	Bonds	Bank Loans	Accounts payable	Dividend payable	Advance by Govt.	Profit & loss acc.	Total
1920..	$10,533,700	$3,000,000	$5,351,204	$1,987,204	.....	.....	809,014	$21,681,122
1919..	10,533,700	3,000,000	3,067,435	1,288,503	$263,343	.....	1,713,757	19,866,739
1918..	10,477,450	.....	2,809,071	1,403,343	261,936	.....	2,148,123	17,099,923
1917..	10,447,450	.....	2,081,806	1,113,101	261,936	700,000	2,360,274	16,994,569
1916..	8,427,800	.....	2,288,253	1,209,021	210,695	600,000	2,278,459	15,014,228

Profit and loss account: Income.

Profft and loss account:

Income.

Year	Sales of products	Ores, etc. on hand	Sundries	Dividends from Power Co.	Total
1920.....	$2,227,611	$3,336,463	$31,287	$241,845	$[illegible]
1919.....	9,761,005	2,987,297	11,679	143,133	[illegible]
1918.....	9,780,565	2,828,416	16,005	150,000	[illegible]
1917.....	12,700,971	2,615,664	60,441	150,000	[illegible]
1916.....	7,203,807	2,682,934	62,804	84,143	[illegible]

Expenditures.

Year	Ore at end previous year	Ore and metals purch'd	Freight on ore	Mining and reduction	Depreciation etc	Power	Total
1920..	$2,987,297	$1,747,403	$517,029	$5,174,281	$[illegible]	$40,317	$10,837,206
1919..	2,848,416	3,066,580	358,376	5,195,641	577,420	976,[illegible]	[illegible]
1918..	2,615,674	4,120,244	190,637	4,487,412	421,273	9[illegible]	[illegible]
1917..	2,682,933	5,899,082	286,973	4,910,670	676,388	[illegible]	[illegible]
1916..	1,146,313	2,913,426	204,546	4,479,870	292,137	7[illegible]	[illegible]

Dividends: rate of 10% per year quarterly from May 1906, to April, 1907; then 1¼% in November, 1907; 4% in October, 1912; 2% quarterly from July, 1913, to October, 1915; and 2½% quarterly from January, 1916, to Sept. 30, 1920; fourth quarter of 1920 passed; none in 1921. The total is $6,836,852.

Property: company was formed to take over the following properties, either by direct ownership, or by stock control; War Eagle Consolidated Mining & Development Co., Ltd.; Centre Star Mining Co., St. Eugene Consolidated Mining Co., The Rossland Power Co., and the Trail smelter, formerly operated by the British Columbia Southern railroad. In 1907, the Iron Mask, Idaho and Enterprise mines at Rossland were purchased and the Phoenix Amalgamated Copper Mines, Ltd.; also the Keystone and Four Ace claims adjoining the Phoenix, located at Phoenix, B. C. In 1910 the company acquired the La Plata, or Molly Gibson group, near Nelson and the No. 7 group in the Boundary district. In 1911, company purchased control of the Fort Steele Mining & Smelting Co., Ltd., owning the Sullivan silver-lead mine, near Fort Steele; Le Roi Mining Co. at Rossland, the Virginia and Abe Lincoln Mines. In 1915, company purchased the Monte Christo Paul Boy, Eddie J. and the Iron Horse mines, all at Rossland, and acquired a controlling interest in the Silver King Mines, Ltd., at Nelson. Also the No. 1 and the Highland groups in Ainsworth. In 1913, the Deer Park, Grand Prize and Mabel in Rossland were taken over and the Ottawa mine near Slocan City purchased. Control was purchased in the Coast Copper Co., operating on Vancouver Island. In 1916, a lease was taken on holdings of Cons. White Bear Mng. Co. Late in 1917 company bought silicious flux properties in the Camp McKinney and Fairview districts, near Keremeos, B. C. The Voight copper mine near Princeton was acquired in 1918. To ensure a further supply of fluxing ore, the San Poil gold-silver mine at Republic, Wash., was bought in 1918 at a receiver's sale. In 1918, an option was taken on the **Iva Fern** claims on W. side of Kootenay lake on which surface conditions indicate lead-silver ores in 2 veins, and a 250' tunnel driven. To ensure a cheaper supply of fluorspar the Rock Candy claims on Kennedy creek, were acquired in 1918, and a 100-ton mill erected. In 1919, control of the Sunloch Mines, Ltd., on Vancouver island, was acquired. The 23 Silver Tip zinc-lead-gold-silver claims between Eutsuk and Whitesail lakes, Sibola section, in most southerly area of Omineca division, were taken under option in 1919.

Drilling and other work in the **Blue Grouse** mine of Gordon Bay Mines, Ltd., proving discouraging, option was dropped in 1919. The Silver King, Coast Copper, Cons. White Bear, and Sunloch companies are separately described.

The **Le Roi-Centre Star** group, on the southern slope of Red mountain at Rossland, is still the principal property. At this place the country rock is a complex of effusive and fragmentary volcanics of the Paleozoic age

intruded by a large number of nearly vertical dikes, from a few feet to 250' wide, with generally N.-S. trend, the dikes being basaltic, and occasionally slickensided, larger dikes cutting off the veins completely, with the more important orebodies occuring at the points of intersection, and having a series of faults, mainly parallel to the dikes. Ore occurs in shoots of 3 to 50' width, and 50 to 600' length, widening at intersection of veins with dikes. Ore is strongly auriferous and fairly argentiferous chalcopyrite, associated with pyrite and pyrrhotite with gangue of silicious altered country rock, ore ranging 0.5 to 2% copper, and $8 to $20, and occasionally up to $100 gold per ton. Pay shoots extend, in some cases, from wall to wall, and from local enrichments the wall in some cases being very indistinct, and ore shading into the country rock. There are several veins, the more important being the Centre Star, Le Roi and War Eagle, on which the mines are opened, these being shear zones, carrying chalcopyrite disseminated mainly in pyrrhotite, with some pyrite and arseno-pyrite.

The **Rossland** group, which now has a total acreage of about 775 acres, includes the Le Roi, Centre Star, War Eagle and Iron Mask mines, which are practically one, all connected by drifts and crosscuts, with about 58 miles of workings. Mines are worked by overhand stoping, partly on the shrinkage system and partly timbered with square sets, cut from round timber. Electric haulage is used throughout. 13 electric locomotives hauling 2-ton side dumping cars to the underground ore pockets of the Centre Star shaft.

The Centre Star mine has a 2,200' 68° inclined shaft, with 16 levels opened at intervals of 125 to 175'. The shaft is concreted from the 12th level to the bottom. The mine has 8 to 10 different orebodies, but ore comes principally from the Centre Star vein, averaging 0.6% copper, 0.3 oz. silver, $8 to $10 gold per ton.

In the Centre Star-War Eagle-Iron Mask group, ore is mined from the 3 Centre Star veins, Main, North and South, as well as from the Iron Mask, War Eagle, Josie, Poorman and Mugwump veins.

The Le Roi group produces ore from the Le Roi main South, Intermediate, North Peyton and Hollywell veins.

Electric power for the complete operation of the mines is taken from the Bonnington Falls plant of the West Kootenay Power & Light Co., controlled by Cons. M. & S. Co., 35 miles distant at 60,000 volts, stepped down at the mine to 2,000 volts for distribution and use. The compressor room has a 120-k. w. direct-current generator, driven by an alternating current motor, supplying current at 250 volts for electric motors on surface and underground, and for lighting. Air for drilling is furnished to all the mines through one system.

The mines are gold, rather than copper producers.

The **Richmond-Eureka** mine, at Sandon, under lease to Clarence Cunningham, has argentiferous lead and zinc ores, developed by tunnels aggregating 1¼ miles in length. Ore is transported to bin on C. P. R. R. tracks at Sandon by 4,000' aerial tram.

The **Sullivan** mine, at Kimberly, and 20 miles from Cranbrook on the C. P. R.R., is a lead-zinc producer, whose ore occurs in replacement deposit, in a fine grained argillaceous quartzite. Ore is a mixture of fine-grained galena, zinc blende, and iron sulphide. The ore-shoot shows a maximum stope width of 125'. Development principally by tunnels and raises. A low-level tunnel, 8,100' long, equipped with double standard-gauge tracks, has been driven to open this property, which is one of the most important zinc mines developed in North America for many years. The tunnel and upper workings are to be connected by a shaft. The ore is complex, but experimental work has proven that it can be satisfactorily milled. It will go to a 900-ton mill at company's smelter at Trail, the concentrate being treated by the electrolytic process. Electric locomotives are used in the mine and an aerial tram from upper workings to railroad cars.

In 1920 the mine produced 242,294 tons zinc-lead ore and 13,214 tons of lead ore.

The **Molly Gibson** mine, bought 1910, formerly owned by Molly Gibson Mining Co., Ltd., and later by La Plata Mines, Ltd., has a regular fissure vein in granite containing highly argentiferous lead-zinc ore. Developed by over two miles of tunnels. An aerial tram 2 miles long connects the mine and mill, while a second, five miles long, connects mill and loading bins, 5 miles from Kootenay lake. The mine is equipped with 100-ton mill, operated by water power, and two air-compressors.

Operated for 2 months only in 1920 and in 1921 was leased to W. A. Cameron for a period of several years.

The **St. Eugene** mine, at Moyie, is equipped with a 500-ton mill, but considerable of its equipment has been dismantled. Mine operated for 7 months in 1920, making a small production, and was turned over to lessees in October.

No. 1 Group, 6 miles from Ainsworth, 400 acres, has a contact deposit between dolomite and a dark lime schist. The ore, occurring in beds 3 to 8" thick, consists largely of oxides of iron, zinc, and lead in a siliceous lime gangue. Principal value is in silver, about 9 oz. per ton. Development is by tunnel and winze. Equipment includes a 2-stage, 11x16x18" Jenckes air compressor, driven by belt from 150 h. p. 2,080-volt motor, power being supplied from a 350 k. w. generator at Highland Mill, Cedar creek, 9,000' distant; and an aerial tram, connecting mine ore bins with loading bins, on shore of Kootenay lake. Storage capacity at mine and lake bins is about 700 tons. Operated by lessees in 1921.

Highland Group, 1½ miles from Ainsworth, 240 acres, has a series of fissure veins in hornblende schist. Ores are silver-lead and development is by tunnels. Equipment includes 6-drill air compressor, driven by water power and a single rope aerial tram, 4,080' long, connecting mine ore bins with 150-ton mill at Kootenay lake. Power for mill is from a 350 k. w. generator, driven by a Pelton wheel under a head of 1,000'. Mine was closed in Feb., 1920.

The **Ottawa** group of 17 claims is in Slocan City district. Ore occurs in a fissure vein in granite. Development by tunnels and winzes to depth of 600'. Principal metal is silver, associated with copper, lead and zinc sulphides, some barite in gangue. The mine is being operated under a 4-year lease from 1920 by the **Ottawa M. & S. Co.,** which see.

Details of all the mines are too lengthy for insertion, but the following table gives summary of the facts concerning the principal properties.

Name	Class of ore	Development in 1920 feet	Total Drilling in miles	Total Drilling in 1920 feet	—Production— in 1920 tons	—Production— to date tons
Rossland Gp.	gold, copper	5,460	60.80	4,519	54,524	4,877,440
White Bear	gold, copper	613	1.95	.....	120	3,002
St. Eugene	lead	171	20.10	....	1,050	1,026,355
Sullivan	zinc, lead, pyrite	1,920	8.53	2,620	259,814	1,032,359
Highland	lead, silver	144	3.60	....	194	4,923
Molly Gibson	silver, lead	123	2.26	....	272	9,044
No. 1	silver	315	1.90	....	754	24,704
Emma	copper	208	1.45	....	18,069	243,822
Richmond-Eureka	lead-silver	....	1.80	....	1,113	19,420
Ottawa	silver	83	2.17	....	510	1,628

Reduction works: the Trail smelter near the International boundary, treats all kinds of ores and does an extensive custom business, which will be mainly smelting concentrate and refining copper from the Canada Copper Corporation at Princeton, when that company starts operations.

There are two sampling mills, equipped with crushers and Vezin samplers; No. 1 mill, for copper ores, of 200 tons hourly capacity; No. 2 for lead ores, of 100 tons hourly capacity.

The smelter has a calcining department, and blast-furnaces for copper and lead. All the copper ores are bedded and hauled from the beds (of 21,000 sq. ft.) by electric locomotives to the charge bins, and from these to the furnaces. Lead ores for the roasting department are delivered to beds by a system of belt conveyors and drawn from these beds by a conveyor over an electric scale to the roasters.

The calcining department consists of three 22½′ 7-deck Wedge roasters, and five 26′ Godfrey furnaces. The roasted ore is sintered in 32 Huntington Heberlein sintering pots and 3 Dwight-Lloyd sintering machines, fumes being passed through the Cottrell electric precipitator.

The 1,800-ton copper smelter has 4 blast furnaces, 2 of 35′ and 2 of 25′ taking a 32 oz. cold blast. Two 12′ Great Falls type converters are in operation making blister copper.

The 350-ton lead smelter has one 45x180″ and three 45x180″ blast furnaces, with mechanical feed, reducing mainly calcined ores. Crude lead ores are roasted in seven 26′ Godfrey furnaces, which reduce the sulphur from the original tenor of 16% to 8%, and these calcines are reroasted in fifteen Heberlein sintering pots, yielding a product carrying only 4½% sulphur. 9′ Huntington-Heberlein sintering pots, yielding a product carrying only 4½% sulphur. The sintered ore, carrying 30 to 50% lead, is smelted in the blast-furnaces, each making 50 to 85 tons of lead bullion daily, with about 4% matte fall. This matte is roasted and again put through the blast-furnaces, and slags are graulated. Blast-furnace gases are passed through a Cottrell precipitator.

An electrolytic lead refinery, handles anodes cast from the silver-lead bullion. This plant, of 100 tons daily capacity, was the first electrolytic lead refinery ever built, and uses the Betts process. The lead is of exceptional purity, with average assay of about 97%, which means that a short ton of lead carries only about 1 oz. of impurities, which is excellent work. work.

The silver refinery, taking silver sludge from the electrolytic lead tanks, has a water-jacketed reverberatory furnace for the production of doré bullion, and the necessary kettles, tanks, and bluestone plant for parting the precious metals with sulphuric acid; also furnaces for melting and casting the silver and gold bullion. The silver bullion is 999 fine and the gold bars are 995 fine.

The electrolytic copper refinery now handles 50 tons per day, having been enlarged in 1918 at cost of $250,000. A wire-rod mill is also to be built costing $75,000.

Blast is supplied at 32 oz. for all furnaces, by one No. 9, and one No. 9 1/27, one No. 11, and one 400 cu. ft. Root blower, and one 200 cu. ft. Connersville blower.

An electrolytic zinc plant was erected in 1916. The process is similar to that used at Anaconda, Mont., but is the direct result of the operation of an experimental plant treating ore from the Sullivan mine and producing 1,000 lb. of zinc per day.

The plant contains two driers, three 18x5′ ball mills, thirteen 7-deck 25-ft. Wedge roasters, a large leaching building, where the ores are leached by counter-current continuous process in Pachuca tanks and thickened in Dorr thickeners, purified in Pachuca tanks, and filtered with Kelly and Oliver filters, electrolyzing-tank rooms, where the solutions are electrolyzed in concrete electrolytic tanks; thirteen 1,000 k. w. motor-generator sets; the necessary transformer plant to reduce the 60,000 volt current with which the plant is supplied; and a melting plant with two reverberatory furnaces for melting the cathode zinc.

U. S. Patent No. 1,320,805, Nov. 4, 1919, was issued to R. H. Stewart, S. G. Blaylock, Robert Vaughan, and J. K. Batchelder of this company, for hydro-chemical extraction of zinc from ores or other zinc-containing

material in which the zinc has been made soluble by roasting, the process above.

The zinc concentrator, with daily capacity of 900 tons, is equipped with a 6x6′ ball mill, a standard 24″ 17-cell Minerals Separation flotation machine, concentrating tables, filters, thickeners, and complementary appliances. This plant is to be increased to 2,500 tons capacity. Briefly, the method consists in removing a little of the heavy galena on tables, the middling is subjected to wet magnetic separation for removal of pyrrhotite, and finally to preferential flotation for separation of the blende from the galena. Concentrate from the mill goes to the electrolytic plant described above.

The mill at the Rock Candy mine makes a product carrying 84% calcium fluoride and 6% silica.

Other accessories to the Trail smelter are copper and zinc casting departments, sulphuric-acid plant (2,879 tons in 1918), hydro fluosilicic plant (196 tons in 1918), and bluestone plant, all recently overhauled and in good order.

Power for the reduction works is electric throughout, and brought from Bonnington falls, on the Kootenay river.

The works have a central heating station and well-equipped machine, carpenter, boiler, and electric shops. The assay-office, which handles an unusual variety of work, in great detail, is exceptionally commodious and well equipped.

Production, including custom ores:

	Ore Smelted, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.	Zinc, lb.
1921	408,346	51,037	1,173,890	3,556,517	57,051,110	53,131,270
1920	592,763	42,636	1,097,930	26,474,652	4,501,594	36,995,795
1919 (15 mos.)	398,118	59,605	1,782,025	41,711,147	6,933,962	30,743,461
1918	374,889	52,917	1,708,692	38,844,946	7,982,903	21,800,912
1917	359,404	69,704	2,471,887	44,260,989	7,404,352	15,021,127
1916	447,017	98,314	2,285,631	39,974,411	4,446,080	3,088,199
1915	447,064	148,891	2,230,500	40,177,910	5,306,184	.....
1914	374,771	129,083	2,568,301	34,617,318	3,645,997	.....
1913	407,124	186,017	2,224,458	48,325,252	3,454,814	.....
1912	.....	129,789	1,765,992	26,072,074	2,914,181	.....
1911	.....	119,067	1,458,758	24,026,015	4,421,988	.....
1910	.....	137,614	1,162,406	42,368,816	5,974,959	.....
1909	.....	114,920	2,443,475	43,675,077	4,637,631	.....
1908	.....	121,380	2,224,888	32,157,139	4,004,468	.....
1907	.....	69,186	1,100,271	20,380,083	3,433,310	.....
Total	1894-1920 6,350,432	1,951,048	32,278,092	580,593,764	96,898,237	106,344,850

Company at present is the only one in the world producing electrolytically refined copper, gold, lead, silver, and zinc at one plant; also making sulphuric acid, hydrofluosilicic acid, bluestone, and manganese dioxide. Trail is a metallurgical center using the latest processes, not following recent practice, but a leader in devising new methods.

While Cons. M. & S. has many mines, its future apparently depends on the large ones described, especially the Sullivan mine.

Its custom business is important and will expand. The management is enterprising, competent, and eminently fair in its dealings with the companies that ship ore to its smelter.

CONS. WHITE BEAR MNG. CO. **BRITISH COLUMBIA**

Address: Cons. M. & S. Co. of Canada lessee, Rossland, B. C.

Property: at Rossland, Trail Creek division, adjoins the Rossland group of the Cons. M. & S. Co. on the W., contains pyrrhotite-chalcopyrite ore lenses in diorite porphyrite underlying the barren Mount Roberts formation.

Up to 1908, when company operations closed, development consisted of 1,000′ shaft, with about 4,000′ of total workings, and 4 veins had been opened. Ore is copper-gold and in the main low grade.

Equipment: included an Elmore concentrating plant.

After 8 years of idleness, property was taken under lease by **Cons. M. & S. Co. of Canada**, which see.

CONWAY MINING CO. **BRITISH COLUMBIA**

Address: c/o J. M. Miller, Billingham, Wash., or J. Brown, mgr., Ferguson, B. C.

Property: Old Gold and Silver Queen mines in Trout Lake division, W. Kootenay district, 13 miles from Ferguson. The ore is high-grade silver-lead.

COPPER CREEK MINING CO., LTD. **BRITISH COLUMBIA**

Address: W. Ross Alger, sec., 601 Agency Bldg., Edmonton, Alberta. **Mine address:** Kamloops, B. C.

Property: Tenderfoot group on Copper creek, Kamloops division, Yale district. Ore is copper-gold-silver. Idle much of 1919, mine was reported under option in 1920 to eastern capital and a concentrator was to be erected.

COPPER MOUNTAIN MG. & DEV. CO. **BRITISH COLUMBIA**

Office: 5406 Union Ave., South Tacoma, Wash. Mine near Quatsino. Fully described Vol. XII.

CORK-PROVINCE MINES, LTD. **BRITISH COLUMBIA**

Office: Kaslo, B. C. Mine at Zwicky, B. C.

Officers: W. E. Zwicky, pres.-gen. mgr.; Henry Giegerich, v. p.; W. H. Burgess, sec.-treas., with J. A. Johnston, R. E. M. Strickland, directors. Transfer office: Kaslo. W. H. Burgess, registrar.

Inc. May, 1915, in British Columbia. **Cap.** $1,000,000, 10c par, 8,500,000 issued; increased July 17, 1919, to $1,250,000; shares $1 par. Bonds issued, $17,500. Net indebtedness at end of 1920 was $16,000.

Property: 13 claims, 9 Crown granted, containing about 700 acres on the S. Fork of Kaslo creek in the Ainsworth division, 4½ miles from Zwicky on a branch of the C. P. R. R. Company is a consolidation of the Cork and Province groups.

The ore occurs in fissure veins in slate, which have a N. E.-S. W. course and 68° dip. The shoots are 6′ to 30′ wide, containing silver-lead, and zinc ore.

Development: a 1,400′ crosscut tunnel, intersects the Black Fox and the Cork veins, at depth of 300′ and has 2,300′ of workings. The Black Fox vein cut at 700′ from the portal is 4′ to 6′ wide, but has no commercial ore at this point and will be explored. The Cork vein cut at 920′ is strong and wide and contains 4 productive ore shoots averaging 8′ wide for lengths of 50 to 325′. Ore reserves are said to be 10,000 tons, to about the 300′ level.

Equipment: 100-ton concentrator, flotation unit, hydro-electric plant, saw-sawmill, compressor and electric lighting system.

Production: mine yielded 1,206 tons previous to consolidation, and about 933 tons in 1915; 45 in 1916; 414 in 1917; 733 in 1918. Ore shipments averaged 35 oz. silver and 49% lead in 1918.

Operations were resumed in June, 1919, but suspended in October; 225 tons of lead concentrate, and some zinc was shipped. Idle pending refinancing.

CORONATION GOLD MINES, LTD. **BRITISH COLUMBIA**

Address: Will Haylmore, 1232 Wharf St., Victoria, B. C. **Mine address:** Lillooet, B. C.

Property: Coronation mine on Cadwallader creek, Lillooet division. Was idle for several years until 1920, when taken under lease by Aylward & Burdick.

COUVERAPEE MINING CO., LTD. **BRITISH COLUMBIA**

Address: O. S. Chopin, pres., 211 - 8th Ave. W., Calgary, Alberta. **Mine address:** Field, B. C.

Property: Couverapee mine on Mt. Stephen, Golden division, E. Kootenay district, shows a replacement deposit in limestone, the ore assaying 15% lead and 3 oz. silver per ton, with a small amount of zinc. Was a shipper in 1918, but idle 1919-'20 because of boundary litigation with the adjoining Monarch mine. Reported that an amalgamation of the two mines has been effected.

CUNNINGHAM, CLARENCE **BRITISH COLUMBIA**

Address: Alamo, B. C. **Mine address:** Sandon, B. C.

Property: the Silverite and Sovereign silver-lead mines at Sandon, Queen Bess mine, and claims of Standard Silver Lead Mng. Co., Slocan division., purchased in mid-1921. Also by control, holdings of Wonderful Group Mng. Co., Idaho-Alamo Cons. Mines, Ltd. and Enterprise (B. C.) Mines, Ltd., and under lease, the Richmond-Eureka mine of Cons. Mng. & S. Co. of Canada. Lease on mines of Van Roi Mng. Co. was relinquished late in 1921. Cunningham owns also the Alame Concentrator. Except for the two first named, these mines, etc., are separately described.

Cunningham has a reputation for combining a progressive mining policy with up-to-date methods.

DALY MINES CO., LTD. **BRITISH COLUMBIA**

Controlled by **Portland Canal Mines Co.** (q. v.), as a U. S. Holding company, organized by Pat Daly and T. H. Wilson of New York, late in 1921.

Property: the Big Missouri mine (described under that title) and International group of 8 claims, in the Solman River section, Portland Canal division, 6½ miles northeasterly of Stewart on the international boundary. The latter, in which Daly owns a ¼ interest, shows an 8 to 10' vein in schist, to be developed by a 300' tunnel to reach depth of 160'. Ore is silicified schist and quartz, carrying pyrite.

DELLIE MINING & MILLING CO., LTD. **BRITISH COLUMBIA**

A reorganization, 1918, of the Silver Hoard Mining Co., described in Vol. XIII.

Address: L. R. Hawley, sec.-treas., 614 Hutton Bldg., Spokane, Wash. **Mine address:** W. S. Hawley, mgr., Ainsworth, B. C.

Officers: W. H. Carder, pres.; Dr. E. N. Northrop, v. p.

Inc. 1918, in Washington. In summer of 1919, company levied an assessment of 1c. per share in order to pay off its heavy indebtedness.

Property: the Silver Hoard mine, 5 claims, 2020 acres, Crown-granted, 7 miles N. W. of Ainsworth, said to carry the same vein stoped in No 1 mine of Cons. M. & S. Co., 2,400' away. The vein is in limestone. Milling ore is said to assay 3% lead, 10% zinc, and 15 oz. silver per ton.

Development: by 7,000' of workings.

Equipment: includes hydro-electric power, compressor, hoist and a 75-ton flotation plant.

Production: from 1911 to 1916, reported as 43 cars of ore, assaying 46.9 oz. silver, 4% lead, and 15% zinc, with net smelter returns of $32,000. Mine operated by Grant Bros. and Rogers under a 2-year lease from 1921.

DELTA COPPER CO., LTD. **BRITISH COLUMBIA**

Address: 703 Tegler Block, Edmonton, Alberta **Mine office:** Tramville, B. C.

Officers: W. H. Hargrave, pres.-mng. director; J. H. Miller, v. p.; A. J. McCormick, v. p.; C. R. Tufford, sec.; Colin Case, treas., with G. A. McAlpine, John Timothy, C. S. Pingle and W. S. Sargent, directors. W. G. Norrie-Lowenthal, cons. engr.

Property: 25 claims, including the Delta, Chicago, Hazelton, and Dyke group of claims, in the Hazelton section, Omineca division, adjoining the Rocher de Boule mine on the east. Also, controls Butte & Rocher de Boule Copper Co. (q. v.), owning the Highland Boy group

Some tunneling was done in 1919, but owing to lack of funds, work was suspended. Property considered promising.

For geology, see Memoir 110 (1919), Canadian Geological Survey.

DISCOVERY MINING & POWER CO., LTD. **BRITISH COLUMBIA**

Address: Wm. Morrison, mgr., Atlin, B. C.

Property: placer ground on Pine creek, Atlin mining division. Gold production for summer of 1919 was about $25,000, by several sets of lessees. Said to be controlled by Frank H. Mobley, of Prince Rupert.

DOLLY VARDEN MINES CO. **BRITISH COLUMBIA**

Inc. in Delaware.

Property near Alice Arm, taken over by Taylor Mining Co. (which see). Company was involved in protracted litigation with Taylor Engineering Co., which was finally settled in 1920.

DONOHOE MINES, LTD. **BRITISH COLUMBIA**

Address: F. M. Hawkes, pres., 610 First Ave., Seattle, Wash.; C. A. Moon, gen. mgr.; Jos. T. Knapp, supt.

Property: 8 claims, including the Tubal Cain, King William, and Joshua mines, near Stump lake, Nicola mining division. Ore contains copper, lead, zinc, silver, and gold. The deposit consists of quartz veins, 10 to 60" wide, traversing a green diabase porphyrite. Development has followed veins to 400' in depth. In 1919, the Joshua shaft was unwatered and exploration resumed. Shipments of silver ore sent to Trail.

Equipment: includes compressor and air-drills. A 50-ton concentrator is to be installed.

DOUGLAS CHANNEL MINES, LTD. **BRITISH COLUMBIA**

Address: 409 Crédit Foncier Bldg., Vancouver, B. C.

Is a reorganization of the Drum Lummon Mines, Ltd.

Cap. $3,000,000. Glenville A. Collins Engineers, Ltd., as managers, liquidated indebtedness of old company and continued development work. In June, 1921, the **Drum Lummon Mines. Ltd. (N. P. L.)** was organized and acquired the holdings of the Douglas Channel, in exchange for 1,225,000 shares of stock.

DRUM LUMMON MINES, LTD. **BRITISH COLUMBIA**

Described in Vol. XIV.

Reorganized in 1921 as Douglas Channel Mines, Ltd., and property sold to Drum Lummon Mines, Ltd., (N. P. L.) which see.

DRUM LUMMON MINES, LTD., (N. P. L.) **BRITISH COLUMBIA**

Address: Glenville A. Collins, mgr., 410 Credit Foncier Bldg., Vancouver, B. C. **Mine office:** Douglas Channel, B. C.

Officers: G. A. Collins, pres.; J. Broatch, v. p.; N. M. Silcock, sec.-treas., with N. Thompson, Dr. T. B. Turner and J. F. Meads, directors.

Inc. June 10, 1921. **Cap.** $3,000,000; $1 par; 1,325,000 issued, 1,225,000 shares going to Douglas Channel Mines, Ltd.

Property: 13 claims on Drum Lummon bay, N. shore of Douglas channel, Coast section of Skeena division, 25 miles from Hartley Bay.

Geology: ore occurs as bornite, chalcocite and chalcopyrite in quartz, biotite, or feldspar, as replacements along an andesite dike.

Development: to depth of 700', by 400' main tunnel with depth of 200' and a 400' drift. A 100' winze is being sunk. Workings total 2,000'. Management estimates ore reserves at 5,000 tons, averaging $25 per ton. Shipping ore said to average 65% copper, 60% silver and $45 gold. Shipments made to Tacoma smelter.

DUNDEE MINING CO. **BRITISH COLUMBIA**

Address: Ymir, B. C.

Property: the Dundee mine, adjoining the Yankee Girl at Ymir, Nelson division. Mine is reported to have very favorable indications of a large tonnage of commercial ore, having a tunnel 2,954' long said to prove the ore to 1,100' depth. Arthur Lakes, Jr., estimated 100,000 tons ore proven, with a gross value of $850,000, or $380,000 net.

Property was under option 1920-'21 to the Mining Corp. of Canada, Ltd.

ECHO SILVER-LEAD MINING CO., LTD. BRITISH COLUMBIA

Address: L. J. McAtee, sec.-treas., 27 E. Boone Ave., Spokane, Wash., or P. J. Bonner, supt., Silverton, B. C.

Inc. in Washington. **Cap.** $150,000; par 10c.

Property: near Silverton, in Slocan mining division, adjoins Standard Silver Lead property.

Development: by tunnels. Main ore shoot said to be 8' in width. Late in 1918, company is reported to have arranged for a lease of the Standard Silver Lead Co.'s mill during part of each month, and in May, 1919, the output was at the rate of 4 carloads silver-lead concentrates, and 3 carloads zinc concentrates monthly. Total shipments in 1919 to Trail were 500 tons.

EDEN & CRESCENT MINING CO. BRITISH COLUMBIA

Address: 1405 Old Natl. Bldg., Spokane, Wash. **Mine address:** Coffee Creek Landing, near Ainsworth, B. C.

Officers: A. L. White, pres.; W. J. Nichols, v. p.; F. B. M. Brode, sec.-treas., with W. Y. Williams, C. F. Caldwell and W. H. Button, directors, at last report.

Inc. January, 1917, in Washington. **Cap.** $75,000; shares 5c par; 900,000 issued. **Property:** 8 claims, on Kootenay lake, near Ainsworth.

Development: by 2 shallow shafts and 800' tunnel. A crosscut opened 6' of ore assaying 30% lead and 6 oz. silver per ton. A small amount of development work is done annually.

EFANJAY GOLD MINING CO. BRITISH COLUMBIA

Address: A. J. Grover, sec.-treas., Hyde Bldg., Spokane, Wash.

Officers: J. A. Irvine, pres.; J. L. Goodwin, v. p.

Company organized in 1916 to take over the Fawn group of claims in Sheep Creek section, Nelson division, near Salmo, and reported to show an orebody 14" wide carrying from $21 to $65 gold per ton.

Development: by tunnel.

Company holds also a lease on placer claims on the Tulameen river in Similkameen division, subleased in 1917 to the Placer Development Co. of America, Ltd., which in 1918 spent $25,000 from July to December, building a dam across the Tulameen river, a spillway and flumes. Bedrock was not reached and operations have not yet been resumed.

ELLEN GROUP GOLD MINING CO. BRITISH COLUMBIA

Address: Prince Rupert, B. C.

Property: Ellen group on Shuttle Island, Queen Charlotte division, 7 miles from Lockeport. An 8" quartz vein carrying free gold has been opened by a 65' crosscut.

ELLIS SILVER MINING CO., LTD. BRITISH COLUMBIA

Office: 31 Wellington St., East Toronto, Ont.

Officers: in 1918.—P. W. Ellis, pres.; M. C. Ellis and R. V. Ellis, v. p.'s.

Inc. in Ontario.

Property: the Eastmont group, about 60 acres, on Ten-mile creek, Slocan mining division. Said to show silver-lead ore, developed by tunnels on 4 levels. Mine under lease and bond to H. D. Lea & Co., shipped 50 tons in 1918 and 102 tons of ore in 1919.

EMANCIPATION MINING CO., LTD. BRITISH COLUMBIA

Described in Vol. XIV. Property acquired by **Liberator Mining Co.**, which see.

EMIGRANT MINES, LTD. BRITISH COLUMBIA

Address: J. Fagan, mgr., Yale, B. C.

Property: Emigrant mine in Yale Division, idle at last account. Ore carries gold and copper.

ENGINEER MINES BRITISH COLUMBIA

The former owner, Capt. James Alexander, was lost in the S. S. Princess Sophia disaster, October, 1918. J. A. Fraser, Gold Commissioner, Atlin, B.

C., custodian for the Alexander heirs, the Allan I. Smith Estate of Philadelphia. Reginald Brook, mgr., Gleanerville, B. C.

Claiming a 20% interest and alleging that the mine is to be sold for $3,000,000, W. P. Grant started suit in the B. C. Supreme Court against Gold Commissioner and Mining Recorder at Atlin. The suit was dismissed in Oct., 1920. The Engineer Mining Co., which owned the mine, but allowed the claims to lapse in 1907, before the present owners staked the claims, started action to establish their title to the property, on the ground of "Fraud". The case was decided in favor of the Alexander heirs in October, 1921, but an appeal has been taken.

Property: 11 claims, on east side of Taku arm, and 25 miles from Atlin, shows quartz veins with native gold and tellurides in shales and greywackes. Deposits range from simple veins a few inches in thickness to compound veins over 200' thick. Two large central veins of the latter type are "hubs" from which several veins radiate. "Hub A" is 200' wide and over 300' long; "Hub B" is 270' in width.

Development: includes a great number of open-cuts, and several tunnels driven on the most promising-looking veins. Surface work has exposed about 25 veins, up to 4' in width, a few containing shoots and pockets of bonanza ore; two of these are especially rich—the boulder vein and the shaft vein. Greater part of work has been on vein "E" on which a 275' shaft has been sunk, with four levels, totalling about 1,100' of workings. All this work has been in ore. Waste broken about 10' ahead of ore, which is afterward taken down with as little shooting as possible, and sorted into 3 grades. The first grade, showing visible gold, is treated in a 5-foot ball mill; the record run of this mill was 296 oz. gold from 160 lb. of ore.

Shipments made to Tacoma smelter, 1919.

A minister of Mines report for 1918, states "there is every reason to believe that it can be developed into one of the greatest gold-producers on the Continent." Little work being done, owing to litigation over title.

ENTERPRISE (B. C.) MINES, LTD. BRITISH COLUMBIA

Address: Clarence Cunningham, Alamo, B. C. **Mine address:** Slocan City, B. C.

Property: on Enterprise Creek, Slocan City division, 8 miles northeasterly of the City of Slocan, was first worked in 1894 and has been something of a producer.

ENTERPRISE MINING, DEV., & POWER CO. BRITISH COLUMBIA

Address: 308 Empire State Bldg., Spokane, Wash.

Officers: Chas. A. Coffin, pres.-gen. mgr.; W. V. Garrett, v. p.-mgr.; N. L. Jackson, sec.-treas., all of Spokane.

Inc. in Washington. **Cap.** $250,000; par 10c.

Property: 7 claims, 2 Crown-granted, at Paulson, Trail Creek division, said to show three gold veins, two silver veins, and a large lead-zinc vein.

Development: by several tunnels, one 300' long. Idle.

EUREKA COPPER MINES, LTD. BRITISH COLUMBIA

Address: 507 Union Bk. Bldg., Victoria, B. C., or Nelson, B. C.

Officers: J. J. Malone, pres.; J. G. Bunyan, sec.-treas.; with J. A. Gibson, L. K. Larson, and J. J. Bunyan, of Nelson, and S. G. Campbell, Vancouver, directors.

Property: since October, 1918, under lease and bond to **Inland Mng. Co.** (q. v.), which has so far made two payments.

EVA MINING CO. BRITISH COLUMBIA

Former address: W. C. Bailey, sec., Nelson, B. C.

Inc. in British Columbia. **Cap.** $1,500,000; par $1.

Property: at Camborne, on Poole creek, Lardeau mining division. Although the mine is one of the most extensively developed properties in the district, it has been idle for several years. Developed by over 5,500' of workings, with 200,000 tons of ore blocked out; the 30,500 tons already milled showed a gross value of $5.69 per ton.

Equipment: includes a 10-stamp mill and a compressor.

EVENING STAR MINE BRITISH COLUMBIA

Address: Hugh Sutherland, owner, mgr., Winnipeg, or 302 Hoover St., Nelson, B. C. Wm. Moore, supt., Slocan City, B. C.

Property: on Dayton creek, 3½ miles E. of Slocan City. A crosscut driven from the middle of the old tunnel reported to have cut the vein, October, 1920. Shipped 49 tons of ore in 1918. Equipment being installed and buildings erected 1922, to replace those destroyed by fire.

EXPANSION GOLD MINING & MILLING CO. BRITISH COLUMBIA

Probably idle. Property near Camp McKinney, Osoyoos division, is described in Vol. XIV, of this book.

FALLS CREEK MINING CO. BRITISH COLUMBIA

Carl M. Mohr, mgr., Nelson, B. C., who is manager of the Suokane M. & D. Corp, also.

Inc. in Washington. **Cap.** $1,500,000; par $1; assessable.

Property: Beasley-Monarch group, 6 claims, near Beasley siding, 8 miles W. of Nelson, under bond and lease from Spokane M. & D. Corp (q. v.), said to show 2½% copper ore. Has a 1,500′ tunnel, reaching a depth of 500′. Late in 1921, a crosscut opened 7′ of ore, assaying 7% copper and $2.50 per ton in gold, or about $18.00.

FERGUSON MINES CO., LTD. BRITISH COLUMBIA

Mine address: Ferguson, B. C.

Controlled by Geo. Alexander, of London, Eng., represented by Jas. Anderson, Box 122, Kalso, B. C. Company in hands of receiver and mine leased for company's account.

Property: the Ajax, Nettie L., and Silver Cup groups in Trout Lake mining division, with over 2 miles of workings. Considerable ore was shipped 15 to 20 years ago; 550 tons ore shipped in 1912, assaying 40 oz silver and 60% lead.

The mill was dismantled, July, 1921. Mines have been operated intermittently by lessees.

FIFE MINES, LTD. BRITISH COLUMBIA

Address: Rossland, B. C. Chas. Dempster, gen. mgr.

Property: the Hattie Brown claim at Rossland and the Dykehead, Ben Hur, Three Bells, and Fife claims at Fife, near Christina lake, 12 miles E. of Grand Forks, Boundary district, B. C. Claims show vein up to 30′ in width, carrying about 6′ of smelting ore, with balance of concentrating grade, developed by a glory hole, an 80′ shaft and a main tunnel having a 235′ winze.

Ore: contains chalcopyrite, carrying gold and silver values, claimed to average 3 to 6% copper and $4 to $8 gold per ton.

Equipment: includes necessary mine buildings and a 5-drill air compressor. Property considered promising. Idle.

FIRE VALLEY GOLD MINING CO. BRITISH COLUMBIA

Probably dead. Described in Volume XIV.

FISHER MAIDEN MINING CO. BRITISH COLUMBIA

Officers: J. L. Prickett, pres.; Wm. Huntley, v. p.; H. S. Stoothre, sec.-treas., Sherwood Bldg., Spokane, Wash., with John O'Connor, directors.

Cap. 1,500,000 shares; 10c. par; 1,000,000 issued.

Property: the Fisher Maiden group, 7 miles from Silverton, Slocan division, reported sold to Barney Crilley and J. J. Malone, on a 3-year bond and lease, 1917. Claims said to carry silver, lead, and zinc.

No recent information, probably idle.

FLINT MINING CO., LTD. BRITISH COLUMBIA

Controlled by **Index Mng. Co.**, which see.

Address: E. J. Edwards, Kaslo, B. C.

Property: Flint mine, on S. fork of Kaslo creek, in Ainsworth division, W. Kootenay district. Company was developing in 1919; no information since.

FLORENCE SILVER MINING CO., LTD. **BRITISH COLUMBIA**

Offices: 517 Hutton Bldg., Spokane, Wash., and Ainsworth, B. C.

Officers: F. R. Wolfe, pres. and gen. mgr.; A. F. Kelly, v. p.; D. E. Saunders, sec.-treas., with J. A. Lavender, and A. M. Frost, directors. R. H. Hewer, gen. supt.; J. H. Noble, mill supt.

Inc. July 1, 1911, in Washington, and in November, 1917, in British Columbia. **Cap.** $1,250,000; $1 par. Stock transferred at company office, Spokane.

Dividends: in March, 1919, initial dividend, 1½¢ a share, $17,650; 3¢ in 1919; none since. Total is $34,726.

Property: 8 claims, Crown-granted, 370 acres, 2 miles N. of Ainsworth, Claims on the west side of Lake Kootenay, extend west from shore about 2 miles.

Ore: lead, zinc and silver in E. W. fissure veins and replacement deposits in quartzite and slate. Three ore-shoots have been developed, one said to have over 400′ of commercial ore. Milling ore said to contain 7.4% lead, 7% zinc, 11% iron, and 2.5 oz. silver.

Development: the main working tunnel (N.-S.) is 3,600′ long. It is connected by raises with No. 2 tunnel, 360′ above; the latter is 2,400′ long and has over 10,000′ of workings at average depth of 700′. No. 3 and 4 levels have about 700′ of workings. Company states that it has 600,000 tons of ore blocked out that average 14% lead, 10% zinc, and 4 oz. silver.

Equipment: includes 250-h. p. compressor, 350-h. p. hydro-electric plant, and 1,800′ aerial tram from No. 3 tunnel to the mill. The 300-ton concentrating mill on the shore of Kootenay lake was completed May 1, 1917. Water power is developed at Woodberry creek, under 350′ head. A 500′ surface tram runs from tunnel portal to terminus of an 1,800′ aerial tram that runs to the mill. A 40-h. p. gasoline motor hauls ore in 10-car trains.

Production: 1,800 tons of concentrate in 1920, valued at about $70 per ton net at smelter. Labor trouble and low price of lead affected the 1920 output. Toward end of 1921, shipments averaged 69.8% lead and 14 oz. silver per ton.

FORT STEELE OPERATING CO. **BRITISH COLUMBIA**

Address: care Carl Comple, Detroit, Mich., or Fort Steele, B. C.

Is the operating company for **Victor Silver Leaf Mng. Co.**, which see.

FORTY-NINE MINING CO., LTD. (THE) **BRITISH COLUMBIA**

A subsidiary of the Alaska-British Columbia Metals Co., which see.

Offices: 730 Rogers Bldg., Vancouver, B. C., and 135 Broadway, New York. Harry Howsen, mgr., Stewart, B. C.

Officers: S. I .Silverman, pres.; H. B. Price, v. p., 227 Pemberton Block, Victoria, B. C.; Silas P. Silverman, sec.-treas., 701 Rogers Bldg., Vancouver, B. C., with C. F. Caldwell and O. B. Bush, directors.

Inc. March, 1919, in British Columbia. **Cap.** $1,500,000; par $1; outstanding 100,000 shares. Registrar and transfer agent, U. S. Corporation Co., New York City. Listed on New York Curb. Sales $5 high, $1 low, 1919.

Property: 7 claims and 2 fractions, Crown-granted, on W. slope of Mt. Dillworth, in Salmon River section, Portland Canal division, 20 miles N. E. of Stewart, B. C., or Hyder, Alaska. There are 2 parallel veins, the larger of which is 30′ wide and said to average 21 oz. silver and $20 gold.

Development: by opencuts and 2 tunnels, with a total of 400′ of underground workings. See Vol. XIV for earlier work.

Work was continued during 1920, but was suspended in 1921, to await completion of roads and adjustment of labor trouble.

GABBRO COPPER MINES, LTD. **BRITISH COLUMBIA**

Address: Geo. E. Winkler, pres.-mgr., Box 1460, or 420 Sayward Bldg., Victoria, B. C. **Mine office:** Jordan River, B. C.

Property: on west coast of Vancouver island, in Jordan River section of New Westminster division, adjoins the Sunloch, is said to have good surface showings.

GALENA MINING & MILLING CO. BRITISH COLUMBIA

Address: J. B. Clark, sec., 1519 - 9th St., Spokane, Wash., or 542 First Ave. So., Seattle, Wash. **Mine address:** Silverton, B. C.

Company was formed to take over the Galena silver-lead-zinc mine in the Silverton section, Slocan division. The estate of the late Patrick Clark of Spokane holds 75% of the stock, and the A. W. McCune interests in Salt Lake City hold the remainder.

Development: exploration opened up orebody said to be 11 to 14' wide, as disclosed in raises 150' apart on the intermediate level. Ore said to be worth about $20 a ton.

Equipment: includes a 150-ton concentrator, with daily output of 35 tons concentrate. Recovery is 90% lead on tables and 80% zinc by flotation. Rolls and Huntington mills do the crushing.

Leased to James Casey early in 1919, but now closed down.

GAMBLE MINING CO., LTD. BRITISH COLUMBIA

Address: Main St., Kimberly, B. C.; H. S. Gamble, pres.; N. W. Burdett, sec.; R. E. Beattie, mgr., Cranbrook, B. C.

Property: placer claims on Wildhorse creek in the Fort Steele mining division, E. Kootenay district. A monitor was operated during the summers of 1919, 1920 and 1921.

GENERAL MINING, MILLING & LEASING CO. B. C.

No recent information; probably idle. Described in Volume XIV, which see.

GEORGIA RIVER MINING CO., LTD. BRITISH COLUMBIA

C. H. Dickie, Duncan, B. C., chief owner.

Property: an option on 8 claims on Georgia River, Salmon River section, Portland Canal division, 17 miles from Stewart, shows free milling gold ore, said to run $100 per ton. Ore occurs in a 20' quartz vein running E.-W. and an 18" fissure vein having a N.-S. course.

Development: by 700' tunnel and 40' winze. Considerable work planned for 1921.

GIBSON MINING CO., LTD. BRITISH COLUMBIA

Jas. H. Doyle, Nelson, B. C., liquidator.

Address: King George Hotel, Kaslo, B. C., or D. K. May, mgr., 226 Rookery Bldg., Spokane, Wash.

Officers: F. E. Archer, pres.; S. C. Warr, v. p.; E. H. Latham, sec.-treas., with D. P. Cosgriff and W. H. Phillips, directors.

Cap. $2,000,000; par 10c, outstanding July 1, 1921, 1,421,963 shares issued.

Annual report, year ended July 1, 1919, shows: receipts from stock sales, $82,152; from ore sales, $803; accounts payable, $16,930; total expenditures, $112.092.

Property: 7 claims, 260 acres, on So. Fork of Kaslo creek, Ainsworth division, 12 miles W. of Kaslo, and 7 miles from Zwicky on the C. P. R. R. Sulphide ore occurs as a contact deposit in schist and slate. Pay shoots from 40-120' long said to average 12% lead, 16% zinc and 9 oz. silver.

Development: by 4,000' of tunnels on two veins to depth of 700'. Present company shipped 21¼ tons in 1918, averaging $45 per ton. Idle since July, 1919, owing to litigation. Further development considered necessary to prove value of the property.

GLACIER CREEK MINING CO., LTD. BRITISH COLUMBIA

Probably dead. Property in Portland Canal region is described in Volume XIV.

GLEANER MNG. & MLG. CO. BRITISH COLUMBIA

Address: Gleanerville, Atlin, B. C.

Property: 3 and a fraction claims in Taku Arm section, Atlin division, adjoining the Engineer mine on E., shows 5 quartz veins carrying native gold and pyrite. Idle in 1920.

GLENORA MINING CO. **BRITISH COLUMBIA**

Subsidiary of **Alaska British Columbia Metals Co.**, Alaska Bldg., Seattle, Wash.

Cap. 600,000 shares of which A. B. C. Metals owns, or controls 300,000 shares of 500,000 issued.

Property: the Carson Coulter group, 150 acres, at Glenora, on the Stikine river, Stikine division, not far from holdings of Stikine Mng. Co., covers 4,500' on strike of vein. The ore carries pyrrhotite and chalcopyrite and is said to have assayed 8% copper and $4 in gold and silver per ton at the surface. Idle for a number of years.

GOLD CURE MINING CO. **BRITISH COLUMBIA**

Officers: Chas. F. Caldwell, pres., Kaslo, B. C.; J. F. Blake, v. p.; Clarence Marsh, sec.-treas., 314 Dalton St., Spokane, Wash., with A. G. Copeland, directors.

Inc. in 1917, in British Columbia.

Property: 7 claims on South fork of Kaslo creek, Ainsworth division, said to show several veins of silver-lead ore from which high grade ore was shipped in the early days.

Development: by tunnels. No recent report, presumably idle.

GOLDEN CANYON GOLD & SILVER MNG. CO., LTD. **B. C.**

Officers: W. J. McMillan, pres.; Peter Hamilton, v. p.; with R. J. McMillan, all of Vancouver.

Property: in Slocan region, said to show ore assaying as high as 60% antimony.

Development: several hundred feet of tunnels. Shipments total 100 tons. No recent information; probably idle.

GOLDEN GRANT MINES, LTD. **BRITISH COLUMBIA**

Address: A. Martin, sec., 305 Pemberton Bldg., Victoria, B. C. **Mine address:** Cardon Landing, B. C.

Property: Giant mine at Spillimacheen, Golden division, E. Kootenay district, is reported to have a considerable amount of low grade silver-lead-zinc ore in sight. Idle 1919-'20.

GORDON BAY MINES, LTD. **BRITISH COLUMBIA**

Idle.

Property: the Blue Grouse group on Cowichan lake, New Westminster division, was operated by Cons. M. & S. Co., and some 4 to 5% ore mined. Option was relinquished in 1919.

GRANBY CONS. M. S. and P. CO., LTD. **BRITISH COLUMBIA**

Offices: 718 Granville St., Vancouver, B. C., and 25 Broad St., New York. Mines at Hidden Creek, B. C., and Valdez, Alaska; and other places in B. C. and Alaska. Smelter at Anyox, B. C.

Officers: W. H. Nichols, pres.; J. T. Crabs, W. H. Robinson, and Edwin Thorne, v. p.'s; Henry Bruere, B. Hochschild, W. A. Paine, J. B. F. Herreshoff, E. P. Earle, R. P. Butchart and Chas. Hayden, directors; Edward Everett, sec.; H. Harvey, asst. sec.; Valentine Quinn, treas.; L. R. Thomas, asst. treas.; H. S. Munroe, gen. mgr.; J. A. Bancroft, asst. gen. mgr.

Inc. March 29, 1901, by special act of the British Columbia Parliament. **Cap.**, originally $15,000,000; shares $10 par; changed, 1906, to $100 par, increased to $20,000,000 in February, 1914, to provide for conversion of bonds, $15,000,420 outstanding. **Bonds:** authorized February 25, 1913, $5,000,000 first mortgage, 6%, 15-year, convertible at par; June 30, 1919, $1,799,800 series A, of which $931,900 are stamped bonds; dated May 1, 1913. Series A bonds are convertible until May 1, 1923, at holders' option, into stock at par with cash adjustment of accrued interest and current dividend. Bonds of general issue redeemable at 105 plus interest after 10 years. 4% to be retired by purchase at $110, annually; outstanding, Dec. 31, 1920, $1,503,400. Capital increased to $25,000,000 in February, 1920, also bonds increased by $2,500,000, 8%, underwritten by Hayden, Stone & Co. Shares listed on New York and Boston Stock exchanges. Range of shares during 192(

was $55½ high and $15⅛ low, with total sales of 36,056 in New York; in 1921 range was $31¾ to $15 with sales of 40,250.

Boston Safe Deposit & Trust Co., and Lincoln Trust Co., New York, registrars; American Trust Co., Boston, and Title Guarantee & Trust Co., New York, transfer agents; registrar of bonds, Title Guarantee & Trust Co., New York; trustee of bonds, Columbia Trust Co. and Central Union Trust Co., New York. Annual meeting, first Tuesday in May.

Company was organized to purchase the property and assets of the old Ironsides Mining Co., Knob Hill Gold Mining Co., Ltd., Gray Eagle Gold Mining Co., Ltd., Granby Consolidated Mining & Smelting Co., Ltd., and the Grand Forks Water & Light Co., at an aggregate cost of $12,097,030. Stock to the amount of $1,402,970 was issued for cash and services rendered.

Comparative General Balance Sheet, years ending June 30 to 1919, then Dec. 31:

Assets.

Year	Prop.and Equipment	Invest-ments	Supplies Accts.|Rec.	Cash, Ore and Metals	Total
1920	$18,312,336	$1,070,169	$2,308,498	$3,215,357	$24,906,360
1919	17,597,917	743,370	5,608,312	83,774*	24,033,374
1918	15,220,344	630,412	7,920,190	66,897*	23,837,843
1917	22,315,637	683,230	6,448,063	.....	29,447,931
1916	20,366,316	575,644	1,041,012	2,927,317	24,910,288
1915	19,965,755	430,517	568,465	1,756,543	22,721,281

* Cash only.

Liabilities.

	Capital Stock	Bonds	Current	P. & L. Surplus	Total
1920....	$15,000,420	$3,991,400	$5,417,242	$497,298	$24,906,360
1919....	15,000,420	1,799,800	6,108,744	1,124,409	24,033,374
1918....	15,000,420	2,039,800	3,368,206	3,429,418	*23,837,843
1917....	15,000,420	2,514,000	1,242,806	9,434,038	29,447,931
1916....	14,998,520	3,042,300	281,997	6,587,471	24,910,288
1915....	14,998,520	3,390,000	664,680	3,668,087	22,721,281

* Includes $1,256,267 reserve for depletion of ore and plant.

Comparative Income Account, years ending June 30 to 1919, then Dec. 31:

Year	Gross Sales	Total Expenses	Int. Deprec.	Net Income
1920.....	$6,684,123	$6,718,169	$652,965	$687,011†
1919.....	6,455,000	6,660,054	120,884*	219,879†
1918.....	11,522,472	7,519,492	131,325*	3,542,624
1917.....	12,259,185	7,022,402	211,532*	5,025,251
1916.....	11,370,500	7,262,879	288,325	3,819,295
1915.....	5,053,886	3,713,329	411,393	929,164
1914.....	4,504,766	3,882,695	182,520	439,551

*Bond interest paid. †loss.

Figures for last 6 months of 1919 are not available.

Dividends for years ended June 30:

$133,630.....	1903	$270,000.....	1909	$1,049,895.....	1916
339,991.....	1905	248,481.....	1910	1,499,848.....	1917
1,620,000.....	1906	449,955.....	1913	1,499,848.....	1918
1,215,000.....	1907	449,955.....	1914	562,500.....	1919
540,000.....	1908	449,955.....	1915	Total.....	$10,329,038

None paid in 1920 and 1921.

Property: includes original Granby group at Phoenix in the Boundary district, B. C.; the Hidden Creek mine on Granby bay, Observatory inlet, B. C.; Copper Key and Belcher groups at Belcher mountain, Wash.; the Oversight group; the Bonanza Creek mine; 30 quartz claims on Granby Penin-

sula; Mamie and Dean mines on the Kasaan Peninsula; the Midas mine at Valdez, and the It mine adjoining the Dean on Prince of Wales island.

In the Portland Canal district is the limestone quarry, which supplied 41,000 tons in 1919.

Company also owns a large interest in a coal mine and coking plant at Crows Nest Pass, and a 100,000-h. p. water power site at Kettle Falls. The smelter at Grand Forks, operated since 1901, was closed down June 20, 1919. Company also owns the Cassidy coal mine of over 800 acres at Nanaimo, on Vancouver island, 70 miles N. of Victoria.

The Phoenix Mines

The Granby or Knob Hill properties at Phoenix, B. C., 43 claims and fractions, 1,050 acres. Mining operations were stopped June 14, 1919, and plant completely dismantled by end of 1920. The mines still show 2,513,636 tons of low grade ore, of which amount about 500,000 tons is available. The geology and development are described in Vols. XIII and XIV.

Grand Forks Smelter: blown out in 1919 and by end of 1920 was being dismantled. Plant is described in Vol. XIII.

Hidden Creek or Anyox Mines.

Address: E. E. Campbell, supt., Hidden Creek, B. C.

The Hidden Creek mine is located on Granby (formerly Goose) bay, Observatory inlet, south of and parallel to Portland canal. It is probably the largest copper mine of British Columbia. The 9 claims cover the top and sides of a hill 920′ high, enclosed by 2 branches of Hidden creek and 2 miles from Anyox, the smelter site and seaport town of the company.

Geology: the ore occurs as a mass of solid sulphides, pyrite and chalcopyrite, or mixed with country rock in shear zones, in crushed and schistose argillite. The rocks are folded and mashed but are part of the cover of the great granite mass forming the Coast range. There are 2 deposits, one 25 to 40′ wide, traced 1,400′, the other estimated to be 100′ wide and of unknown length. Development by diamond drill holes shows the ore to extend 500′ below sea-level, a vertical distance of 1,450′ below outcrop.

Development: by tunnels, and shaft totaling 45,000′. Diamond drilling totals 109,805′. During 1920, development of all kinds was confined to a minimum, resulting in decrease of ore reserves.

Production: in 1921, amounted to 914,000 tons as compared with 807,083 tons in 1920. Reserves on Dec. 31 estimated to be 10,986,420 tons high grade and 10,339,085 tons low grade ore. Plans are underway to construct a concentrating plant to treat both the low grade and certain ores which are two siliceous for economical pyritic smelting.

Alaskan Mines

Operations were suspended in 1918 due to shortage of transportation facilities and mines have since remained idle because of general economic conditions. Ore shipments, however, continued into 1919. The Midas mine at Valdez has reserves of 140,138 tons of ore; grade is not given, but 1917 shipments averaged 3.24% copper, 0.476 oz. gold and 0.32 oz. silver. The last shipments from the Mamie and It mines averaged 1.90% and 4.89% copper, respectively.

Anyox Smelter: this is the company's headquarters and chief plant. There are 4 furnaces, 54″ wide and 30′ long, making it the largest pyritic smelter in the world, treating about 3,000 tons daily. Company has laid out a town, installed water works, electric plant, graded streets, built stores, hospitals, etc. To supply fuel for the smelter, coal is brought from Vancouver Island and made into coke at Anyox, in a plant completed in 1919. By-products are saved. The works were described in "The Canadian Mining Journal" of November 26, 1919; also in the Annual Report of the Minister of Mines of British Columbia for 1919.

In 1920, the plant treated 796,150 tons of ore, of which 47,070 came from outside sources.

During 1921 there were 930 men employed at Anyox.

Production: for years ending June 30, to 1919; then Dec. 31, except 1916, which is for nine months ending March 31.

Year	Tons (a) Ore	M'ng Cost	Sm. Per ton	Total per ton	Lb. Cu.	lb. Copper	Oz. Silver	Oz. Gold	Value Ore
1921 (9 mos.).....	.....	.....	.....	.....	.....	27,292,178	[illegible]	2,178	[illegible]
1920.....	749,090	.....	.....	.....	.....	25,744,447	[illegible]	[illegible]	[illegible]
1919(d)....	367,276	.....	.....	.....	.....	[illegible]	[illegible]	[illegible]	[illegible]
1919.....	997,294	.....	.....	$5.03	27.97	11,260,585	[illegible]	[illegible]	[illegible]
1918.....	1,475,637	.....	.....	.....	29.15	27,637,258	[illegible]	[illegible]	[illegible]
1917.....	1,490,804	$1,348	1.926	3.274	25.27	44,685,001	[illegible]	[illegible]	[illegible]
1916.....	1,929,205	0.990	1.300	2.290	22.36	37,676,368	[illegible]	[illegible]	[illegible]
1915.....	1,098,020	0.850	1.190	3.180	23.99	43,178,083	[illegible]	[illegible]	[illegible]
1914.....	1,289,000	0.800	1.220	2.730	16.89	26,638,912	[illegible]	[illegible]	[illegible]
1913.....	1,279,869	0.750	1.210	2.650	17.68	23,330,097	[illegible]	[illegible]	[illegible]
1912.....	739,519	0.770	1.260	2.900	18.91	13,231,121	[illegible]	[illegible]	[illegible]

Custom ore is not included in the figures after 1917.

(a) In 1916, custom ore amounted to 1½% of total ore treated.

(b) After crediting gold and silver. (c) Estimated.

(d) July to December inclusive. (e) Includes custom ores.

Granby is a great and well managed company. Expenditures in recent years on equipment exceed $5,000,000. Operations in 1920 were confined to Anyox and the supply of coal and coke. Company's surplus will probably show a further reduction for the year 1921, and additional funds may have to be found to carry the comparatively recent capital investment and to tide it over the present economic depression.

GREAT CARIBOO GOLD CO. **BRITISH COLUMBIA**

See **Lightning Ck. Gold Gravels & Dr'n'ge Co.**

GREAT OHIO COPPER MINE **BRITISH COLUMBIA**

Sargent & Munro, owners, New Hazelton, B. C.

Property: adjoins the Butte Rocher De Boule mine and is operated by Jennings and Trimble, under lease and bond. A well defined fissure vein in granodiorite, traceable at surface for 700', carries an orebody 4' wide, giving assays of 22.5% lead, 9.5% copper, 134 oz. silver, 8.6% zinc and 0.04 oz. gold.

Development: by 355' tunnel, open cuts and drifts. Ore occurrence and conditions are similar to those in the Rocher De Boule, but further development necessary to determine value of mine. No recent information.

GRIBBELL ISLAND COPPER CO. **BRITISH COLUMBIA**

Office: 203 First National Bank Bldg., Bellingham, Wash. Mine at Gribbell Island, Skeena division, Cassiar district. Idle since 1906, owing to lack of funds. Fully described, Vol. XI, Copper Handbook.

GUINDON MNG. & MLG. CO. **BRITISH COLUMBIA**

Address: care Frank Guindon, Moyie, B. C.

Property: at Moyie lake, Fort Steele division, E. Kootenay district. Ore is silver-lead.

HARRIS MINES, LTD. **BRITISH COLUMBIA**

Address: W. A. Harris, New Hazelton, B. C.

Property: American Boy mine on 9-mile Mtn., Omineca division, 5 miles N. of New Hazelton. Ore occurs in fissure veins, 6"-3' wide, in tuffaceous sediments, containing galena, sphalerite and tetrahedrite in a siliceous gangue.

HEDLEY GOLD MINING CO., LTD. **BRITISH COLUMBIA**

A Canadian re-incorporation, 1918, of the Hedley Gold Mng. Co.

Offices: 25 Broadway, New York; and Hedley, B. C.

Officers: I. L. Merrill, pres.; W. B. Dickson, v. p.; J. D. Clarke, sec.-treas., with W. D. Thornton, E. C. Congdon, G. E. Tener, G. P. Jones, Geo. G. McMurty, Marcus Daly, and W. E. Corey, directors. G. P. Jones, gen. supt., Hedley, B. C.

Inc. 1913, in British Columbia, as successor to the Yale Mining Co. **Cap.**, $2,400,000; shares $10 par; all issued. Guaranty Trust Co., New York, transfer agent; Mechanics & Metals Nat. Bank, New York, registrar. An-

nual meeting, second Wednesday in April, at Hedley, B. C. Listed on New York Curb.

Comparative Statement of Income Account:

Year	Rec. at Mill	Expenditures	Profits(a)	Dividends	Surplus	Ernge. on Cap. Stock
1920	$324,985	$326,926	(b)$1,940	.....	$6,379	....
1919	509,840	478,098	31,742	$48,000	8,320	$0.13
1918	690,711	558,133	132,578	108,000	24,578	0.55
1917	737,840	499,745	238,095	240,000	441,783	1.98
1916	711,997	463,380	248,617	240,000	443,688	2.07
1915	796,591	421,846	374,745	300,000	74,745	3.12
1914	797,341	409,112	388,229	300,000	88,229	3.23
1913	802,330	397,075	405,255	360,000	45,255	3.38
1912	748,133	362,253	385,880	360,000	25,880	3.22
1911	.....	.....	318,152	300,000	18,152	2.65

(a) Includes interest earned. (b) deficit.

Comparative General Balance Sheet, Dec. 31:

Assets.

Year	Property Account	Current Assets	Total
1920....	$2,222,547	$216,448	$2,438,995
1919....	2,222,547	134,697	2,447,245
1918....	2,222,548	217,516*	2,440,064
1917....	1,494,364	147,418	1,641,783
1916....	1,487,018	156,670	1,643,688
1915....	1,439,542	195,528	1,635,070
1914....	1,394,275	166,049	1,560,324

Liabilities.

Year	Capital Stock	Undivided Profits	Total
1920....	$2,400,000	$6,379	$2,438,995
1919....	2,400,000	8,320	2,440,064
1918....	2,400,000	24,578	2,440,064
1917....	1,200,000	441,783	1,641,783
1916....	1,200,000	443,688	1,643,688
1915....	1,200,000	435,070	1,635,070
1914....	1,200,000	360,325	1,560,325

* Includes supplies, etc., $189,585.

Dividends:	Amount	Rate %
1909.....	$030	3
1910.....	1.40	14
1911.....	2.50	25
1912.....	3.00	30
1913.....	3.00	30
1914.....	2.50	25
1915.....	$2.50	25
1916.....	2.00	20
1917.....	2.00	20
1918 old Co.....	0.30	3
1918 new Co.....	0.45	4½
1919.....	0.20	2
Total		$2,484,000

In September, 1919, quarterly dividend was passed to conserve surplus for development. None in 1920 and 1921.

Property: the Nickel Plate and Sunnyside mine, 31 claims Crown-granted, and mill site, 1,370 acres in all, on Nickel Plate Mountain, and in Similkameen Valley, Osoyoos mining divison, Boundary district, Hedley, B. C. Also owns the Copper Flat property near Silver City, N. M.

Geology: the Hedley ore deposits are of contact metamorphic origin, and occur at contact of dikes and sheets of gabbro in altered limestone; they are irregular in outline, usually have a well-defined boundary on the side of the gabbro, and dip about 24°. Ore occurs in shoots. Nickel Plate shoot is 150′ wide, 40′ thick, and 1,500′ long. Principal ore mineral is arsenopyrite, with which occurs chalcopyrite, pyrrhotite, sphalerite, pyrite, gold and sometimes tetradymite; the valuable content of the ore is gold alone. In the association of gold with arsenopyrite in deposits of this origin the Nickel Plate ore deposits are unique and have no known counterpart in North America, excepting perhaps the White Caps at Manhattan, Nevada.

Development: 2 tunnels, 900′ and 1,160′ long and a 35° incline shaft, 1,000′ deep. Greatest depth of workings are at 5,200′ elevation, 670′ below the outcrop. Shrinkage stoping is used, and no timbering required. New work in 1920 amounted to 690′ and 2,210′ of diamond drilling. Management plans to spend $35,000 in additional drilling and development work.

Reserves: Jan. 1, 1920, were 100,000 tons of $9.15 ore, 95,000 tons of $7 ore and 70,000 tons of $6 ore. The 900′ level has the highest grade ore, and which is said to extend lower so that deeper development will give in-

creased reserves. On account of high prices the mill was closed during winter (1919-20); and development work only carried on.

Ore is transported from the mines to the mill at Hedley by means of electric and gravity tramways. The former is 1 mile long, while the 45° gravity tram is 10,000′ long, with a 4,000′ drop.

Equipment: includes an air hoist, two compressors, each of 2,000 cu. ft. capacity and driven by 440 h. p. motors; also a 200-ton 40-stamp mill equipped with 24 Frue vanners and 12 Deister tables.

Electric power supplied by company's hydro-electric plant on the Similkameen river, with 2,100 h. p. twin turbines. Powerhouse has a 1,250 k. v. a. alternating current generator. Total cost of plant, $192,000, charged to capital account.

Recent production:

	Ore Tons	Ave. Assay	Gold Rec.	% Rec.
1920.....	38,053	$ 8.72	$324,985	87
1919.....	62,907	9.17	509,840	88
1918.....	67,313	10.34	690,711*	90.00
1917.....	71,207	11.29	737,840*	90.00
1916.....	73,491	10.65	711,997	....
1915.....	74,625	11.65	796,592	....
1914.....	78,494	10.80	797,340	94.09
1913.....	70,796	12.03	802,330	94.14
1912.....	70,455	11.19	748,133	....

* Including sale of arsenic to Tacoma Smelting Co., recovered in concentrates.

Conditions in the lower levels of the mine have changed considerably during the past four years. While the orebodies are larger and stronger and maintain practically the same grade, the specific gravity has increased due to an increase in arsenopyrite, which adds to the cost per ton of ore milled. Concentrate tonnage rose from 3,831 tons in 1913 to 6,218 tons in 1915, and to offset this increase in costs the company installed a cyanide plant. War conditions during 1918 prevented extensive development and not enough new ore was opened to replace the amount milled. Hedley is a good property well managed.

The mine was operated from March to October, 1920, and was to be reopened July, 1921.

HELLSGATE MNG. CO., LTD. **BRITISH COLUMBIA**

Address: Ashcroft, B. C.

Property a: number of claims in Thompson river valley, Ashcroft division, near Spence's Bridge, shows gold-bearing alluvial deposits.

HERCULES MINES, LTD. **BRITISH COLUMBIA**

Address: F. M. McLeod, mgr., 803 Dominion Bank Bldg., Vancouver, B. C., and R. G. E. Deckie, supt., Canada Life Bld., Vancouver, B. C.

Officers: F. M. McLeod, pres.-sec.; Albert T. Craig, v. p.-treas.; with R. G. Ed. Leckie and Wellington Beaton, directors.

Inc. 1909, in British Columbia. **Cap.** $1,000,000; $1 par; 598,751 shares outstanding.

Property: 3 patented claims, 157 acres at head of Salmon river, Portland Canal division, 13 miles N. of Stewart. The outcrop has been traced for 2,000′. In 1910, a vein from 5 to 30′ wide was found in greenstone-schist. The ore carries galena, chalcopyrite, gold and silver. Work to be resumed, 1922. A prospect.

HEWITT-LORNA DOONE MINES **BRITISH COLUMBIA**

Address: R. Insinger, owner, P. O. Box 2,181, Spokane, Wash.

Property: 12 Crown-granted claims, 1,200 acres timber, and a 125-ton flotation mill, located at Silverton, in Slocan division. Ore is lead-zinc.

Development: by tunnels to depth of 1,200′. Some development work done in 1918-19, under lease, by Clarence Cunningham. In a suit brought

against Cunningham for non-fulfillment of contract, Insinger was awarded a sum equal to the amount of development work agreed upon but not completed by the defendant. The property is closed down.

HIGHLAND VALLEY MINING & DEVELOPMENT CO. **B. C.**

Fully described in Vol. XIV. Company reorganized in 1921 as **Ashcroft Copper Co., Ltd.**, which see.

HOBSON SILVER LEAD CO. **BRITISH COLUMBIA**

Address: C. H. Harvey, Paulsen Bldg., Spokane Wash., and Ymir, B. C.

Officers: George T. Reynolds, pres.; W. L. McEachren, v. p.; W. B. Ward, Jr., sec.-treas., Fort Worth, Texas; C. H. Harvey, asst. sec. and treas.; preceding with J. C. Buchanan, F. R. Monfort and W. A. Buchanan, directors.

Inc. 1911, in Washington. **Cap.** $1,500,000; $1 par: outstanding 1,286,571. Stock transferred at company's office. Annual meeting in January.

Property: Yankee Girl mine, 3 claims and 2 fractions, patented, 126 acres, on Dundee Mtn, at Ymir, Nelson division, said to show lead-zinc ore in fissure deposits in tongues of granodiorite, which extend into schist; strike N. E.-S. W.; dip 60°. Ore is said to assay $20 gold, 6.5 oz. silver and 5.5% lead per ton. The main vein, the Yankee Girl, drifted on for 3,000' in No. 4 tunnel, is 5' to 12' wide and shows 2 ore shoots, 50' and 300' long respectively.

Development: 4 tunnels, No. 1, 1,600' long; No. 2, 2,400' long and 400' below the surface; No. 3, 400' long and 175' below No. 2; No. 4, 4,300' long and 600' below No. 2, is driven in the footwall and for the first 1,160' nearly parallels the vein. The Yukon vein is probably same as main vein. Estimated to have 35,000 tons of probable ore. Total underground workings over 10,000'.

Equipment: includes 2 air compressors and a 6,000' tramway.

In 1918, shipments amounted to 8,847 tons ore, most of it going to the Canada Copper Corp.

Holdings were taken over in 1920 by **Texas Yankee Girl Mng. Co., Ltd.**, which see.

HOPP MINES (JOHN HOPP & CO.) **BRITISH COLUMBIA**

Address: M. Bailey, mgr., Barkerville, B. C., or John Hopp, 1617 4th Ave., W., Seattle, Wash.

Property: 3 hydraulic mines on Lowhee and Mosquito creeks, near Barkerville, Cariboo division. That on Lowhee is the most important producer. The season of 1921 is reported to have brought fair returns.

HORN SILVER MINES PARTNERSHIP **BRITISH COLUMBIA**

Address: E. W. Condit, mgr., 906 Vancouver Bl., Victoria, or Similkameen, B. C.

Property: Horn Silver mine in Similkameen division; developed by 2,000' of workings. Ore occurs in a vein said to be from 18" to 6' wide, with gold-silver values. Development work underway since 1919, the returns from shipments paying all expenses.

Production: about 1,000 tons of 40 oz. silver ore per year.

HOWE SOUND CO. **BRITISH COLUMBIA**

New York office: 665 Fifth Ave. **Mine office:** Britannia Beach, B. C.

Officers: Evander B. Schley, pres.; W. H. Gelshenen, v. p.; W. J. Quigly, v. p., with H. M. Hanna, Jr., G. H. Howard, C. E. Dunlap, Reeve Schley, Chas. G. Raynor, and K. B. Schley, directors. W. J. Walworth, v. p.-sec.; Emil Richter, asst. sec.-treas.; E. B. Schley, chairman executive committee; C. P. Browning, mine supt.

W. J. Quigly, gen. mgr., El Paso, Tex., A. L. Eaton, gen. mgr., at El Potosi property.

Inc. Aug. 22, 1903, in Maine. **Cap.** $3,000,000; $1 par; 1,984,150 issued. Bankers Trust Co., New York, transfer agent. Chase National Bank, New York, registrar. **Bonds:** $4,304,000, 20-year, 6%. There was authorized and

issued $5,380,000 to acquire El Potosi M. Co. Of this, $1,075,000 has been retired by sinking fund.

On Jan. 3, 1918, a voting trust agreement to terminate Jan. 3, 1923 or earlier, was entered into by holders of a majority of the capital stock and the voting trustees. To Dec. 31, 1919, 1,662,282 shares had been exchanged for Voting Trust Certificates that are listed on the N. Y. Curb. Shares sold in 1920, high 4½, low 2¼; in 1921 (July), high 2⅛, low 2, on N. Y. Curb.

Comparative Balance Sheet:

Assets

	1920	1919	1918
Mining property	$7,985,317	$7,859,350	$7,739,915
Plant, buildings, machinery	4,413,108	4,181,364	4,023,834
Investments	1,159,997	932,014	871,545
Inventory	467,980	528,464	622,974
Accounts rec.	64,523	557,487	431,529
Bonds—U. S., Canada, etc.	2,259,445	1,648,947	1,316,414
Cash	313,059	619,333	319,116
Other	649,714	702	10,086
Total	$17,313,144	$16,327,660	$15,355,404

* Includes production in transit, $766,397.

Liabilities.

	1920	1919	1918
Capital stock	$1,984,150	$1,984,150	$1,984,150
Bonds—20-year, 6%	4,035,000	4,304,000	4,573,000
Reserves	8,011,278	6,377,390	4,696,823
Profit and loss	2,933,305	3,220,381	3,597,848
Current	349,411	441,739	503,583
Total	$17,313,144	$16,327,660	$15,355,404

Comparative Profit and Loss Statement:

	1920	1919	1918
Smelter returns	$6,791,066	$6,936,069	$7,846,423
Miscellaneous income	233,261	143,012	179,571
Total income	$7,024,330	$7,079,081	$8,025,994
Mining, Transp., Mlg., Sm., & Mktg	4,716,163	5,021,527	5,480,673
Taxes	329,795	223,483	242,367
Admin. and extraordinary	131,208	.....	102,753
Depreciation and depletion	1,532,292	1,583,605	1,606,827
Interest	205,117	231,103	253,951
Balance	109,753	19,363	440,023

Dividends: 15c in 1918; 20c in 1919; 20c in 1920; 5c in 1921. Total, $1,190,490.

Company owns the entire stock issue of the Britannia Mining and Smelting Co., Ltd., which in turn owns the Britannia Power Co. and the Howe Sound Power Co. Howe Sound also owns 53,800 shares of the total issue of the El Potosi Mining Co., which, in turn, owns a large majority of the stock of the Chihuahua Mining Co.

In 1920, company acquired 172,857 shares, $1 par, of the Calera Mng. Co., a New Jersey corporation, owning property in Chihuahua, Mexico.

Britannia Mining & Smelting Co., Ltd.

Inc. in British Columbia. **Cap.** $2,500,000; $25 par; $2,299,150 issued.

Property: holdings at end of 1920 were 515 Crown-granted mineral claims and 17 beach lots of 23,943 acres; 31 mineral claims of 1,459 acres 10 timber licenses of 5,599 acres; a total of 30,992 acres. During the year 1918

$113,605 was spent for new property in prospecting, surveying, Crown granting, etc. The Britannia mine is subdivided into four divisions, known as the Fairview, Bluff, Jane, and Empress, all connected by underground workings. Company has also some claims 12 miles E. of Britannia Beach, on which $75,000 was spent in 1919.

Geology: the orebodies consist of a series of roughly parallel lenses of chalcopyrite and pyrite in schist, and large masses of silicious material through which chalcopyrite and pyrite are irregularly disseminated. All the orebodies developed thus far are confined to about 100 acres, the remainder of the company's holdings being undeveloped.

Development: by a main adit, 13'x9' and 4,712' long, crosscutting the mineralized zones at an elevation of 2,150' above the sea, on what is called the 2,200' level. The present productive workings are all above this main gathering and haulageway, connection being made by a blind main shaft with the 1,000' level on No. 1 vein, 3,900' from the adit portal, and by 2 raises, one reaching to the 1,000' level on No. 1 vein and the other (No. 68) to the 850' level on No. 3 vein. These raises are used for conveying ore from the upper workings, the latter, the more important, connecting with all levels between 850' and 2,200'.

Glory holes covering about 10 acres at the surface extend to the 250' level, from where ore is conveyed by winze to the 1,800' level and then transferred to raise No. 68.

Eventually mine will be operated from a main adit at the 4,100' level which will transport the ore direct to the mill; this adit was in about 4,000', April, 1921 and an upraise to reach the 2,700' level is being driven.

Workings aggregate about 40 miles. Little advance was made in the first half of 1920 and total for the year was 7,078' only; in addition there was 5,446' of drilling, of which 2,130' was done on the Victoria, a less well developed section of the property. The indications are that this section will add an entirely new tonnage to the ore reserves.

Ore Reserves: at end of 1920 were 4,951,510 tons, averaging 1.9% copper as compared with 5,298,555 tons in 1919. Broken reserves were 1,687,156, showing a decrease of 175,040 tons from those of 1919.

Equipment at the shaft includes a double-drum electric hoist on the 1,050' level and a Gates crusher in the rock-raise between the 1,050' and 2,200' levels, placed on the 1,800' level and run by a 75-h. p. motor. This raise, 200' east of and connected with the shaft, serves as a storage bin for ore, with capacity of 4,000 tons above the 1,800' level and 2,000 tons below the 1,800' level. The raise is lined with 12" by 12" timbers. Electric motors haul the ore from the chute to the portal of the tunnel. From the portal the ore is hauled 3 miles by electric railway to head of a 33% incline, 5,500' long, vertical drop of 1,450', which leads to the bins of the concentrator at the water's edge. Other similar raises, equipped with crushers, are driven in different localities to give flexibility to the operation.

By system of dams, intakes and pipe lines, Britannia creek has been harnessed to produce over 8,000-h. p. during most of the year. Work done in 1917, to develop Furry creek produces over 2,500-h. p., which will be increased by additional installations in the future. As reserve power, there is a steam turbine plant of over 3,000 h. p. capacity located at the beach.

Equipment: includes 8 compressors, some driven by water wheels, some by steam, and some by either steam or water-generated electricity, with total capacity of nearly 20,000 cubic feet of free air per minute.

The concentrating mill at Britannia Beach was treating about 2,500 tons of ore daily, when destroyed by fire, March, 1921. A new 2,500 ton concentrating plant to cost $1,000,000 is to be completed by mid-1922.

There are 2 townsites in connection with the company's operations, one at Britannia Beach, on the shore of Howe Sound, and the other, known as the Mine Townsite, laid out at the portal of the new tunnel. The Britt-

ania Beach settlement, destroyed 1921 by a snowslide, has been rebuilt on a new site. Shipments are made to the Tacoma smelter.

Production is as follows:

Year	Concentrate Tons	Copper Lb.	Gold Oz.	Silver Oz.	Total Value
1920.....	75,728	18,161,854	6,495	101,505	$6,791,666
1919.....	70,099	17,330,844	4,350	99,863	6,956,769
1918.....	63,655	18,322,482	3,045	98,131 (a)	7,840,423
1917.....	57,217	16,357,329	992	91,504	7,019,815
1916.....	.....	16,288,835	791	91,905 (a)	6,042,538
1915.....	.....	9,058,045	397	50,306	1,616,133
1914.....	.....	11,841,232	213	68,515	1,640,379
1913.....	.....	13,167,000	89	72,300	2,052,188
1912.....	.....	14,300,000	....	76,500	2,583,285
1911.....	.....	8,685,000	....	46,000	1,074,334
1910.....	.....	520,000	1,000	7,500	64,000

(a) includes lead and zinc values.

The Britannia proved a hard problem to handle for years, but has made money under the present management, which is thoroughly capable. A successful future seems certain, and the results are a tribute to the far-seeing judgment and persistency of Mr. E. B. Schley.

During 1921, 250 men were employed in development work which is reported to have materially increased the ore reserves.

HUDSON BAY ZINC CO., LTD. **BRITISH COLUMBIA**

Fully described in Vol. XIII. W. E. Cullen, sec., Hyde Bldg., Spokane, Wash.

IDAHO-ALAMO CONS. MINES, LTD. **BRITISH COLUMBIA**

Address: Clarence Cunningham, Alamo, B. C. **Mine address:** Sandon, B. C.

Property: Idaho-Alamo group, on Carpenter creek, Slocan division, said to show a considerable tonnage of silver-lead-zinc milling ore which is shipped to the Alamo concentrator.

IKEDA MINES, LTD. **BRITISH COLUMBIA**

Address: A. Ikeda, Ikeda Bay, Queen Charlotte Island, B. C., or S. J. Castleman, sec., 22 Imperial Bldg., Vancouver, B. C.

Inc. Sept., 1910 in British Columbia. **Cap.** $850,000; shares $1 par.

Property: the former holdings of the Awaya-Ikeda Co., Ltd., taken over for $200,000, include 42 claims, 2,100 acres, in several groups on Ikeda bay, at the southern end of Moresby island, 3 miles from Jedway, and connected therewith by government rail and telephone. Steamer connection is had with Vancouver, 450 miles distant. The principal or Lily group of 8 claims, 400 acres, was discovered May, 1898, by Arichka Ikeda, and developed by him until taken over by the present company, September, 1910.

Geology: the group shows limestone and slate cut by dikes of greenstone and diorite, having well defined flat fissures at right angles to and between the vertical main fissures. Ore occurs in a series of veins of 2 to 8′ width, the largest orebodies lying along the horizontal main fissure. The vein principally developed is of 5 to 30′ width, proven for 1,000′ in length and about 300′ in depth. The ore shoot, up to 20′ in width, carries lenses of chalcopyrite, averaging, as mined, about 2.5% copper, with a gangue of silicious country rock and occasional stringers of quartzite and limestone. The ore mined by the former owners averaged about 4% copper, 2.2 oz. silver and $2.25 gold per ton.

Development: the Lily mine has 4 tunnels connected by winzes. No. 3 tunnel, 940′ long, driven on the vein for 660′, has about 5′ of chalcopyrite of good average tenor and ends in a 40x50′ chamber from which considerable

ore has been stoped, the ore in the chamber apparently not being the same as that followed in the tunnel, lying about 45′ to the N. and found by crosscutting. Little new work was done in 1919.

Production: ore shipped to Granby smelter at Anyox:

Year	Tons	Copper, lb.	Gold oz.	Silver, oz.
1919.....	151	38,990	51	722
1918.....	358	83,384	77	987

A concentrating plant is needed to treat the lower grade ores in this mine.

INDEX MINING CO. **BRITISH COLUMBIA**

Address: E. J. Edwards, mgr., 3328 9th St., Spokane, Wash., or Kaslo, B. C.

Property: the Index mine on South fork of Kaslo creek, Ainsworth division, 14 miles from Kaslo, containing veins of silver-lead ore, in a highly metamorphosed zone of sedimentaries near granite. Faulting is frequent. Company controls the Flint Mng. Co., which see.

Development: by several tunnels, one being driven to cut the vein at a depth of 300′ below the upper workings.

Equipment: water-power under 250′ head, compressor, etc.

Shipment of $100 per ton ore reported in 1920.

INDIAN MINES CO., LTD. **BRITISH COLUMBIA**

Address: L. W. Patmore, sec., Prince Rupert, B. C.

Property: in the Salmon River section, Portland Canal division, 10 miles N. of Stewart.

Development: by opencuts and tunnels, exposing a quartz vein from 12 to 20′ wide and for a length of 2,000′, that carries galena, sphalerite and pyrite.

INLAND MINING CO., LTD. **BRITISH COLUMBIA**

Address: Walla Walla, Wash. **Mine office:** Granite Siding, Paulson and Nelson, B. C.

Officers: Albert Niebergal, pres.; J. F. Talabere, v. p.; Alfred Bachtold, sec.-treas.; with C. E. Nye, D. Donovan, H. Ibberson, and G. Magallon, directors. W. M. Myers, mgr.; H. D. Griswold, supt. at Paulson.

Inc. in Washington. **Cap.** $1,500,000; shares $1 par; non-assessable.

Property: all near Nelson, Grand Forks division, consists of the Inland gold mine, closed as being unprofitable: the Berlin gold-silver copper mine on Trail creek, under lease since 1918, to the **Griswold-Billingsley Co.**; the Eureka copper mine on Eagle creek, under option from the **Eureka Copper Mines, Ltd.**, since 1918; and the Granite-Poorman gold mine, acquired July, 1919, from the **Kootenay Gold Exploration Co.**, the latter reported under bond and lease to Bowness and Mahon, who are developing with five men.

Development: the Eureka and Granite-Poorman mines have been extensively opened by tunnels and shafts, exposing a considerable quantity of ore. A long crosscut has been driven in the Eureka to open the vein at depth.

Equipment: steam and electric power, compressors, hoists, pumps, aerial trams and 10 and 20-stamp concentrating plants with ball-mill.

Production: definite figures are not obtainable, but the Eureka has shipped several thousand tons of smelting ore, and the Granite-Poorman has been operating on and off for 30 years. Ore and concentrates are sent to the Granby smelter.

Company operations suspended for lack of funds, 1920-21.

INTERNATIONAL COPPER CO. **BRITISH COLUMBIA**

Address: A. C. Garde, mng. engr., Prince Rupert, B. C.

Property: the Bald Mountain group of 32 claims, 1,600 acres, on the N. part of Porcher island, Skeena division, 20 miles by water from Prince Rupert. Several ore-zones have been disclosed by shallow workings, one showing ore carrying 4% copper, 1 oz. silver and 0.04 oz. gold. This seam

was 12" across near the surface, widening at a depth of 25' to 48" with 6.2% copper. Little has been done since 1916. Climatic and economic conditions are considered good.

INTERNATIONAL DREDGING & EXPLORATION CO., LTD. B. C.

Address: 303 Jones Bldg., Victoria, B. C., or W. E. Loveridge, mgr., Harper's Camp, B. C.

Property: placer ground on Seven Mile creek, near Quesnel, Cariboo district.

INTERNATIONAL EXPL., DEV. & INVEST. CO., LTD. B. C.

Address: 209 Sherwood Bldg., Spokane, Wash. **Mine address:** J. W. Osborne, mgr., Eholt, B. C.

Officers: T. A. Farrell, pres.; S. A. Haynes, sec.-treas., with E. T. Smith, R. L. Smith and J. W. Osborne, directors.

Cap. $500,000; shares $1 par.

Organized to locate, acquire and develop prospects, eventually disposing of them to operating companies. A 3-year option for $60,000 was taken on 7 claims near Paulson, 17 miles from Grand Forks, and several claims were exploited 12 miles from Grand Forks. Idle at last account.

IRON MASK MINE BRITISH COLUMBIA

Owned by **Kamloops Copper Co.**, which see.

IRON MOUNTAIN, LTD. BRITISH COLUMBIA

Address. John Waldbeser, mgr., or R. W. Mifflin, sec., Salmo, B. C.

Property: the Jersey and Emerald mines in Sheep Creek camp, Nelson mining division. A 50-ton concentrator was completed in 1920. Shipments to Trail in 1919 amounted to 177 tons from the Emerald and 42 tons from the Jersey mine. The Emerald mine has been a shipper of lead-silver ore since 1906, with a total production of about 50,000 tons.

I. X. L. GOLD MINING CO. BRITISH COLUMBIA

Address: John S. Baker, Fidelity Trust Co., Tacoma, Wash.

Property: I. X. L. mine, adjoining the O. K. mine, and about 2½ miles W. of Rossland. Ore occurs in a fissure vein in serpentine, containing free-gold, copper, lead and iron. The mine is under 3-year lease from March 1921 to R. B. Shelledav and associates, of Rossland. A 1,700 lb. shipment of picked ore to the Trail smelter in September netted $2,887.

JACKSON BASIN ZINC CO. BRITISH COLUMBIA

Probably liquidated as property was acquired by **Utica Mines, Ltd.**, 1919.

JEWEL-DENERO MINES, LTD. BRITISH COLUMBIA

Secretary's office: W. Robertson, 71 George St., Edinburgh, Scotland. **Mine office:** Greenwood, B. C.

Directors: J. Galloway, chairman; J. E. Rogerson and W. W. Slater.

Inc. Nov. 22, 1912, in Edinburgh.

Cap. £70,000; shares 5s each; 279,400 shares issued. Authorized bond issue, £12,500, 8%; £11,202 issued.

Property the Jewel gold mine at Greenwood, developed to depth of 500' by shafts and crosscuts and started production in 1911. Produced 16,325 tons of ore in 1914, yielding £31,360. In 1915 only development work was done and in 1916 the mine was being operated by lessees. **Equipment:** includes a 15-stamp cyanide mill. Idle 1921-'22.

KAMLOOPS COPPER CO. BRITISH COLUMBIA

Lessee of Kamloops Mines, Ltd.

General office: 609 First National Bank Bldg., Duluth, Minn. **Mine address:** Kamloops, B. C.; E. G. Wallinder, supt.

Inc. Sept. 7, 1909, in Arizona. **Cap.** $3,000,000; shares $10 par, part paid, 128,561 issued, none preferred. First-mortgage bonds on Iron Mask mine amount to $210,000; and convertible 6% notes, $128,500.

Accounts for period of 2 years show revenue of $337,454 of which ore sales netted $109,330. Balance at end of September, 1916, was $77,572. Excess of current assets over liabilities was $33,840. No statement since.

Property: 10 claims, 2,041 acres, 228 acres mineral land, including the Iron Mask mine, 7 miles S. W. of Kamloops.

Geology: the Iron Mask shaft is sunk on a shear zone, mineralized for 20 to 30′ in width, with segregations of better grade ore forming a pay-streak of variable width, carrying chalcopyrite, associated with magnetite in a chloritic gangue, containing orthoclase intercrystallized with copper sulphide. The country rock is diorite with smeary basic patches of gabbroic material. The Iron Mask orebody averaged 28′ in thickness, and was lenticular in shape above the 690′ level; here it was cut off by a horizontal fault. It has been found below this level by diamond-drilling from the 750′ level and is being opened up. The ore is troublesome to concentrate by ordinary methods owing to its chlorite and quartz-orthoclase gangue.

The mine shows several orebodies besides the Iron Mask, all of them due to "igneous after effects," and occurring in fresh diorite, filling fissures as replacements along fissures and in patches, the ore consisting of orthoclase, chlorite, epidote and other secondary pneumatolytic minerals, with interlocked chalcopyrite, pyrite, magnetite, etc.

The Erin orebody shows excellent ore and numerous pits at various points on the property all show ore.

See Annual Report of Minister of Mines, British Columbia, 1915, for detailed description of geology, workings, etc. Examined by Walter Harvey Weed.

Development: includes the 780′ Iron Mask shaft and over 18,000′ of workings, on 9 levels; the 330′ Erin shaft sunk on ore for 300′ with 600′ of drifts and crosscuts; the 50′ Lucky Strike shaft and 3 other prospect shafts. Electric power is obtained from the City of Kamloops power-station. In 1917 and 1918, approximately 8,000′ of diamond-drilling was done.

Equipment: includes 300-ton flotation, mill, one 150-h. p. compressor, one 225-h. p. motor for the "Iron Mask" hoist and 8 smaller motors, 6′ double-drum hoist, 3 air compressors of 1,300 cu. ft. capacity, good for 15 drills, and electric-light plant and a sawmill. Transportation is by a good wagon road with steep grades, leading to the railway siding below Kamloops. The management plans a 2½-mile tram, having a drop of 1,100′. Power comes from an hydro-electric plant at Kamloops.

Idle D. Braithwaite, sec.-treas., Fairview, Boundary district, B. C.

Production: the mill was not operated to capacity during 1918, total shipments of copper concentrates amounting to 2,800 tons. Regular operations were conducted in 1919, employing 50 men. Concentrates shipped to the Tacoma smelter.

It is understood that the English corporation has extended the time for further payments on the property.

KAMLOOPS MINES, LTD. **BRITISH COLUMBIA**

Office: 151 Coronation House, 4 Lloyds Ave., London, E. C., Eng. Company in hands of trustees, as property is under lease and bond to the **Kamloops Copper Co.**

KEYSTONE DEVELOPMENT CO., LTD. **BRITISH COLUMBIA**

Address: Kaslo, B. C. **Mine address:** A. J. Harris, mgr., Zincton, B. C. Wm. Martin, pres.; W. J. Elmendorf, cons. engr.

Property: Charleston group of 6 claims in Ainsworth division, W. Kootenay district, near the Whitewater mine, developed by tunnels. The ore is silver-lead.

KING EDWARDS MINES, LTD. **BRITISH COLUMBIA**

Idle. D. Braihwaite, sec.-treas., Fairview, Boundary district, B. C.

Inc. 1904, in British Columbia. **Cap.** $500,000; shares $1 par.

Property: 10 claims, 500 acres, in the Similkameen district. Opened by 350′ of workings, said to show a sulphide orebody 6 to 10′ wide averaging 5% copper.

KING SOLOMON COPPER MINING CO., LTD. **B. C.**

Office: 206 Penfield Bldg., Philadelphia, Pa. Mine office: Cowichan, British Columbia.

Officers: A. S. Anderson, pres.; Philip Singleton, v. p.; Jas. Humes, v. p.-gen mgr.; J. K. Evans, sec.; H. A. Nolte, treas., with B. I. Foster and Geo. T. Storey, directors.

Inc. July 2, 1908, in British Columbia. **Cap.** $1,000,000; par $1; issued 685,005 shares.

Property: 133 acres patented claims, near Cowichan, Vancouver island, includes the King Solomon, Queen of Sheba and Koksilah claims, showing two fissure veins in syenite and diorite.

Development: by 700′ tunnel and two open quarries, 125 by 50′ and 50 by 70′. Operations confined to small amount of development work since 1917, pending construction of railway (C. Natl. R. R.)

Equipped with 65-h. p. steam engine, air compressor, saw-mill, houses, etc.

About 800 tons of ore shipped to Tyee smelter returned 8 to 9% copper, 1 oz. silver and small amount of gold. No production, 1917-20.

KITCHENER MINES, LTD. **BRITISH COLUMBIA**

Address: R. W. Harrison, Quesnel, B. C.

Operating a placer mine on Keithley creek, Quesnel division, Cariboo district. The channel has been attacked by drifts. Reported that pay gravel should be reached in the 1922 season.

KITSALAS MOUNTAIN COPPER CO. **BRITISH COLUMBIA**

Address: Usk, B. C.

Officers: J. D. Wells, pres.; Jesse Brooks, v. p.; A. J. Thomson, treas. and mgr.; Usk; with S. H. Davis, and Jas. Darby, directors.

Inc. in British Columbia. **Cap.** $500,000; par $1.

Property: 6 claims in Omineca division, one mile from Usk, with workings but 200′ above Grand Trunk R. R., shows several quartz veins opened by cuts and tunnels showing ore carrying argentiferous bornite and chalcocite, with free gold in both quartz and bornite.

Development: by 60′ incline and 400′ tunnel.

Equipment: includes a crusher, Gibson mill, Wilfley table, and gasoline engines. Shipments made to Tacoma smelter in 1919. Only development work done in 1920-21.

KLEANZA CO., LTD., THE **BRITISH COLUMBIA**

Address: John Willman, mgr., Usk, B. C.

Property: the Golden Crown claims on Kleanza Mtn., Omineca division, near Usk. Two quartz veins, stripped during 1919, showed gold and copper. The country rock is granite cut by lamprophyre dikes. Developing since 1919.

Company also engages in lumbering and sawmilling, and operates an hydro-electric plant. A concentrating mill is contemplated.

KOOTENAY BELLE GOLD MINE **BRITISH COLUMBIA**

Address: M. M. McCune, mgr., Sheep Creek, via Salmo, B. C.

A. W. McCune, Salt Lake City, in 1918, had a bond on this property together with the Queen Vancouver, and Alexander mining groups, in the Sheep Creek gold camp of the Nelson mining division. The Queen is credited with a past production of $1,300,000, and the Kootenay Belle, $100,000 in gold.

Properties had been idle several years, but new management started a 3,000′ crosscut tunnel and continued development to 1920.

KOOTENAY BONANZA MINES, LTD. **BRITISH COLUMBIA**

Office: 901 Vancouver Block, Vancouver, B. C.

Officers: W. Finch Page, pres., London, Eng.; A. E. Rand, v. p.; R. S. Lennie, sec.-treas.; preceding with A. C. Burdick and J. A. Hendry, directors.

Inc. in British Columbia. **Cap.** $3,000,000; shares $5 par; outstanding, $200,000. Company organized to take over the Silver King mine from the bondholders of the Hall Mining & Smelting Co., Ltd.; the claims of the Kootenay Development Syndicate, Ltd.; Dandy & Ollie Cons. Mines, Ltd., and of the Starlight Mines, Ltd., as well as other properties.

Silver King and Dandy groups of claims were sold to the Silver King Mines, Ltd. The company now holds 34 other claims, comprising the North Star, Great Western Starlight and Irene groups, comprising practically all the mineral area of Toad mountain, at Nelson.

Presumably idle.

KOOTENAY GOLD EXPLORATION CO. BRITISH COLUMBIA

Company defunct. Property acquired July, 1919, by **Inland Mining Co.**, which see.

LADYSMITH SMELTING CORPORATION, LTD. B. C.

Address: F. A. Sieberlings, Goodrich Tire & Rubber Co., Akron, Ohio. **Operating office:** Ladysmith, Vancouver Island, B. C. S. deWitt, sec.-treas., 2101 L. C. Smith Bldg., Seattle, Wash.

Property: 1,247 acres, including 13 claims, Crown granted 342 acres, a 45-acre smelter site and 800 acres timber lands. Owns the Ladysmith smelter, and mineral lands on Mt. Sicker, Vancouver Island, purchased from the Tyee Copper Co., in December, 1916, for $275,000. In January, 1920, 14 additional copper claims were acquired.

The Tyee mine, on Mt. Sicker, in the Somenos district, 11 miles N. W. of Duncans, and about 80 miles from Victoria, yielded only 1,200 tons of ore in 1907, and has been idle since. The orebody was rich, but shallow, and although it was explored thoroughly, nothing of value was found.

Smelter: known as the Ladysmith works, is well located, on a 45-acre site on Oyster harbor, and treated custom ores from as far N. as Alaska and as far S. as Mexico. The smelter was remodeled and practically rebuilt 1909-1910. There is a 40x210′ wharf, having an electric hoist, connected, by an elevated incline trestle, with the smelter bins, which are of 5,400 tons capacity. The works are terraced throughout, permitting handling of material by gravity, and have a capacity of 500 tons daily.

The furnace building has 42x120″ and 48x160″ Allis-Chalmers blast furnaces of 200 and 300 tons daily capacity, respectively.

Production: the smelter yield was 3,604,474 lb. copper in 1903; 5,045,000 lb. in 1904; 3,039,398 lbs copper, 103,474 oz. silver and 5,952 oz. gold in 1905; 3,173,431 lbs. copper in 1908, 2,148,058 lbs. copper in 1909; 45,758 tons of ore, yielding 3,392,901 lbs. copper, 41,128 oz. silver and 10,041 oz. gold in 1910; In 1911, 42,030 tons of custom ore were treated. Closed down 1911.

The 250-ton mill was remodeled and flotation installed, 1917.

In 1918, the smelter was in operation for 5 weeks and closed down because sufficient ore could not be obtained to keep even one furnace running.

Company is developing the Alaska holdings of **Latouche Copper Mining Co.**

LA FRANCE CREEK MINING CO. BRITISH COLUMBIA

Address: Sheep Creek, via Salmo, B. C.

Property: silver-lead-zinc claims on La France creek, Nelson division, difficult of access, but upon which $60,000 is said to have been spent. Several tunnels have been driven, 1,100′ in all, cutting ore at a depth of 600′.

LAKE SHORE MNG. CO., LTD. BRITISH COLUMBIA

Address: E. J. Edwards, 3328-9th St., Spokane, Wash. **Mine address:** Ainsworth, B. C.

Property: 12 claims, in Ainsworth division, between Highland and Florence Silver mines just N. of Ainsworth. Ore is silver-lead. Development consists of 200′ shaft and 600′ tunnel.

LANARK MINING CO. BRITISH COLUMBIA

Address: Illecillewaet, B. C.

Officers: Wm. B. Dornberg, pres. and mgr., Spokane, Wash.; Geo. L. Allen, v. p.; A. H. Blair, treas., Yakima, Wash.

Inc. in Washington. **Cap.** $200,000; par 10c.

Property: 16 claims in Revelstoke division, at Laurie, on the C. P. Ry., has produced considerable high-grade silver-lead ore. The main tunnel or 400′ level, is 700′ long; and the orebody has been mined out above this level.

A winze 140' deep with 180' of drifting, exposes the downward extension of the orebody.

Development: continued during 1919 and 1920, is reported to have opened up 2' of high-grade ore and 6' of milling ore at 1,000' depth.

Equipment: includes 250-h. p. hydro-electric plant to run the compressor, hoist, and concentrator.

LASQUETI ISLAND MINING CO., LTD. **BRITISH COLUMBIA**

Address: 708 Birks Bldg., Vancouver, B. C. or Hy. Lee, mgr., Lasqueti, B. C.

Officers: R. A. Mather, pres.; A. D. Tennant, v. p.; John D. Mather, sec.; Geo. E. Winter, treas., last accounts.

Inc. 1910. **Cap.** $500,000; shares 25c par.

Property: 3 claims, 150 acres, on Lasqueti island, Nanaimo division, at the S. W. end of Texada island, on the Gulf of Georgia, 55 miles from Vancouver.

Development: by tunnel, on 20' veins known as St. Joseph, having 4 paystreaks, of 6 to 24" width, said to carry ore averaging 10% copper and $20 gold per ton. Idle.

LEO MINING CO. **BRITISH COLUMBIA**

No record of operations since 1916. Described in Vol. XIV.

LE ROI No. 2, LTD. **BRITISH COLUMBIA**

Secretary's address: L. Rowell, 4 Broad St., Place, London, E. C. 2, England. **Mine office:** Rossland, B. C.

Directors: Lord Ernest Hamilton, chairman; A. B. Dealtry, L. W. Harris, H. G. T. Hawes and Major C. H. Campbell. Alex Hill & Stewart, managers and cons. engrs.; P. S. Couldrey, mgr.

Inc. June 1, 1900, in Great Britain. **Cap.** £600,000; £5 par; fully issued and fully paid. End of fiscal year changed from Sept. 30 to Dec. 31, 1920.

Dividends: 5s in 1901; 5s in 1902; 2s in 1904; 3s in 1905; 1s in 1912; 2s in 1915-16; 1s. in 1916-17; 1s in 1920. Total to end of 1920, £2 13s per share, or £318,000.

Report for 15 months ending Dec. 31, 1920, shows a loss of £12,181; previous balance, £21,088; 1920 balance after dividends was £3,576. Income from ore sales was £21,102 in 1919 and £23,392 in 1920.

Company owns the following stock interests: 15,700 shares, £1 par, in Cloncurry Synd.; 63,193 ord. shares, 1s par, and 10,483 pfd. shares, £1 par, in Van Roi Mining Co.; 447 shares, £1 par, in Dobbin and Cloncurry Mines Ltd. In addition, £16,022 have been advanced to these companies.

Property: the Le Roi II group, including the Josie, No. 1 and Annie mines, and 2 claims near the Velvet mine; and the Giant California claims acquired in 1914; all at Rossland in the Trail Creek division. Also 5 claims in Ymir camp, Nelson division.

Josie mine has 5 pyrrhotite veins containing chalcopyrite and pyrite. Output in 1919, averaged 14.99 lb. copper, 0.68 oz. gold, and 0.56 oz. silver per ton, with a gross value of $264,576 total, or $17.27 per ton for 15,317 tons, and in 1920 (15 mos.), 0.62 oz. gold, 0.71 oz. silver and 17.56 lb. copper, valued at $271,743, or $16.55 per ton for 16,422 tons.

Development: by the Josie main shaft to the 1,950' level, and by 3 tunnels, 2 on the Josie and 1 on the Poorman claim. During 1919, new work amounted to 1,316' of drifts, crosscuts and raises, also 3,535' of diamond drilling at a cost of $2.04 per foot, compared with an 1,114' advance for 15 months in 1920, plus 5,744' of drilling costing $3.06 per foot.

Management estimated 5,012 tons of broken ore in stopes, Sept. 30, 1919 and none of first class at end of 1920. The total footage of diamond drilling from 1902-1919 (incl.) is 120,762', at an average cost of $1.92.

Equipment: includes a 150-h. p. electric hoist, a machine shop, framing shop, smithy, superintendent's dwelling, etc.

The mill, across a small gulch from the Josie shaft, is of 50 tons rated daily capacity, having Blake and Gates crushers, 2 Chilian mills, 3 Jencke sizers, and 6 Wilfley tables. An Elmore oil concentrator, fully described

Vol. IV, was installed 1903, proving a technical, but not a commercial success, and was superseded by Wilfley tables. A 70-ton flotation unit was added to treat low grade dump ore, with an indicated extraction of 90%, and began operation in fall of 1921.

Production: largest production was 3,001,027 lb. in 1902. Recent production has been as follows, years endings September 30:

Year	Tons ore	Copper Lb.	Gold Oz.	Silver Oz.
*1920	16,422	288,415	10,187	11,692
1919	15,317	229,658	10,559	8,621
1918	19,642	671,122	8,516	19,687
1917	10,984	574,799	4,006	15,631
1916	19,231	730,015	7,258	17,675
1915	15,681	870,268	7,961	23,788
1914	29,679	.....	.....	.....
1913	35,553	.....	.....	.....
1912	.....	507,499	14,157	12,281
1911	.....	864,500	22,725	19,219
1910	.....	970,966	26,447	24,078

*15 months to Dec. 31, 1920.

Except for development and construction, operations were suspended for part of 1921.

LIBERATOR MINING CO. **BRITISH COLUMBIA**

Address: E. T. Hodge, 1522 Standard Bk. Bldg., Vancouver, B. C. **Mine address:** Wm. Thompson, mgr., Jessica, B. C.

Inc. 1920 to succeed **Emancipation Mining Co., Ltd.**

Property: Emancipation mine, 15 claims, in Coquihalla valley, Yale division, about 15 miles from Hope, acquired for $60,000 in cash and $100,000 in company shares. A bedded quartz vein, 1-3′ wide, occurs in slates carrying free gold, silver, pyrite and arsenopyrite.

Development: by 1,200′ tunnels.

Equipment: including stamp mill, installed and work underway. Management claims 5,000 tons of $20 ore blocked out (Oct. 1921). Shipments made to Tacoma smelter, 1919-'20.

LIGHTNING CREEK GOLD GRAVELS & DRAINAGE CO., Ltd. B. C.

Office: C. H. Unverzagt, mgr.-treas., 405 Lexington Ave., New York City. John S. Horgan, pres.; Wilson M. Taylor, sec. **Mine address:** Wingdam, B. C.

Inc. 1896, in British Columbia. **Cap.** $3,000,000; shares $5 par; 481,359 issued. **Bonds:** $250,000 authorized; $185,000 outstanding.

Property: 40 claims, 2,036 acres, or about 20 miles of placer leases along lower Lightning creek, Quesnel division, Carbiboo district, with a plant and P. O. at Wingdam, B. C. Several million dollars is said to have been taken out of the gravel deposits near Stanley many years ago. Below Stanley, deep drifting work was started at La Fontaine, and the bed rock gravel mined out for some distance, but it carried insufficient gold to be profitable. Below Fontaine down to Wingdam the placer deposits have not been worked to any extent, the ground being too deep to be worked without heavy pumping machinery. In 1919, a 195′ shaft was sunk to bedrock, and a new 3-compartment shaft was finished, but operations presumably ceased early in 1920, when the new shaft was destroyed. Development has been negligible.

The present company claims to have spent $1,400,000 for the property and its development, but so far has been unsuccessful in its mining operations. The ground has been prospected for several seasons by a Keystone drill. The management claims "there are over $10,000,000 net values already (December 31, 1919) disclosed." For opinions, see Annual Report, 1919, of the Minister of Mines, B. C., also the "New York Curb" for March and May, 1919.

In April, 1921, the Mines Operating Co., presumably organized by the same interests, claimed to have acquired the Lightning Creek holdings. Two other concerns, Standard Finance Co. and Great Cariboo Gold Co., are in some way involved in this enterprise. Company is unfavorably regarded and the minority stockholders have at last forced the property into receivership.

LITTLE BERTHA-PATHFINDER MINES **BRITISH COLUMBIA**

Address: Grand Forks, B. C., or A. E. Savage, supt., Bannock, B. C.

A consolidation of the **Bertha Cons. G. Mng. Co.** and the **Pathfinder Mng. Co.**

Property: on the E. side of the north fork of Kettle river, 16 miles N. of Grand Forks. The mines carry copper-gold-silver shipping ore near surface and have been worked in a small way. In 1920, new interests started a 1,000' tunnel.

LITTLE BILLY OPERATING CO. **BRITISH COLUMBIA**

Probably dead. Little Billy mine now owned by **Van Anda Copper Gold Co.**

LORNE MINE **BRITISH COLUMBIA**

Owned by Arthur F. Noel, Lorne Mine P. O., B. C.

Mine on N. side of Cadwallader creek, about 50 miles from Mission Station, in Lillooet mining division, is said to have 9 distinct orebodies.

Development: by tunnels. Development work in 1918 yielded 380 tons of ore, returning 192 oz. gold and 37 oz. silver when milled. In 1919 the mill treated 400 tons of ore yielding $2,565 in gold.

Idle in 1921.

LOUIS CREEK PLACER GOLD MNG. & DEV. CO., LTD. **B. C.**

Address: 302 Hinckley Bldg., Seattle, Wash. or 34 Hastings St. E., Vancouver, B. C. **Mine address:** Louis Creek, B. C.

Officers: J. S. Sherry, pres.; Fred Breaks, v. p. and mgr.; O. E. Newkirk, sec.-treas.; with H. P. Crosby, and M. Whaun, directors.

Inc. Feb., 1918, in Washington. **Cap.** $200,000; par 10c; 750,000 shares in treasury.

Property: 3 half-mile leases, 200 acres, on Louis creek, Kamloops mining division, Yale district, said to have gold-platinum ore. No recent report.

LUCKY BOY MINING CO. **BRITISH COLUMBIA**

Address: S. L. Meyers, pres., Erie, B. C.

Property: Lucky Boy mine, in Nelson division, W. Kootenay district. Copper ore occurs in a 2½' vein.

LUCKY JIM ZINC MINES, LTD. **BRITISH COLUMBIA**

Office: 138 Burdett Ave., Victoria, B. C. A. W. Bevan Allen, Receiver. P. O. Box 857, Victoria, B. C. **Mine address:** Zincton, B. C.

Officers: Dr. H. C. Lamback, pres.; Dr. T. A. Russell, v. p.; G. T. Edmiston, sec.-treas., all of Spokane; with J. I. Collison, Chas. McKenna, and Chas. Ehrenberg, directors.

Inc. April, 1919, in British Columbia. **Cap.** $2,500,000; increased Jan., 1918, to $6,000,000; shares $1 par; authorized bond issue $150,000 bearing 7%.

Property: 11 Crown granted claims, 343 acres, including the Lucky Jim mine at Zincton, Slocan division, developed by 3,600' of tunnels, drifts, raises, and crosscuts.

Operations were suspended by lack of funds in 1914, and mortgage forclosure for $62,000, started when the Court appointed a receiver to reopen the mine. Operations were resumed in 1915, and in December, 1916, receiver paid off first mortgage and was instructed by the Court to pay off the second mortgage (see later). For many years the affairs of the company were badly tangled due to an over-issue of approximately 3,000,000 shares of stock by G. Weaver Loper, formerly managing director and transfer agent, who was sent to the Washington State Penitentiary. The company was reorganized, and a statement made covering operations from April 1914, to April, 1918. The income was $249,874, of which $228,161 was from

ore shipments; expenditures totaled $246,721, leaving a balance of $2,653. On the balance sheet was an item $2,999,899, listed as over-issued shares. Total assets were $5,533 with indebtedness of $71,291, or net deficit of $65,758. To avoid litigation, on account of the over-issue of stock an increase in capitalization was made to cover it.

Early in January, 1920, shareholders were notified that the Trustees for the mortgagees had commenced proceedings to foreclose the mortgage, and unless $12,000 was paid on account, company would eventually lose its property.

The necessary funds could not be raised among stockholders and the mortgage was foreclosed, Feb. 17, 1921. A reorganization is being planned.

LYNN CREEK ZINC MINES CO. **BRITISH COLUMBIA**

Address: Vancouver, B. C. W. C. Woods, pres.; G. Phillips, sec., at last accounts.

Property: several Crown-granted claims on west fork of Lynn creek, Victoria division, near North Vancouver, show lead-zinc ore. Development is by tunnels. Since 1918, only the essential assessment work has been done to patent the claims.

MAID OF ERIN SILVER MNG. CO., LTD. **BRITISH COLUMBIA**

Address: Haines, Alaska, or care Robt. W. Wiley, mgr., Rainy Hollow, B. C.

Property: in Rainy Hollow, Atlin division of Cassiar district. Company reported to have begun operations in 1919 and to have shipped silver-copper ore to Tacoma. Active in 1921.

MANSFIELD MINING CO. **BRITISH COLUMBIA**

Address: M. R. Leahy, Ferguson, B. C.

Property: the Crescent mine on 8-mile creek N .shore of Trout Lake Trout Lake division, developed by 2 tunnels to depth of 350′, said to show a 7′ vein of silver-lead ore, assaying $12. A high grade shoot is reported to carry 70% lead and 50 oz. silver per ton.

MAPLE LEAF MINES, LTD. **BRITISH COLUMBIA**

Mine address: Franklyn Camp, B. C.

Officers: H. W. Young, pres.-mgr.; John Donaldson, sec.-treas., both of Grand Forks; with J. B. Miller, S. B. Sangers. Thos. Dunlop, C. W. Brown, and H. W. Collins, directors.

Property: on N. fork of Kettle river, 40 miles from Grand Forks said to show lead ore; with a small amount of copper, but not in commercial quantities.

Development: by tunnels. During 1919, the lower tunnel was lengthened 160′ and a 100′ crosscut driven.

Equipment: includes a gasoline engine, 3-drill compressor, and assay office.

The value of the property depends on future development.

MARBLE BAY MINE **BRITISH COLUMBIA**

See **Tacoma Steel Co.**

MASTODON MINING CO. **BRITISH COLUMBIA**

Address: J. W. Evans, mgr., 4 McDonald Blk., Lethbridge, or Revelstroke, B. C.

Property: 10 claims, 23 miles N. E. of Revelstoke, between La Forme and Carnes creeks, W. Kootenay district, shows zinc and lead ores.

Development: consists of a 110′ shaft with some driving, and much open cut work, said to have been very encouraging.

McALLISTER MINING & MILLING CO. **BRITISH COLUMBIA**

Property: the McAllister mine, sold to **Slocan Silver Mines, Ltd.**, which see.

McKINLEY MINES, LTD. **BRITISH COLUMBIA**

Described in Volume XIV. Property transferred to Chas. R. Leonard, Butte, Montana, to be held in trust until sold for not less than $40,000. The

proceeds of sale, after deducting expenses, are to be distributed prorata among the shareholders.

McLENNAN SILVER MINES, LTD. BRITISH COLUMBIA

Address: Vancouver, B. C.; or Alice Arm, B. C.

Officers: J. A. McLenan, pres.; R. C. Purdy, v. p.; Dennis Campbell, sec.-treas., with Dr. Peter A. McLennan, Dr. A. F. Greer and A. E. Carey, directors.

Inc. 1920 in B. C. **Cap.** $1,500,000; par $1.

Property: the Royal group, 7 claims, in Kitsault river section, Nass River division, adjoining the Dolly Varden mine on the west. Development said to have opened a vein 12′ wide, traceable for 400′ at surface, with ore running high in silver.

MINERAL CLAIMS DEVEL. CO., LTD. BRITISH COLUMBIA

Formed in 1919 by W. A. Somerville, et al., to take over holdings of **Homestake Mng. & Devel. Co., Ltd.**, which see. Two payments have been made under the option.

MINERAL HILL MINES, LTD. BRITISH COLUMBIA

Address: 506 Winch Bldg., Vancouver. **Mine address:** H. J. Fetter, supt., Stewart, B. C.

Inc. 1919. **Cap.** $2,500,000; $1 par.

Property: Mineral Hill group, 7 claims, E. of and adjoining the Big Missouri, in the Salmon River section, Portland Canal division, 12 miles N. of Stewart. Surface work opened ore rich in native silver and argentite.

Development: by 400′ tunnel and 300′ of crosscuts and drifts. Exploration continued, 1921-22.

MINES OPERATING CO. BRITISH COLUMBIA

Address: W. E. Parker, v. p., 405 Lexington Ave., New York City.

Presumably organized by C. H. Unverzagt interests to succeed **Lightning Creek Gold Gravels & Drainage Co.**, which see. In September, 1921, company advertised for parties willing to advance $150,000 to put the property on a producing basis with estimated profits of $5,000 per day. Appears to be a promotion, that needs watching.

MINNEAPOLIS & TEXADA COPPERITE CO., LTD. B. C.

Offices: 1311 Washington Ave., N., Minneapolis, Minn., and Vananda, Texada Island, B. C.

Officers: A. Stremel, pres.; E. E. Rorem, 1st v. p.; John Kraft, 2nd v. p.; A. E. Barker, sec.; John F. Danek, treas.; above, with Eden Schmidt, Hilmer Olson, B. F. Laflin and W. H. Curtis, directors.

Inc. in Arizona. **Cap.** $1,000,000; shares $1 par; 400,000 issued.

Property: 5 claims, 225 acres, on Texada Island, 47 miles N. W. of Vancouver, said to show 2 main veins, the Swan and the Paxton, containing copper ore, with gold and silver. Paxton vein is said to be traceable 1,500′ on surface. Value of property is entirely prospective.

Also holds certain claims under lease from Norsemen Expl. Co.

Development: 200′ shaft, with 300′ of drifting; also a number of test pits. Considerable mill ore extracted in this work, reported to average 4% copper, 2% lead, and $5 per ton in gold and silver.

MINNESOTA GOLD & SILVER MNG. & MFG. CO. B. C.

Succeeded by **Triune Gold & Silver Mng. & Mfg Co.**, which see.

MINNESOTA SILVER CO. BRITISH COLUMBIA

Controlled by Yawkey estate. **Address:** New Denver, B. C.

Property: Ivanhoe group on the Divide between Sandon and Four mile creek Slocan division; operated under bond and lease in 1918 by **Rosebery Surprise M. Co.**, but option later relinquished. The mill and water rights were sold to Silversmith Mines, Ltd., in 1921 for $15,000.

MOLLY GIBSON (BURNT BASIN) MNG. CO., LTD. B. C.

Address: D. 853, Rossland, B. C. **Mine office:** Paulson, B. C.

Officers: W. R. Braden, pres.; J. B. Singer, v. p.; I. J. Tremblyth, sec.; M. E. Purcell, mgr. director.

Cap. $1,000,000; par $1; 240,000 treas. shares.

Property: the Molly Gibson group, 9 claims, in Grand Forks division, 4 miles S. W. of Paulson, on the C. P. R. R., shows a mineralized area 2,000′ long, covering a porphyry-limestone contact. Vein said to average from 2-8′ in width and to assay from $5-$25 in gold. Three cars of ore shipped in 1920 averaged $43 per ton.

Development: by 300′ crosscut tunnel connecting with shaft.

Worked steadily throughout 1920; idle in 1921; reported that operations were to resume early in 1922.

MOLYBDENUM MINING & REDUCTION CO., LTD. B. C.

Address: F. H. Coyne, sec., 516 30th Ave., S., Seattle, Wash. J. D. Ross, Ross, mgr. Anyox, B. C.

Property: Success mine, 21 claims on the Alice Arm section, Nass River division, 15 miles from Anyox. The group shows a series of quartz veins in a mineralized zone 60′ wide, which for a length of about 800′ show small bunches of ore containing silver, lead, zinc, and molybdenum. A 4,000′ aerial tram connects the mine and mill.

The property has been tied up by litigation since 1916. In June of that year, the court at Victoria issued an order requiring that the property be placed on the market at a fixed price of $150,000.

Idle several years.

MOOSE GROUP MNG. CO., LTD. BRITISH COLUMBIA

Address: F. M. Sylvester, pres., 717 Vancouver Bldg., Vancouver, B. C. P. W. Racey, supt., Alice Arm, B. C.

Property: 4 claims, adjoining the Last Chance, in the Kitsault River section, Nass River division, 19 miles N. of Alice Arm, said to show two veins, one 20′ wide. The ore is grey copper with high silver content, some manganese and a little galena.

Development: driving 2 tunnels, the upper 310′ above the lower.

MOTHER LODE SHEEP CREEK MINING CO. B. C.

Probably dead. Described in Vol. XIV. Property amalgamated with that of **Nugget Gold Mines, Ltd.**, which see.

MOUNTAIN CHIEF MINING CO., LTD. BRITISH COLUMBIA

Address: Royal Bank Bldg., Nelson, and Renata, B. C.

Officers: J. W. Evans, pres.-mgr.; J. H. Lawrence, sec.-treas., with A. D. Nash, Chas. F. Blacha, and W. A. Gordon, directors.

Inc. 1918. **Cap.** $50,000; $100 par; increased April 1921 to $600,000; $10 par.

Property: 5 claims, 3 miles from Renata, on Lower Arrow lake, Trail Creek division. Stripping and open cut work is said to have disclosed an orebody 5 feet wide and 100′ long, in limestone, near the contact with an intrusive granite. Ore assays about 2½ oz. silver and 3½% copper. In 1918, about 600 tons of ore were shipped from old workings. In September, 1919, a 200-ton shipment was made. A hoist and compressor were installed and the mine is reported under development.

MOUNTAIN CONS. MINING CO. BRITISH COLUMBIA

Property: 7 miles from Sandon, B. C., consists of two claims said to show a small, but rich vein in granite. Ore is silver-lead, with a little gold. The mine is in rough country and can be worked only in the summer. Operations each season said to result in a profit.

MOUNT SICKER & B. C. DEV. CO., LTD. BRITISH COLUMBIA

Idle. **Office:** 30 George Square, Glasgow, Scotland. Fred L. Smith, chairman; John D. Steel, sec.

Inc. Oct. 20, 1898, in Great Britain. **Cap.** £125,000; shares £1 par. Lands are on Mt. Sicker, Vancouver Island, B. C.

MULTIPLEX MINING & MILLING CO. BRITISH COLUMBIA

Address: P. O. Box 424, Revelstoke, B. C., or Camborne, B. C.

Officers: O. T. Bibb, pres.-mgr.; F. G. Wrightson, sec., with Jos. Stevenson, L. P. Schooling, and J. G. Hilbery, directors.

Inc. April, 1914, in British Columbia. Cap, $1,000,000; par $1 non-assessable; 339,391 shares in treasury.

Property: 18 claims, 830 acres, 1¼ miles E. of Camborne, at junction of Poole and Mohawk creeks, in Lardeau division, West Kootenay, said to show silver-lead-zinc ore in fissure veins, also gold ore in quartz veins of different type. It is said that $25,000 has been spent on development work by tunnels, with about 1,500' of workings. Company planned to build a hydro-electric plant and resume development work at last account.

MUSKETEER GROUP BRITISH COLUMBIA

Owned by Miles Donald, Alice Arm, B. C. but under option to J. D. Meenach, of Seattle, Wash.

Property: 5 claims on the E. side of the Kitsault river, Naas River division, 18 miles N. of Alice Arm. Developed by shallow workings claimed to show ore running 32 oz. silver per ton.

NELSON MINING & DEVELOPMENT CO. BRITISH COLUMBIA

Officers: F. A. Starkey, pres.; Clarence Marsh, sec.-treas.; W. W. Shaffner, gen. mgr.

Property: company has a bond on the Comstock group of 3 claims near Poplar, Ainsworth division, at an elevation of 6,000'. A quartz vein, sparsely mineralized with galena, lies in schists and argillites, cut by aplite dikes, and carries a little gold, silver, lead and zinc.

Development: by 2 tunnels, 158' apart, the lower being in about 170'. A prospect with fair indications.

NEW CANADIAN METAL CO., LTD. BRITISH COLUMBIA

S. S. Fowler, Riondel, B. C., mgr. Control is held in France.

Property: the Bluebell lead-silver mine at Riondel, near Ainsworth.

Geology: the deposit is a replacement in limestone, irregular masses of ore following the bedding, with tongues projecting into the foot-wall country of pre-Cambrian sediments.

Development: mine is 600' deep on incline of 35° with extensive workings extending under Kootenay lake. The mine was flooded 1917, by an inrush of water; the old pump could not handle the water and a new 1,000-gal. pump has recently been added. In the spring of 1920 the mine workings were partly unwatered and operations resumed with a small force.

Equipment: includes mill and Blake crushers, rolls, jigs, trommels, Huntington mills, Wilfley and Deister tables.

Production: shipped 5,000 tons of oxidized ore from surface workings in 1918; in 1919 shipments to Trail amounted to 1,249 tons crude ore and 36 tons of cencentrate.

NEW DOMINION COPPER CO., LTD. BRITISH COLUMBIA

Controlled by Canadian Copper Corp., Ltd. Mines considered exhausted and of no commercial value. For description, see Vol. XII.

NEW ERA MINING CO., LTD. BRITISH COLUMBIA

Address: 1218 Standard Bk. Bldg., Vancouver, or Camborne, B. C. W. E. Morphy, mgr.

Property: lease and bond on the Beatrice mine, 3 Crown-granted claims above timber line, near Camborne, Lardeau division. The mine which has 1,400' of tunnel work, was closed down some years ago on account of the low price of silver. Ore said to assay about 34% lead and 100 oz. silver per ton. Reopened in 1919.

NEW HAZELTON GOLD-COBALT CO. BRITISH COLUMBIA

Address: Nicholas Thompson, pres., 309 Pacific Bldg., Vancouver, B. C. R. Dalby Morkill, sec.-treas. Mine address: Hazelton, B. C.

Property: near Hazelton, on W. slope of Rocher De Boule mountain, Omineca division, 5 miles from Carnaby, shows a 2' vein in granodiorite. This vein contains bunches and bands of ore varying from 3 to 15" in width. ore contains auriferous arsenopyrite with some molybdenum. In 1918 a 26-ton shipment assayed 1.24 oz. gold; 1.4% MoS$_2$; 1.18% Mo; 1.12% cobalt; 0.6% nickel; 8.98% arsenic.

Development: by tunnels, the main one is over 700′; a second tunnel 250′ lower, in about 200′.

An aerial tram carries the ore 1,000′ down the mountain, from which point it is packed 5 miles to the Grand Trunk railway.

Property: shows another vein which is supposed to be a continuation of the main Rocher De Boule vein. Idle several years.

For geology, see Memoir 110, (1919) Canadian Geol. Survey.

NICKEL PLATE MINE **BRITISH COLUMBIA**

See **Hedley Gold Mining Co.**

NOBLE FIVE MINING CO. **BRITISH COLUMBIA**

Address: R. Dunsmuir & Sons, owners, Victoria or Sandon, B. C. Paul Lincoln, mgr.

Property: the Noble Five and Deadman groups between Sandon and Cody in the Slocan division, has been extensively developed during the past 8 years. The present lowest level has a 4,000′ crosscut, 1,100 below upper workings, and about 3,000′ below apex of the Noble Five and Last Chance veins, proving the continuity of the veins at depth. The veins contain silver-lead ore. In 1919, company acquired the adjoining Reco mine of 5 claims, developed by 15,000′ of workings and once a famous producer of silver-lead ore; see Reco M. & M. Co. in Vol. XIV.

A 4-compartment, 1,000′ raise connects the upper workings with the lower level which is to be the main haulage way. Company employs between 30 and 40 men. Said to have ore reserves sufficient to keep the mill busy for 2 years or more.

Equipment: water-power, compressor, and 100-ton flotation plant using the Callow system, completed in 1920, at a cost of $250,000. The mill was closed down, February, 1921.

Is an old and well known mine that produced bonanza ore from its upper levels.

NOONDAY MINES CO. **BRITISH COLUMBIA**

Office: 1017 Paulsen Bldg., or Box 1772, Spokane, Wash. **Mine address:** Sandon, B. C.

Officers: R. C. Lammers, pres.; J. B. White, sec.-treas.-mgr.; C. D. Randall, sec.; with H. S. Burdick and S. White, trustees.

Cap. $750,000; shares 25c par; 2,000,000 issued.

Property: the Noonday and other claims on Carpenter creek, Slocan division, near Sandon.

Development: by tunnels, with several thousand feet of workings, said to have opened 14,000 tons of $17.50 lead-silver ore.

A promising prospect. Shipments have been made at various times.

NORSEMEN EXPLORATION CO. **BRITISH COLUMBIA**

Office: 1048 McKnight Bldg., Minneapolis, Minn. **Mine office:** Capsheaf, Vananda, Texada Island, B. C.

Officers: E. E. Rorem, pres.; W. H. Curtis, v. p.; C. A. McKenzie, sec.; Allen T. Rorem, treas.; B. F. Laflin, A. E. Barker and Eden Schmidt, directors; Robt. Forbes, cons. engr.; Jas. Forbes, Sr., supt.

Inc. in Arizona. **Cap.** $500,000; shares $1 par; issued, $375,000.

Property: 23 claims, 1,000 acres, 730 patented, on Texada Island, B. C., shows contact deposits between limestone, granite and diorite. Copper occurs as chalcopyrite and bornite, with gold and silver values. The Capsheaf claim has an 80′ vertical shaft that showed 10′ of ore, said to have averaged 4% copper and $6 gold and silver. Test shafts along the vein for several hundred feet show a continuity of the vein, and crosscutting proved it to be about 25′ wide. The Cameron claim, adjoining the Texada iron mine, owned by the Puget Sound Iron Co.—on which extensive development has been done, has a capping of magnetic iron with large lenses of chalcopyrite. The vein is reported to be over 180′ wide and is thought to average 4% copper. The Aladdin claim carries silver-lead ores. It has a 212′ vertical shaft with about 250′ of crosscutting. The Aladdin, De Ore,

and Blizzard claims are leased to the Minneapolis & Texada Copper Co. Company's property covers about 4 miles along the various veins, is convenient to tide water transportation and about 20 miles from a smelter.

NORTH POINT MINING CO., LTD. **BRITISH COLUMBIA**

Address: Oscar Eden, Prince George, B. C.

Property: a silver-gold-lead mine near Giscoma Portage, Cariboo division. A 600' tunnel to cut the main vein was 350' long in mid-1921.

NORTH STAR MINING CO. **BRITISH COLUMBIA**

Address: O. C. Thompson, Kimberley, B. C.

Property: the North Star mine in Fort Steele division, E. Kootenay district, under lease to Thompson and McKinley. In 1919, production was 7,121 tons of lead-carbonate ore, somewhat curtailed because plant was in part destroyed by fire. Shipments were made also in 1920; operations suspended Jan., 1921, were resumed in September. Equipped with compressor, etc.

NUGGET GOLD MINES, LTD. **BRITISH COLUMBIA**

Address :735 Granville St., Vancouver, B. C. **Mine office:** Salmo, B. C.

Officers: Alister Forbes, pres., with N. T. Burdick, R. S. Lennie, C. M. Oliver and W. H. Logan, directors. E. B. Crickmore, sec.; R. H. Stewart, cons. engr.; Harold Lakes, mine supt.

Inc. in British Columbia. **Cap.** $1,050,000, in 1,000,000 common and 50,000 preference shares; increased March 10, 1921 to 100,000 pfd. shares and 1,900,000 com. shares, $1 par. Listed on Spokane Stock Exchange. Balance sheet of Dec. 31, 1920, shows; Assets, $1,100,190, including property, $531,240, equipment, $205,466, cash, $1,367. Liabilities include mortgage on Mother Lode, $50,000; current, $58,133. Net bullion sales were $30,984; production costs amounted to $60,157, leaving an operating loss of $31,847 for second half of 1920.

Property: 15 claims, including the Searchlight, and Nugget groups, and the Mother Lode acquired in 1919 by amalgamation with Mother Lode Sheep Creek Mines Co., in Sheep Creek district, Nelson division, 15 miles from Salmo, showing 5 veins in chlorite and quartz schists.

Development: by tunnels, with 6,000' total workings. A 1,600' tunnel cut vein of the Nugget mines in November, 1921, on the Sheep creek side of the mountain, beneath the old Nugget workings.

Equipment: water-power (400 h. p. available), 14-drill compressor, dwellings, 3,800' aerial tram, and 10-stamp mill with cyanide plant. The mill, acquired from the Mother Lode company, is said to give a 97% recovery on 100 tons daily.

Production: from 1908 to 1911, the Nugget produced $220,000 gold from 14,000 tons of ore. The loss in tailing was from $3.50 to $5.50 per ton. The old Mother Lode company made a profit of $163,617 during the period 1912-1915. During 1920, 6,757 tons were mined; 4,647 tons milled yielded 2,774 oz. gold. About 35 men employed.

Examined in 1920, by Andrew Larson, Spokane.

NUMBER ONE MINE **BRITISH COLUMBIA**

Owned by J. M. Harris, Sandon, B. C., and F. T. Kelly.

Property: 5 claims, 231 acres, shows a fissure vein containing silver-lead ore, cutting through slate, and porphyry.

Development: by 3 tunnels, 200, 500 and 700' in length. Total output to date, 312 tons of ore. Owners report $22,270 received from ore sales in 1918, with operating expenses of $16,702 and $3,000 paid as dividends.

OLALLA COPPER MINING & SMELTING CO. **B. C.**

Property idle, but under 25-year lease to Yale Development & Construction Co., organized among the stockholders of this company. No recent information. Fully described in Vol. XIV.

OLIVE A. SILVER LEAD CO., LTD. BRITISH COLUMBIA

Address: A .D. Wheeler, lessee, Ainsworth, B. C., or J. W. Beckett, 2003—10 St., Spokane, Wash.

Property: the Gallagher mine in the Ainsworth division, W. Kootenay district, 2½ miles N. W. of Ainsworth, shows irregular replacement deposits of lead carbonate ore in limestone, assaying high in silver. Developed by 2 tunnels.

OREGON & B. C. MINING & DEV. CO., LTD. BRITISH COLUMBIA

Idle many years. Fully described in Vol. XIV.

OTTAWA MINING & SMELTING CO. BRITISH COLUMBIA

Address: A. L. MacPhee, Slocan City, B. C., who with L. H. Biggar (mgr.) and Pat McQuire, has a 4 year lease from 1920 on the Ottawa mine of **Cons. M. & S. Co. of Canada,** which see.

Property: the Ottawa group on Springer creek, Slocan division, 5 miles E. of Slocan City. Ore carries silver, copper, lead and zinc, the former predominating. Estimated to be 35,000 tons of ore in dumps and stopes carrying 10 to 20 oz. silver per ton.

Equipment: includes 50-ton flotation plant erected by lessees at cost of $30,000, using crusher, tube mill and 9 cells and connected with, mine by 2,000′ air tram. A 4′ Pelton supplies 160 h. p. Mill operation began in mid-1921, making a concentration of 35 tons of ore into 1 with a 75% silver extraction, at a cost of $2 per ton of ore for milling and freight.

OUTSIDER MINE BRITISH COLUMBIA

Address: Martin Woldson, owner, Spokane, Wash.

Property: 8 claims, at Maple bay, Portland Canal division, 35 miles S. of Stewart, formerly known as the Brown Alaska property which was equipped in 1916 with an aerial tram from the mine to the beach. Several thousand tons of ore assaying about 2.8% copper, were shipped during 2 years operations. Shows several veins from 6 to 30′ in width. The ore is low grade and silicious.

Development: by tunnels, the longest about 800′. Five hundred feet of new work in 1918, opened an oreshoot 200′ long and 16′ wide assaying 2% copper. Only a small amount of development done annually.

Equipment: includes two compressors, water power, aerial tram, ore-bins, dock, etc., not in good order.

OUTLAND SILVER BAR MINING CO., LTD. BRITISH COLUMBIA

Address: 543 Hastings St. W., Vancouver, B. C.

Inc. July 19, 1920. **Cap.** $500,000; $1 par.

Property: Outland group on Salmon river, about 14 miles above the Premier.

PACIFIC COAST EXPLORATION CO., LTD. BRITISH COLUMBIA

Company controlled by Sir Donald Mann, had an option on the Big Missouri mine (q. v.) in the Portland Canal division. Property was drilled and otherwise explored. Option was presumably relinquished and property taken over by Daly Mines Co., ltd., which see.

Address: 43 Victoria St., Toronto, Ont. Wm. Nobe, mgr., Stewart, B. C.

PACIFIC MINES DEVELOPMENT CO. BRITISH COLUMBIA

Address: W. J. Elmendorf, Sandon, B. C.

Organized and controlled by Campbell, Wells & Elmendorf, Prefontaine Bldg., Seattle, Wash.; Oscar V. White has a 10% interest.

Property: a lease on 6 Crown-granted claims, including Payne mine, on Carpenter creek, Slocan division, first located in 1891 and originally owned by the Payne Mines, Ltd.

Development: by 4,000′ crosscut, raises and winzes, completed at a cost of $160,000 by the Slocan-Payne Mines, Ltd., under a lease in 1912 The main orebody has been followed for 1,200′ in length.

Production: to date estimated at $50,000 tons silver-lead ore and 6,000 tons zinc ore.

Operated by lessees in recent years, prior to organization of present company.

PANAMA MINE BRITISH COLUMBIA

H. Giegerich, Kaslo, B. C., owner. The mine, W. of Whitewater, in the Slocan country, is developed by 2,000' of tunnels and drifts to depth of 300'. Reported to carry a contact vein, from 3-5' wide, that averages 120 oz. silver. Small shipments made to the Trail smelter. Developing with a small force each summer.

PARADISE MINES BRITISH COLUMBIA

Owned by R. Randolph Bruce, Invermere, B. C., Robt. MacDonald supt.

Property: on Spring creek, Windermere division, shows silver-lead carbonate ore in limestone. Ore assays 35 to 45% lead and 35 to 45 oz. silver per ton.

Development: by tunnels, with 7,000' of workings.

Production: in 1918, 2,470 tons; in 1919, 1,700 tons; in 1920, 1,200 tons. Employs 35 to 40 men.

PAYNE MINES, LTD. BRITISH COLUMBIA

Address: Oscar V. White, agt., Sandon, B. C.

Property under lease to **Pacific Mines Dev. Co.** (q. v.), and described thereunder.

PERRIER GOLD MINES, LTD. BRITISH COLUMBIA

Address: D. 1059, Nelson, B. C.

Officers: C. C. Crossley, pres.; R. W. Hinton, v. p.; W. M. Cunliffe, sec.-treas.

Inc. 1920. **Cap.** $250,000.

Property: Perrier mine on Cottonwood creek, near Nelson, developed by 120' shaft, with 200' drift northerly, said to be in 2' of milling ore.

Equipment: includes 150-ton mill, compressor, hoist, pump, water power. A stamp mill is planned.

PIONEER GOLD MINES, LTD. BRITISH COLUMBIA

Address: Andrew Ferguson, 432 Richard St., Vancouver, B. C., or Lorne Mine, B. C.

Property: Pioneer mine in Cadwallader Creek area, Lillooet division. The ore is gold-bearing and is treated on the ground. Mine was closed down for part of 1920, but operations reported to have been resumed.

PLACER DEVELOPMENT CO. OF AMERICA, LTD. B. C.

Address: 603 Scan. American Bk. Bldg., Tacoma, Oregon. **Mine address:** Tulameen, B. C.

In 1917, company took a sublease on placer ground on the Tulameen river, controlled by the **Efanjay Gold Mng. Co.**, which see.

PLACER GOLD MINES CO. OF SEATTLE BRITISH COLUMBIA

Address: W. G. McLean, sec., 1002 Third Ave., Seattle, Wash. T. M. Daulton, mgr., Atlin, B. C.

Property: placer claims on Ruby creek, in the Atlin division. The pay-streak is covered by basalt. Operations are both hydraulic and dredging, depending on conditions. During 1919, an advance of 217' was made. Seventeen men moved 53,000 yd., recovering about $40,000, from May 1st to October.

PORTLAND CANAL MINES CO. BRITISH COLUMBIA

Controlled by Pat Daly and T. H. Wilson, New York City.

Is the U. S. holding company for the Daly Mines Co., Ltd. (q. v.), a British Columbia corporation, owning the Big Missouri group (q. v.), Salmon River zone, Portland Canal division.

These companies organized in fall of 1921, presumably succeed the Pacific Coast Expl. Co.

PORTLAND CANAL TUNNELS, LTD. BRITISH COLUMBIA

E. J. Hearn, sec., 104 Moody Blk., Victoria, B. C.

Officers: R. I. Elliott, K .C., Pres.; with R. M. Stewart and J. R. Waghorn, directors.

Inc. Aug. 23, 1912, in British Columbia. **Cap.** $700,000; shares 25c par.

Property: 10 claims, Crown-granted, near Stewart, Portland Canal, B. C. Company was organized to drive a crosscut tunnel to intersect the vein series of Glacier Creek, previously worked in the Portland Canal and in the Stewart Mining Co.'s properties. The tunnel, over 3,000' long, has so far failed to disclose orebodies of permanent commercial value. Idle since 1914, owing to lack of funds.

PREMIER GOLD MINING CO., LTD. **BRITISH COLUMBIA**

Address: Dale L. Pitt, mgr., Premier, via Stewart, B. C.; or care American Smelting & Refining Co., 120 Broadway, New York City.

Officers: R. W. Wood, pres., Fernie, B. C.; H. A. Guess, of A. S. & R. Co., v. p. and managing director, 120 Broadway, New York. Minor C. Keith, v. p.; with R. K. Neill, W. R. Wilson, I. Untermyer, G. T. Bridgman, directors. W. E. Merriss, sec.; L. A. Chapin, treas.

Inc. 1919, in British Columbia. **Cap.** $5,000,000; $1 par.

Property: the Premier, or Bush mine, with the 8 Cascade Falls claims, located in 1910 by William Dilworth and the Bunting brothers. Claims No. 4 and 8 contain the Premier mine. The property is adjacent to the Alaska line, on the east side of Cascade creek, a tributary of the Salmon river, and 14 miles from Stewart at the head of Portland Canal.

The claims were formerly owned by the Salmon-Bear River Mining Co., ('See Canadian Mining Journal' of October 7, 1919), which did a little trenching and tunneling, but neglected to open the great outcrop of the high-grade vein now being worked. The claims were idle until the summer of 1914, when W. J. Rolfe examined them for a Canadian company. The vein was traced for 800' down the hill, the surface stripped and the trenches cut at regular intervals all exposed pay ore, some high-grade. The mine was then bonded to New York interests and work re-started in the winter of 1914, in charge of H. P. Plate, who drove 3 exploratory tunnels. After 18 months work, at cost of $60,000, the option was given up. In 1918 R. K. Neill examined the ground and bonded it for $100,000. A few yards crosscut work in the reopened tunnel showed that it paralleled the vein and was 6' from it. An 82' crosscut showed ore that averaged $55 per ton in gold and silver. Recent work has blocked out a large tonnage of high grade gold-silver ore.

In August 1919, it was examined by Mr. H. A. Guess and a 52% interest purchased for the American Smelting & Refining Co. and associates. British Canadian Silver Corp. also said to hold an interest. The latter is reported to have sold (Feb., 1922) its controlling interest in B. C. Silver Mines, Ltd. to the Premier company.

In December, M. D. W. Bacon, of Los Angeles, filed suit against Mr. Neill, claiming half of his interest in the mine, based on an alleged partnership between them. In January, 1921 judgment was recorded in favor of Neill.

Geology: according to J. J. O'Neill in Canadian Dept. of Mines Summary Report for 1919, Part B, all high-grade deposits are in grano-diorite porphyry, close to its contact with tuffs, and the large deposits of low-grade material occur near the upper margin of this porphyry in rock which apparently is an intimate mixture of porphyry and metamorphosed tuff. The principal silver sulphide is argentite, with freibergite, and pyrargyrite. There are also pyrite, sphalerite, galena, and chalcopyrite.

Development: by an adit, 600' long, opening considerable milling ore, also 2 shoots each 70' long, assaying $100 and $200 per ton, respectively. Two lower adits, 250 and 710' below the upper one, were in 1,200' and 1,000', September, 1921, the upper of these having opened the same high-grade and additional milling ore. Total extensions in 1921 were 4,447'

which includes a 420′ shaft connecting 3 and 4 levels. Considerable diamond drilling has been done from the various adits, including 6,821′ drilled in 1917.

Equipment: water-power, electric-light plant, crushing and sorting house, compressor, and 100 ton concentration and cyaniding mill. An 11-mile aerial tram, from the mine to Stewart, B. C., on the coast, was completed late in 1921; the fall in this distance is 1,400′, of which 900′ is in the first 3 miles. In 1921, company employed 382 men.

Production: during winter of 1918-'19, 488 tons of high-grade ore was shipped, yielding 3,209 oz. gold and 108,285 oz. silver, worth $165,000. Production since purchase by the A. S. & R. Co. and associates has been to September, 1921, about 38,000 oz. gold and 1,400,000 oz. silver, from approximately 6,000 tons of ore. Shipments are made to the Tacoma smelter. Total mine output in 1921 was 15,129 tons of ore.

The Premier is a big potential producer, in good hands.

PRINCESS COPPER MINING CO. **BRITISH COLUMBIA**

Address: John Walker, c/o Wallbridge & Walker, 333 Homer St., Vancouver, B. C.

Property: 6 claims, 2 miles up the Matheson (Matsin) river, Knight Inlet section of the Nanaimo division. Irregular, lenticular, garnetite orebodies, carrying copper ore, mostly bornite, lie in metamorphosed limestone. These characteristics render exploration difficult.

Development: by a main adit 210′ long, exposing a little ore, assaying 0.9% copper and 1.4 oz. silver, across 3′ of garnetite. A 6″ shoot was showing in the face at last accounts. Indications would warrant further development work.

PRINCETON MINING & DEV. CO., LTD. **BRITISH COLUMBIA**

Address: Box 215, Princeton, B. C.

Officers: F. F. Foster, pres.-mgr.; G. E. Murphy, v. p.; Perley Russell, sec.-treas.

Inc. Oct. 12, 1917, in British Columbia. **Cap.** $150,000; par 10c; non-assessable; 500,000 shares issued.

Property: the Copper Farm group of 3 claims, 156 acres, in Similkameen division, 4½ miles E. of Princeton, on Great Northern R. R. On the upper levels the vein shows 6″ of ore assaying up to 16% copper 2-12 oz. silver and 45c.-$2.50 gold.

Development: by 3 tunnels, 48--480′ deep. Equipped with 3-drill compressor and steam power.

Work was reported resumed in 1920 with a small force.

PROVIDENCE MINING CO. **BRITISH COLUMBIA**

Address: Box 446, Greenwood, B. C.

Property: Providence mine, 1 mile N. of Greenwood, carries a quartz vein 1′ wide with N.-S. strike and dip of 60° E. Ore contains gold, silver and lead.

Development: by 500′ shaft, drifts and raises.

Equipment: includes 600 cu. ft. compressor, and pumps

Production: in 1919, shipments to Trail amounted to 338 tons containing 39,903 oz. silver, 267 oz. gold and 7,616 lb. lead. Treatment cost was $5.50 per ton and transportation $5.50 per ton.

Mine was operated under lease in 1919-'20 by Morrison & Gillis (M. S.) of Greenwood. Company resumed operations early in 1921 and expects to make regular shipments. About 35 men employed.

PTARMIGAN COPPER MINES, LTD. **BRITISH COLUMBIA**

Address: care H. H. Johnson, Kirkland Lake, Ont.

Property: 8 claims at 5,300′ elevation, 15 miles inland from the mouth of Bear River, on Bedwell Sound, Vancouver Island. Considerable development work was contemplated on the property, but all work was suspended shortly after the outbreak of the European war.

Claims are on Big Interior mountain and show gossan outcrops underlain by chalcopyrite-magnetite ore. No recent information.

QUATSINO COPPER CO. BRITISH COLUMBIA

Dead. Succeeded 1916 by **Coast Copper Co.**, which see.

QUEEN BESS MINE BRITISH COLUMBIA

Owners: Clarence Cunningham, Alamo, B. C., and Dr. J. G. Cunningham, Spokane, Wash. **Mine address:** New Denver, B. C.

Property: 9 claims, on Carpenter creek, Slocan division, N. W. of Sandon, show silver-lead ore in fissure veins developed by tunnels and by a 300′ shaft.

Recent operations curtailed owing to adverse labor conditions; shipments to Trail smelter resumed late in 1921.

QUEEN BESS MINES CO. BRITISH COLUMBIA

Address: O. A .Thomas, pres. and mgr., 400 Central Bldg., Seattle, Wash. H. W. Schuett, sec., Black Pool, B. C.

Property: 6 claims on E. side of North Thompson river, Kamloops division, 2 miles south of Blackpool Station on Canadian Northern Ry., said to show fissures in greenstone, with silver-lead and zinc ores. Veins are from 2 to 6′ wide. Also owns Noonday gold groups, in same district.

Development: 300′ shaft and several tunnels, with several hundred feet of workings in which sufficient ore was considered in sight to warrant building a 50-ton concentrator which began operating in February, 1919.

Shipments in 1919 amounted to 26 tons of silver-lead concentrates. No later figures available.

QUEEN MINES, INC. BRITISH COLUMBIA

Address: E. V. Buckley, Alma Centre, Wis.

Property: the Queen, Yellowstone and Alexandria mines and a millsite on Sheeps Creek, near Salmo, said to show several veins containing gold ore.

Development: 700′ shaft with drifts run over 100′, said to expose an orebody 8-33′ for 800′ in length, and averaging $9 per ton.

Equipment: includes 20-stamp mill.

Mine credited with total production of $1,529.000.

Reported 1921 under bond for $150,000 to **Queen Ore Hill Mines, Ltd.**, (q. v.), organized by C. H. Cassill.

QUEEN-ORE HILL MINES CO., LTD. BRITISH COLUMBIA

Address: C. H. Cassill, Wellington Apts., Spokane, Wash.

Inc. 1921, in B. C. **Cap.** $250,000; 25c. par.; 600,000 shares in treasury.

Property: a lease and bond on the Queen mine on Sheep Creek, near Salmo, owned by the Queen Mines, Ltd., and the adjoining Ore Hill group of 5 patented claims.

No work is being done.

QUESNEL FORKS GOLD MINING CO. BRITISH COLUMBIA

Presumably dead. Was formed to take over holdings of Bullion Mng. Syndicate, but this did not materialize.

RAMBLER-CARIBOO MINES, LTD. BRITISH COLUMBIA

Head office: Three Forks, B. C.; **Post office:** New Denver, B. C.

Officers: A. F. McClaine, pres.; Alfred Coolidge, v. p.; W. A. Cameron, supt., with J. F. Hall, C. L. MacKenzie, Johnston Armstrong and H. Cornwell, directors; A. E. McClaine, Jr., sec.-treas.

Cap. $2,000,000; $1 par; all issued. Listed on Spokane, Exchange.

Financial statement of December 31, 1920; shows assets, $2,034,541, including mines, $1,762,800; equipment, $55,000; cash on hand, $10,156; Balance forward, $23,345; receipts from ore sales, $31,181; from stock sales, $13,023; expenditures amounted to $32,518.

Dividends: $385,000 prior to 1903; $35,000 in 1915; $87,500 in 1916; $35,000 in 1917; $17,500 in 1919. The total is $560,000.

Property: 5 crown-granted claims, at the head of McGuigan creek, near Three Forks, Slocan division, has been operated for many years as a silver-lead and zinc mine, and has been extensively developed at depth. On the 14th level a 5,000′ crosscut was run; but development there was disap-

pointing, the orebody apparently not extending that far. The Jennie and Last Chance claims were acquired for $65,000, of which the final payment of $25,000 was made in January, 1920.

Development: during 1920, the 800′ level was driven 400′, mostly in Jennie ground and the 700′ level is being continued. The ground is well mineralized, but no commercial ore was opened up.

Operations adversely affected by labor trouble and metal market. Company suspended operations in September, 1921, and mine and mill were leased to W. A. Cameron, the superintendent, who also operates the Molly Gibson mine of the Cons. M. & S. Co.

Management is considered "honest, efficient, and extremely conservative," but gives out but little information.

RECO MINING & MILLING CO. **BRITISH COLUMBIA**

Probably dead; see Vol. XIV. Property taken over in 1919 by **Noble Five Mng. Co.**, which see.

RECORD MINING CO. **BRITISH COLUMBIA**

Out of business. Described in Vol. XIV. Holdings taken over by **California Mining Co., Ltd.**, which see.

RED CLIFF MINING CO. **BRITISH COLUMBIA**

Idle. Bankrupt. Mine at Stewart, Skeena district, B. C. See description in Vol. XII.

RELIEF MINING CO. **BRITISH COLUMBIA**

Presumably dissolved; see Vol. XIV. Succeeded by **Second Relief Mng. Co.**, which see.

RENO GOLD MINES, LTD. **BRITISH COLUMBIA**

Mine address: Sheep Creek, B. C.

Officers: W. B. Pool, pres.-gen. mgr.; Thos. K. Kirkpatrick, v. p.; Clarence Pool, treas.; Jas. O'Shea, sec., with Michael O'Donnell, directors.

Inc. 1921. **Cap.** $1,000,000; $1 par; 500,000 shares in treasury.

Property: the Reno-Donnybrook group, 16 claims, between Fawn and Hidden creeks, Nelson division, 9 miles from Salmo and 1 mile N. of the Nugget Gold Mines. The 6 veins which have been prospected show a quartz filling carrying about $20 in free gold; vein widths apparently increase with depth and show somewhat decreased ore values.

Development: by main adit, in 120′ (November, 1921) on No. 1 vein, showing 2′ of high grade gold ore.

ROCHER DE BOULE COPPER CO. **BRITISH COLUMBIA**

Idle.

Address: Butte, Montana. **Mine office:** Tramville, B. C. D. J. Williams, mgr.

Officers: M. S. Browning, pres.; A. Fred Wey, v. p., and S. A. Douglass, directors.

Inc. Oct. 15, 1911, in Arizona. **Cap.** $1,000,000; $1 par; fully issued, fully paid. Listed on Butte (Mont.) Exchange. Annual meeting, October 20.

Property: 6½ claims, Crown grant, 325 acres with 50 acres millsite and 100 acres other lands, in Hazelton section, Omineca division, 9 miles from the Grand Trunk Pacific railroad.

Ore occurs in fissure veins in granite, veins having an E.-W. strike with dip of 60°. Five ore-shoots developed had average width of 5½′, 1000′ long and proven to depth of 150′, according to management.

Development: by shaft and 800′ tunnel. Copper occurs as chalcopyrite and bornite.

Mine was under lease to Montana Continental Dev. Co. from 1913 to February, 1916, and during this time value of shipments totaled over $700,000.

Equipped: with 240-h. p. hydro-electric plant, aerial and surface tramways, compressor and saw-mill by lessees, who worked mine on royalty basis.

For several years this mine was the most important in the district, but exhaustion of the developed orebodies in the upper levels caused a decreased

production in 1918, and in October, 1918, the property was shut down until conditions should become normal.

Production: from April, 1915, to the time it closed down, was 39,833 tons of ore, containing 4,214 oz. gold, 62,865 oz. silver, and 5,746,306 lb. copper. For detailed description, see the 1914, 1916, 1917, and 1918 Annual Reports of the Minister of Mines, B. C. For geology see Memoir 110 (1919) Can. Geol. Survey.

ROSEBERY SURPRISE MINING CO., LTD. BRITISH COLUMBIA

Head office: Nelson, B. C. **Operating office:** New Denver, B. C.

Officers: H. L. Hollis, pres.; W. C. Boyden, v. p.; Otto T. Langbein, sec.-treas. J. P. MacFadden, gen. supt.

Property: company owns the Surprise, Ajax and Monitor mines near Sandon, the Bosun mine at New Denver, and the Rosebery mill at Rosebery, B. C.

Bosun mine: near shore of Slocan lake, half-way between New Denver and Silverton, was first worked in 1898, but only acquired by present company in 1917. Vein is large and carries lenses of galena ore carrying zinc blende, but running high in silver. The blende ore is said to assay 70 to 90 oz. silver and between 45 and 55% zinc. Old workings consist of 5 tunnels driven on the vein and opening it to a depth of 400'. Recent work comprises an extension of old workings and driving the lower or No. 6 tunnel a half mile to gain a depth of 800' on the vein. In 1921-'22, much of the output is from the 5th level, and in part from a second vein, 8' wide, discovered in the hanging wall. The lead and zinc ores are said to run 180 and 100 oz. in silver, respectively.

Surprise mine: 3 Crown-granted claims, 93 acres, 2 miles N. E. of Sandon, has lead-zinc ore in a fissure vein in slate. Development: a main tunnel over 3,000' long, with total workings of 15,000'. Mill feed assays 62 oz. silver, 19% lead, and 16% zinc. Output in 1918 totaled 13,998 tons of ore. Closed down in 1920.

Mining and milling operations curtailed during 1920, and in 1921 limited to the Bosun mine. Shipments made to the Trail smelter.

ROSSLAND KOOTENAY MINING CO., LTD BRITISH COLUMBIA

Idle since 1904. **Office:** 325 Crown Court, Old Broad St., London, E. C., Eng. **Mine office:** Rossland, Trail district, B. C.

Officers: C. Williamson Milne, chairman; Dr. G. Schack-Sommer and Lionel W. Harris, directors; W. S. Gregg, sec.

Inc. May 17, 1902, in Great Britain, as a reconstruction of Rossland-Great Western Mines, Ltd., and Kootenay Mining Co., Ltd. **Cap.** £150,000; shares £1 par; issued. £148,607.

Property: 171 acres, at Rossland, carrying auriferous and argentiferous copper ores, of low grade, and 113 acres placer at West Kootenay. The company also owns 2,615 shares of the Santa Eulalia Development Co., Ltd., owning the Nueva Chihuahua property at Santa Eulalia, Chih., Mex. Revolutionary conditions have prevented any work for several years in Mexico.

ROSSLAND VELVET MINES, LTD. BRITISH COLUMBIA

Address: C. E. Nordman, mgr., Rossland, B. C.

Inc. 1920. **Cap.** $300,000.

Property: the Velvet mine, in Trail Creek division, W. Kootenay district, near Rossland. Ore contains copper and gold. Shipped 310 tons to smelter in 1920.

RUTH MINES, LTD. BRITISH COLUMBIA

Address: Box 122, Kaslo, B. C. **Mine office:** Sandon, B. C.

In 1917, company went into voluntary liquidation and property was offered for sale. Reported in March, 1919, that company was being reorganized. No details of officers or capital.

Property: the Ruth and Hope mines, on Carpenter creek, Slocan division, near Sandon, worked for the Alexander interests of London, by Jas.

Anderson of Kaslo. In 1919, reported that the vein had been cut in the lower tunnel 600' from the portal, and where cut had a width of 8'.

SALMON BEAR RIVER MINING CO., LTD. BRITISH COLUMBIA
Reorganized as the **Premier Gold Mining Co.**, which see.

SANTA ANNA MINING CO., LTD. BRITISH COLUMBIA
Address: 1104 Standard Bank Bldg., Vancouver, B. C. **Mine address:** John McConville, Gowland Harbor, B. C.
Property: 6 claims on Quadra island, Nanaimo division, 11 miles N. of Heriot bay. The ore carries copper, gold and silver.

SECOND RELIEF MINING CO. BRITISH COLUMBIA
Succeeding the Relief Mng. Co.
Address: Erie, B. C.; or Bayfield, Wisconsin. A. D. Westby, mgr.
Property: the Second Relief mine, and 6 patented claims (180 acres) of former Relief Mng. Co., on Salmon river, in Nelson division, 14 miles N. of Erie, said to show sulphide ore in a quartz fissure vein in diorite. Vein strikes N.-E. with dip of 85°. Pay ore occurs in shoots, from 50-170' wide, and is said to average $18 per ton in gold.
Development: to 416' depth by 4 tunnels, each 1,200' long.
Equipment: includes 14-drill compressor, pump, steam power and 75-ton cyanide mill.
Mine is credited with production of over $500,000. In 1918, shipments to Greenwood smelter amounted to 85 tons concentrates resulting from 1,241 tons ore treated. Eleven men were employed and $13,700 was spent on new equipment. In 1919, a fire destroyed much of the surface equipment. Operations have presumably been resumed since reorganization.

SHEEP CREEK CONSOLIDATED BRITISH COLUMBIA
Mine address: Salmo, B. C.
Property: 8 claims, W. of the Reno group and believed to contain the extension of the Reno veins. A prospect.

SILVERADO GROUP BRITISH COLUMBIA
Address: Howard Cameron, Stewart, B. C.
Controlled by J. J. Coughlin of Vancouver, et al.
Property: on E. side of Bear river, opposite Stewart, in Portland Canal division, shows a quartz vein, 4 to 14" wide, assaying 5% copper, $10 in gold and 360 oz. silver per ton. A tunnel is being driven at 2,000' elevation and a tramway constructed. Is a prospect.

SILVER BELL MINE BRITISH COLUMBIA
Owners: R. F. Green of Victoria, and Sam Green. **Mine address:** W. E. Newton, supt., Kaslo, B. C.
Property: a high-grade silver-lead mine on S. fork of Kaslo creek, Ainsworth division, near the Gibson and Index mines. Ore occurs in a shear-zone either in granite or along its contact with sedimentaries. Ore carries lead carbonate, galena, and native silver.
Development: by tunnels, the longest 270', and raises. Shipped 200 tons of high grade ore in 1920.

SILVER CREEK MINES, LTD. BRITISH COLUMBIA
Address: Revelstoke, B. C. D. Woolsey, mgr., Albert Canyon, B. C.
Officers: J. H. Brasetti, pres.; D. Woolsey, v. p. and mgr.; with Patrick Treanor, directors; H. C. Forsyth, sec.; J. B. Watson, treas.
Inc. Sept., 1918, in British Columbia. **Cap.** $750,000; par 50c; issued 700,000 shares; non-assessable.
Property: the Woolsey group, 11 claims, unpatented, about 500 acres, 7 miles by trail from Albert Canyon Sta. on C. P. R. R., shows a fissure vein in slate and gneiss, 23' wide, samples running 6 oz. silver, 6% lead and 6% zinc. Ore is silver-lead, with a quartz gangue.
Development: by tunnels and crosscuts. Property is a promising prospect.
Bonded to C. V. Brenan of Victoria, B. C., at last account.

SILVER CREST MINES, LTD. **BRITISH COLUMBIA**

Address: J. E. Fitzgerald, sec., 420 Rogers Bldg., Vancouver, B. C. **Mine address:** Stewart, B. C.

Cap. $50,000; par 25c.

Property: the Silver Hill group, 11 claims, in Salmon River section, Portland Canal division, on E. side of Dillworth glacier, 14 miles N. of Stewart. Ore is silver-lead.

SILVER CROWN MINING CO, LTD. **BRITISH COLUMBIA**

Office: 429 Rookery Bldg., Spokane, Wash. **Mine office:** Trout Lake, B. C. **Officers:** Fred Hamilton, pres.; A. C. Bartels, v. p.; A. Herman, sec.-treas., with Geo. Skore and H. C. Weyerhoist, directors.

Inc. Feb., 1917, in Washington. **Cap.** $125,000; shares 10c par; assessable; 852,250 issued.

Property: 3 claims, 150 acres, on Ethel Mtn., Trout Lake division, W. Kootenay district.

Geology: fissure vein in granite and limestone, dipping 45° and pitching N. W. Shoots are from 18 to 36" wide. Ore contains silver and lead, assaying $125 per ton. **Development:** by 1,300' tunnel to depth of 550'.

Production: in 1917 was $65,000. No recent information; probabiy idle.

SILVERED-COPPER MINING CO. **BRITISH COLUMBIA**

Probably dead. Described in Vol. XIV.

SILVER GABLE MNG. & MLG. CO. **BRITISH COLUMBIA**

Address: Dr. N. M. Baker, Old Natl. Bk. Bldg., Spokane. Wash., or W. B. Smith, Kaslo, B. C.

Property: in the Ainsworth mining division, W. Kootenay district.

SILVER HOARD MINING CO. **BRITISH COLUMBIA**

Described in Vol. XIII.

Reorganized as the **Dellie M. & M. Co.**, which see.

SILVER KING MINES, LTD. **BRITISH COLUMBIA**

Office: Trail, B. C. **Mine address:** Nelson, Kootenay Lake, B. C.

Officers: Jas. J. Warren, pres.; S. G. Blaylock, v. p.; T. W. Bingay, sec.; W. M. Archibald and R. S. Lennie, directors. Company is owned jointly by the Kootenay Bonanza Co., and the Consolidated Mining & Smelting Co., of Canada, Ltd., in the proportion of ¼ and ¾, respectively.

Property: 5 claims, on Toad mountain, back of Nelson, includes the old Silver King mine, formerly owned and operated by the Hall Mining & Smelting Co., Ltd. Mine is opened by a shaft to the 10th level, showing 3 well defined veins in diabase schist. The ore occurs where the veins are intersected by 2 dikes, and in the altered surface zone is principally bornite, with tetrahedrite, iron pyrites and silver occurring in the unaltered zone below. Gold is present in small amounts. Considerable ore was extracted in the past from above the 5th level in the Main vein. The South vein and the K. vein were practically untouched. Ore reserves are estimated at 100,000 tons. Ore in the main vein has been proven to a depth of 1,130' by diamond drill borings.

Equipment: includes electrical motors of 50-h. p., a 100-h. p. electric pump, an 1,850' tramway, and all necessary mine buildings. Shut down 1915-16. In 1918 mine was kept unwatered and 6,180' of diamond-drilling was done. No ore was shipped. Diamond-drilling in 1919 amounted to 305'.

Inactive in 1920-21.

SILVER ORES, INC. **BRITISH COLUMBIA**

Address: E. J. Fader, Invermere, B. C.

Company controlled by New York interests.

Property: Hot Punch mine in the Windermere division, E. Kootenay district. Also, the Buvan mine in same district, 7 miles from Wilmer.

SILVERSMITH MINES, LTD. **BRITISH COLUMBIA**

Address: Box 1772, Spokane, Wash. **Mine office:** Sandon, B. C.

Officers: John B. White, pres., 1017 Paulsen Bldg., Spokane, Wash., with

J. M. Harris, J. P. McGoldrick, H. C. Lambach, F. B. Grinnell, A. C. Burdick and T. S. McPherson, directors. Oscar V. White, gen. mgr.

Company is the successor of Slocan Star Mines, Ltd., which went into liquidation in 1918. Present company organized in 1918, acquired entire assets of Slocan Star Mines at liquidator's sale, assuming a $90,000 bond issue and delinquent interest amounting to $11,596; a $35,000 floating indebtedness was liquidated by issuance of preferred shares. Shareholders of Slocan Star were given share for share upon payment of 3½¢ additional; for every $5 so paid in, shareholders received one share of preferred stock.

Cap. $750,000, of which $250,000 is 7% preferred, par $5 and $500,000 common stock, par 20¢; assessable to 5¢. In February, 1920, all outstanding preferred shares were retired and bonds and interest paid off.

Annual report for fiscal year ending May 31, 1921, showed cash assets, $7,739; government bonds, $16,452; profit $20,106. P. & L. surplus, $1,137.

Dividends: initial dividend amounting to $25,000, paid Jan. 5, 1921.

Failure of Slocan Star Mines is laid to excessive construction costs due to new milling, hydro-electric, and other equipment, failure to keep development ahead of extraction, and largely lack of sufficient capital.

Property: at Sandon, Slocan division, consists of the Slocan Star and Rabbit Paw groups of 12 Crown-granted claims, which were involved in the protracted and costly apex litigation between the Star Mining & Milling Co., plaintiff, and the Byron N. White Co., for about 10 years. Holdings also include a patented millsite and extensive water rights.

Ore carries silver, lead and zinc, occurring as large shoots in the Slocan Star lode, a strong fissure vein in slate, traceable over a mile. This strikes N. E.-S. W., dips 47° and is 10′ wide, bulging in places to as much as 70′ across.

Development: by 11 main tunnels, No. 11, the lowest; ingress and egress is through No. 10, a crosscut tunnel 2,100′ into the vein, total workings over 15,000′. Reserves have been practically exhausted down to 5th level. From the 6th level to surface, several shoots of sphalerite with siderite gangue were left intact in former years. On No. 10 level, the main oreshoot is 430′ long and 6′ wide. This orebody is blocked out from the 11th to the 5th level, reserves being estimated at 200,000 tons.

The Ivanhoe mill acquired in 1921, was remodelled and enlarged to 150 tons daily, and put into commission on Dec. 31.

Production: for year ending May 31, 1920, 13,400 tons ore yielding 280 tons shipping ore, 834 tons lead concentrate and 834 tons zinc concentrate, returning $205,996, with a net profit of $14,350. In 1920, the mill treated 15,588 tons of ore. Shipments amounted to 134 tons crude ore and 2,021 tons silver-lead concentrate, returning $260,404. Expenses were $169,840.

SILVER STANDARD MINING CO. BRITISH COLUMBIA

Office: 506 Winch Bldg., Vancouver, B. C. **Mine office:** W. G. Norrie-Lowenthal, New Hazleton, B. C.

Owners: J. W. Stewart, Angus Stewart, D. McLeod, and the estate of the late A. L. McHugh.

Gross earnings in 1916 were $49,000, and $65,000 in 1918; $71,272 in 1919, $101,312 in 1920.

Property: the Silver Standard mine, 14 Crown grant claims, 700 acres, 7 miles N. of New Hazelton, in Omineca division, said to show 9 fissure veins in calcareous sandstone, dipping 62° and striking N. 50° E. Veins are from 12 to 72″ wide and 4 of them carry profitable ore. Shoots are 100 to 600′ long. Ore is a sulphide, mill ore averaging 0.10 oz. gold, 30 oz. silver, 3% lead and 11% zinc.

Development: by 1,400′ tunnel to be extended 800′, and total of over 4,000′ of workings to 500′ depth. Mining is by shrinkage stoping. Reserves are 15,000 tons. No. 4 vein has a continuous shoot over 400′ long.

Equipment: includes 60-h. p. gas engine, 350 cu. ft. compressor. In 1918, a 50-ton concentrator of the Faust type was completed on Two Mile creek.

about 3 miles from the mine. Ratio of cencentration is 5 to 1. Ore is hauled by truck from mine to mill.

Production: in 1918, 90 tons of silver-lead concentrates yielded 38 oz. gold, 14,913 oz. silver, 83,050 lb. lead and 356 tons zinc concentrates yielded 97 oz. gold, 43,363 oz. silver; in 1919, 137 tons silver-lead concentrates, 42 oz. gold, 28,068 oz. silver, 140,919 lb. zinc; and 349 tons zinc concentrates, 96 oz. gold, 43,325 oz. silver, 34,021 lb. lead, 224,539 lb. zinc; in 1920, 279 tons silver-lead concentrate yielded 86 oz. gold, 43,696 oz. silver, 189,488 lb. lead, 66,460 lb. zinc and 601 tons zinc concentrates, 131 oz. gold, 59,324 oz. silver, 73,372 lb. lead and 453,512 lb. zinc.

The property was closed down Dec. 1920, but work was resumed early in 1922.

For geology, see Memoir 110 (1919) Canadian Geol. Survey.

SILVER TIP MINING & DEV. CO., LTD. **BRITISH COLUMBIA**

Address: 717 Vancouver Blk., Vancouver, B. C. **Mine address:** P. W. Racy, mgr., Stewart, B. C.

Property: 3 claims, Silver Tip group, in Salmon River section, Portland Canal division, 14 miles N. of Stewart, has a quartz vein showing 8" streak of galena with high silver value. Developed by tunnel.

SILVER TIP MINING & POWER CO. **BRITISH COLUMBIA**

Office: J. H. Beattie, 718 Green Bldg., Seattle, Wash.

Officers: at last accounts, A. Julian, pres.; G. B. Gilfillan, v. p.; M. S. Davys, engr., Kaslo, B. C.

Inc. Jan. 15, 1910, in Washington. **Cap.** $1,000,000; shares $1 par; 615,862 issued. Bonds, $700,000 of 7%.

Property: the Lake Side mines, 557 acres, Skagit county, Wash.; also a lease on the Hewitt-Lorna Doone mines in Slocan district, B. C. acquired from Silverton Mines, Ltd., in 1917, but since relinquished. See **Hewitt-Lorna Doone Mines**, in this volume.

SILVERTON MINES LTD. **BRITISH COLUMBIA**

In 1917 assets, including a lease on the Hewitt-Lorna Doone mines, were transferred to the Silver Tip Mining & Power Co.

Described in Vol. XIII.

SIMILKAMEEN CONS. COPPER CO. **BRITISH COLUMBIA**

At last accounts property was worked by Pacific Syndicate, Ltd., on which there is no recent information. Company, etc., described in Vol. XII.

SIMILKAMEEN MG. & SM. CO., LTD. **BRITISH COLUMBIA**

Idle. No recent information. Described in Vol. XIII. Address, at last accounts, care Bank of British North America Bldg., Vancouver, B. C. Mine near Princeton, B. C.

SITTING BULL MINING CO. **BRITISH COLUMBIA**

Address: 838 Henry Bld., Seattle, Wash. **Mine address:** E. D. Smith, supt., Invermere, B. C.

Property: the Sitting Bull mine on Boulder creek, Windermere mining division, said to have high-grade silver-lead ore.

Development: on 5 levels by tunnels. In March, 1919, company had 90 tons of ore sacked for shipment that averaged 132 oz. silver and 29% lead. No work has been done since 1919.

SLOCAN SILVER MINES, LTD. **BRITISH COLUMBIA**

Successor to McAllister Mng. & Mlg. Co., in 1920.

Address: R. A. Grimes, pres.-mgr. Kaslo, or Three Forks, B. C. W. Riddell, sec.-treas.

Property: McAllister mine on N. fork of Carpenter creek, Slocan division, 3 miles from Three Forks. Ore occurs in a well-defined quartz vein in quartzite, carrying grey copper with values mainly in silver; assays show 33 oz. silver, 5% lead, $1 gold and 2% copper. Reported that 2 ore shoots, one 600' long, have been uncovered, and that ore reserves containing 1,500,000 oz. of silver, are available.

SLOCAN STAR MINES, LTD. **BRITISH COLUMBIA**

Described in Vol. XIII. Went into liquidation in 1917 and entire assets acquired by **Silversmith Mines Ltd.**, which see.

SNOWSTORM & IONA GROUPS **BRITISH COLUMBIA**

Address: Stuart Henderson, owner, P. O. Box 638, Victoria, B. C.

Property: 23 claims, in Highland valley, 29 miles from Ashcroft on the C. P. R. R., reported under examination by the Provincial government under the "Mineral Survey & Development Act". On the Snowstorm, 5,736' of diamond drilling opened up an orebody varying in width from 8-18' and assaying 1-2.7% copper. On the Iona, a tunnel is in 225' in quartz carbonate formation. Development continued during 1920.

SNUG COVE COPPER CO., LTD. **BRITISH COLUMBIA**

Address: C. M. Oliver, mgr., 419 Rogers Bldg., Vancouver, B. C. **Mine office:** Bowen Id., B. C.

Property: several claims adjoining those of the Bowena Copper mines on the N., on the E. side of Bowen island, 12 miles W. of Vancouver. They contain shear-zones, one carrying copper sulphides. A 160' adit was driven, but no ore was cut.

SOHO CONS. MINES, LTD. **BRITISH COLUMBIA**

Address: Sherwood Bldg., Spokane, Wash. **Mine address:** Sandon, B. C. J. C. Ryan, mgr., 1610 Gardner St., Spokane, Wash.

Property: Soho silver-lead mine on Carpenter creek, Slocan division, W. Kootenay district, shows 4 veins. Developed by 100' shaft, etc.; total workings over 3,000'.

SOUTH EASTER MINING CO. **BRITISH COLUMBIA**

A subsidiary of the Northern Customs Concentrators, Ltd., of Cobalt, Ont. A. S. Holmes, local mgr., Skidegate, Queen Charlotte Islands, B. C.

Property: 7 claims, one mile from Skidegate, shows 3 quartz veins; one, with commercial ore traceable on surface over 1,000', is 8 to 10' wide, and assays $8 to $15 gold per ton.

Development: by 100' shaft, with several hundred feet of workings on the 50 and 100' levels.

Closed most of 1919. Reorganization underway.

SPOKANE MINING & DEV. CORP. **BRITISH COLUMBIA**

Office: Nelson, B. C.

Officers: J. A. McLean, pres.; F. A. Starkey, v. p.; Chas. F. Caldwell, v. p.; C. M. Leamonth, sec.; W. F. Baker, treas., with H. T. Hodge, and M. C. Monahan, directors. C. M. Mohr, managing director.

Inc. May, 1917, in British Columbia. **Cap.** $1,500,000; par $1.

Property: the Beasley-Monarch mine, 6 claims, near Beasley, 8 miles west of Nelson, shows 2 fissure veins between diorite footwall and granite hanging-wall. Vein matter consists of quartz, calcite, pyrite, and chalcopyrite. No. 1 vein is proven for 800' by open cuts and pits, and varies up to 20' in width. Several cars of ore shipped assayed 3½% copper, and $1.50 to $2.00 gold and silver per ton. No. 2 vein opened by open cuts and 150' tunnel, is said to be traceable for a mile on surface. Also the St. Anthony gold mine in same district.

In 1919, the Monarch was taken under bond and lease by Falls Creek Copper Mng. Co. (q. v.), and is being explored by diamond drills under direction of C. M. Mohr.

SPOKANE ROCHER DE BOULE MINING CO. **B. C.**

Idle and probably dead. Fully described in Vol. XIV.

STANDARD FINANCE CO. **BRITISH COLUMBIA**

See **Lightning Cr. Gold Gravels & Drainage Co.**

STANDARD SILVER-LEAD MINING CO., LTD. **B. C.**

Offices: 507 Empire State Bldg., Spokane, Wash., and Silverton, B. C.

Officers: W. J. C. Wakefield, pres.; Geo. H. Aylard, v. p.-gen. mgr.; Chas. Hussey, sec.-treas., Victoria, B. C., with L. K. Larson and W. A. Corey, directors. W. H. North, asst. mgr.

Inc. Dec. 1910, in Washington. Operated under present management

since 1911. Controlled by the Finch-Campbell-Clark estates of Spokane. **Cap.** $2,000,000; shares $1 par; fully paid; all issued. Annual meeting, first Tuesday in May. Security Transfer & Registrar Co., New York, registrar and transfer agent. Listed in Spokane and on New York Curb.

Annual report for 1920 shows: total receipts, $216,609; expenditures, $143,197; operating profit, $73,412. Cash balance, $367,173.

On Sept. 30, 1921, surplus was $411,887, compared with $366,275 on June 30, the increase including $1,401 for lead, etc., and $43,688 net from Beer, Sondheimer settlement.

Dividends: 1912, $425,000; 1913, $650,000; 1914, $475,000; 1915, monthly rate of 2½% commenced September 10, total for year, $250,000; in 1916, $600,000; in 1917, $300,000; none since; a total of $2,700,000 to 1921.

Property: 10 full claims, 6 fractions, 600 acres, 2 miles N. E. of Silverton, located on Slocan Lake. The claims carry fissure veins in slate and graphitic schist. Ore carries silver, lead and zinc in a quartz-pyrite gangue. Silver occurs as gray copper and ruby. The orebodies occur in the form of lenticular masses along the vein, varying in width from 1′ to 25′.

Development: tunnels numbered from 1 to 8, inclusive, open the vein to a depth of 1,200′.

Equipment: 150-ton concentrator, flotation unit, hydro-electric power plant on Four Mile creek and an 8,000′ tramway connecting mine and mill.

Production: in 1917, silver-lead ore realized $881,616; in 1918, $112,898; in 1919, $198,419; in 1920, $182,879.

The mine was sold (July 1921) for $50,000 to Clarence Cunningham and associates.

Company is looking for a promising new property. Expended about $5,000 in 1920 on the Wellington group in Whitewater section of Ainsworth mining division, but dropped option.

STAR MINING & MILLING CO. **BRITISH COLUMBIA**

See **Silversmith Mines Ltd.**

STEMWINDER MINING CO., LTD. **BRITISH COLUMBIA**

Address: 43 Victoria St., Toronto, Ont. **Mine address:** Kimberley, B. C.

Property: the Stemwinder and Ontario group in Fort Steele division, E. Kootenay district, near Kimberley, adjoins Cons. M. & S. Co's Sullivan mine. Ore carries silver, lead and zinc.

STIKINE MINING CO. **BRITISH COLUMBIA**

Address: S. Silverman, 1 Wall St., New York. Controlled by A. B. C. Metals Co., Alaska Bldg., Seattle, Wash.

A. B. C. Metals owned or controlled 600,000 shares of 750,000 issued.

Property: 6 claims, 156 acres, at Grand Rapids, in the Stikine district, accessible from Wrangell, Alaska. Tunnels have been driven in limestone, revealing bunches of zinc blende, but indications are not considered encouraging. Presumably idle.

SUNLOCH MINES, LTD. **BRITISH COLUMBIA**

Address: Trail, B. C., or 717 Vancouver Blk., Vancouver, B. C. **Mine address:** Sooke, B. C.

Mine was acquired in 1917 by Cons. M. & S. Co., Ltd., and is controlled through majority stock ownership.

Directors: W. M. Archibald, pres.; T. W. Bingay, S. G. Campbell, S. G. Blaylock and W. O. Miller. John Hanna, supt.

Property: Sunloch group, 22 claims, on Jordan river, 42 miles by road from Victoria; also an option on adjoining Vulcan group. A logging railway connects the property with tidewater.

Geology: the copper deposits occur on, or near both contacts of a gabbro dike. Ore consists of a sheared and hornblende basalt, carrying a large proportion of finely disseminated chalcopyrite. Alternating layers of rich and lean ore give a banded appearance. Small grains of pyrite are plentifully distributed in the ore.

Development: has been confined almost entirely to one claim, Sunloch No. 6, on which there are 3 well-defined ore-bearing zones, known as

the River, Cave, and Archibald lodes. A tunnel on the River zone cut 5' of 1.9% copper ore, 20' of 3.7% ore, and 3' of 3.8% ore, partly opening 200' along vein at a depth of 240'. An adit on the Cave zone passed through 60' of 4% ore; at 180' a crosscut S. cut 60' of 0.9% ore, 20' of waste, 35' of 2.58% ore, including 11' of 5.1% ore, this at a depth of 240' from surface. A diamond drill hole, 150' farther in than the crosscut and at a depth of 400' cut about 15' of ore assaying 0.65 to 7.9% copper. Less work has been done on the Archibald zone, but it is considered equally promising. Work on opposite side of river shows that the Cave zone continues into the Vulcan group.

Management estimated from 100,000 to 150,000 tons of 3 to 5% ore at end of 1918. Since then, exploration has opened additional ore. Development in 1920 was continued until October, when work was suspended.

Development on the property has shown that property has merit and fully warrants further development.

SURF INLET GOLD MINES **BRITISH COLUMBIA**

Corporation sold its property to **Belmont Surf Inlet Mines, Ltd.**, for 20% of the capital stock of that company.

SURPRISE MINE **BRITISH COLUMBIA**

Owned by **Rosebery Surpise Mining Co.**, which see.

TACOMA STEEL CO. **BRITISH COLUMBIA**

Office: Tacoma Bldg., Tacoma, Wash. **Mine office:** Vananda, Texada Island, B. C.

Officers: S. R. Balkwill, pres.; E. M. Shelton, v. p.; A. F. Eastman, sec.-treas.-gen. mgr.; D. C. Stephens, supt.

Cap. $50,000. Paid five $35,000 dividends.

Property: 208 acres of iron ore lands on Vancouver Island, and the **Marble Bay copper mine,** 3,000 acres, Crown-granted, near Marble Bay harbor, at the northern end of Texada Island.

Geology: the Marble Bay is a high grade copper mine of the contact metamorphic type, yielding bornite ore carrying 5 to 10% copper with gold-silver values. The orebodies are detached and occur in a thick limestone formation altered to garnetiferous marble. The ore lenses vary from 5' to 200' long and 10' to 50' wide. The largest was 15'x20' and 502' vertically. On the lower levels, the ore is essentially unchanged. The limestone lies flat and is cut on the 1,700' by granodiorite, impregnated with sulphides.

Development: by a 1,600' three-compartment shaft and several thousand feet of workings. A 45° winze extends 365' below the 1,500' level; a new level was opened from it at 1,700', equal to 1,619' vertical. At the bottom of the winze the ore assayed 2.8% copper, 0.5 oz. silver, and 0.72 oz. gold. The stope between the 1,500' and 1,600' levels is up to 65' high, 70' long, and 8' wide. In 1920, only diamond drilling done between 16th and 17th levels. Work in 1921 on 1,700' level disclosed small orebodies, not sufficiently large to warrant extraction, with copper at 14 cents. Orebodies, though rich, are not continuous, necessitating expensive exploration work to develop new ones. See Victor Dalmage, Econ. Geol., Oct., 1921, p. 372.

Equipment: includes steam and electric power, with 5 hoists, 5-drill and 10-drill air compressors. There is a wharf, on Marble Bay, having large ore bunkers, connected with the mine by a ground tram. In connection with the mine there is a limestone quarry and 4 kilns, with daily capacity of 300 bbls. of lime.

Production: 11,697 tons of gold-silver-copper ore in 1917; 626,422 lb. of copper in 1918.

TALTAPIN MINING CO., LTD. **BRITISH COLUMBIA**

Address: W. Sanders, sec., 416 Standard Bank Bldg., Spokane, Wash. A. Wood, mng. dir. **Mine office:** Burns Lake P. O., B. C.

Property: the Silver Fox claim, on Taltapin lake, Burns Lake section, Omineca division. The main vein, 8' wide, shows quartz ore carrying lead, copper and silver, in part milling and in part high grade. Developed by a drift-tunnel. Operations began in 1919.

TARHEEL COPPER CO., LTD. **BRITISH COLUMBIA**

C. J. Lincke, supt., Golden, B. C.

Property: the Tarheel group of claims, near Golden on the middle fork of the Similkameen river, Golden mining division.

TASSOO MINING & SMELTING CO., LTD. **BRITISH COLUMBIA**

Out of business. Property now owned by F. C. Elliott, of Victoria, B. C., and J. E. Cortell, of Seattle, Wash., described, Vol. XIII.

TATLAYOKO GOLD MINES CO., LTD. **BRITISH COLUMBIA**

Address: Squamash, B. C.

Property: 6 claims on Chromium creek, tributary to Klinaklena river, northern part of Nanaimo division. A quartz vein, with strike S. 20° E. and dip of 37°, cuts a series of dikes; the width is from a few inches to several feet. Ore carries gold and silver, one sample assaying 3.5 oz. gold and $26 in silver per ton. Lenses of stibnite also occur. Developed by 4 tunnels. Equipped with saw mill and assay office. A concentrator is contemplated. Reported that $50,000 had been expended to Jan. 1, 1921.

TAYLOR ENGINEERING CO., LTD. **BRITISH COLUMBIA**

Is the holding company for **Taylor Mng. Co.**, which see.

TAYLOR MINING CO., LTD. **BRITISH COLUMBIA**

Subsidiary of Taylor Engineering Co., Ltd.

Address: 850 Hastings St., W., Vancouver, B. C. **Mine address:** C. B. North, mgr., Alice Arm, B. C.

Officers: A. J. Taylor, pres.; with R. P. Butchart, H. C. Chiene, C. M. Rowlson, and J. F. Tener, directors. John Anderson, sec.

Inc. in June, 1919, with capital of $1,500,000, $1,200,000 paid up, by the Taylor Eng. Co., to take over the property of the Dolly Varden Mines Mines Co. This ended a legal squabble that tied up the property for some time, and was a much discussed matter in the Provincial Legislature. The Taylor Engineering company constructed a railway from tidewater to the mine, but the Mines company failed to pay for the work done, which drove the Engineering company into financial distress, as it owed $462,500 borrowed to pay construction bills. Meanwhile, the Dolly Varden company gave the Temiskaming Mining Co., of Ontario, an option on the mine for $900,000. Finally, the Legislature gave owners 10 days in which to pay off all labor claims and the Engineering company's account. The D. V. mines company defaulted, so the Engineering company took possession and organized the Taylor Mining Co. On Sept., 1921, Geo. Wingfield brought suit against the company for $182,322, to cover a $150,000 mortgage and accrued interest, due July 31, 1921.

Property: the **Dolly Varden** and Wolf silver mines, 480 acres of patented ground, on the Kitsault river, Nass River division, 18 miles from Alice arm, near Granby bay. Railroad connects mine with tidewater, 18 miles distant. Mine is described in "Eng. & Mng. Jour." of March 13, 1920, by Robert Dunn.

Geology: ore occurs in a shear zone in andesite, the ore being considered as secondary. Near the surface native silver occurs in extremely rich streaks. Lower down, ruby silver, argentite, and stephanite also occur and at 270′ in depth ruby silver is the principal mineral. Fine-grained pyrite, carrying good value in silver occurs from surface to bottom level (300′). Faulting and cross-fissuring is common and make a complex structure.

Development: to depth of 1,200′ by 6 tunnels, connected by raises. Besides this tunnel work, diamond drilling is said to have developed about 45,000 tons of ore. Samples of shipping ore gave 244 oz. silver, 18% lead, 12.4% zinc.

The Wolf group: 2 miles N. of the Dolly Varden, on opposite side of

river, also belongs to the Dolly Varden group. Ore is similar to the Dolly Varden, though a little lower in silver.

Development: consisting of 85' of tunnels, 770' of open cuts, and 4,900' of diamond-drilling has shown probable existence of 120,000 tons ore containing about 1,800,000 oz. silver, and over 400,000 tons of lower-grade ore.

Equipment: includes 18-mile narrow gauge railway from mine to Alice Arm and 2,000' aerial tram, etc. Railway was extended to Wolf mine in 1920. There is also a steam plant, 400 cu. ft. air compressor, machine shop, dwellings, cook and bunk-houses and dock at Alice Arm. A 500 h. p. hydro-electric plant was installed, 1920.

Production: shipments to Anyox and Tacoma smelters from Sept. 1, 1919 to Sept. 1, 1920, amounted to 1,170,000 oz. silver. Heavy snowfalls closed railway in December, but a force of men was retained for development work until end of 1921.

TEXAS YANKEE GIRL MNG. CO., LTD. **BRITISH COLUMBIA**

Subsidiary of **Mining Corp. of Canada, Ltd.**, Cobalt, Ont. **Mine address:** W. T. McDowell, supt., Ymir, B. C. A. W. Newberry, mgr.

Company in 1920 acquired holdings of **Hobson Silver Lead Co.**, at Ymir, in the Nelson division, which see, for description.

TIDEWATER COPPER CO., LTD. **BRITISH COLUMBIA**

Address: 227 Pemberton Blk., Victoria, B. C. **Mine office:** Sydney Inlet, B. C.

A subsidiary of the Alaska British Columbia Metals Co., 135 Broadway, New York. H. B. Price, pres.-gen. mgr. The A. B. C. Co. owns 90% of entire stock issue. Dan M. Drumheller, Jr. supt.

Inc. in Washington. **Cap.** $1,000,000; par $1. **Bonds:** $300,000, 7-year, 7% first mortgage conv., guaranteed by A. B. C. Co.

Property: 8 claims, 400 acres, also an 80-acre manufacturing site on the beach, 200 miles N. W. of Seattle, Wash., by boat to Sydney inlet on west coast of Vancouver Island, B. C. Mine known as Dewdney, or Indian Chief, has been worked by many different companies since 1897, and is said to have produced 15,000 tons of 4½% copper ore. Ore is a contact deposit of garnetized limestone containing bornite, with small quantities of chalcopyrite and chalcocite, capping a granodiorite hill. The present company acquired the property in 1916 and has expended $800,000 in development work and equipment. The Yreka claims on Quatsino sound were bonded in 1919.

Development: by tunnels. During 1919, No. 2 and 3 S. side adits were extended 400' and 200', raises and drifts totaled 600', and diamond drilling 1,000'. Diamond drilling was continued throughout 1920-'21.

In the Annual Report for 1919, it is estimated that "As this orebody (the South) is exposed in the underground workings nearly 400' below the surface of the mountain, it is possible that a tonnage of approximately 250,000 tons may be available without sinking."

Equipment: water-power, 350 h. p. in 4 units, ore bins., 3,000' aerial tram, compressor, crushers, ball and tube-mills, and 300-ton flotation plant, making a recovery of over 94%. The concentrates average 35% copper. Costs are reported as 9¢ per lb. of copper. The mill was closed down early in 1921, and development work only performed during that year; operations were resumed Feb., 1922.

TOBY CREEK MINING CO., LTD. **BRITISH COLUMBIA**

Address: 850 Hastings St. W., Vancouver, B. C. **Mine office:** Athalmer, B. C.

Officers: M. H. Leggat, pres.; E. O. Connish, v. p.; D. G. Lockyer, sec.-treas., W. L. Smith, mgr., 824 Broadway, Seattle, Wash., with D. D. Young, F. R. Begg, B. W. Greer and C. F. Lee, directors.

Inc. May 17, 1920, in B. C. **Cap.** $300,000; $1 par; 82,000 shares in treasury, May, 1921.

Property: Silver King and Maple Leaf claims, on S. fork of Toby creek, Windemere division, East Kootenay district. Developed by 200' tunnel and 100 tons of silver-lead ore reported ready for shipment.

TOFINO COPPER CO. **BRITISH COLUMBIA**

Dead. Was a subsidiary of the Alaska British Columbia Metals Co., operating a group of copper-silver claims on Copper Creek, Vancouver Island.

TRAIL MINING CO., LTD. **BRITISH COLUMBIA**

Address: c/o R. C. Crowe, Trail, B. C. **Mine address:** A. W. McCune, Jr., Salmo, B. C.

Property: near Salmo, Nelson division, W. Kootenay district, developed by a tunnel, 600′ long, Sept. 1, 1921. Oxidized lead ore with silver values occurs in a vein, reported to be 16′ wide.

TRAIL SMELTER **BRITISH COLUMBIA**

Owned by **Consolidated Mining & Smelting Co. of Canada, Ltd.**, and described under that title.

TREASURE MOUNTAIN MINING CO. **BRITISH COLUMBIA**

Idle. Described in Vol. XIV.

TRIUNE GOLD & SILVER MNG. & MFG. CO., LTD. **B. C.**

Successor to Minnesota G. & S. Mng. & Mfg. Co.

Address: R. H. Battey, mgr., Ferguson, B. C.

Property: the Triune mine, near Ferguson, in the Trout Lake division, at an elevation of 7,500′. A quartz vein, carrying galena, iron pyrite, and blende, lies in slates, which rest on a footwall of schist. The average of 18 cars of ore was 34% lead, 6 to 9% zinc, 0.5 oz. gold, and 182 oz. silver.

Development: by 4 tunnels. No. 4 is in 600′ in slate, with no ore showing, but indications seem promising. Further development necessary.

TROJAN MINING CORP. **BRITISH COLUMBIA**

Address: 837 Henry Bldg., Seattle, Wash. **Mine address:** F. D. Smith, supt., Athalmer, B. C.

Property: Trojan mine on Slade creek, Windemere division, E. Kootenay district, shows a quartz fissure vein carrying copper.

Equipment: includes 35 h. p. gas engine and compressor. Active development was underway in 1919, but no later information available.

TRUE FISSURE MNG. & MLG. CO., LTD. **BRITISH COLUMBIA**

Address: T. W. Mitchell, sec., 229 E. 6th St., Cincinnati, Ohio. **Mine address:** Ferguson, B. C.

Cap. $2,500,000; par $1.

Property: 8 crown-granted claims, and 160-acre millsite, in Trout Lake division, West Kootenay district, ½ mile from Ferguson, shows silver-lead-zinc ore with some gold, which assays to 75 oz. silver, 35% lead, 25% zinc, and 0.15 oz. gold. Developed by tunnels. Active in late 1921.

TYEE COPPER CO., LTD. **BRITISH COLUMBIA**

Smelter and assets sold in December, 1916, to the **Ladysmith Smelting Corp'n. Ltd.**, which see.

UNION COPPER MINING CO. **BRITISH COLUMBIA**

Address: D. Campbell, 503 Pender St., Vancouver, B. C.

Property: the Union group of claims, on the N. side of Knight inlet, Nanaimo division, Vancouver Island. No ore has been found, so far as the 280′ adit and 54′ crosscut have been opened. Quartz, carrying iron pyrite, occurs in a belt of metamorphosed sediments of slaty structure.

UNION MINING CO. **BRITISH COLUMBIA**

Address: Grand Forks, Lewis Johnson, part owner and mgr.; company not incorporated.

Property: 4 claims, 150 acres, Gloucester camp, Grand Forks division, Yale district, shows gold-silver ore.

Development: by 4 tunnels, with several hundred feet of workings. New work consists of a crosscut N. from No. 2 tunnel and a drift on the vein is said to be 22′ wide and to assay $20 per ton. The shaft is being continued to 300′ depth. The mine is 27 miles from rail, and transportation and smelting charges absorb most of the value. Owners have been trying to raise money to build a mill.

Production: in 1916, 605 tons of $35 ore; in 1917, 751 tons shipped re-

turned $31.80 per ton; in 1918, 153 tons assaying $6.20 to $12.80 gold and 31-50 oz. silver per ton; in 1919, 81 tons assayed .31 oz. silver and 0.28 oz. gold.

UNITED METALS MINING CO. **BRITISH COLUMBIA**

Address: T. C. Nutter, mgr., Alice Arm, B. C.

Property: 3 claims, Illiance section, in Skeena division, 11½ miles N. E. of Alice Arm, showing numerous quartz veins in sedimentaries; continuity of ore-shoots in length and depth is very irregular. Mineralization consists of galena and zinc-blende, carrying silver values. Property has been undergoing exploration, no ore being shipped, though 50 tons of ore was packed, ready for shipment, late in 1919. The work done during that year did not open the vein to any advantage.

In 1919, all right, title, and interest in the company was sold to D. J. Hancock and T. C. Nutter for $25,000; the only remaining interest the stockholders have is the division of the money to be paid by them.

UTICA MINES, LTD. **BRITISH COLUMBIA**

Address: T. R. French, Kaslo, B. C.

Officers: Chas. F. Caldwell, pres.; T. R. French, sec.-treas., with H. R. Wade, F. T. Abey, and V. D. Williamson, directors. W. C. Sayer, R. H. Voorhees and W. Tolman, directors.

Inc. in British Columbia. **Cap.** $2,000,000; $1 par; 1,600,095 issued. 200,000 shares offered at 10c each in December, 1919, to pay pressing debts. Auditors' report, January 12, 1918, showed cash on hand, $213; buildings, equipment, etc., $28,470; mine, $1,427,945; stock discount, $184,628; total assets, $1,690,310. Liabilities included accounts payable, $6,994; bills payable, $7,500; profit and loss, $75,690. An initial dividend of 2c was paid in June, 1917, followed by 2c in September. These two dividends together with fact that smelters refused to accept the ore on account of the high zinc content, left the treasury in a depleted condition at end of year.

Property: on 12 Mile creek, Ainsworth division.

Development: by tunnels to 1,200' below vein outcrop. Workings cover over 6,000'. In 1918, the mine operated only about 3 months, due to lack of funds. Output was 222 tons of ore, which produced 13,661 oz. silver, and 10 tons lead. Company operations were suspended in April, 1919, but resumed later by lessees. Shipments for 3 months in 1919 amounted to 155 tons, containing 17,360 oz. silver and 26 tons of lead.

In 1921-22, property was under lease to O. C. Thompson and W. E. Horton who have opened 2 ore shoots, 18 and 24" wide. A 200' crosscut tunnel is being driven to attain 250' additional depth. The former is also lessee of the North Star mine.

VALDEZ ISLAND COPPER CO., LTD. **BRITISH COLUMBIA**

Address: 220 Pemberton Blk., Victoria, B. C.

Officers: F. H. Rosher, pres.; S. F. Rosher, sec., Capt. F. N. D. Rosher, mgr., with G. A. Fraser, directors.

Cap. $500,000; shares non-assessable.

Property: Copper Mt., or Ingersoll group, 19 claims and a fraction, about 1,000 acres, at head of Gowland harbor, on Quadra Island N. W. of Nanaimo, is one of oldest locations on coast, but has never been thoroughly prospected until recently. Ore is chiefly chalcocite and bornite, with alterations to carbonate oxides and native copper, occurring along joint planes and shear-zones, apparently as isolated orebodies of lenticular shape. The Senator and Copper Mt. claims have the best showing and yielded most of the ore shipped in 1918 and 1919 (300 ton). Development on this claim has been mostly in open-cuts. Dump samples give 3.5% copper; no precious metals.

Total shipments to date, about 3,000 tons.

VAN ANDA COPPER & GOLD MINES CO., LTD. **B. C.**

Inactive. H. W. Treat, gen. mgr., and L. Goodacre, trustees; Jas. Raper, agt., Van Anda, B. C. Company is presumably alive, but not operating.

Property: 20 claims, crown-granted, 840 acres, including the Copper Queen, Cornell and Little Billie mines.

The Copper Queen mine has lenses of rich ore, mainly bornite, with some chalcopyrite along a diorite-limestone contact. The deposit has one main ore-shoot, 150′ long and 30′ wide. See Texada Id., B. C. by R. G. McConnell, Geol. Survey Canada Memoir 58, 1914, pp. 566-64.

The Copper Queen shaft is 600′ deep with a winze 240′ deep on the 500′ level. In 1918 the mine was operated under lease by Thomas Davis, of Seattle, Wash.

VANCOUVER MINING DEV. SYNDICATE **BRITISH COLUMBIA**

See Volume XIV.

VAN ROI MINING CO. **BRITISH COLUMBIA**

Controlled by Le Roi No. 2, Ltd., Rossland, which holds 63,193 ordinary and 10,483 preference shares, out of 90,000 and 30,000 issued.

Office: Leonard Rowell, 4 Broad St. Place, London, E. C. 2. **Eng. Mine office:** Silverton, B. C.

Directors: Lord Ernest Hamilton, chairman; A. B. Dealtry, T. J. Lloyd, supt.

Inc. July 9, 1908. **Cap.** £34,500 in 30,000 £1 pfd. and 90,000 1s. ordinary shares.

Property: the Vancouver group at Silverton, Slocan division, bonded to Clarence Cunningham in 1916 for $225,000 and credited with production under his management, of $350,000. The option was relinquished in October, 1921.

VICTOR SILVER LEAF MINING CO. **BRITISH COLUMBIA**

Address: 612 6th Ave., Spokane, Wash. **Mine address:** Fort Steele, B. C.

Officers: R. Abernethy, pres.; E. R. Abernethy, sec.; C. E. Berry, treas.; all of Spokane, with Geo. F. Gundry, and John Tospon, directors.

Cap. $1,500,000; par $1.

Property: 3 claims, on Maus creek, 10 miles E. of Fort Steele, said to show gold-silver-lead-zinc ore in 3 shoots. No shipments have been made, though sorted ore is said to assay $100 per ton.

Development: by tunnels, longest 400′

Property is being operated by **Fort Steele Operating Co.**, which see.

VIKING COPPER CO. **BRITISH COLUMBIA**

Presumably idle. See Vol. XIV.

WALLACE MOUNTAIN MINES, LTD. **BRITISH COLUMBIA**

Address: H. B. Morley, sec., Box 176, Penticton, B. C. **Mine address:** Beaverdell, B. C.

Property: the Sally silver group on Wallace Mtn., Greenwood division, reported leased to Glenville A. Collins in 1921.

Production: in 1920 amounted to $80,000. Present output said to run 300 to 400 oz. silver per ton of ore, with some lead.

WALTERS INVESTMENT CO. **BRITISH COLUMBIA**

Address: Geo. H. Walters, Empire State Bldg., Spokane, Wash. Controls **Waverly-Tangier Mng. Co.**, which see.

WASHINGTON MINES, LTD. **BRITISH COLUMBIA**

Address: W. H. Burgess; Kaslo, B. C. or Rambler, B. C.

Directors: J. L. Retallack, O. T. Stone and W. H. Burgess, sec., all of Kaslo, B. C., and Clive Pringle, Ottawa, Ont. Same interests in control of the Whitewater mine.

Inc. in British Columbia. **Cap.** $300,000; par $1; assessable.

Property: Washington and Slocan Bay groups, Ainsworth division, was for several years the largest shipper of that section, but ore became baser in depth and property was closed down in 1911. Mine is said to contain large bodies of complex lead-zinc ore in its lower levels, which can now be profitably concentrated.

Was operated by lessees, 1919-'20.

WAVERLY-TANGIER MINING CO. **BRITISH COLUMBIA**

Reported organized in 1920 by Walters Investment Co., Empire State Bldg., Spokane, Wash., who bonded and reopened the mine in 1918.

Property: the Waverly-Tangier group on Downie creek, Revelstoke division, first prospected in 1896 by Gold Fields of British Columbia Ltd. Several veins have been opened up containing silver, lead, gold and copper.

Development: by 3 tunnels, longest 650', raises and crosscuts, totaling 1,300' of old workings to vertical depth of 450.

A wagon road to Albert Canyon, 25 miles to the S. E., is being repaired and development work is to be continued.

WELLINGTON GROUP **BRITISH COLUMBIA**

Address: H. W. C. Jackson, lessee, Slocan, B. C. **Mine address:** Retallack, B. C.

Property: on Whitewater creek, Ainsworth division, was being developed by Standard Silver Lead Mng. Co., but option relinquished in 1920.

WESTERN BELLE MINING CO. **BRITISH COLUMBIA**

Idle or dead. See Vol. XIV.

WESTERN MINES EXPLORATION SYNDICATE **B. C.**

Address: J. D. Kearns, sec., 470 Granville St., Vancouver B. C. P. H. Fraser, mgr., Harpers Camp, B. C. **Property:** a placer gold property at Quesnel, in Cariboo mining district.

WESTERN MINING & DEVELOPMENT CO. **BRITISH COLUMBIA**

Dead. See Vol. XIII.

WEST KOOTENAY POWER & LIGHT CO., LTD. **B. C.**

Controlled by Consolidated Mining & Smelting Co.

Office: Rossland, B. C.

Company owns three hydro-electric plants with a revenue-producing load of 23,712 h. p., current being supplied to mines and works along the International boundary. Company is an important accessory to mining in British Columbia.

WESTMOUNT MINE **BRITISH COLUMBIA**

Address: H. D. Lea, lessee, Slocan City, B. C.

Property: on Enterprise creek, 8 miles from Slocan lake, located in the early nineties, worked continuously from 1905 to 1914, and now being actively worked by lessees. The main vein, from 3 to 6' wide, consists of decomposed granite with quartz in granite. Ore carries silver, lead, and zinc.

Development: by 4 adits and extensive drifting, etc. Present work consists of stoping between No. 3 and 4 levels. Shipped 3 carloads to the Trail smelter in 1919.

WHALE CHANNEL MINES CO., LTD. **BRITISH COLUMBIA**

Address: A. H. Wallbridge, sec.-treas., 333 Homer St., Vancouver, B. C.

Company organized in December, 1919, to develop 6 claims on Princess Royal Island, Skeena division, 3 miles north of the Belmont Surf Inlet mine. A 1,500' tunnel was to be driven to open a 12' vein which had been traced for 3,500' on surface.

WHITEWATER MINES, LTD. **BRITISH COLUMBIA**

Address: W. H. Burgess, sec.-mgr., Retallack, via Kaslo, B. C. Is also manager of Washington Mines, Ltd.

Property: one of the earliest producers in Ainsworth division, was sold over 20 years ago to Whitewater Mines, Ltd., of London. Credited with total production of $3,300,000. Mine at Retallack, on a branch of the C. P. R., has been worked under lease since 1918 on a 20% royalty basis, employing 15-20 men.

Production: 1918, consisted of 409 tons of silver-lead ore, and 133 tons silver-zinc ore. In 1919, 619 tons of silver-lead ore and 202 tons of silver-zinc ore were shipped to smelters.

WOLF GROUP **BRITISH COLUMBIA**

See **Taylor Mining Co., Ltd.**

WONDERFUL GROUP MINING CO. **BRITISH COLUMBIA**

Address: care Clarence Cunningham, Alamo, B. C. **Mine address:** Sandon, B. C.

Property: 9 claims, in 2 groups, on Carpenter creek, Slocan division, acquired from Miller Creek Mng. Co. and the original Wonderful Group Mg. Co., in 1913, for $75,000. Ore is lead-silver.

New owner seems to have found the main vein so unsuccessfully sought by former owners, as it was reported in 1918, that $125,000 worth of ore had been shipped, and the daily output in September, 1919, was 100 tons. Ore is milled in the Alamo concentrator at Alamo, on the Kaslo-Nakusp Ry. Operations curtailed in 1920 owing to lack of labor.

YALE DEVELOPMENT & CONSTRUCTION CO. **B. C.**

Has a 25-year lease on property of **Olalla Copper Mining & Smelting Co.**, fully described in Vol. XIV.

YMIR-WILCOX DEV. CO., LTD. **BRITISH COLUMBIA**

Idle many years. Described in Vol. XIV.

MANITOBA

The Province has a rich mineralized belt that extends easterly for 100 miles from the Saskatchewan border, at Lake Athapapuskow, to Herb lake (formerly called Wekuska). The deposits at Flin Flon, Schist and Copper lakes are near the west end of this belt, and include the Great Sulphide mine, Mandy mine and several other properties. The Pine Root area, on the east arm of Athapapuskow lake, is said to rival the Flin Flon. At Herb lake, at the east end of the belt, the Rex mine, Dauphin and 3 other properties are being opened up.

The Flin-Flon and Schist Lake districts have attracted much attention since 1916, because of the large size and richness of the copper deposits found there. They are situated 650 miles N. W. of Winnipeg and 90 miles N. W. of The Pas, northern Manitoba, and reached by steamer from The Pas to Sturgeon lake, thence 40 miles east to Flin Flon lake.

The rocks are greenstones, conglomerates, etc., intruded by quartz-porphyry dikes and masses. The ores are sulphides and carry copper, gold and silver, with some zinc.

The region was described in detail by R. C. Waccale, Commissioner of Northern Manitoba, at the Pas, "Mining and Mineral Prospects in Northern Manitoba."

BELLEVUE MINING CO. **MANITOBA**

Succeeded by **Selkirk Gold Mng. Co.**, which see.

BINGO MINES, LTD. **MANITOBA**

Office: Jos. Myers, pres., 401 Montreal Trust Bldg., Winnipeg, Man. R. J. Kennedy, supt., Herb Lake, via The Pas, Man.

Inc. 1920. **Cap.** $2,000,000; $1 par. Stock offered at 50c.

Property: the Bingo mine, in Herb Lake section of The Pas district, 20 miles from Hudson's Bay Ry., northern Manitoba, near the Rex mine of the Herb Lake Gold Mines, Ltd., developed by 170′ shaft, showing 12″ of quartz assaying high in gold.

Developing. Favorably reported on by Prof. J. S. De Lury of Manitoba University.

Company apparently controls the **Pas Cons. Mines** (q. v.) and is reported to have an option on the **Rex** mine.

BROOKLYN MINING CO. **MANITOBA**

Address: Bert Clarkson, pres., 57 Market Arcade, Buffalo, N. Y., or care R. E. Hickey, 509 Paris Bldg., Winnipeg, Man. A. L. Anderson, supt.

Property: in Gold Lake area, Big Rice Lake district. Quartz veins, 2′ maximum width, occur in shear zones in porphyry: the ore is gold-bearing. Development began in spring of 1919, and includes 2 shafts with greatest depth of workings 110′.

BRUCE CONS. GOLD MINES, LTD. **MANITOBA**

Address: 849 Somerset Bldg., Winnipeg, Canada.

Officers: Col. Wm. Grassie, pres., with E. D. Alderson, W. B. Tovell, J. J. Papineau and Dr. Halpenny, directors.

Cap. $2,500,000; par $1.

Property: 275 acres in Gold Lake area, Big Rice Lake district.

CALUMET-CORBIN MINES CO. **MANITOBA**

Presumably dead; see Vol. XIV. Company was succeeded by Dominion Gold Mining Co.

CANADIAN MNG. & LEASING CORP. **MANITOBA**

Property: Cabin claim, adjoining the Morrison No. 1 claim of the Lake Superior Corp. in Rice Lake district, acquired for $50,000 from Algoma Exploration & Development Corp. in 1921. Company also reported operating property of Gold Pan Mines, Ltd., under lease in 1922.

CHICA MINING CO. **MANITOBA**

Address: 605 Wolvin Bldg., Duluth, Minn. **Mine address:** The Pas, Man. C. S. Power, sec.

Property: the Chica claim at Athapapuskow lake, the Pas district, near mouth of Pine Root river, shows a narrow zone of porphyry flanked by conglomerate, with granite intrusions. Drilling in 1918-19 to depth of 400′ is reported to have found a lens of chalcopyrite at the porphyry conglomerate contact.

COMMONWEALTH GOLD MINES, LTD. **MANITOBA**

Address: 236 Curry Bldg., Winnipeg, Man. Geo. H. Porter, mgr.

Property: the Commonwealth claim at Gold lake, Big Rice Lake district, shows quartz outcrops in granite. The quartz carries free gold, pyrite and chalcopyrite.

COPPER KING MINING CO., LTD. **MANITOBA**

Address: 910 Somerset St., Winnepeg, Man. E. E. McLosky, mgr.

Property: on the shore of Winnipeg Lake, The Pas district, 2½ miles from mouth of Wanipigow river, shows pyrite and chalcopyrite, with quartz and calcite, disseminated throughout a shear zone of granite gneiss. Ore lenses and stringers are from a few inches to 3′ wide, and will perhaps average 1% copper. Some drilling has been done.

DEEP GOLD ROCK MINES, LTD. **MANITOBA**

Address: 242 Main St., Winnipeg, Man. D. A. Urquhart, mgr.

Property: the Ginney group, near Bulldog lake, Big Rice Lake district. A shear zone up to 15′ wide in schist, shows quartz lenses and stringers, with free gold and pyrite present in both quartz and schist. Surface work was being done during 1921.

DEVLIN MINING & DEVEL. CO. **MANITOBA**

Address: 232 Portage Ave., Winnipeg, Man. F. T. Carruthers, sec.

Property: 20 claims, at Rice Lake, Twp. 17, R. 15, Bird River district, 15 miles from the C. R. Ry. Ore is chalcopyrite and nickeliferous pyrrhotite in a norite-granite contact. Is a prospect.

DOMINION GOLD MINING CO. **MANITOBA**

Presumably dead; see Vol. XIV. Was a successor to Calumet-Corbin Mines Co. The Gold Pan and Gold Seal claims, said to have been a part of Dominion company's holdings, now owned by **Gold Pan Mines, Ltd.**, which see.

FLIN FLON MINE **MANITOBA**

Address: Mining Corporation of Canada, Ltd., Bank of Hamilton Bldg., Toronto, Ont. Wm. Koerner, mgr.

Property: 10 claims, including the Flin Flon mine, on the E. side of Flin Flon lake, 90 miles N. W. of The Pas, Northern Manitoba.

Geology: the orebody, partly in Manitoba and partly in Saskatchewan, occurs in a shear-zone striking N. W. and dipping 70° E. The rock is greenstone, in places amygdaloidal, intruded by quartz-porphyry on the hanging-wall side. The footwall is a talcose rock that is probably a basic dike. The

deposit has been formed by replacement and shows courses of unmineralized rock, while the main orebody is a lens of solid sulphide made up of pyrite, sphalerite, chalcopyrite, and magnetite, with gold and silver values. The disseminated ore on the hanging wall, though low in copper, is fairly high in gold and silver, while on the footwall the reverse obtains.

Development: preliminary work was by trenching and diamond-drilling. In all, 44 holes were put down, a total of 25,664', to depth of 1,600', proving the orebody over a length of 2,500' and 300' width, and revealing 16,812,290 tons of probable ore and 2,975,100 tons of possible ore. The average content is 1.82% copper, 3.49% zinc, $1.60 gold and 1.2 oz. silver. In 1920, $400,000 was spent on underground work. No. 1 shaft is 200' deep with 498' of crosscutting and 260' of drifting on the 200' level. No. 2 shaft is 300' deep with a 170' crosscut on the 100' level and a 185' crosscut on the 300' level.

Equipment: includes that bought from the Mandy company nearby, and a complete camp of a dozen log cabins.

A majority interest in property was sold to the Mining Corp. of Canada, May, 1921, after option held by W. B. Thompson had been dropped.

GABRIELLE MINES, LTD. **MANITOBA**

Address: 207 Scott Blk., Winnipeg, Man.

Officers: A. C. Gray, pres.-mgr.; E. A. Pelletier, v. p.; C. A. Millican, sec.-treas., with J. W. Sifton and B. Stuart Mackenzie, directors.

Inc. 1919, in Manitoba. **Cap.** $1,000,000; $1 par; 459,268 shares outstanding, March, 1921. Annual meeting 2nd Thursday in September.

Property: 2½ claims, patented, about 110 acres, near Rice lake, Big Rice Lake district, said to show 4 quartz veins containing gold-silver-platinum.

Development: by 132' shaft and 125' tunnel. Further development planned when necessary funds available.

Unfavorably reported on by J. B. Tyrrell, and property closed down, August, 1921.

GOLD PAN MINING CO. **MANITOBA**

Officers: Jas. H. Ashdown, pres.; F. O. Fowler, v. p.; Gordon McTavish, sec.-treas., with E. F. Hutchings, S. Hart Green and Sam Scott, directors. J. A. Borthwick, supt.

Property: Gold Pan and Gold Seal claims at Big Rice Lake, 130 miles N. E. of Winnipeg, located on the same vein, which is traceable at surface for 3,000'. The ore occurs in lenses of gold-bearing quartz.

Development: on the Gold Pan by 191' shaft and 42' winze to depth of 230', also about 500' of drifting; on the Gold Seal, a 210' shaft and drifting said to show a 4½ quartz vein, carrying free gold, pyrite, chalcopyrite and sphalerite.

Equipment: includes 3-stamp mill, 3-drill compressor, boilers and hoist.

Company ceased work on the Gold Pan mine in 1920 and is now reported developing the Gold Seal claim. Property reported under option to Canadian Mng. & Leasing Corp'n. (1922).

GORDON MINE **MANITOBA**

Address: J. P. Gordon, owner, The Pas, Man.

Property: at Copper Lake, The Pas district. Drilling in 1920 is said to have shown a lode width of 45' and mineralization increasing with depth. Ore is gold-bearing.

GREAT SULPHIDE CO. **MANITOBA**

Described in Vol. XIV. See **Flin Flon Mine.**

GREAT WEST GOLD MNG. CO., LTD. **MANITOBA**

Address: Winnipeg, Man. R. S. Ripstein, mgr.

Property: the Apex and Eva group, in Big Rice Lake district, N. of Turtle lake, developed by 58' shaft showing a 5' vein assaying $27 in gold per ton. Active in 1921.

HERB LAKE GOLD MINES, LTD. MANITOBA

Offices: The Pas, Manitoba, Canada, and Makeever Bros., mgrs. of the Mines Development Syndicate, 170 Broadway, New York City.

Officers: M. M. Makeever, pres.; J. S. Cooper, v. p.; Sanford Makeever, sec.-treas., above with C. C. Pringle, J. R. Campbell, Barney Doran, directors. Walter Neal, mgr.; J. R. Campbell, supt., Herb Lake, via The Pas, Manitoba.

Inc. in Manitoba, Canada. **Cap.** $1,000,000; par $1; all issued.

Property: 7 claims, includes the Rex mine, on N. E. shore of Herb (Wekusko) lake, The Pas district, said to show a quartz fissure vein 3' wide in hornblende schist, traceable for a distance of 1,700'. Ore carries free milling gold reported to average $27 per ton. Pay ore shoot is 75' long, depth not determined. Overhand stoping methods are used for mining ore.

Development: by 65° incline shaft, 270' deep, and 500' of workings.

Equipment: 5x7" steam hoist, 300 cu. ft. air compressor, pump, 10-ton Lane amalgamation mill, with Deister-Overstrom tables; also assay office and complete camp.

Production: from May to November, 1918, reported to have shipped gold bullion to value of $27,323.

Mine closed in Nov., 1918 on account of labor shortage, was reopened July, 1920. Reported under option to Bingo Mines Co. in 1921.

HITITRITE MINE MANITOBA

Property: one of many groups in N. W. quarter of Twp. 19, R. 14 E., in southern Manitoba, 85 miles N. E. of Winnipeg. Pyrrhotite and chalcopyrite occur in norite, similar to that at Sudbury. Assays show nickel, copper and a little platinum.

INDEPENDENCE MINES, LTD. MANITOBA

Address: care H. B. Redmond, mgr., Winnipeg, Man.

Property: near the lake in Big Rice Lake district, has the same general characteristics as the Gabrielle mine (q. v.). Ground has been developed to a considerable degree.

KISKI MINING CO., LTD. MANITOBA

Controlled by **North Canada Expl. Co., Ltd.,** which see.

Address: 303 Merchants Bk. Bldg., Winnipeg, Man. **Mine address:** The Pas, Man. H. V. Hudson, sec.

Property: the Kiski-Wekusko group at Herb lake, The Pas district, upon which the first gold discovery of this area was made. Three veins have been uncovered; No. 2 is up to 6' wide and has been opened by a shaft. Vein filling consists of quartz, tourmaline and arsenopyrite carrying gold, some copper and lead are present.

LAURA MINES, LTD. MANITOBA

Address: 759 Fleet Ave,. Winnipeg, Man. T. Duff Smith, mgr.

Inc. in October, 1919. **Cap.** $2,000,000.

Property: located in the Big Rice Lake district. The ore is gold bearing.

MAMMOTH MINING CO. MANITOBA

Address: 705 McIntyre Bldg., Winnipeg, Man. **Mine address:** The Pas, Man. John Connor, pres.

Property: the Apex group near Herb lake, The Pas district, shows a highly silicified zone of mineralization in granite, carrying pyrite, some chalcopyrite and gold. Mineralization has been traced for 1,000', and has an average width of 15 to 20'. Assays range $1.50 to $24 in gold. In spring of 1921, company was in litigation over title.

MANDY MINING CO. MANITOBA

Address: Geo. R. Bancroft, supt., The Pas Manitoba, Canada.

Subsidiary, by a 78% stock control, of the Tonopah Mining Co. of Nevada, with head office at Bullitt Bldg., Philadelphia, Pa.

Cap. $100,000.

At end of 1919, current assets were $523,484, and liabilities, $347,549.

of which $327,465 was indebtedness to Tonopah Mng. Co.; for 1920, these figures were $632,011 and $267,906, with $248,938 due the mother company. The net operating profit for 1919 was $217,452, and surplus, $168,318; for 1920, $243,131 and $289,105, respectively.

Property: at Schist lake, north of The Pas, is developed by 200′ shaft and diamond-drill exploration below this depth. Orebody as opened showed 25,000 tons of chalcopyrite, averaging 20% copper and $5 in gold and silver, surrounded by 180,000 tons of low grade ore, assaying 6.5% copper 25% zinc and $5 in precious metals: the latter is too porr to mine under present conditions. All of the high grade ore was extracted by March, 1919, and work was suspended.

Equipment: includes hoist, tramway, barges, etc., reported to have been sold in part, March, 1920, to syndicate developing the Flin Flon property.

Production: final shipment of 7,510, tons made in 1920. Gross value of shipments has been; in 1917, $233,026; in 1918, $527,516; in 1919, $629,666 and in 1920, $417,157; total, $1,807,365, with a total net profit at the mine of about $500,000. Charges for transportation were necessarily high, about $20 per ton to R. R. point alone.

MANIGOTAGAN MNG. & DEVEL. CO. **MANITOBA**

Address: 215 Curry Bldg., Winnipeg, Man.

Property: the Moose group near Rice lake in Big Rice Lake district, shows gold-bearing quartz lenses in a wide, well-defined shear zone in schist, near its contact with a granite intrusion. The main quartz body, 2 to 6′ wide has been opened by an 100′ shaft.

MINES DEVELOPMENT SYNDICATE **MANITOBA**

Address: Makeever Bros., Managers, 262 Washington St., Boston, Mass., or 170 Broadway, New York City. F. G. Stevens, chief cons. engr.

Syndicate is a co-operative association. Organized January, 1919. Each investor holds pro-rata share. On Jan. 1, 1922, paid in capital was about $600,000, of which Makeever Bros. contributed $180.000. The syndicate took over properties and work of the Mines Exploration Syndicate, which had been formed to run but 2 years. This syndicate develops properties before making cash payments for title.

Properties: under development include: (1) The Rex gold mine, in Manitoba, developed and equipped with a mill and now held by the **Herb Lake Gold Mines, Ltd.**, which see; (2) A one-fourth interest in the Northern Manitoba; (3) A controlling interest in the Candelaria Mines, at Estencita, Jalisco, Mexico, on which one mile of development work has been done, but the mill not yet completed; (4) Owns the Tajitos and Espinosa mining properties in state of Nayarit, Mexico; (5) Oil interests as follows; twelve (12) producing wells at Centerville, Kansas; 1,036 acres in Warren county, Kentucky, on which 8 wells have been completed; a fourth interest in 4,740 acres in Fort Norman oil field of Northern Alberta, 640 acres of which adjoin those of the Imperial Oil Co.'s original discovery.

MINES EXPLORATION SYNDICATE **MANITOBA**

Described in Vol. XIV. Succeeded by **Mines Development Syndicate,** which see.

NORTH CANADA EXPLORATION CO., LTD. **MANITOBA**

Succeeds Northern Manitoba Mng. & Dev. Co., a Makeever promotion, described in Volume XIV.

Address: 170 Broadway, New York, or care J. F. Caldwell 395 Broadway, Winnipeg, Man. **Mine address:** The Pas, Man. H. J. Bickel, sec.; R. Kerr, mgr.

Inc. 1919.

Company controls the **Kiski Mng. Co., Ltd.**, which see.

Property: Moosehorn gold claim on Herb lake, via The Pas, northern Manitoba. Limited development done and small shipments made by former company. Practically idle, 1920-21.

NORTHERN COPPER & NICKEL MINES MANITOBA

See same title under Ontario.

NORTHERN MANITOBA MINING CO. MANITOBA

Address: The Pas, Manitoba.

Officers: H. S. Hohnson, pres.; R. Kerr, sec.

Cap. $1,000,000; par $1.

Is a local enterprise, financed by The Pas people.

Property: 3 gold claims at Herb lake, The Pas district. Developed by 120' shaft. A one-car shipment in 1918 is said to have given returns of $81 per ton, but work was stopped on account of lack of money.

Equipment: costing $12,000, includes a 40-h. p. boiler, and a compressor.

NORTHERN MANITOBA MINING & DEV. CO. MANITOBA

Described in Volume XIV. Succeeded in 1919 by **North Canada Exploration Co., Ltd.**, which see.

PAN EXTENSION GOLD MINES CO., LTD. MANITOBA

Address 220 Curry Bldg., Winnipeg, Man.

Officers: H. B. Montgomery, pres.; John Beckman, mng. director-sec.-treas., with Wm. Buckley, E. J. Harden and Wm. D. Shaw, directors.

Inc. in Manitoba. **Cap.** $3,000,000; $1 par; stock offered at 50c.

Property: in Big Rice Lake district, adjoining the Gold Pan mine and presumably on the same orebody. The vein is 4½' in width, with 3' of quartz, showing galena and free gold.

Development: by 200' shaft; work to be continued in conjunction with Gold Pan, under management of J. A. Borthwick.

Pan Extension stock has been rather extravagantly exploited in the press by the Canadian promoters.

PAS CONSOLIDATED MINES, LTD. MANITOBA

Address: 410 Montreal Trust Bldg., Winnipeg, Man. C. G. Ashwin, mgr., The Pas, Man. Company controlled by Bingo Mines, Ltd.

Property: the Elizabeth-Dauphin group, 6 claims, 1 mile N. of the Rex. A 50' shaft has been sunk in quartz, opening a 3' vein.

Operations suspended awaiting more favorable conditions.

PENNIAC GOLD REEF MINES, LTD. MANITOBA

Succeeded by **Star Lake Gold Mines, Ltd.**, which see.

REX MINE MANITOBA

Controlled by **Herb Lake Gold Mines**, which see.

SELKIRK GOLD M. CO. MANITOBA

Reorganization of the Bellevue Mng. Co.

Address 502 Huron and Erie Sts., Winnipeg, Man. J. D. Sinclair, sec.; Frank Phillips, supt.

Property: the Luleo mine at Hole river, Big Rice Lake district, reopened under new management in 1922.

STAR LAKE GOLD MINES, LTD. MANITOBA

Office: 509 Merchants' Bank Bldg., Winnipeg, Manitoba, Canada.

Officers: W. R. Milton, pres.; J. H. Hicks, sec.; J. W. Harris, treas., with E. R. Potter and John Smith, directors.

Inc. Nov., 1915, to purchase the property of the Penniac Gold Reef Mines, Ltd. Terms of purchase were as follows: owners agreed to take 333,333 shares of stock and set aside 33,333 shares for development purposes. Stockholders in the Penniac Mines to receive 200,000 shares and to pay to the Star Lake $25,000 to liquidate liabilities of old company, amounting to $15,000, and leave a surplus for development work. Star Lake Co. agreed to have $100,000 in treasury within 6 months from November, 1915, otherwise vendors could cancel agreement. 125,000 shares offered to public at $1 par.

Cap. $1,000,000; $1 par; 500,000 issued. "An extraordinary 'speculative investment' is offered to the public for a limited number of 6% preferred shares at par, to be redeemed later at 15% above par," is the wording of a circular.

Property: 6 patented claims, 200 acres, on Star Lake, eastern Manitoba, said to show a quartz vein in a shear zone of Keewatin conglomerate near a contact between granite and schist. Vein minerals include quartz, gold-bearing pyrite and arsenopyrite. The Penniac company is reported to have spent $100,000 on development work, consisting solely of test pits and a 90′ shaft, said to disclose two lodes. The main shear zone is said to be 200′ wide, with two main and several lesser parallel quartz veins with strike N. 35-45° E. and dip N. W., all showing gold in payable quantities. Property reported on by R. C. Wallace, University of Manitoba; W. H. Jeffrey, W. J. Tretheway of Toronto, and J. Tait Milliken of Colorado.

Development: by 95′ shaft and 150′ tunnel.

Equipment: includes a 5-ton mill, office and several buildings. Management planned extensive development and banked on platinum content of the ore to make large profits. No recent information, probably idle.

NEW BRUNSWICK

EASTERN CANADIAN COPPER CORPORATION, LTD. **N. B.**

Mail returned 1918, from former address.

Fully described in Vol. XIII.

INTERCOLONIAL COPPER CO. **NEW BRUNSWICK**

Office: P. O. Box 294, Pawtucket, R. I. **Mine office:** Dorchester, Westmoreland county. N. B.

Officers: Darius L. Goff, pres.; T. J. Edwards, sec.; F. J. Powers, treas.

Has been idle several years. Operations will probably never be resumed. Property: described in Vol. XIII.

NORTH AMERICAN ANTIMONY SMELTING CO., LTD. **N. B.**

Address: Stanley Elkin, pres.; St. John, N. B.

Mine address: Antigonish, N. B.

Is a prospect containing a small vein of good ore.

NOVA SCOTIA

Sixteen gold mines were operated in 1921, but the combined output was but 1,650 tons of ore crushed, yielding 379 ounces gold, or $4.65 per ton.

BRADFORD MINES, LTD. **NOVA SCOTIA**

Address Tangier, Nova Scotia, A. L. Schneider, mgr., or care W. C. Milner, Halifax, Nova Scotia.

Officers: T. Heffler, pres.; A. E. Abrams, v. p.; W. C. Milner, sec.-treas., with Paul J. Engel, Jr., 37 Wall St., New York, and G. J. Partington, Halifax, directors.

Inc. Oct. 3, 1914, in Nova Scotia. **Cap.** $1,000,000; $1 par; outstanding, 440,000 shares. Transfer office and registrar, Security Reg. & Transfer Co., New York. Listed on New York Curb.

Property: the Bradford mine, 264 acres, in Tangier gold district, Halifax county, 40 miles by steamer from Halifax. Ore occurs in several gold-bearing "leads," varying from 3″ to 18″ in width, with milling ore, averaging ½-1 oz. gold per ton.

Development: by 630′ three-compartment Kent shaft with 4 crosscuts driven E. and W. at 22′, 340′, 500′ and 600′. Also has 80′ Bradford and 50′ Rose shaft.

Equipment: hydro-electric plant, compressor, 20-stamp mill, machine and blacksmith shop and buildings.

Output to 1917 estimated at $700,000.

Employed 12 men in 1921 and added 4 transformers, rock crusher and other machinery.

CAPE BRETON COPPER CO., LTD. NOVA SCOTIA

Mine near Coxheath, Cape Breton county, N. S.

Cap. $2,000,000.

Property: the old Coxheath mine and adjoining lands, 10 miles, from Sidney, Cape Breton, shows several cupriferous veins, of which the principal, averaging 10′ in width, traverses felsite and diorite, carrying lenses of argentiferous and auriferous chalcopyrite, in a silicious gangue, ore averaging about 4.5% copper. Deepest shaft 420′. Idle many years.

CARIBOU GOLD MINES, LTD. NOVA SCOTIA

Address: Caribou, N. S. G. H. Lawlor, mgr.

Property: the H. F. Ross mine in Halifax county, Caribou district, developed by 2 shafts connected on the 130′ level. Produced 305 tons of ore yielding 137 oz. of gold in 1920, to September, when mine was closed. No production 1921 and reopening dependent on labor conditions.

CHETICAMP COPPER CO., LTD. NOVA SCOTIA

Idle. **Office:** 37 Sackville St., Halifax, N. S. **Mine office:** Cheticamp Inverness county, N. S.

Officers: Edward Staris, pres.; John W. Regan, sec.-treas.; Milton V. Grandin, supt., at last accounts.

Inc. May, 1904, in Nova Scotia. **Cap.** $3,000,000; shares $1 par, as a merger of the Eastern National Copper Co., Ltd., and 3 other corporations.

Property: 950 acres, freehold, also a 200-acre mill and smelter site, 1,000 acres timber lands, and 200 acres water frontage, with a government license for exploring and locating mines on 50 sq. miles.

Property shows a mineralized zone, in micaceous schist, of 350′ width, traceable 1½ miles, carrying 4 orebodies, of which 3 are developed by a 200′ shaft and by tunnels of 25′, 35′ and 115′, claimed by company to show 250,000 tons of exclusively sulphide ore, averaging 2.5 to 3.5% copper, 18% lead, 30 oz. silver and $2 to $30 gold per ton. Nearest railroad is 38 miles, but mine is only 5 to 6 miles from tidewater. Property considered promising, though estimates of tonnage and values are excessive.

CONSOLIDATED MANGANESE CO., INC. NOVA SCOTIA

Address: H. H. Burham, mgr., New Ross, Lunenburg county, Nova Scotia. Promoted during the war, now idle and machinery for sale.

Property: the Granite pit and Bone pit mines, yielding soft or pyrolusite ore in upper workings with hard, or manganite ore beneath it. **Development:** includes 196′ Kane shaft.

Equipment: concentration mill, hoist, and pumps, etc.

Mill treated 400-500 tons of ore, mainly from the 85′ level of the Kane mine, in January, 1921. Closed down since.

Production: 150 tons of manganite ore and 30 tons of pyrolusite ore in 1921.

DOMINION MINING CO. NOVA SCOTIA

Probably dead. See Volume XIV.

E. H. GLADWIN & CO. NOVA SCOTIA

Address: E. H. Gladwin, mgr., Beaverdam, Halifax county, N. S.

Property: the Austin-Thomas mine, prospected for five years past, by shallow shafts, 25′ to 30′ deep, on 2″-8″ gold quartz leads, showing 3 pay shoots.

Production: in 1921, 55 tons crushed in mill, yielding 11 dwt. gold.

Employs 8 men.

GOLDENVILLE CONS. MNG. CO., LTD. NOVA SCOTIA

Fully described in Volume XIV. Successor, 1916, to Goldenville Cons. M. Co., Ltd. Reorganized in 1919 as **Sherbrooke Mines & Power Co., Ltd.,** which see.

GREAT BRAS D'OR MINING CO. NOVA SCOTIA

Baddeck, Victoria county, N. S. **Mine office:** Middle River, Victoria county, N. S. D. J. Patriquin, mgr. Operates a gold mine. Last production reported was 775 tons ore, yielding 262 oz. gold. No recent returns.

ALEX GREENOUGH NOVA SCOTIA

Address: Oldham, Halifax county, N. S.

Property: covers the Galena lead, 8" thick. Milled 85 tons, 1921, giving 13 oz. 2 dwt. gold with 16 tons on dump.

HALL & HITCHIE MINE NOVA SCOTIA

Address: Herman Hall, mgr., Caribou, Halifax county, N. S.

Property: the Monroe and Elk Mines, first named showing several small quartz leads, 4" to 10" thick, intersected by "angulars" and carrying free gold.

Development: by Holman Monroe and Bob Wright shafts and several pits. During 1921, only surface work done.

Equipment: includes 10 stamp gold mill, with Wilfley table and 10 h. p. engine, 3 drill compressor, etc.

Employs 5 men.

Production: 40 tons milled yielded 74.25 oz. gold.

W. P. C. INGLIS MINE NOVA SCOTIA

Address: S. O. Mason, foreman, Mount Uniacke, Hants county, N. S.

Property: the Hayes mine, reopened 1921, developed to 90' depth, showing 6"-14" ore.

Employs 5 men.

LAKE COPPER MINING CO., LTD. NOVA SCOTIA

Idle. **Office:** care Dr. H. Mackay, New Glasgow, N. S. **Mine office:** Polson's Brook, Antigonish county, N. S. A. G. Baillie, gen. agt.

Inc. January, 1908. **Cap.** $2,500,000 share $1 par.

Property: 6,400 acres, on Polson lake, said to show a vein 5' thick, traceable a mile and carrying auriferous, and argentiferous copper ore. Mine has a 103' shaft with 554' of workings.

LOON BROOK MINING CO., LTD. NOVA SCOTIA

Office: 1 Leys Ave., Letchworth, Herts, Eng. **Mine office:** Montague, N. S. E. Romilly Smith, mgr.

Operating a gold property and 10-stamp mill with cyanide unit in Montague district, N. S.

Last production reported was 118 tons of ore, which yielded 400 oz. gold.

No recent returns.

MONTAGUE GOLDFIELDS, LTD. NOVA SCOTIA

Head office: 80 Granville St., Halifax, N. S. **Mine office:** E. S. R. Smith, mgr., Montague, Halifax county, N. S.

Officers and directors: Jas. Farquar, pres.; E. S. Romilly Smith, gen. mgr.; R. G. Rent, sec.-treas.; A. C. H. Gerhardi, supt.

Property: the Montague gold mine, in Halifax county, shows the usual thin gold quartz "leads" in anticlinal folds with pay ore where crossed by "angulars", or fractures.

Development: by 300' shaft with 800' of work on 280' level and stoping lengths of 700' to height of 100' to 200'. New 500' shaft planned for 1922.

Equipment: includes 25-stamp mill, tube mill and a 100-ton barrel-amalgamation plant.

In 1921, new equipment included 30-h. p. gasoline engine, 2 Gould pumps, etc.

Examined in 1921 by J. Lindsay Allen who spent 3 months at mine for British interests. This work disclosed a 26-inch quartz vein, traceable 2 miles, opened for 200' and said to run $9 per ton. The St. Patrick vein, 18' wide, is said to run $18 per ton.

Employs 5 to 25 men.

Production: 1921, was 80 tons milled, yielding 159.6 oz. gold.

NOVA SCOTIA MOLYBDENUM CO., LTD. NOVA SCOTIA

Address: Union Bk. of Canada, Halifax, N. S. **Mine address:** New Ross N. S. H. C. Burchell, mgr.

In 1918 company was operating a molybdenite deposit at New Ross, Lunenburg county. Ore occurs in a pegmatite dike and is said to assay ½-1% molybdenum sulphide. Developed by 100' shaft.

H. P. & J. H. PURCELL MINE NOVA SCOTIA

Address: Sheet Harbor, Halifax county, N. S.

Property: shows 7"-14" vertical vein of quartz in hard slate and diabase. Ore carries galena and free gold, one sample of 50 lbs. assaying $191 per ton.

Development: slight. Employs 4 men.

RENFREW GOLD MINES, LTD. NOVA SCOTIA

Controlled by M. J. O'Brien, Ltd., 511 Union Bk. Bldg., Ottawa, Ont.

Mine address: Renfrew, N. S. B. McConnell, mgr.

Property: the Renfrew gold mine in Hants county.

H. F. ROSS MINE NOVA SCOTIA

Address: H. F. Ross, Caribou, N. S.

Owned by Cariboo Gold Mines, Ltd., which see.

SCHEELITE MINES, LTD. NOVA SCOTIA

Controlled by M. J. O'Brien, Ltd., 511 Union Bk. Bldg., Ottawa, Ont.

SHERBROOKE MINE & POWER CO., LTD. NOVA SCOTIA

Organized 1919 to succeed Goldenville Cons. Mining Co., Ltd., was a reorganization, 1916, of Goldenville Mining Co., Ltd.

Address: 170 Summer St., Boston, Mass.

Mine office: Goldenville, Guysboro county.

Officers: D. E. Makepeace, pres.; E. B. Estes, sec.; J. A. Floyd, treas., with A. C. Post, W. E. Bremmer, Z. F. Rooke, W. W. Johnson and H. N. Wright, directors. J. W. Warner, mgr.

Inc. June 1, 1919, in Nova Scotia. **Cap.** $2,400,000; $1 par; 2,000,000 outstanding. Bonds authorized, $60,000; $25,000 outstanding.

Property: 501 acres on St. Mary's river, Goldenville, Guysborough county, said to show quartz veins in anticlines of slate and quartzite. Pay ore ocurs in 3 belts, with narrow quartz seams containing coarse gold.

Development: by vertical and incline shafts to 750' depth, with 5,500' total workings. New work being done on 160' and 260' levels of Stewart shaft, with stopes 40' high and 100' long on Stewart and Strike lodes.

Equipment: includes 500 h. p. hydro-electric power plant, 50 h. p. electric hoist, 1,000 cu. ft. compressor, turbo-pump and 40-stamp mill.

Idle in 1920. Mine was unwatered and 10-stamps in operation, for 4 months, 1921, milling 1,390 tons yielding 75.3 oz. gold.

Employs 25 men.

WENTWORTH COPPER CO., LTD. NOVA SCOTIA

Idle.

Inc. 1907, to acquire lands, bought at foreclosure sale, of the Cumberland Copper Co. Company apparently holds property for speculation purposes as no work has been done since purchase.

WEST GORE ANTIMONY CO. NOVA SCOTIA

Property: the Rawdon mine, at West Gore, N. S., opened 1884. Company is closely allied with the St. Helen's Smelting Co., Manchester, England, which refines the product.

The main deposit is up to 4' wide and has been opened for 200' on one level. The ore consists of stibnite and native antimony, associated with pyrite, quartz and calcite. Country rock is a soft slate.

Development: by shafts, the main one, 502' deep, with a 332' winze below this level.

Production: about 1,200 tons of ore monthly, yielding 110 tons of concentrates containing 38 to 45% antimony. No recent information. Inactive, 1921.

ONTARIO

Much of the data herein is abstracted from the valuable reports issued by the Ontario Department of Mines.

ACME GOLD MINES, LTD. **ONTARIO**

See **Hollinger Cons. Mines, Ltd.**

ADANAC SILVER MINES, LTD. **ONTARIO**

Office: Excelsior Bldg., Toronto. **Mine address:** Haileybury, Ont., Can.

Officers: R. A. Cartwright, pres.; Alex. Faskin, v. p.; M. R. Cartwright, treas, and managing director; with E. M. Campbell, and C. L. Sherrill, directors; Jas. Aitcheson, sec.

Inc. March, 1915, in Ontario. **Cap.** $3,000,000; $1 par; 2,825,122 shares issued. Trusts & Guarantee Co., Ltd., registrar and transfer agent.

A merger with the Victory company to form a $3,000,000 corporation, Adanac to get $1,000,000 in shares, will take place in 1920.

Property: in Coleman Twp., Cobalt district, adjoins the Temiskaming, showing smaltite, niccolite, and a little silver.

Development: by 420′ shaft. Diamond-drilling from the 310′ level was commenced in December, 1919, but only small pockets of ore were found. The mine was closed down early in 1920.

AETNA GOLD MINES, LTD. **ONTARIO**

Address: 340 Confederate Life Bldg., Toronto, Ont. **Mine address:** So. Porcupine, Ont. C. H. Lambert, sec.

Inc. March 8, 1918. **Cap.** $1,000,000.

Property: in Whitney Twp., Porcupine area, Timiskaming district.

ALADDIN COBALT, LTD. **ONTARIO**

Liquidators: Frank F. Fuller, sec., 638 Salisbury House, London Wall, and R. Simpson, Finsbury Pavement House, both London, E. C. 2, England. **Mine address:** Cobalt, Ont.

Directors: D. H. Herbert, chairman, Lt. Col. Chas. Gold, Capt. C. R. E. Jorgensen, and S. B. Peech.

Registered April 23, 1913. Acquired all the capital of the **Aladdin Cobalt Co., Ltd.**, registered in Canada with a capitalization of $500,000, shares $5 par. Canadian shareholders received 5 fully-paid £1 shares for every two $5 shares held. Controls Chambers Ferland Co.

Cap. £500,000; shares £1 par; 499,993 shares issued.

Company in voluntary liquidation since 1919, property becoming a part of Kirkland Lake Proprietary (1919) enterprise, 2 shares of which were exchanged for 7 shares of Aladdin.

Chambers Ferland Co.

Subsidiary of Aladdin Cobalt Ltd.

Address: 58 Wellington St., Toronto.

Inc. 1908 in Ontario. **Cap.** $2,500,000; par $1.

Aladdin Cobalt Co., Ltd.

Subsidiary of Aladdin Cobalt Ltd.

Address: Excelsior Life Bldg., Toronto. **Mine office:** Chas. A. Richardson, mgr., Box 239, Haileybury, Ont.

Inc. Aug. 23, 1912, in Ontario. **Cap.** $500,000; $5 par; all issued.

Dividends: ½% January 24, 1916; 2% February 28, 1917; none reported since; total, $48,000.

Property: 125 acres, includes the Chambers Ferland mine, in Coleman Twp., Timiskaming district, supposed to have the extension of the adjoining Nipissing vein system.

Ore: silver in veins of calcite.

Development: by several shafts, deepest 425′. New work on the 410′ level reported to have opened up a 2″ vein of high grade ore. A lease which permitted use of Right of Way company's shaft was relinquished in late 1921.

Equipment: newly installed, includes double-drum hoist, 125-ton crusher, 125 h. p. boiler, ore bins and an ore house with engine.

Production: of 25 tons daily to Bailey custom mill reported early in 1921; later in year company operations ceased, but by arrangement with Nipissing, Aladdin ores are mined and milled on a cost basis by that company.

ALEXO MINING CO., LTD., THE ONTARIO

Address: Porquis Junction, Ontario.

Officers: G. F. Haning, pres.; Maj. E. F. Pullen, v. p.-mgr., H. N. Roberts, sec.-treas., with Capt. Frank Pullen, Lt.-Col. C. W. Allen, and F. J. Stewart, directors.

Inc. January 3, 1912, in Ontario. **Cap.** $40,000, $1 par; 30,005 shares issued.

Property: the Alexo mine in Dundonald Twp., Timiskaming district, discovered in 1908 and active work starting in 1912. The ore, a nickel-copper pyrrhotite, averages 4% nickel and is shipped to the Mond Nickel Company's smelter.

Development: by 400′ shaft, crosscuts and drifts.

Production: 8,618 tons in 1918; total 49,746 to January 1, 1919. About 20 men employed. Inactive in 1920.

ALGOMA CUSTOM SMELTING & REFINING CO., LTD. ONTARIO

Idle several years. **Works office:** Thessalon, Algoma, Ont. See Vol. XI. Copper Handbook.

ALGOMA STEEL CORPORATION ONTARIO

Subsidiary of the Lake Superior Corporation.

Gen. office: Sault Ste. Marie, Ont. **Secretary's office:** Traders' Bank Bldg., Toronto, Ont. W. C. Franz, pres. and gen. mgr.; Alex Taylor, sec. G. R. McLaren, supt. M. A. Hanna & Co., sales agents.

Inc. May, 1907, in Ontario, as Lake Superior I. & S. Co. Name changed in 1912.

Cap. $15,000,000 com. and $15,000,000 7% cumul. pfd.; par $100; $15,000,000 com. and $10,000,000 pfd. issued, and all held by Lake Superior Corp.

Property: the Helen and Magpie iron mines, old producers, in Michipicoten district, with blast furnaces at Sault Ste Marie. The Helen, opened in 1899, is developed to vertical depth of 641′. The mine was a steady producer of iron ore, which occurs as goethite with some hematite, until closed down in 1919, after producing a total of 2,479,189 tons.

The Magpie, opened up in 1911, is developed by a 4-compartment shaft to depth of 581′ with levels at 125′, 205′, 305′, 435′ and 560′. The orebody, mainly siderite, is said to be 50′ wide for a length of 1,500′ and when roasted makes a fair Bessemer ore. Mining is by back stoping and sub-levels.

The ore carries 50% iron and 0.020% phosphorus. Shipments from the Magpie are sent to the Sault blast-furnaces. Employs about 250 men when working to capacity.

Production: (Magpie) in 1914, 98,070 tons; in 1915, 118,697 tons; in 1916, 187,966 tons; in 1917, 174,774 tons; in 1918, 157,095 tons and in 1919, 163,008 tons, a total of 919,544 tons.

ALGOMONT MINES, LTD. ONTARIO

Address: 911 Kent Bldg., Toronto, Ont. **Mine office:** c/o Rydel Bk., Algoma, Ont.

Inc. 1920. **Cap.** $4,000,000.

Property: copper-gold-silver claims in Aberdeen Twp., Algoma district.

ALLIED GOLD MINES, LTD. ONTARIO

Address: 55 Yonge St., Toronto; or 1905 Dime Bank Bldg., Detroit, Mich. **Mine office:** Boston Creek, Ontario.

Officers: F. L. Smith, pres., Detroit; Angus Smith, v. p.; A. W. Brechting, sec.-treas., with J. H. Remick and W. H. Muir, directors. F. C. Loring, cons. engr.; R. W. Norrington, mgr.

Inc. October, 1918, in Ontario. **Cap.** $2,000,000; par $1; outstanding 1,250,000 shares. Security Transfer & Registrar Co., transfer agent.

Property: 12 claims, 7 patented, 480 acres, in Boston Twp., Boston Creek area. Company was organized to acquire large acreage of gold-mining land in this area, following the success of the Miller-Independence Mines, which adjoins on the S. the Renaud-Cullen group of the Allied company. The group is said to have several quartz veins with one well-defined fissure showing almost across the property. This is developed by a 100′ shaft, and diamond-drilling work.

Equipment: electric hoist and compressor.

No ore is blocked out as yet; but property is being explored by diamond drills.

ALLIED PORCUPINE GOLD MINES, LTD. **ONTARIO**

Main office: Sun Life Bldg., Toronto, Ont. **Mine office:** South Porcupine, Ont.

Officers: W. A. McConnell, pres.; R. L. Hudson, v. p.-treas.; A. J. Young, sec., with F. W. Hudson and W. D. Robb, directors. R. Kirkegaard, cons engr.-gen. mgr.; L. K. Fletcher, supt.

Inc. 1921, in Ontario. **Cap.** $5,000,000; $1 par; 2,500,000 shares issued. Trust & Guarantee Co., registrar and transfer agent.

Company is a consolidation of the Three Nations Gold Mng. Co., La Palme Porcupine Mines, North Whitney Gold Mines and the Cavana Veteran claim. Reported that La Palme stockholders would receive one share of new company for each 2 shares of La Palme stock held. Three Nations company had previously gone into liquidation.

Property: 18 patented claims, 720 acres, in Whitney Twp., Porcupine area. Ore occurs as a disseminated deposit in Kewatin and Temiskaming schist, with E.-W. course and dip of 40°.

Development: by 250′ vertical shaft and about 1,000′ of workings. Diamond-drilling to depth of 1,000′.

Equipment: includes hoist, compressor, pump, steam-power, 10-stamps and cyanide plant.

New company unwatered Three Nations mine late in 1921 and plans extensive drilling campaign. It is alleged that La Palme company has not lived up to the merger agreement, and litigation has ensued.

ALLIE ISLAND COPPER MINE. **ONTARIO**

Office: 225 Water St., Kenora, Ont., Can. Owned by F. W. Moore et al.

Property: 4 claims, the S 777, K. 312, K 314 and K 315, 156.64 acres in all, at the east end of Allie Island, about 15 miles from Kenora.

Geology: claims cover an outcrop of serpentine, or chlorite-schist, carrying small pellets or crystals of native copper. Country rock is dolomite, altered trap and greenstones. Orebody claimed to be ½ mile long, with a maximum width of 700′.

Development: is surficial only, 40 and 20′ pit-holes, showing ore in bottom. Ore said to average 1½% copper. Owners planned development work at last account.

ALPINE SILVER MINES **ONTARIO**

Address: 806 Ferry St., Niagara Falls, Ont. **Mine address:** E. J. Thompson, mgr., Gowganda, Ont., Can.

Property: in Van Hire Twp., Gowganda silver area. 25 miles W. of Elk Lake terminus of the T. & N. O. Ry. Exploratory surface work was being done late in 1921, said to have exposed the main vein for 400′, and to have disclosed other veins; ore is silver-bearing. It is planned to extend old 600′ tunnel to cut veins at 200′ depth; reported that monthly expenditures are $3,500.

AMERICAN MOLYBDENITE, LTD. **ONTARIO**

Address: C. J. Peters, mgr., Wilberforce, Ontario, J. J. Gray, sec., 760 Keele St., Toronto, Ont.

Directors: Wm. Flavelle, A. W. Marsh and W. J. L. McKay.

Inc. in Ontario. **Cap.** $1,000,000; $1 par.

Property: 100 acres at Wilberforce, said to show a huge dyke of pyroxene with molybdenite evenly disseminated.

Equipment: steam power and 125-ton mill with flotation unit.

APEX PORCUPINE MINES, LTD. ONTARIO

Address: 420 Bank of Hamilton Bldg., Toronto, Can.

Officers: Sir Henry Pellatt, pres.; J. A. Jacobs, v. p., with D. S. Friedman, M. Workman, A. M. Bilsky and R. P. Gough. C. H. Manaton, sec.-treas.

Inc. 1911. **Cap.** $2,000,000; $1 par; 1,800,000 shares issued. Trusts & Guarantee Co., Toronto, registrar and transfer agent.

Owns 80 acres in southern Tisdale Twp., Porcupine district, showing pyrite and free gold, developed by 120′ shaft. Shut down since 1912.

ARGONAUT GOLD, LTD. ONTARIO

Address: 601 Royal Trust Bldg., Montreal, Quebec. **Mine office:** Larder Lake, Ont.

Officers: J. H. Rainville, pres.-gen. mgr.; Eugene Fiset, v. p., with A. Raymond, F. A. Labelle, O. Lemieux, A. Grovel and L. Gratton, directors. L. J. A. Marchand, sec.-treas. John W. Morrison, gen. supt.; J. E. Hardman, cons. engr.

Inc. 1919, in Ontario. **Cap.** $3,000,000; $1 par; 715,430 shares in treasury, Jan. 1, 1921; 500,000 shares were offered at 40c. per share (Can. currency) in November, 1921. Crown Trust Co., transfer agt.; Montreal Trust Co., registrar; both of Montreal. Annual meeting in April.

Balance sheet for year ending Jan. 31, 1921, shows: total assets, $2,132,849, including current, $16,679; fixed, $2,130,282; liabilities include accounts payable, $9,521; balance due on Boissonault claims, $18,000.

Property: 11 claims, 460 acres, including La Mine d'Or Huronia, near S. end of Beaverhouse lake, N. E. corner of Gauthier township, Larder Lake area, 18 miles E. of Dane on the T. & N. O. Ry., and 57 miles N. of Cobalt. Gold was discovered in 1901. Examined by Forest Rutherford.

Geology: the claims show 22 veins, all carrying gold, striking N. E., and more or less vertical. Of these Nos. 2, 15, 16, 20 and the New Vein, assay $12 to $19 per ton and are of sufficient width to warrant development. Some of them consist mainly of felsite in which are magnetite, copper pyrite and pyrite. Others are made up mostly of calcite, and again others consist mainly of quartz. The country rock is greenstone, which is cut by quartz-porphyry dikes. The ore mined during 1920 averaged $10 per ton.

Development: by 3 shafts. The deepest, or No. 3 shaft, has 2 compartments and was down 380′ at end of 1921. Levels have been opened at 85, 200 and 350′, with 2,600′ of lateral workings. On the 350′ level, a 5′ vein has returned an average assay of $19 for a distance of 280′. Ore reserves are estimated to be 50,000 tons of $14 ore.

Equipment: hydro-electric power, 12-drill compressor, hoist, 15-stamps, copper plates and test mill.

Production: from development work amounted to 4,637 tons, returning $32,513 in 1920.

ASSOCIATED GOLDFIELDS MINING CO., LTD. ONTARIO

See Vol. XIV. Taken over March, 1921, by **Canadian Associated Goldfields, Ltd.**, which see.

ATIC LAKE MINES, LTD. ONTARIO

Address: 711 Dominion Bank Bldg., Toronto, Ont.; Edw. Watts, mgr.

Inc. Aug. 19, 1918. **Cap.** $40,000.

Property: on Atic Lake, Thunder Bay district.

ATLAS GOLD MINES, LTD. ONTARIO

Address: Confederation Life Bldg., Toronto, or 157 James St., Montreal.

Mine address: A. M. Bilsky, supt., Kashbow P. O., Ont.

Cap. $2,000,000; par $1; 1,250,000 shares issued. Listed on Toronto Standard Stock Exchange. Shares, 20c low, 40c high, 1918; 35c low, 40c high in 1919.

Property: 42 acres, in McMurchy Twp., West Shining Tree gold area, Sudbury district, 60 miles S. of Porcupine. Said to show 15 veins, five of which have been stripped and examined.

Veins are well defined, and about 2' in width. Company is planning development, but was idle in 1920.

AURUM MINES, LTD. **ONTARIO**

Office: 420 Bank of Hamilton Bldg., Toronto, Ont., Canada. **Mine office:** Matheson, Ont.

Officers: Sir Henry M. Pellatt, pres.; Col. J. B. Miller, v. p.; with W. B. Reid, A. E. J. Blackman and A. H. Jeffrey, directors. C. H. Manaton, sec.; H. M Asling, treas.

Inc. in Ontario. **Cap.** $1,500,000; $1 par; 800,000 shares outstanding.

Property: 2 patented claims, 80 acres, adjoining the Croesus mine, in Munro Township.

Ore: occurs in quartz and schist veins in basalt, dipping N. W.-S. E.; average value of the gold contents is as yet undetermined. Mine examined by W. J. Trethewey and A. G. Kirby, who recommended diamond-drilling in attempt to pick up the Croesus vein. Idle.

BAILEY COBALT MINES, LTD. **ONTARIO**

Address: 1446 Railway Exchange Bldg., Chicago, Ill.

Inc. August 15, 1906, in Ontario. **Cap.** $5,000,000, shares $1 par. Trusts & Guarantee Co., Ltd., Toronto, Can., transfer agt. and registrar. In 1914, company being deeply in debt, a permanent liquidator was appointed.

Reorganization Committee: because of the bankrupt condition of the company and appointment of liquidators by Supreme Court of Ontario, the following consented to act as a committee and prepare a plan for reorganization: Albert G. Wheeler, Jr., chairman; Wm. E. Stevenson and H. S. Langdon, with Walter Laier, sec., 22 William St., New York. Lawyers' Title Insurance & Trust Co., New York, is depositary.

Reorganization plan: as finally worked out, provides that the liquidators transfer the Bailey mine and its assets to a new company, to be known as the **Bailey Silver Mines, Ltd.**, which see.

Judgment obtained by E. A. Benson for $90,000 due him was purchased by the Profit Sharing Construction Co. of New York, and was sustained. The property was sold by order of the court to the Bailey Silver Mines, Ltd., newly organized by interests closely associated with the Northern Customs Concentrators, Ltd. The new company paid the Benson claim of $90,000 and $40,000 for legal expenses, in addition to 425,000 shares given Bailey Cobalt stockholders for their property. See Vol. XIV for record of litigation.

Company has been in the hands of liquidators since June, 1914. At a meeting held Sept. 23, 1921, liquidation proceedings were ended, a directorate was elected and authorized to accept the 425,000 Bailey Silver shares, which it is understood are to be held en bloc.

BAILEY SILVER MINES, LTD. **ONTARIO**

Address: Excelsior Bldg., Toronto. **Mine office:** Cobalt, Ont.

Officers: A. J. Young, pres.; C. J. Boother, v. p.; Alex Fasken, treas., with Wm. Hines, Jr., and G. H. Sedgewick, directors. W. R. Sweeney, sec.; L. O. Walton, asst. sec.; G. E. Bateman, cons. engr.; Norman Laing, purch. agt.; Capt. Sandow, mine supt.; Robt. E. Dye, mill supt.

Inc. Feb. 3, 1920, in Ontario, to acquire holdings of Bailey Cobalt Mines, Ltd. (q. v.) and the 200-ton custom mill of the Northern Customs Concentrators, Ltd., at Cobalt. **Cap.** $1,250,000; $1 par. Funded debt: $150,000 first mortgage 7% bonds, due March 1, 1925, issued to take up Bailey Cobalt holdings. Toronto General Trusts Corp., Toronto, transfer agent, registrar, and trustee for bonds. Annual meeting, 3rd Tuesday in February.

Gross revenue for first half of 1921 amounted to $68,936.

Property: the Bailey mine, 38 acres, adjoining the Penn Canadian mine in Coleman Twp., Nipissing district. In Nov., 1921, lease was taken on the old Silver Cliff mine.

Development: by shafts to 5th or 280' level. Several veins have been opened up and regular shipments being made. The ore averages 20-25 oz. silver for a width of 4-6'. From May 10 to Dec. 31, 1920, 383' of crosscutting, raising and drifting was done and 21,600 cu. ft. of stoping. A narrow gauge railroad has also been completed from the Nipissing Central R. R. connecting mine and mill. Ore developed and in place estimated at 12,100 tons containing 173,000 oz. silver. The Silver Cliff was reported to have about 6,000 tons of ore in reserve, Jan. 1, 1922.

Production: the 200-ton mill, to be known hereafter as the **Bailey Silver Custom Mill**, treats about 4,000 to 5,000 tons per month, from the Bailey, La Rose, Silver Leaf and Ophir mines. The mill has been operated continuously since April 1, 1920 to June 30, 1921, treating 70,631 tons returning $204,506; gross earnings for 1921 were approxiamtely $147,072. During first half of 1921, the Bailey mine shipped 6,451 tons of ore.

BALDWIN GOLD MINING CO., LTD. ONTARIO

Address: 301 Dominion Bank Bldg., Toronto. **Mine address:** W. Wilson, mgr., Kenogami Lake, Ont.

Officers: F. W. Tanner, pres.; F. W. Gates, v. p.; J. A. Cherry, sec.-treas.; with Jas. Edward and Jas. Gorrie, directors.

Inc. January, 1917, in Ontario. **Cap.** $2,500,000; par $1; outstanding, 2,178,284 shares. Chartered Trust Executor Co., Toronto, transfer agt. Listed on Standard Stock Exchange, Toronto.

Property: 160 acres, in Eby Twp., Timiskaming district. Gold was discovered on tract in 1910 and property bought in 1917 from Mr. Jas. Gorrie for 1,500,000 shares. Ore occurs in quartz veins.

Development: on one vein includes a 200' shaft, with 500' of workings, said to expose ore of "large amount but not estimated."

Equipment: includes a hoist and compressor. Property is a prospect.

BEAUMONT GOLD MINES, LTD. ONTARIO

Succeeds North Davidson Mines, Ltd.

Address: R. T. Jeffrey, 1601 Royal Bank Bldg., Toronto. **Mine address:** Schumacher, Ont.

Property: 2 claims, about 80 acres, in Tisdale Township, Porcupine area.

Development: by shaft, 300' deep, July, 1921, and in Nov. preparations were made for drilling property. A 200-ton mill is planned.

BEAVER AUXILIARY MINES CO. ONTARIO

Seventy-five per cent. of company's capitalization is held by Beaver Cons. Mines, Ltd., which see.

Property: 120 acres, at Elk Lake, in James Twp., carries silver ore, mainly of milling grade. **Development:** by 330' main shaft, crosscuts and drifts. **Equipment:** hoist, two 90 h. p. boilers and compressor. No work has been done on the property for several years.

BEAVER CONS. MINES, LTD. ONTARIO

Mine office: H. L. Donaldson, supt., Cobalt, Ont.

Office: 810 Lumsden Bldg., Toronto, Ont.

Officers: F. L. Culver, pres.-gen. mgr.; F. C. Finkenstaedt, v. p.; H. F. Tremain, sec.-treas.; preceding officers, Wm. T. Mason, F. L. Lovelace, W. E. Stevenson, and R. Graham, directors.

Inc. February, 1907. **Cap.** $2,000,000; $1 par, fully paid, all issued. Union Trust Co., Toronto, and Security Transfer & Registrar Co., New York, transfer offices. Annual meeting in April. Stock listed on Standard Stock Exchange, Toronto.

Comparative General Balance Sheet, years ending February 28:

Assets.

	1919	1920	1921
Cash	$29,198	$43,257	$2,031
Supplies	20,049	9,122	11,666
Ore and bullion on hand	34,096	73,892	15,448*
Beaver Aux. Mines, Ltd., stock	143,250	143,250	143,250
Kirkland Lake Gold Mining Co.	370,958	362,262	371,520
Bills receivable	267,000	404,726	421,881
Beaver Mine	1,000,000	1,000,000	1,000,000
Buildings and timbering	93,984	99,256	99,256
Plant and equipment	118,861	118,861	119,838
Development	82,934	82,934	82,934
Discount on shares	863,973	863,973	863,973
Other	315,384	31,023	33,896
Total	$3,072,687	$3,232,556	$3,165,693

Liabilities

	1919	1920	1921
Capital	$2,000,000	$2,000,000	$2,000,000
Depreciation	141,515	152,295	184,503
Profit and loss balance	901,645	1,049,081	953,255
Accounts payable, etc	29,527	31,180	27,935
Total	$3,072,687	$3,232,556	$3,165,693

* Due from smelters.

Dividends: $170,000 in 1911; $180,000 in 1912; $60,000 in 1913; $60,000 in 1914; $120,000 in 1915; $60,000 in 1916; $60,000 in 1920. The total is $710,000.

Property: 2 claims, patented, 60 acres, in Coleman Twp., Cobalt district; also owns approximately 7/8 of entire stock of Kirkland Lake Mining Co., Teck Twp., which see, and a 3/4 interest in the Beaver Auxiliary Mines Co., owning 120 acres in James Twp. A lease is held on the adjoining Prince Davis property.

Ore carries silver, cobalt, and arsenic in narrow calcite veins, in diabase and the Keewatin formation. Ore occurs as high-grade in pockets and shoots, or as milling ore.

Development: by 1,650′ vertical shaft, which encountered the lower diabase-Keewatin contact at a depth of 1,570′. The high grade ore on the 1,600′ level was the deepest occurrence of such ore at Cobalt. New work in 1919-20 amounted to 1,870′ and in 1920-21 to 1,285′; in the former period large bodies of milling ore were uncovered, but no new orebodies have since been found.

Equipment: includes a 150-ton concentrator, giving an extraction of about 80%, blacksmith shop, dwellings, etc.

Production: year ending Feb. 28:

	Silver Oz.	Earnings
*1921	157,274	$189,902
1920	301,781	391,299
1919	385,043	393,386
1918	372,973	354,341
1917	566,964	499,690
1916	746,310	351,124
1915	900,000	158,465
1914	762,699	168,630

*** 10 months.**

In face of the falling silver price, mine was shut down Dec. 31, 1920; company has transferred its interest to the gold producing Kirkland Lake, under same management.

BIDGOOD GOLD MINES, LTD. ONTARIO

Address: 806 Ferry St., Niagara Falls, Ont. **Mine office:** Kirkland Lake.

Officers: Geo. Tough, pres.; D. H. Angus, mgr.

Property: 8 claims in Teck Twp., Timiskaming district between Mud and McTavish lakes, E. of Kirkland Lake. Veins occur in the porphyry, or in conglomerate near it. Quartz carries copper and iron pyrite, with some pyrrhotite and molybdenite. Two veins assayed from 80 cents to $12 per ton. No. 4 vein is 25' wide, and traceable for 250', and No. 9 is 8' wide, traceable for 350'.

Development: by over 3,000' of surface trenching, and a shaft 40' deep, Dec. 1, 1921, with laterals being extended on 3rd and 4th levels.

Equipment: 65 h. p. boiler, 6 by 8" hoist, 3-drill compressor, etc.

BIG DYKE MINING CO. ONTARIO

Address: South Porcupine, Ont., Can.

Property: the McRae-Porcupine and Pike Lake mines, in Delora Twp., Porcupine Gold area, 4 miles S. of South Porcupine. Was developing mid-summer of 1921.

BLUE QUARTZ GOLD MINES, LTD. ONTARIO

Is a merger of La Santa Lucia Gold Mines, Ltd., and Cartwright Gold-fields, Ltd.

Address: Horace C. Crow, 184 Sunnyside Ave., Toronto, Ont.

Officers: Horace C. Crow, pres.; C. H. Taylor, v. p.-gen. m.

Inc. 1921, in Ontario. **Cap.** $3,000,000; par $1.

Property: La Santa Lucia, one claim, and the adjoining Cartwright group of 6 claims, on S. shore of Painkiller lake, in the Beatty-Munro gold area, Larder Lake division, Timiskaming district; also 2 Cartwright claims, 80 acres, on N. shore of lake. Narrow veins, a few inches to 2' wide, occur in rocks of Keewatin and Timiskaming age. Ore consists of brittle fractured quartz, with some calcite, carrying gold, both free and as tellurides, and pyrite. Seven veins have been exposed.

Development: by 110' shaft and surface work. Drilling and lateral work are now (Jan. 1922) underway.

Equipment: is being installed to replace that destroyed by fire in 1916.

BOSTON CREEK MINING CO., LTD. ONTARIO

Address: Imperial Bank Chambers, Niagara Falls, Ont. **Mine address:** Boston Creek, Ont.

Officers: F. M. Richardson, pres.-mgr.; W. B. Albright, v. p.; M. L. Quillman, sec.-treas.; R. E. Margenau, mgr.

Inc. in 1916 to take over mine from the R. A. P. Syndicate, financed by Sherwin-Williams Paint Co. interests, who spent $250,000 on the property. **Cap.** $2,000,000; $1 par; 1,050,000 shares issued and 999,995 were pooled for two years. Security Transfer & Registrar Co., New York, transfer agent. Listed on New York Curb, and on Toronto Stock Exchange. Shares sold, 13c. low, 39c. high, 1918; 18c. low, 33c. high, 1919; 8c. low, 22c. high, 1920; 1c. low, 15c. high, 1921.

Property: 21 claims, 100 acres, in Boston township, 45 miles N. W. of Cobalt and 382 miles N. of Toronto and crossed by the T. & N. R. R. See Vol. XIV for complete description.

Although extravagant statements in brokers' letters and market rigging created suspicion, the property will, it is believed, eventually be a milling proposition, ranking well with the various Porcupine companies. Mine has been idle for some time on account of disagreement between company and R. A. P. Syndicate, whose shaft the Boston Creek was using. Reported that the two companies would be consolidated. No recent returns.

BOSTON McCREA GOLD MINES, LTD. ONTARIO

Address: 1118 Prudential Bldg., Buffalo, N. Y. **Mine address:** Boston Creek, Ont.

Officers: G. W. Morris, pres.; W. R. Adams, mgr.

Property: in Pacaud Twp., Boston Creek area, Timiskaming district, shows 2 parallel veins about 3′ wide. Ore is gold bearing, assaying $8 to $25 per ton. No work apparently has been done since mid-1920.

BOSTON-PARRY SOUND COPPER CO. **ONTARIO**

Mine office: Parry Sound, Parry Sound district, Ont. Inc. June, 1908, in Maine. **Cap.** $1,000,000; shares $1 par. Is a close corporation.

Property: 200 acres, in the vicinity of the Wilcox and McGowan mines. Idle some years, but owners are well-to-do and expect to reopen property some day.

BOURKES MINES, LTD. **ONTARIO**

Address: 55 Yonge St., Toronto. **Mine office:** J. J. Byrne, mgr., Sesekinika, Ont.

Cap. $5,000,000, increased from $2,500,000 in Nov., 1921; par $1; 1,700,000 shares offered to stockholders in proportion to their holdings.

Property: the south half of Lot 9 in second concession of Benoit Twp., at Bourke's siding, N. W. of Kirkland Lake, developed by shaft and 1,500′ of workings. A 28″ gold quartz vein exposed at 200′ depth.

Equipment: 80-h. p. steam boiler, 210 cu. ft. compressor, 2 hoists.

The company has been short of funds for some time, and the mine closed down.

BOUSQUET GOLD MINES, LTD. **ONTARIO**

Address: 6 King St. West, Toronto. **Mine office:** Willisville, Ont.

Officers: Harold Tough, pres.; R. R. Tough, v. p.-mgr.; Wm. B. McPherson, sec.-treas., with Thos. Baird, and Jas. A. Bousquet, directors.

Inc. 1920, in Ontario. **Cap.** $2,000,000; $1 par.

Property: 10 claims, in Howry Creek area, Sudbury mining division, 7 miles E. of Willisville on the Algoma Eastern R. R. and 66 miles from Sudbury. Gold ore occurs in narrow quartz veins in a belt of grey schist.

Development: by 2-compartment vertical shaft, being sunk early in 1921.

Equipment: includes compressor, boiler, engine and buildings.

Development results said to be disappointing and mine closed down Nov. 1, 1921. Company reported seeking a more promising property.

BRANT MINES, LTD. **ONTARIO**

Address: W. M. MacDonald, mgr., Gowganda, Ontario.

Officers: J. C. Cohoe, pres.; E. L. Goold, v. p.; O. Hall, sec.-treas., with F. L. Mapes, W. H. Whittaker, C. W. Leeming and C. H. Waterous, directors.

Inc. 1917, in Ontario. **Cap.** $1,500,000; $1 par; 1,000,000 issued.

Property: 87 acres, formerly owned by the Mapes-Johnston Silver Mines Co., in Meickle township, Silver Lake district, and near the Miller Lake-O'Brien mine.

Development: by 350′ shaft and other workings. On 320′ level, ore assaying 2,000 oz. silver per ton was reported as being mined.

Equipment: includes hoist, compressor, machine-drills, and accessories.

Shares quoted at 57c. early in Nov., 1917. No recent information.

BRITISH AMERICA NICKEL CORP., LTD **ONTARIO**

Office: Jackson Bldg., Ottawa, Ont. **Mine and smelter office:** Nickelton, Sudbury, Ont.

Officers: Edgar N. Rhodes, pres.-mng. director; D. Vogt and V. N. Hybinette, v. ps.; S. M. Brown, sec.-treas., with J. Fred Booth, F. W. Field, Sir Eric Hambro, E. R. Wood, Sir U. J. R. Borresen, A. Gronningsater (technical dir.), Sir Robert Borden, S. Giertsen, Oscar Jebson, P. C. Stevenson and E. A. Cappelen Smith, directors. J. H. Gillis, chief engr.; E. Hibbert, mgr. of mines; E. J. Carlyle, mgr. of smelter; R. L. Peek, mgr. of refinery; Frank E. Lathe, chief chemist; T. N. Hay, purch. agt.; R. F. Howard, elec. engr.; H. L. Roscoe, supt. of mines.

Inc. August, 1913, in Canada. **Cap.** $20,000,000; par $100; all issued. **Funded debt:** $24,500,000 authorized; $22,500,000 bonds outstanding. British

Government holds $14,000,000 of stock and $3,000,000 bonds. National Trust Co., transfer agt. and registrar.

Property: 17,590 acres in McKim Twp., Sudbury nickel district, Ontario, the Corporation owns 17,590 acres, of which 12,590 acres are within a mineral bearing zone, 4 miles N. W. of Sudbury, the balance being non-mineral and required for smelter townsites, etc. Included in the above are the following mines: Murray, Whistle, Wild Cat, Jackson, Nickel Lake group, W. D. 16, Elsie, Gertrude, Victor, Lady Violet and Falconbridge. Lands contain 21 known orebodies, 7 of which have been developed. The Murray orebody consists of norite impregnated with pyrite and chalcopyrite with a greenstone-granite footwall, and has been proven to a depth of 1,000' on a 38° dip, with a thickness of 40 to 140'. The ore carries 3% nickel and copper, but higher grade is known to exist at depth; metals of platinum group are present . The company has spent $900,000 on diamond drilling from 1907 to 1918.

Development: at the Whistle mine has reached the producing stage, but work has been largely concentrated at the Murray, which is opened by a 1,200' three-compartment shaft with 8 levels. Mining methods permit of a 90% extraction of the whole ore mass.

Ore reserves: diamond drilling has developed over 18,000,000 tons, 16,000,000 tons of which is in the Murray mine.

Equipment: at the Murray includes three 1,000' h. p. boilers; a double-drum hoist handling 8 ton skips at speed of 1,500' p. m.; 4 compressors supplying 6,500 cu. ft. of air. The mine supplies 1,300 tons of ore per day which is crushed to 2" in a 46x48" crusher and 20% of material discarded is waste. Transportation on 5 levels is handled by 5-ton electric locomotives hauling four 4-ton cars. Ore is conveyed to the smelter, 1¼ miles distant in 35-ton cars. **Smelting plant:** consists of two 50x360" blast furnaces, fed by especially designed four 4-ton compartment charge-cars on standard gauge track, hauled by electric locomotives; and three 13x30' basic lined converters served by two 60'-span 40-ton electric cranes. Six 1,000 h. p. boilers supply power to four 2,200 h. p. turbo-blowers delivering air to furnaces and converters. Gases pass through flues and chambers to a 300' stack with 25' inside diameter. Entire plant is so arranged that it may be electrically driven when outside power is obtainable. The furnace capacity is about 1,600 tons of ore per day. Matte from the furnaces carrying 12% nickel and copper ore, blown up to 81% in the converters, then granulated and shipped to the refinery.

Refinery: is situated at Deschenes, Quebec, where cheap electric power is procurable, and uses the Hybinette process of separating the copper, nickel and precious metals from the matte. It is equipped with two 8 hearth Wedge roasters from where the matte passes to the leaching department and a part of the copper is extracted. Leached matte is electrically smelted and nickel copper anodes are cast for treatment in the nickel-depositing building, which covers 3 acres. In addition to nickel, nickel sulphite and nickel ammonium salt are produced. The slimes are treated in a special department to yield the platinum metals, gold and silver. The plant has an annual capacity of 15,000,000 lb. of nickel. About 55 tons of copper is produced per 100 tons of nickel

The mines are served by the Canadian Pacific, Canadian Northern Ontario and Algoma Eastern railroads.

The company was orginally financed by the British Government as a war measure and the smelter and refinery, begun in late 1916 and early 1918 respectively, were put into commission in Jan. 1920. In February, 1921, mines and plants were closed down pending a financial reorganization, which became effective in mid-summer following.

BRITISH MOLYBDENITE, LTD. ONTARIO

Address: 34 Victoria St., Toronto. **Mine address:** Gooderham, Ont.

Officers: Harry Secord, pres.; Geo. W. Hunt, sec.

Property: in Glamorgan, Twp., Haliburton county, 1¼ miles E. of Gooderham. Operations began in 1918.

BRUCE MINES, LTD. **ONTARIO**

Dead. Mines sold to **Mond Nickel Co.** in 1915.

BUFFALO MINES, LTD. **ONTARIO**

Fully described in Volume XIV. Company went into voluntary liquidation, March, 1920. The property is now owned by the **Mining Corporation of Canada, Ltd.**

BURKE GROUP **ONTARIO**

Owners: Messrs. Burke, Landagne, Cochrane and Bulloch.

Property: 13 claims, on W. shore of Granite lake, Fawcett Twp., West Shiningtree area, Sudbury district, shows a N.-S. quartz vein in altered pillow lava and schist. The ore is gold-bearing. Late in 1921, was taken under option by Hollinger Cons., which will drill ground.

BURNSIDE GOLD MINES, LTD. **ONTARIO**

In voluntary liquidation.

Address: R. Simpson, liquidator, Finsbury Pavement House, London, E. C. 2, England.

Property: 3 claims adjoining the Tough-Oakes, in Teck Twp., Kirkland Lake area, sold to Kirkland Lake Proprietary (1919), Ltd., stockholders receiving one £1 Kirkland Lake share for two Burnside shares.

Development: by 3 shafts, No. 2 being connnected with Tough-Oakes workings on 400′ level. No. 3 has been deepened to 500′ to attack faulted segment of Tough-Oakes No. 2 vein, discovered on Burnside ground.

Equipment: includes 30-ton mill.

CALUMET & ALGOMA MINING CO. **ONTARIO**

Address: Lucas Hermann, sec., 109 Fifth St., Calumet, Mich. Mine near Massey, Algoma, Ont.

Officers: Jos. Vertin, pres.; Chas. Schenk, v. p.; Lucas Hermann, treas.

Inc. 1905. **Cap.** $1,000,000; shares $5 par; assessable; issued, $100,000; paid in, $1.75. A reconstruction of the Copper Queen Mining Co., Ltd. In March, 1919, had no debts, and had $400 in the treasury.

Property: 957 acres, freehold, shows a 45′ fissure vein, traceable about 3 miles, carrying medium-grade chalcopyrite ore, more or less auriferous, with occasional bornite and malachite, giving assays of 5 to 25% copper. Has 2 shafts, No. 1 being 138′ deep, and 2 tunnels, longest 195′. Lands are heavily timbered and well watered. Idle several years.

CALUMET & MONTANA CONSOLIDATED MINING CO. **ONTARIO**

Described in Vol. XIV. Succeeded in 1918 by the **Three Star Silver Mines, Ltd.**, which see. Company was a reorganization of the Calumet & Montana Mng. Co., described in Vol. XI.

CAMBURN SILVER MINES, LTD. **ONTARIO**

Address: Rm. 901, 263 St. James St., Montreal. **Mine address:** Box 756, Cobalt, Ont. J. H. Rattray, mgr.

Inc. in 1919. **Cap.** $3,000,000, increased in 1920 from $1,500,000; par $1.

Property: the Lumsden and Waldman mines in Coleman Twp., Timiskaming district.

CANADIAN AMERICAN RESOURCES, LTD. **ONTARIO**

Address: 1006 Royal Bank Bldg., Toronto.

Officers: Alex. Alexander, pres., 927 Fifth Ave., New York; L. E. Denyes, v. p., Toronto; Dr. R. G. Bogart, sec., Kingston, Ont.; Geo. B. Leighton, treas., New York; with Jacob Rupert and Geo. B. Gifford of New York, and S. W. Jenckes, St. Catherines, Ont., directors.

Inc. in Ontario late in 1919. **Cap.** $50,000,000. Company was organized to aid the development of mining and oil properties.

CANADIAN ASSOCIATED GOLDFIELDS, LTD. **ONTARIO**

Practically a successor to Associated Goldfields Mng. Co., Ltd.

Mine address: Geo. A. Gray, Larder Lake, Ont. **Office:** 306, C. P. R. Bldg., Toronto.

Officers: Geo. A. MacKay, pres.; A. A. McFall, v. p.; A. Singer, J. Din-

woody, and D. H. McCartney, directors. R. Wm. MacKay, sec. There is an advisory committee of 38 stockholders.

Inc. in 1921, in Ontario. Cap. $30,000,000; $1 par. This concern is supposed to have taken over the Associated Goldfields Mng. Co., Ltd., Goldfields, Ltd., Larder Lake Gold Mng. Co., Ltd, and Tournemile Mng. Co., Ltd., the first named is to receive 18,000,000 shares (4 to 1 basis) of new company, Goldfields to receive by an equal exchange 2,350,647 shares, others to receive 1 share of new stock for 2 old; the remainder, about 8,000,000 shares, to remain in treasury.

Associated Goldfields has apparently agreed to the above arrangement, and being reported to have stock control of Goldfields, Ltd. (q. v.), the latter also has presumably agreed. In March, 1921, however, 40 stockholders petitioned the Government for relief and in July, a protective committee was appointed to prevent by legal process the consolidation of Goldfields, Ltd. with new company.

The financial position at the end of March, 1921, was cash and Victory Bonds, $825,401, and notes receivable, $275,000. Current liabilities were under $15,000. During 1919, $169,259 was spent and perhaps a total of about $330,000 to the end of that year.

Property: about 2,000 acres, includes the Harris-Maxwell, the Kerr-Addison, and the Reddick mines, now known as Blocks B, C, and D, respectively, located in Larder Lake district, Ontario. Block B mine is opened to the 500′ level, with workings practically all in silicified dolomite.

Reported to have acquired Costello-Thighe and Costello-Lucy claims late in 1921.

Development: during 1919, gratifying results were obtained on the 300, 400, and 500′ levels of Block B. In Block C and D, 2 lenses of ore, each 2,000′ long, from 50 to 150′ wide, and proved to a depth of 500′ by drills, are said to average $11.50 per ton. It is estimated that there is enough ore to supply a 2,000-ton mill for years. These deposits are enclosed by lower-grade ore, 400 to 500′ wide. A 3-compartment shaft was down to 350′ on Block C by August, 1921. An extensive development campaign, largely by drilling, is reported to be under way.

Equipment: in addition to plants on Blocks B and D, the construction of a 1,000-ton mill, to be eventually of 10,000 tons capacity, is contemplated.

See Goldfields, Ltd. for further information regarding Blocks B and D.

This company is ambitious and desirous of doing big things, so it is to be hoped that the optimistic estimates of reserves are correct. Certain features have come in for a lot of criticism in Ontario, seemingly justified by an incident during 1920. It appears that the Provincial Government proposed building a branch line from the T. & N. O. Ry. to Larder Lake, costing $250,000 for 16 miles, which the Associated company admits is of great importance to its future; yet when the Government wished to make an examination of the mine to see whether the line was justified, the company was unwilling to submit its property to the inspection. Therefore only a macadam road is to be built. By Oct., 1920, criticism had increased, and considerable doubt existed concerning the estimates given.

All work on Block B ceased on Oct. 1, 1921, and efforts to be concentrated on two other blocks. At a stockholders' meeting in Jan. 1922, it is reported that management was subjected to much criticism.

CANADIAN CASEY COBALT CO., LTD. ONTARIO

Address: 1514 Bk. of Hamilton Bldg., Toronto, Ont. Mine address: New Liskeard, Ont.

Directors: W. W. Perry, C. H. C. Leggott and Edna Fitzsimons, all of Toronto.

Inc. 1920, in Ontario. **Cap.** $245,000.

Property: in Casey Twp., Cobalt silver area, Timiskaming district.

CANADIAN COPPER CO. ONTARIO

Entire stock of company taken over by **International Nickel Co. of Canada, Ltd.** and company dissolved.

CANADIAN EXPLORATION CO., LTD. **ONTARIO**

Offices: 28 Victoria Sq., Montreal, and Naughton, Ont.

Mine closed and plant sold, property was described in Vol. XIII.

CANADIAN-KIRKLAND GOLD MINING CO. **ONTARIO**

Address: Kirkland Lake Ont. **Mine address:** Kirkland, Ont.

Officers: A. A. Amos, pres.; Geo. Tough, v. p.-mgr.; G. G. T. Ware, sec,.-treas.; with D. H. Angus, and R. W. Brigstocke, directors.

Inc. in Ontario. **Cap.** $2,000,000; par $1.

Property: 4 claims, 154 acres, in Teck Twp., Kirkland Lake area, Timiskaming district.

Development: by 2 shafts, one 150′ deep, sunk in mineralized zones consisting of quartz veinlets and greywacke, impregnated with copper and iron pyrite, galena, and calcite. In 1920, 200′ of crosscutting on the 150′ level failed to cut the orebody and further work was discontinued. A 45° drillhole, 400′ deep, was put down at a point 500′ S. of the shaft to intersect the vein.

Property under option since May 1, 1919, to **Northcrown Porcupine Mines Ltd.**, which see.

CANADIAN MINING CORPORATION, LTD. **ONTARIO**

Liquidated. Interests taken over by **Mining Corporation of Canada, Ltd.**

CANADIAN MINING & FINANCE CO., LTD. **ONTARIO**

Office: 85 Bay St., Toronto, Can.

Company is not engaged in any mining operations, simply owning a few claims. The several properties that it formerly managed are now owned by the **Hollinger Consolidated Gold Mines, Ltd.**, which see.

CANADIAN SMELTING & REFINING CO. **ONTARIO**

Out of existence, described in Vol. XIII. Former office, Orilla, Ont.

CANE SILVER MINES, LTD. **ONTARIO**

Address: 508 Lumsden Bldg., Toronto, Ont. **Mine address:** Elk Lake, Ont. H. J. Martin, sec.

Property: in Cane Twp., Elk Lake area, Timiskaming district. S. of Kenabeck P. O., on the Elk Lake branch of the T. & N. O. Ry. No. 8, the most important of the veins discovered is about 12″ wide. The ore is aplite with value in silver. There are 3 shafts.

The rumor that Hudson Bay Mines was to become interested seems to be unfounded, but it is understood that officials of that company are involved in the Cane Silver Mines.

CARIBOU COBALT MINES CO. **ONTARIO**

Offices: 61 Broadway, New York, and Cobalt, Ont.

Officers: Herman Cook, pres.; F. M. Loper, v. p.; E. H. Westlake, sec.-treas., with J. H. Susmann and Sam A. Lewisohn, directors.

Inc. September 29, 1913, in Maine. **Cap.** $1,000,000; $1 par; 950,000 outstanding, of which 837,498 shares are owned by the Kerr Lake Mines, Ltd. Listed on New York Curb. The Caribou Cobalt Mines Co. owns the entire capital stock of Cobalt Comet Mines, Ltd., which is the operating company. Dividends to April, 1917, totaled $175,000.

CART LAKE SILVER MINES, LTD. **ONTARIO**

Idle. No recent information. Described in Vol. XIV.

CARTWRIGHT GOLDFIELDS, LTD. **ONTARIO**

Now a part of **Blue Quartz Gold Mines, Ltd.**, which see.

CARVETH GOLD MINES, LTD. **ONTARIO**

Address: c/o Faskin, Excelsior Life Bldg., Toronto. T. H. Carveth, sec.

Property: in Thomas Twp., Porcupine area, Timiskaming district. Some drilling has been done.

Early in 1920, reported that company was selling stock by representing that property was "in the very heart of the gold yielding district of the Procupine Division", and that the Government had been called upon to take action because property is actually situated 20 miles from the center.

CASEY-COBALT MINING CO., LTD. ONTARIO

Office: Balfour House, Finsbury Pavement, London, E. C., Eng. R. F. Eden, liquidator.

Company went into voluntary liquidation, November, 1920, and assets have been distributed. Fully described in Volume XIV.

CASEY-COBALT SILVER MINING CO., LTD., ONTARIO

Head office: 15-20 Traders Bank Bldg., Toronto. **Mine office:** New Liskeard, Casey Township, Ont.

Officers: W. R. P. Parker, pres.; J. P. Watson, v. p., with G. M. Clark, Capt. R. E. G. van Cutsem and Lieut. Graeme Watson, directors. John W. Shaw, mine eng. Company was controlled by the Casey Cobalt Mng. Co., Ltd., now liquidated.

Inc. Dec. 19, 1906. **Cap.** $100,000; par $1; all issued. Paid $203,249 in dividends.

Property: originally 40 acres in Harris Twp., and the Casey-Cobalt mine in Casey Twp., 9 miles N. E. of New Liskeard. In 1918 practically all work was done on the property of Casey-Harris Mining Co., Ltd., of which company Casey-Cobalt Silver Mining Co. owned a half interest. Since 1918 all the available ore of the two properties has been milled and operations have ceased. The only work done in 1918-'19 was on the property of the Harmak Mining Co., which lies W. of the Casey. Operations were charged for at cost, the Casey company to receive 10% of the Harmak Company profits for a number of years.

Equipment: includes hoist at 375' shaft, compressor and mill erected in 1918.

Presumably in liquidation. Mill sold to **Triplex Gold Mines, Ltd.,** in 1922.

CASEY MOUNTAIN MINING CO. ONTARIO

Address: 115 Stair Bldg., Toronto. **Mine address:** Judge, Ont.

Officers: Robt. G. Williamson, pres.-mgr.; W. A. Staples, sec.-treas.

Property: about 240 acres, 2 miles from the Casey-Cobalt mine, in Casey township, about 15 miles N. W. of Cobalt.

Development: by 425' shaft, said to have cut a vein of silver ore of commercial value.

After an idleness of 2 years, active development reported to have resumed in mid-1921.

CASTLE MINING CO. ONTARIO

Entire capital stock owned by **Castle-Trethewey Silver Mines Co.,** which see.

CASTLE-TRETHEWEY SILVER MINES CO. ONTARIO

Successor to Trethewey Silver Cobalt Mine, Ltd., effective January, 1922.

Office: 603 Standard Bank Bldg., Toronto. **Mine address:** Gowganda, Ont.

Officers: J. P. Bickell, pres.; J. B. Tudhope, v. p.; with Gordon Taylor, W. J. Sheppard and S. R. Wickett, directors. L. J. Pashler, sec.-treas.; Murray D. Kennedy, mgr.; J. S. McReavy, supt.

Inc. May 30, 1906, in Ontario. **Cap.** $2,000,000; $1 par; outstanding Feb. 1, 1922, 400,000 shares. Toronto General Trust Corporation, transfer office; C. E. Robin, registrar. Listed on New York Curb, and Toronto Stock Exchange. **Dividends:** of 123% were paid to Jan., 1919. Profit and Loss surplus, Dec. 31, 1919, was $69,848.

At reorganization meeting, Jan. 1922, name was changed as above, stockholders of old company to receive one share of new for each 4 shares of old stock held, with 30 days in which to subscribe for 1,600,000 treasury shares pro rata at 10c. per share. This will pay off about $40,000 debts of old company and provide working capital.

Company owns all the shares of the Castle Mining Co., Ltd.

Property: Castle Silver mine, 11 claims, 400 acres, in Nicol Twp., Gowganda area, adjoining Miller Lake O'Brien, developed by shaft to depth of

270'. Also a lease on 112 acres under Miller Lake. Small production has been realized from development work.

The Tretheway mine, 35 acres, in Coleman Twp., adjoining Coniagas Mines, Ltd., on N., was sold to that company in January, 1920, for $100,000.

CATHERINE GOLD MINES, LTD. **ONTARIO**

Address: 806 Ferry St., Niagara Falls, Ont. **Mine address:** Boston Creek, Ont. T. B. Tough, pres.

Property: in Catherine Twp., Boston Creek area, Timiskaming district, is said to have good surface indications.

CENTRAL OPERATING CO., LTD. **ONTARIO**

Subsidiary of **Mining Corp. of Canada**, which see.

Address: 1514 Trader Bk. Bldg., Toronto, Ont., or M. F. Fairlie, mgr., Cobalt, Ont.

Operates holdings of Foster Cobalt Mng. Co. under lease to parent company, Mining Corp. of Canada.

Property: the Foster mine on shore of Glen Lake, Coleman Twp., Timiskaming district, developed by 6 shafts to depth of 210'; lateral work is considerable, including a 1,600' crosscut under the lake.

CHALLENGER GOLD MINING CO., LTD. **ONTARIO**

Address: c/o Amour & Mickle, Confederation Life Bldg., Toronto, Ont. **Mine address:** Bourkes, Ont.

Officers: P. R. Webster, pres., with H. P. Rickard and Alex Miller, directors.

Inc. in Ontario. **Cap.** $110,000.

Property: in Bernhart Twp., Bourkes area, Timiskaming district.

CHAMBERS FERLAND MINING CO., LTD. **ONTARIO**

See description under **Aladdin Cobalt, Ltd.**

CHAPUT-HUGHES GOLD MINES, LTD. **ONTARIO**

Address: 1507 Royal Bank Bldg., Toronto, Ont. **Mine address:** Haileybury, Ont. J. A. Hughes, mgr.

Property: one claim, in Teck Twp., Kirkland Lake area, Timiskaming district. First opened in 1919, and a strong, well mineralized vein exposed. Machinery was installed and shaft sinking begun in 1921.

CHENEY COPPER CO., LTD. **ONTARIO**

Office: 5 Melinda St., Toronto, Ont.

Officers: D. M. Robertson, pres.; R. P. Gouch, v. p.; G. Taylor, sec.-treas.; preceding with J. S. King, G. P. McCallum, J. L. Coffee and G. Waldron, directors, all of Toronto.

Inc. in Ontario. **Cap.** $2,000,000; $1 par; fully paid. No bonds. No stocks in hands of the public.

Property: 700 acres, of which 400 are held by Crown patent and the balance under Mines Act of Ontario, 28 miles from Thessalon, on C. P. railway and 40 miles east of Sault Ste. Marie.

Geology: lands show a series of three parallel veins exposed by outcrops, trenches and open cut for 1½ miles, with width of 4' to 12'. Strike is north 16° west with dip of 75° to south. Veins are mostly quartz with pockets or lenses of specular iron, iron pyrites and copper minerals.

Idle.

CHURCHILL MINING & MILLING, LTD. **ONTARIO**

Address: 117 King St. W., Toronto, Ont. **Mine address:** Wasapika Lake, Ont. W. R. Knox, mgr.

Inc. March 22, 1918, in Ontario. **Cap.** $1,000,000.

Property: 4 claims to the S. W. of Michiwakenda lake, Churchill Twp., West Shiningtree gold area, 20 miles N. E. from Westree on the C. N. Ry. Two veins, 2 to 3' wide, occur in a rusty pillow lava-schist. Towards the W. they come together and pass into a porphyritic rock. A 40' shaft on the N. vein showed 38' of ore, carrying gold and pyrite.

CLIFTON PORCUPINE MINES, LTD. **ONTARIO**

Office: 703 Bank of Hamilton Bldg., Toronto. **Mine address:** Wm. C. Offer, supt., Box 120, South Porcupine, Ont.

Officers: F. C. Preston, pres.; H. L. Gibson, v. p., with W. E. Preston, Jas. Cowan and Wm. C. Offer, directors. E. H. Bridger, sec.-treas. P. D. Reid, mgr.

Inc. April 5, 1919, in Ontario. **Cap.** $2,000,000; par $1; 1,590,000 shares outstanding. Trusts & Guarantee Co., Ltd., Toronto, registrar and transfer agent. Annual meeting, 2nd Tuesday in Sept.

As of July 1, 1920, current assets were $14,369; liabilities $911.

Property: one claim, 50 acres, in Porcupine district, ½ mile S. of Dome Mines, Ltd., said to show several quartz veins in quartz-porphyry.

Development: by 170' shaft with total workings about 1,000'. Considerable ore developed above 200' level in 1919. Total output to date reported as $14,511.

Equipment: includes power house, hoists and compressors.

Electric power installed 1920, but operations suspended late in that year owing to lack of funds.

COBALT COMET MINES, LTD. **ONTARIO**

Offices: 61 Broadway, New York; and H. A. Kee, mgr., (Giroux Lake) Cobalt, Ont. Same general officers as Caribou Cobalt Mines Co., which company owns the entire capital stock of Cobalt Comet Mines, Ltd.

Inc. April 16, 1913, in Ontario. **Cap.** $1,000,000; $5 par; 190,000 outstanding. Annual meeting, 2nd Thursday of Feb. Dividends total $290,000.

Property: 2 part claims, patented, 70 acres in Coleman Twp., Timiskaming mining district, formerly known as the Drummond mine.

Ore fissure veins contain shoots of variable widths of rich silver ores, whose minerals are native silver and cobalt-nickel sulpharsenides.

Development: by two shafts, 100' and 200' deep.

Equipment: includes an air hoist, electric pump, compressed air and electric power.

Production: practically all ore in sight has been removed and future earnings depend on further discoveries of ore. Low-grade ore is treated by the Dominion Reduction Co.; high-grade ores are shipped. Mine yielded 203,777 oz. in 1916 and 4,869 oz. in 1917. No recent production reported.

COBALT-FRONTENAC MINING CO., LTD. **ONTARIO**

Address: D. H. Flecher, mgr., Flinton, Ont.

Officers: Geo. W. Millan, pres.; Noah Dyment, v. p.; M. Doyle, sec.-treas.

Property: the Golden Fleece mine, near Flinton. Developed by incline shaft. **Equipment:** includes mill and cyanide plant.

Production: in 1919, 15 oz. gold, yielding $300.

COBALT-ONTARIO DEVELOPMENT CO. **ONTARIO**

Reorganized 1919 as Matachewan Gold Mines, Ltd., which see.

COBALT PROVINCIAL MINING CO., LTD. **ONTARIO**

Address: J. M. McCarthy, sec.-treas., 121 Chamber of Commerce Bldg., St. Louis, Mo. **Mine office:** Box 747, Cobalt, Ont.

Directors: F. G. Logan, John Riddington, J. M. McCarthy and C. L. Painter.

Inc. in Ontario. **Cap.** $1,500,000; $1 par; all issued. Chartered Trusts & Executor Co., Toronto, transfer agent and registrar.

Property: 31 acres, adjoining Nipissing at Cobalt, Coleman Twp., Timiskaming district, developed by 350' shaft with 5,500' of workings.

COBALT REDUCTION CO., LTD. **ONTARIO**

See Mining Corporation of Canada, Ltd.

COBALT SILVER QUEEN, LTD. **ONTARIO**

Address: 1322 Traders Bk. Bldg., Toronto, Ont. **Mine address:** Box 256, Cobalt, Ont. W. J. Post, mgr.

Inc. April 8, 1906. **Cap.** $1,500,000; par $1; all issued.

Dividends: $315,000 to end of 1918; last in Dec. 1908.

Property: the Silver Queen mine, 58 acres, in Coleman Twp., Timiskaming district, just E. of McKinley-Darragh. Was under lease in 1918 to Geo. A. Irwin, of Cobalt.

COLUMBIA COPPER MINING CO. **ONTARIO**

Idle and probably dead. Described in Volume XIV.

COMFORT-KIRKLAND MINES, LTD. **ONTARIO**

Address: 12 King St. E., Toronto, Ont.. **Mine office:** Kirkland Lake, Ont.

Directors: Dr. C. V. C. Comfort (Rochester N. Y.), Andrew M. Stobie, Malcolm Stobie, Archibald McVey Little and H. M. V. Weller, R. A., Bryce, cons. engr.

Cap. $1,500,000; par $1.

Property: lies between the Ontario-Kirkland and Minaker holdings, in Teck Twp., Kirkland Lake area, Timiskaming district, 1 mile S. of Kirkland Lake. The formation is greywacke with porphyry dikes.

CONIAGAS MINES, LTD., THE **ONTARIO**

Office: 50 Ontario St., St. Catherines, Ont. **Mine office:** Cobalt and So. Porcupine, Ont.

Officers: R. W. Leonard, pres.; Alex Longwell, v. p.; with R. P. Rogers, A. L. Bishop, R. L. Peek, F. D. Reid, gen. mgr., and H. H. Collier, directors. J. J. Mackan, sec.-treas.; Wm. C. Offer, supt. at So. Porcupine.

Inc. November 24, 1906, in Ontario. **Cap.** authorized and outstanding $4,000,000; $5 par. Toronto General Trusts Corp., transfer agt. Annual meeting in December. Listed on Toronto Stock Exchange. Share prices $1.45 low, $3.67 high 1918; $2.40 low, $3.15 high 1919; $1.75 low, $3.15 high in 1920; $1.20 low, $2.20 high in 1921.

Owns 2,495 shares of the stock of the Coniagas Reduction Co., Ltd., (see below), which handles this company's product.

Income Account, Fiscal Years Ending October 31:

Year	Gross income	Net income	Dividends and bonuses	Surplus for year
1921	$917,634	$398,722	$800,000	$401,278(b)
1920	1,089,485	529,274	500,000	29,274
1919	1,049,671	650,595	400,000	250,595
1918	1,017,212	609,358	500,000	109,358
1917	1,065,745	641,334	300,000	341,344
1916	1,192,424	840,791	600,000	240,791
1915	1,013,513	658,730	600,000	58,730
1914	1,407,877	968,387	1,320,000	351,613(b)
1913	2,186,664	1,693,583	1,640,000	53,583
1912	2,172,967	1,676,953	1,440,000	236,953

(b) deficit.

Balance sheet as of Oct. 31, 1921, shows assets, $6,267,955, which includes Coniagas mine, $3,985,700; Maidens McDonald property, $52,500; Montgomery Maidens, $500; Trethewey mine, $55,559; machinery, camps, etc., $330,209; Coniagas Reduction Co., $249,500; Canada Victory Loan bonds, $894,563; and current, $658,996. Liabilities include, current $212,866; reserve for depreciation, $329,000. Surplus is $1,695,890.

Dividends: and bonuses to Nov. 1, 1921, amount to $10,840,000, of which $2,140,000 were bonuses.

Property: the Coniagas mine, 40 acres on the townsite of Cobalt, Coleman Twp., adjoining the Nipissing Mines on the W. In 1917, the Maidens-McDonald and Maidens-Montgomery claims, 120 acres, in Deloro Twp., 4 miles S. W. from South Porcupine, were acquired; this property adjoins the Ankerite mine, held under option by the company until 1918, when after making substantial payments, the option was dropped. In January, 1920, a 35-acre tract adjoining Coniagas on the N., was purchased from the Trethewey Silver-Cobalt mine for $100,000. Claims in McVittie Twp., Larder Lake gold area, were taken under option, 1920-21, and are to be drilled. The Coniagas mine contains a large number of small, but very rich veins carry-

ing silver with small amounts of nickel, cobalt, and arsenic. The Porcupine property is gold-bearing, but is still in the development stage.

The Augaunico, mine in Bucke Twp., was sold for $10,000 on Jan. 2, 1920; company had expended over $17,000 in exploration without encouraging results.

Development: totaled 37,119' of underground workings on October 31, 1921. New work for year ending Oct. 31, 1921, amounted to 730'. Development work was confined to following small stringers and exploration on all levels and driving numerous crosscuts through unexplored ground. No important new orebodies were developed during the year, though a large tonnage of low-grade ore was developed. Connection was made with the Trethewey workings in 1920. No work has been done at Porcupine for 2 years or more.

Ore reserves: management states that extent of low-grade ore is very difficult to determine, but one year's supply of broken ore was available, Nov. 1, 1921. The company is retreating sand and slime tailing of which it has remaining 75,000 tons of sands and 18,600 tons of slimes, containing about 212,000 oz. of recoverable silver. Sand tailing on Trethewey amounts to 37,000 tons with a 173,900 oz. silver content.

Equipment: includes a 60-stamp concentrating mill handling 300 tons daily; a flotation plant for treating tails; and the Buffalo cyanide mill taken under lease in 1920 for the reclamation of old slime tails. An underground electrical haulage system was completed in 1921. Much of the Trethewey equipment has been sold.

In year ended Oct. 31, 1921, mill treated 113,279 tons of ore, averaging 11.30 oz. silver per ton, and made an extraction of 68.32%; the extraction of flotation plant from mill tailing was 68.29%. The flotation plant treated also 19,125 tons of old sand tails; 14,932 tons of old slimes were reduced by cyanide.

Shipments for year were: 402 tons of mill concentrate averaging 1,930 oz. silver per ton; 537 tons of flotation concentrate averaging 655 oz., and 25.46 tons of ore averaging 4,407 oz. per ton.

Production, years ending October 31:

Year	High-grade ore, tons	Tons Concts.	Cost per Oz. silver Cts. (a)	Cts. (b)	Ounces Silver	Price, Oz. Silver Cts.
1921..	25	939	33.52	6.33	1,301,515	70.88
1920..	20	912	48.98	7.35	994,235	122.50
1919..	14	953	34.94	7.45	940,267	106.00
1918..	63	1,396	33.87	7.98	974,264	94.14
1917..	124	742	21.36	4.31	1,344,267	79.89
1916..	193	648	15.24	4.27	1,773,286	63.11
1915..	267	607	13.62	3.25	2,002,053	49.25
1914..	485	688	12.44	3.58	2,497,394	56.75
1913..	735	1,034	8.76	4.32	3,252,566	68.58

(a) includes all expenses except shipping, smelting, refining and marketing charges which are under (b).

Total production of mine to October 31, 1921, amounted to 29,498,278 oz.

Ore and concentrates are treated by the Coniagas Reduction Co., Ltd., which see below; but in 1920, some part of flotation concentrates were shipped to A. S. & R. Co. at Pueblo, Colo.

Coniagas Reduction Co., Ltd., The

Entire stock issue owned by the Coniagas Mines, Ltd., except 5 shares issued to directors to qualify.

Inc. 1908, in Canada. **Cap.** $250,000; $100 par.

Owned a smelter and refinery at Thorold, Ont., producing silver bullion, cobalt and nickel, both metallic and oxides, white arsenic, etc. D. A. Mutch, supt.

During fiscal year ending Oct. 31, 1921, company shipped 1,486,857 oz. silver and treated 1,413 tons ore, dry weight. Company producers silver, arsenic, and the oxides of cobalt and nickel.

Dividends: total $450,000 in 13 years; the last $100,000 in 1920.

Due to low metal prices and high costs, company operated under difficulties in 1920-21.

CONSOLIDATED COPPER CO. OF PARRY SOUND ONTARIO

Office: 705 Palladio Bldg., Duluth, Minn. **Mine office:** Parry Sound, Parry Sound district, Ont.

Officers: Robt. Forbes, pres.; Robt. Millard, v. p.; J. G. Harris, sec.-treas.; preceding, with A. C. Le Richeux, Frank Cox, E. E. Rorem, Dr. J. D. Budd and C. J. Jackes, directors.

Inc. February, 1902, in Ontario. **Cap.** $5,000,000; shares $1 par; issued about $3,100,000. No stock for sale.

Property: 1,500 acres, patented, carries considerable standing timber, in Foley, McDougall, Hagerman and Cowper townships. Part of property formerly held by Hattie Belle Gold, Copper & Nickel Co. and the Valentine Mica Mining Co.

Geology: contact deposits between slate and quartzite, and fahlbands containing chalcopyrite ore with occasional bornite and chalcocite, mainly low in grade, but with occasional seams of high-grade ore. There are 18 different orebodies, as shown by test pits and stripping, 4 of which are slightly developed. The fahlbands show a width of more than 1,000', carrying 7 bands of ore, of 200' estimated aggregate width, amenable to concentration. Ores assay 1.5 to 12% copper, 3 oz. silver, and from a few cents up to $8 gold per ton.

Development: by 180' vertical shaft, and about 25 pits of 10 to 100' depth. The Spider Lake mine has a shaft house, and steam hoist good for 500', with necessary mine buildings. A considerable orebody has been exposed by trenching. The Lefex mine, about 220 acres, has an iron gossan, carrying up to 2% copper and $2 to $3 gold per ton. A 600-lb. test shipment, from the 65' level, returned 30% copper, and various samples have shown from 1.5 to 3% nickel, and from nothing to $20 gold per ton.

Idle several years.

CONTACT BAY MINES, LTD. ONTARIO

Office: care J. N. Beckley, Rochester, N. Y. **Mine address:** H. S. Badger, supt., Dryden, Ont.

Inc. July 10, 1918, in Ontario. **Cap.** $200,000. Is a close corporation, and apparently succeeds the Rognon Gold Mines, Ltd.

Property: Rognon, Redeemer and Bonanza groups, near Wabigoon lake, Van Horn Twp., Kenora district, northwestern Ontario.

Development: by 100' Rognon shaft, 86' Bonanza shaft and 286' of drifting E. and W. The orebody is 4' wide, averaging $8 in gold per ton with occasional rich pockets of ore. Test shipments have been made from both Redeemer and Rognon mines.

CORDOVA MINES, LTD. ONTARIO

Office: Sun Life Bldg., Toronto, Ont., Canada. **Mine office:** Cordova Mines, Peterboro county, Ont.

Officers: P. Kirkegaard, pres.; Wm. H. Price, v. p.-treas.; Edw. Willan, sec., with C. M. Kirkegaard and C. M. Garvey, directors.

Inc. 1911, in Ontario. **Cap.** $500,000; shares $5; all issued. Company is operated as a close corporation.

Property: 670 acres, owned in fee simple, in Belmont twp., Peterboro county. Ore occurs in veins in diorite which are said to be from 8 to 30' wide with ore shoots from 50 to 400' long. The ore consists of quartz, schist and iron sulphides, and is estimated to average $5 gold per ton.

Development: by shafts of 160', 400', and 500', depth, with a total of over 6,000' of underground workings. Idle since 1918.

Equipment: the ore and shaft-houses and the mill burned in 1917, were

partly replaced in 1918. Other equipment includes two 1,500 cu. ft. compressors, hydro-electric power plant developing 900 h. p., pumps and 1,800' tramway. Up to 1919 mill had treated about 70,000 tons of a total value of $360,000.

An electric smelting plant for the production of ferro-chromium with a daily capacity of 5,000 lb. completed, February, 1919, was never operated.

CRAWFORD-SKEAD GOLD MINES, LTD. ONTARIO

Address: Haileybury, Ont. **Mine address:** Boston Creek, Ont. H. W. Crawford, mgr.

Property: in Skead Twp., Boston Creek area, Timiskaming district, developed by shallow shaft said to open a 6' vein of quartz porphyry.

No record obtainable of personnel or finances.

CROESUS GOLD MINES, LTD. ONTARIO

Office care A. A. McGrath, Room 812, 42 Broadway New York. **Mine office:** Matheson, Ont.

Officers: D. M. Steindler, pres.; H. M. Thompson, asst. sec.; Chas. Lobner, gen. mgr.

Inc. September 21, 1912, in Ontario. **Cap.** $2,000,000; $1 par; 2,000,000 issued. Stock owned by Dominion Reduction Co.

Property: the Welsh & Dobie claims in Munro township.

Geology: quartz vein in diabase. Gold occurs free and in sulphides, with a little silver. Spectacular gold ore was found on the Dobie claim.

Development: by 400' incline and 2,222' total workings. Near the surface, the shaft produced $1,000 for each foot in sinking. Gold is all coarse and free.

Equipment: includes 50-ton mill, with Hardinge mill, picking belt, and amalgamation plates.

Production: in 1918 was 3,124 oz. gold from 692 tons of ore; total to Jan. 1, 1919, $259,953. Mining operations suspended Feb., 1918.

CROWN-RESERVE MINING CO., LTD. ONTARIO

Mine office: H. F. Strong, supt., Cobalt, Ont.

Offices: Dominion Express Bldg., Montreal, Quebec; 18 Toronto St., Toronto, Ont.

Officers: John W. Carson, pres. and min. dir.; W. J. Gear, 1st v. p.; J. G. Ross, 2nd v. p.; C. A. Smart, J. W. Ross, A. G. Gardner, R. W. Kelford, F. S. Meighen, Ziba Gallagher, and J. H. Thom, directors; Jas. Cooper, sec.-treas.; John Reid, asst sec.-asst. treas.; S. W. Colton, con. engr. H. W. Darling, field engineer; H. J. Stewart, mgr.

Inc. January 16, 1907, in Canada. **Cap.** $2,000,000; $1 par; outstanding Jan. 1, 1918, $1,999,957, of which $231.143 is held by trustees for the benefit of the company and bears no dividends. Crown Trust Co., Montreal and Toronto, transfer office and registrar. Annual meeting, fourth Wednesday in January. Listed on Montreal Stock Exchange and Toronto Stock Exchange and dealt in on New York and Boston curbs. High 66c. low 25c. in 1919; 48-15½c. in 1920; 13-9½c. in 1921.

Dividends: 20% in 1908; 71% in 1909; 60% in 1910-12, 48% in 1913, 24% in 1914; 8% in 1915; 5% in 1916; total dividends to Jan. 1917, $8,000,849, or 335% on the outstanding capital. None paid since.

Balance sheet for 1920 shows: assets, $2,517,321, including cash $50,548; accounts receivable, $21,104. Liabilities include accounts payable, $4,882.

Income Account Essentials—years ended December 31:

Year	Ore Sales	Total Disb.	Net Earnings	Other Income	Total Income	Total Surplus
1920....	$34,260	$125.745	†$91,485	$1,789	†$89,696	$10,[illegible]
1919....	233.034	181,582	51,452	2,424	53,876	[illegible]
1918....	198.017	*446.797	†248.786	3,362	†245,424	[illegible]

* Includes depreciation $174,339. † Deficit

Property: original holdings at Cobalt consist of 23 acres in Kerr Lake, developed by the Crown Reserve mine, which has been one of the heaviest producers in Cobalt. The company co-operated with the Kerr Lake Mining Co. in the draining of Kerr Lake, but the results were disappointing to Crown Reserve in that no new valuable veins were found. The pumping out of the lake made it possible to obtain ore containing over 2½ million oz. silver, which otherwise could not have been extracted, and the small veins discovered, not in themselves of great importance, were sufficient to pay for the whole cost of the operation.

Owns also Reward Gold Mines in Inyo county, Calif.

The Crown Reserve Co. owns 60% of the stock of the Porcupine-Crown Mines, Ltd., (q. v.); see also its operating company, **Northcrown Porcupine.** This mine closed down in June, 1918, but limited operations were resumed in 1919. It is estimated to have $500,000 in ore reserves. Company owns jointly with Kerr Lake Mining Co., Ltd., the Drummond Fraction property from which it received a profit of $9,844 in 1916; no work was done on this property in 1918, but was resumed November, 1919. Lease on holdings of Silver Leaf Mng. Co., Ltd., expired in fall of 1919 and was not renewed. Beginning with May, 1919, company became indirectly interested in the Canadian Kirkland property, (see Northcrown Porcupine).

Development: by 800′ shaft. In 1919, development work amounted to 2,698′, making 40,845′ to date. Work in the unexplored east end of the property cut 4″ of rich ore on the 150′ level in December, 1919.

Strikes, high costs and lack of power handicapped operations during 1920, but diamond drilling reached depth of 1,500′ from the 500′ level. The Reward mine was closed down in 1918, and equipment sold; development results were not encouraging. In 1918-19, company explored the Walsh silver mine in Milner Twp., Gowganda area, and sunk shaft to a depth of 200′, property is still under option.

Production, year ended December 31:

Year	Silver Prod. Gross Oz.	Gross Value	Net Value	Per Ounce—Gross Cents	Per Ounce—Cost Cents	Per Ounce—Profit Cents
1919...	196,812	233,811	233,034	118.80	79.20	39.60
1918...	202,505	198,791	198,011	97.78	94.44	3.34
1917...	329,670	265,839	265,155	80.63	55.60	25.03
1916...	274,470	193,240	191,822	70.40	69.30	1.10
1915...	657,395	344,596	339,425	52.40	45.01	7.39
1914...	1,425,320	740,093	722,873	51.92	28.95	22.97
1913...	1,766,678	1,056,271	1,040,117	59.45	23.02	36.43
1912...	2,714,766	1,692,060	1,638,191	62.32	14.02	48.30
1911...	3,430,902	1,833,516	1,751,300	53.46	10.67	42.79
1910...	3,248,196	1,757,824	1,633,716	54.10	11.97	42.13
1909...	4,034,325	2,080,156	1,895,484	51.56	10.31	41.25
1908...	1,798,954	910,350	854,788	50.64	7.50	43.13
Totals	19,960,676	$10,608,109	$10,067,722	54.78	15.73	39.05

Company's low grade ore is treated by the Dominion Reduction Co.

The future of the Crown Reserve Mining Co. depends upon its ability to acquire new properties. In following this policy, begun in 1915, company has investigated, staked and leased, many properties, in northern Ontario, northern Quebec, northern Manitoba and California; control of 2,000 acres in the two first named is now held.

In 1921, company took over 13 claims in the Larder Lake gold area, Timiskaming district, 17 miles E. of Dane on the T. & N. O. Ry. A 30′ vein in altered basalt assaying $5 per ton in gold has been opened. Results of development are reported to be so encouraging that a subsidiary company is contemplated, with an exploratory fund of $250,000.

DAVIDSON CONS. GOLD MINES, LTD. **ONTARIO**

Is a holding company only, owning £175,000 pfd. and £450,000 common stock of **Porcupine-Davidson Gold Mines, Ltd.**, to which all assets were sold in August, 1921.

Address: 12 King St. E., Toronto, Ont.

Officers: G. C. Crean, pres.; H. H. Sutherland, v. p.-mng. dir.; with J. J. Davis, S. W. McKeown, C. W. Moodie, E. A. Snowman and Robt. Starke, directors. L. C. Platt, sec.-treas.

Inc. Aug., 1919, in Canada, as a reorganization of The Davidson Gold Mines, Ltd. Cap. $5,000,000; $1 par; 4,000,005 shares outstanding; stockholders of old company received 2 shares of new stock for every share of old. Chartered Trust & Executor Co., transfer agt. and registrar.

Report of Dec. 31, 1920, shows current assets of $9,083 and liabilities, $57,261. Fixed assets include $3,662,241 for mineral holdings and plant. For 9 months beginning Sept., 1919, $144,245 was expended on development.

In Jan., 1921, stockholders decided to sell company to English syndicate; 1,000,000 shares were sold to it at 75c. and according to report, remaining outstanding shares were to be taken over at $1.18 per share. Eventually, in August, this resulted in a reorganization, and company sold its entire assets to a new company, **Porcupine-Davidson Gold Mines, Ltd.** (q. v.), receiving £50,000 cash, £175,000 pfd. and £450,000 com. stock of new company.

DAVIDSON GOLD MINES, LTD. **ONTARIO**

Reorganized, 1919, as Davidson Cons. Gold Mines, Ltd., which see.

DELORO SMELTING & REFINING CO., LTD. **ONTARIO**

Address: Deloro, Ont., Can. **Branch offices:** 1404 C. P. R. Bldg., Toronto, and 26 Albemarle St., London W., England.

Officers: M. J. O Brien, pres.; J. A. O'Brien, v. p.; Thos. Southworth, mng. director; S. B. Wright, gen. mgr.; S. F. Kirkpatrick, cons. metallurgist; F. A. Bapty, sec.-treas.

Company is the successor, 1917, of the Deloro Mng. & Reduction Co., with same officers and management.

Owns a smelting plant and refinery at Deloro. Output consists of bar silver, arsenic, nickel oxide and metal, and cobalt oxide and metal. Also manufactures "stellite," a high-grade cutting metal.

Company aims to finish all products at the Deloro plant. Employed about 250 men at last accounts.

DICKSON CREEK (COBALT) SILVER MINES, LTD. **ONTARIO**

Company is controlled in England.

Mine address: H. Hollands-Hurst, mgr., Box 479, Haileybury, Ont.

Directors: W. F. H. Blandford, chairman, Walter Eveling, Phillip Hurst and A. E. Smith.

Property: lots 9 and 10, Concession V, about 110 acres in Bucke Twp., 7 miles from Cobalt, developed to depth of 250' with crosscuts and drifting N. E. and S. W. All work has been done in conglomerate formation. Five men employed.

DOBIE MINES, LTD. **ONTARIO**

Office: Porcupine, Ont.

Officers: Frank C. Armstrong, pres., 25 Broad St., New York; S. J. Le Huray, sec.-treas., 260 St. James St., Montreal; with C. H. Anerum, A. C. Davidson and W. E. Coughtry, directors. H. C. Carmichael, mgr.

Inc. March 27, 1911, in Ontario. **Cap.** $1,500,000; par $5, outstanding, $1,200,000. Of the issued stock, $1,100,000 was given to the owners in payment of the property and $100,000 stock was purchased by the Tisdale Gold Mng. Co., to provide funds for development purposes. Transfer agents: Toronto General Trust Corp., Toronto; Investment Trust Co., Montreal. Listed on Toronto Standard & Mining Exchange, and traded in on the unlisted department of the Toronto Stock Exchange, and on the New York and Boston Curbs. Cash balance April 1, 1919, $30,739.

Property: 17 claims, crown patented, in Tisdale Twp., taken over from the Tisdale Gold Mng. Co., Ltd. Idle several years.

DOME EXTENSION MINES CO., LTD. **ONTARIO**

Fully described in Vol. XIV; property purchased, September, 1920, by **Dome Mines Co., Ltd.** (q. v.) for 76,667 shares of the latter, or on basis of 1 share of D. E. for 30 shares of D. M.

DOME LAKE MINING & MILLING CO., LTD. **ONTARIO**

Offices: New Liskeard, Ont., and South Porcupine, Ont.

Officers: A. A. McKelvie, pres.; Wm. H. Kinch, v. p.; F. L. Hutchinson, sec.-treas., with Thos. McCamus, F. L. Bapst, S. J. Dark and Chas. L. Sherrill, directors. D. M. McPhail, mgr.

Inc. Aug. 26, 1914. **Cap.** $3,000,000; $1 par; all outstanding. Funded debt, $43,200 1st mtge. 5 year gold 7s, issued in 1919. Controlled by Hudson Bay Mines, Ltd., which owns 1,594,045 of the outstanding shares. Trusts & Guarantee Co., Ltd., Toronto, transfer office. Annual meeting, second Monday in February. Listed in Toronto and on New York Curb.

Report for year ending Dec. 31, 1920, shows total assets, $2,158,870, including bills and accounts receivable, $28,205; current liabilities, $30,988; bonds and interest, $46,206. Revenue amounted to $47,448 and expenditures were $53,383, including mining and development, $18,972; milling, $11,531.

Property: 3 claims, patented, 120 acres, in Tisdale township, Porcupine, showing gold ore in quartz veins, regarded as replacement deposits. The veins run N. 10° E. and have a dip of 70°. The mineralized zone traverses a basaltic rock, and runs through the entire group.

Development: to depth of 600' by vertical shaft and 18,375' of workings. Work in 1920 was confined to No. 3 vein on the 600' and 500' levels.

Equipment: includes Vulcan hoist, compressor and 200-ton mill. A 100-ton cyanide plant was completed in 1918.

Production:

Year	Tons Milled	Gross Value	Value per ton	Extraction %	Costs per ton
1920...	5,336	$ 51,919	$9.73	90.00	$3.05
1919...	4,433	23,832	6.50	78.85	....
1918...	11,929	115,202	9.65	84.5	8.73
1917...	16,388	68,214	4.16	66.1	8.14
1916...	6,540	25,629	3.92	....	...

The mine and mill were in operation from Jan. 1 to May 27, 1920, but idle since. A consolidation with the West Dome Cons. Mines is in contemplation.

DOME MINES CO., LTD., THE **ONTARIO**

Head office: 36 Toronto St., Toronto, Ont. Executive and financial: 42 Broadway, New York. **Mine address:** South Porcupine, Ont.

Officers: J. S. Bache, pres.-treas.; W. S. Edwards, v. p.; H. P. De Pencier, v. p.-gen. mgr.; Alex. Fasken, sec.; A. H. Curtis, asst. treas., and asst. sec., preceding, except H. P. De Pencier, with G. C. Miller, Colgate Hoyt, Howard Poillon and T. R. Finucane, directors. C. W. Dowsett, mill supt.

Inc. March 23, 1910, in Ontario. **Cap.** authorized, $5,000,000; outstanding 476,667 shares; $10 par; Guaranty Trust Co., New York, and Trusts & Guarantee Co., Ltd., Toronto, transfer agents. Bankers Trust Co., New York, and Toronto Genl. Trusts Corp'n, Toronto, registrars. Annual meeting, second Tuesday in June. On June 23, 1915, the New York Stock Exchange listed $3,500,000 of the capital stock with authority to add $500,000 on official notice of issuance and payment in full; listed on Toronto Stock Exchange.

Dividends: on Sept. 1, 1915, initial quarterly of 50c per share was paid; continued until reduced in June, 1917, to 25c quarterly. The total was $1,500,000. Disbursements suspended until January 15, 1920, when 25c.

equal to $100,000, was paid; and the same quarterly until July, 1920; then after 25c. quarterly on 476,667 shares; total $2,395,834 to Jan. 20, 1922.

Company proposes to begin redemption of its capital stock, and to this end will repay $1.00 per share on April 20, 1922.

Comparative General Balance Sheet, years ending March 31

Assets.

Year	Property and Equipment	Current	Deferred Charges	Suspense	Total
1921	$5,314,102	$1,817,994	$97,881	....	$7,229,977
1920	4,509,702	1,312,327	87,289	....	5,909,318
1919	4,430,996	495,454	41,647	$34,530	5,002,626
1918	4,449,986	717,921	42,857	31,360	5,242,733
1917	4,457,192	677,357	56,825	....	5,191,375

Liabilities.

Year	Cap. Stock	Current	Reserves	Surplus	Total
1921...	$4,766,670	$278,833	$2,111,194	$ 73,280	$7,229,977
1920...	4,000,000	113,651	1,487,052	308,615	5,909,318
1919...	4,000,000	14,251	931,573	56,801	5,002,626
1918...	4,000,000	21,406	695,930	524,798	5,242,733
1917..	4,000,000	76,221	418,106	697,051	5,191,375

Profit and Loss Statement, years ending March 31:

Year	Gross Earnings	Expenses	Net Earnings	Dev., Deprec. and Improv.	Surplus
1921.....	$2,193,759	$1,239,509	$954,250	$651,770	$302,480
1920.....	1,882,747	930,762	951,985	600,171	351,814
1919.....	16,196	237,279	221,083†	234,373	455,456*
1918.....	1,041,784	237,279	236,459	282,329	45,869*
1917.....	2,194,311	1,241,862	952,448	221,369	731,079
1916.....	1,778,959	.....	912,380	370,518	541,861
1915.....	1,055,497	.....	488,498	309,920	178,578
1914.....	1,204,597	.....	753,328	295,631	457,696

* Deficit. † Loss.

On Sept. 30, 1921, net quick assets were $1,759,385 and net profit, $491,834, before depreciation and depletion.

Property: 6 claims, 240 acres, in Tisdale Twp., Porcupine area. The tract shows the veins of milky quartz usual in the district, the ore carrying free gold and auriferous pyrite. They form a stockwork whose net work of interlacing stringers cut schists and intrusives of pre-Cambrian age. The orebody is over 100' across in places, and has been proved by diamond drill work to a depth of 1,200' or more. The original outcrop, a dome-shaped hillock about 30' high, showed so much free gold at one place that it was called the Golden Stairway. The gold occurs irregularly in the quartz, which is found in large irregular masses, entirely without walls. It is mainly found on or near the contact of an intrusive porphyry with sedimentaries, and is capped by slate. Development has proven the existence of quite as good ore at 700' and in diamond drill holes at 1,150' vertically below the surface, as that mined on the surface and in the upper levels.

The company's option on the 5 adjoining claims, 198 acres, of the Dome Extension Mines Co., Ltd., was extended 6 mos. to Sept. 15, 1920, when it was exercised by payment of 76,667 shares of Dome Mines. Expenditures by latter for exploration and development were $51,682 and $12,875 in fiscal years ending 1920 and 1921. Negotiations for purchase of holdings of Foley-O'Brien, Ltd. were under way late in 1921.

Development: the Dome mine has 3 working shafts, the main shaft being 1,200' deep. Considerable exploration and diamond-drill work has been

done on the orebody, especially during the period December, 1917 to June, 1919, when the mill was idle on account of war conditions.

Up to 1918, over 750,000 tons had been mined and milled and 321,000 tons remained in stopes. Stoping costs in that period were 47c per ton. New methods of mining and ore handling installed in 1919, will, it is said, make a notable saving in costs. A square- type shaft was sunk on the foot-wall side of the ore-bearing zone, to a depth of 1,000', with stations at 100' intervals, and loading pockets for ore and waste on several levels. The eighth level at a vertical depth of 850', is the main haulage way, all ore going to a 36 to 54 in. jaw crusher just below the station. Ore passes are so arranged that all the ore mined above this level, estimated at 2,000,000 tons, will be moved mechanically after it is loaded into cars. Shaft No. 2 is utilized as a main chute or pass from the upper workings to No. 8 level. Electric locomotives are used for haulage. Ore is hoisted by skips working in balance, taking 4 tons per trip at a speed of 1,100' per minute.

During 1919-20, extensions totaled 3,505', with 865' of drilling additional; stoping was largely confined to the 7 and 8 levels, with development extending from the 3 to the 10th level; during 1920-21, extensions were 5,907' and drilling 5,907'; largely on 7th, 8th and 10th levels. Late in 1921, a new orebody, averaging $20 per ton, was found on the 7th level.

Ore reserves: as of March 31, 1918, were 1,950,000 tons averaging $5.10 per ton and in 1919, they were substantially the same. Reported in 1920 that irregularity of ore occurrences and erratic values preclude accurate tonnage estimates, but that a 3 to 4 years ore supply was available; broken reserves on March 31, 1920, were 251,352 tons of ore, and about 200,000 tons a year later.

On the Dome Extension, which is opened by 3 shafts, and on which former management had performed over 10,000' of work, development during 1919-20 consisted of 1,172' of drifts, etc., and 1,285' of drilling. On the 6th level, an orebody covering 12,000 sq. ft., with an ore grade of $4.62 per ton, was discovered and an ore zone on the 10th level was explored; 6,849 tons of ore averaging $4.45 per ton were sent to the mill. In fiscal year ended March, 1921; 4,063' of drilling was done.

Equipment: is modern, extensive, and all electrically driven, by power obtained from Wawaitin Falls, 13 miles from the property. Three-phase current is supplied over the company's own transmission line at 12,000 volts, stepped down to 550 volts by 600 k. w. transformers.

The cyanide mill is of 1,500 tons daily capacity. It contains ball-mills (instead of the stamps formerly used), tube-mills, thickeners, agitators, and filter-presses.

Production: for years ended March 31:

Year	Ore Milled, Tons	Yield per ton	Recovery %	Cost per Ton Mining	Reduction	General	Total
1921...	273,700	$ 7.11	94.73	$2.18	$1.78	$0.57	$4.53
1920...	270,080	6.57	94.30	1.69	1.28	0.47	3.44
1919...	.....	...	....	...	...	...	...
1918...	247,000	4.17	97.67	1.42	1.06	0.30	2.78
1917...	459,530	4.73	92.98	1.44	0.95	0.31	2.70
1916...	347,640	5.50	92.88	1.22	1.01	.32	2.56
1915...	248,550	4.68	90.6	1.38	1.12	.46	2.97
1914...	145,305	8.77	94.51	1.86	1.69	.64	4.19
1913...	101,812	10.72	95.63	1.31	2.35	1.29	4.95

Note: 1918 and 1920 figures are for 8 and 11 months, respectively.

The Dome is a big low-grade mine in which some extraordinarily rich ore is found. The mine and mill are well equipped to handle 1,500 tons daily, and under normal conditions will earn a handsome surplus.

Labor and power shortage handicapped operations during the fiscal year ended March 31, 1921, but conditions have improved since.

DOMINICO MINES CO., INC. ONTARIO

Directors: Dr. Carl H. Hubier, Rochester, N. Y. pres.; John A. McCurdy, Jas. J. Withall, J. Wilson McCleary, W. W. Jones and H. L. Holmes.

Property: Big 4 mine, 155 acres, in Gowganda district, said to show a vein of silver-cobalt ore assaying $26 per ton at 40' depth.

DOMINION NICKEL-COPPER CO., LTD. ONTARIO

Property taken over by **British-American Nickel Corporation**, which see.

DOMINION REDUCTION CO., LTD. ONTARIO

Office: Cobalt, Ont.

Officers: D. M. Steindler, pres.; Mortimer B. Davis, v. p.; H. M. Thompson, sec.-treas., with A. A. Allen and L. L. Steindler, directors. Albert Wood, supt.

Inc. 1912, in Ontario. **Cap.** $2,000,000; shares $1 par; $1,600,000 outstanding. Nearly all stock is held by the directors.

Company took over the Nova Scotia mill at Cobalt. Mill has 40 stamps, and treats custom ore, including low-grade ore from the Kerr Lake and Crown Reserve mines, with which the mill is connected by an aerial tram. All ore is purchased outright and reduced to bullion; payment is made in cash or in bullion. Company also owns and operates the property of the **Croesus Gold Mines, Ltd.**, in Munro Twp., 50 miles E. of Porcupine; has an interest in the St. Anthony, or Thunder mine, at Sturgeon Lake, and operates the Nova Scotia mine.

In 1920, company made a contract with the Peterson Lake company to treat 300,000 tons of tailing in Peterson lake, receiving 35c per ton of net proceeds.

EDWARDS & WRIGHT, LTD. ONTARIO

Address: 120 Bay St., Toronto, Ont. **Mine address:** No. Cobalt, Ont.

Inc. Jan. 30, 1918. **Cap.** $100,000.

Property: the Green Meehan and Red Rose mines in Bucke Twp., Timiskaming district. The former is developed by 200' shaft. Early in 1918, a promising vein was exposed in a 45' winze from bottom level and connection was to be made with the Red Rose.

Production: in 1918, including dump ores, was 50,941 oz. from 3,708 tons of ore. No recent details.

ELLIOTT-KIRKLAND GOLD MINES, LTD. ONTARIO

Address: Haileybury, Ont.

Officers: S. H. Worth, pres.-treas.; R. H. Lyman, v. p. and mgr.; W. A. Gordon, sec.; with John M. Wood and E. W. Kearney, directors.

Inc. December, 1916, in Toronto. **Cap.** $2,000,000; par $1. Traded on Toronto Stock Exchange.

Property: 3 gold-bearing claims, at Kirkland Lake, developed by a 537' shaft and extensive diamond drilling. As commercial ore was not found on the lower levels, work was stopped in 1919, and has not been resumed.

Equipment: 60-h. p. boiler, hoist, compressor, and quarters for 18 men.

ELSTONE DUNKIN MINES, LTD. ONTARIO

Address: New Liskeard, Ont. **Mine address:** Larder Lake, Ont.

Property: 3 claims, in Gauthier Twp., Larder Lake area, Timiskaming district. Ore is gold-bearing. Reported May, 1921, that program called for extensive development, including a 400' shaft. Reported in March, 1922, that company was being reorganized. Is a prospect.

FALCONBRIDGE MINES, LTD. ONTARIO

Address: c/o Fred B. Snyder, pres., 710 Security Bank Bldg., Minneapolis, Minn.

Cap. $10,000. Company is licensed to do business in Ontario.

Property: nickel-copper claims in Falconbridge Twp., Sudbury district.

FIDELITY MINING & DEVELOPMENT CO. **ONTARIO**

Address: 806 Ferry St., Niagara Falls, Ont. **Mine address:** Kirkland Lake, Ont. E. W. Kearney, sec.; Chas Duckeman, mgr.

Property: several claims in Teck Twp., Goodfish Lake section, Kirkland Lake area, directly S. W. of La Belle Kirkland. The rock formations are basalt and diabase, with intrusions of grey quartz-feldspar, porphyry. Lode matter consists of altered basalt with vein quartz and silcified rock, carrying pyrite and molybdenite. Fine, free gold was observed on the outcrop.

Development: by 192′ incline sunk on a 20″ vein, which widened to 84″ at the bottom. Work was suspended from June, 1919, to Feb., 1920.

Equipment: includes 50-h. p. boiler, 6 by 8″ hoist and 3-drill compressor, etc.

FOLEY-O'BRIEN, LTD. **ONTARIO**

Address: So. Porcupine, Ont.

Officers: C. L. Sherrill, pres.; H. B. Hatch, mgr.

Inc. April 3, 1911. **Cap.** $3,000,000.

Property: in Tisdale Twp., Porcupine area, on westerly edge of So. Porcupine, adjoins Dome Extension on N. E. corner, shows interbedded slates and greywacke, intruded by porphyry. Ore is gold-bearing, but none in commercial amounts has been found. Geological conditions are said however to be favorable.

Development: by 3 shafts, 70, 160 and 235′ deep; also a 250′ winze from 160′ level. Laterals amount to 1,800′.

Equipment: includes two 50 h. p. boilers; 2 compressors of 600′ total capacity; and 3 hoists.

Company has not apparently operated since 1914. In late 1921, reported that the Dome Mines were considering purchase of property.

FOSTER COBALT MINING CO. **ONTARIO**

Inc. Feb. 14, 1906, in Ontario. **Cap.** $1,000,000; $1 par. Dividends paid, $45,000; last Jan. 1, 1907.

Owns the Foster mine at Cobalt, worked intermittently up to 1919, by company, or lessees. Now under lease to Mining Corp. of Canada (q. v.), and operated by its subsidiary, Central Operating Co., Ltd. (q. v.). Developed to depth of over 200′ and has been a small producer.

GENESEE MINING CO., LTD. **ONTARIO**

Head office: Cobalt, Ont. **Executive office:** 442 Powers Bldg., Rochester, N. Y. L. F. Steenman, mgr.

Officers: C. F. Wray, pres.; A. H. Dewey, v. p.; Alexander Russell, sec.-treas.; L. F. Steenman, gen. mgr., with Dr. J. Pope Delaney and W. J. Weid, J. G. Comerford and G. H. Welch, directors.

Inc. 1915, in Ontario. **Cap.** $2,000,000; $1 par.

Company has a 6 years lease on the U. S. claim, north of the north claim of the Chambers-Ferland.

Development: by 572′ shaft, with 2,100′ of workings on 500′ level and 265′ on 350′ level. Two veins of low-grade ore were cut on the 500′ level, and crosscutting to these veins on the 350′ level was begun, spring of 1921. Work suspended for lack of funds, but reported that it is to be resumed early in 1922.

GIBSON GOLD MINES, LTD. **ONTARIO**

Address: 302 Ellicott St., Buffalo, N. Y. **Mine address:** Shiningtree, Ont.

Officers: G. A. T. Hagan, sec.; E. C. Roberts, mgr.

Property: one claim in Asquith Twp., Peterborough county, southern section of W. Shiningtree district, and on E. shore of lake of that name. Two or more deposits occur in shear zones. Ore is quartz, well mineralized with pyrite carrying gold.

GIFFORD COBALT MINES, LTD. ONTARIO

Address: c/o R. C. Levesconte, 20 King St. E., Toronto, Ont. **Mine address:** Box 118, Cobalt, Ont. F. B. Mosure, mgr.

Property: in Coleman Twp., Timiskaming district, adjoins the Keeley mine, developed by 200' shaft and winze for 150' deeper; workings total about 1,000'. Ore is silver-bearing. Because of water, mine has apparently not been operated since early 1918.

GLEN LAKE COBALT MINES, LTD. ONTARIO

Probably dead. Described in Volume XIV.

GOLDALE MINING CO. ONTARIO

Address: 85 Bay St., Toronto, Ont. **Mine address:** Schumacher, Ont. Controlled by the Marcus Daly Estate; Jas. Y. Murdoch, pres.; C. H. Poirier, mgr.

Property: 50 claims, 2,000 acres, in Tisdale Twp., Pearl lake section of Porcupine area, Timiskaming district, formerly owned by the Bewick Moreing interests. The drilling program planned by the management was completed Aug., 1921. Property is developed also by 140' shaft.

GOLD CENTRE MINES, LTD. ONTARIO

Head office: 312 Temple Bldg., Toronto. **Mine office:** Timmins, Ontario. B. M. Watson, mgr.

Officers: T. G. Marquis, pres.; Geo. S. Bingham, v. p.; M. P. Van der Voort, sec., with A. H. Jucksceh, Wm. R. Kirk, and W. Melrose directors.

Inc. in Ontario. **Cap.** $3,000,000; par $1; issued 1,500,000 shares. Transfer agent and registrar, Trusts and Guarantee Co., Toronto.

Property: 160 acres, in Porcupine district, formerly owned by the Boyce Syndicate, located about one mile E. of the productive area of the Hollinger Cons. in a section where only a limited amount of work has been done.

GOLDEN SUMMIT MINING CO. ONTARIO

Address: J. L. Kerr, Detroit, Mich. **Mine address:** Sesekinika, Ont.

Inc. 1920 to develop a property on Kapakita creek, in Masonville Twp., Bourke's area, Timiskaming district. Presumably was a stock selling promotion only.

GOLDFIELDS, LTD. ONTARIO

Address: P. Kirkegaard, (of Protective Committee), Sun Life Bldg., Toronto.

Inc. March 14, 1910, in Ontario. **Cap.** $3,000,000; 2,356,647 shares issued.

Property: the Harris-Maxwell (or Goldfield) mine in Hearst Twp., and claims of Reddick Gold Mng. Co., Ltd., 9 miles to N. E., in McCarry Twp., acquired in 1914; both in Larder Lake area.

Development: by 500' shaft with drifts on 65,400' and 500' levels, the Reddick; by 100' shaft and 400' of drifts. New work in 1918 in 100 mines was 1,100'.

Equipment: includes 2 hoists, 8-drill compressor, and 20-stamp mill. Power is supplied by company's hydro-electric plant at Raven lake, 13 miles distant. Reddick mine is equipped with hoist, 3-drill compressor and 10-stamp mill.

The Goldfields mill, completed in 1912, was operating until May, 1913, but apparently not since.

Beginning about 1916, the activities of Goldfields, Ltd., have been closely associated with those of Associated Goldfields Mng. Co., Ltd., and its successor, Canadian Associated Goldfields, Ltd., which see. Professing that no information regarding Goldfields has been made available to its stockholders since April 29, 1912, a protective committee began in July, 1921, to determine the relationship of the company to its so-called successors.

GOLD REEF MINING CO. ONTARIO

Address: 24 King St. W. Toronto, Ont.

Officers: E. P. Smith, pres.; J. Ross Curry, sec.-treas., with M. P. Vandervoort, J. T. Eastwood and S. W. Gooderham, directors.

Inc. in Ontario. **Cap.** $3,000,000; $1 par; 2,000,000 shares issued. Trusts & Guarantee Co., Toronto, transfer agent and registrar.

Property: 240 acres, in Porcupine district, developed by 100′ shaft. Plans include sinking to 300′ depth and diamond drilling.

GOODFISH GOLD MINES, LTD. **ONTARIO**

Address: Haileybury, Ont. H. L. Slaght, sec.

Property: 3 claims in Teck Twp., Kirkland Lake area. Timiskaming district, developed by 80′ shaft. Work was resumed in mid-1921 after several years idleness.

GRACE MINING CO. **ONTARIO**

Address: Geo. J. Blake, pres., 300 Broadway, Buffalo, N. Y. **Mine address:** Eagle P. O., Ont.

Property: the old Grace and Norwalk, or Mauxman groups, on Lake Eagle, Kenora district, 21 miles S. of Eagle river station on the C. P. R. R., reopened in 1919.

Development: by 150′ shaft, drifts and crosscuts, in quartz veins said to contain free milling gold ore.

GRANBY-KIRKLAND GOLD MINES, LTD. **ONTARIO**

Head office: Rm. 303, 57 Queen St. W., Toronto, Ont. **Mine office:** Kirkland Lake, Ont.

Officers: J. M. Childerhose, mng. director; Newton C. Shaver, pres.; D. H. Macdonald, v. p., with Thos. Holgate, I. T. Stockwood and Richard Robinson, directors. A. W. Grierson, supt.

Cap. $2,000,000; par $1.

Property: 3 claims, 139½ acres, in Lebel, Twp., includes the Bain mine between Ontario Kirkland and King Kirkland holdings, on which trenching has disclosed 14 promising veins, six of which carry gold values, said to assay as high as $15.20.

Work has been confined mainly to surface exploration and test pits. Operations resumed June 25, 1921.

GRASSELLI CHEMICAL CO., LTD., THE **ONTARIO**

Office: Hamilton, Ont., Canada. Mine at Lanark, Ont.

Officers: E. R. Grasselli, pres.-treas.; T. S. Grasselli, v. p.; E. R. Bailey, sec.

Inc. 1911, in Ontario. Is controlled by the Grasselli Chemical Co., Guardian Bldg., Cleveland, Ohio.

Property: the Caldwell pyrite mine at Clyde lake, Blithefield Twp., opened about 1919.

Company manufactures acid at Hamilton, and, in addition to its own supply, purchases pyrite in the open market.

GREENE KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: Toronto, Ont. **Mine address:** Kirkland Lake, Ont. W. F. Green, mgr.

Inc. 1919. **Cap.** $3,000,000; $1 par.

Property: in Teck Twp., Kirkland Lake area, Timiskaming district.

HAILEYBURY-FRONTIER MINING CO. **ONTARIO**

Address: H. F. Strong, B. 1000, Haileybury, Ont. Mine at Silver Centre, Ont.

Inc. July 31, 1909. **Cap.** $1,250,000.

Property: in So. Lorrain Twp., adjoins holdings of the Keeley Silver Mines. High grade cobalt-silver ore is found in a number of shoots. Developed by 2 shafts and about 1,000′ of workings, to a depth of 300′.

Late in 1921, claims were taken under lease and option by **Mining Corp. of Canada,** which is installing a larger mine plant and contemplates new shaft.

HARGRAVE CONS. MINES, LTD. **ONTARIO**

A merger of the Hargrave Silver Mines and Reliance companies in

December, 1919.

Address: Cobalt, Ont. Jno. T. Shaw, mgr.

Company owns 40 acres in the Porcupine area. Property at Cobalt, in Coleman Twp., adjoining Kerr Lake Mng. Co. sold to that company for $16,500 in 1921.

HARGRAVE SILVER MINES, LTD. **ONTARIO**

Described in Vol. XIV. Company merged, December, 1919, with Reliance Co., to form Hargrave Consolidated Mines, Ltd. (q. v.), with same capital as H. S. M. Ltd., but free of debt.

HARMAK MINING CO. **ONTARIO**

Address: Toronto, Ontario.

Inc. June 15, 1918, in Ontario. **Cap.** $300,000

Property: in Casey Twp., Cobalt silver area, W. of holdings of Casey-Cobalt Silver Mng. Co., which in 1918 had a contract to develop Harmak ground. Developed by 375' shaft, and equipped with hoist.

The Casey-Cobalt company is now reported to be in liquidation and the Harmak mine is presumably idle.

HARVEY-KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 59 Yonge St., Toronto, Ont. **Mine address:** Kirkland Lake, Ont.

Officers: C. J. Beilby, pres.; W. G. Switzer, v. p.; J. W. Beilby, sec.-treas.; Geo. G. Thomas, mgr.

Inc. in Ontario. **Cap.** $1,500,000; $1 par.

Property: in Lebel Twp., Kirkland Lake area, Timiskaming district, about 2 miles S. E. of Kirkland Lake, shows 2 or more veins.

HATTIE GOLD MINES, LTD. **ONTARIO**

Address: Matheson, Ont.

Property: 200 acres, in Coulson Twp., Munro area, Timiskaming district, 12 miles from Matheson on the T. & N. O. R. R., said to show several quartz veins containing $2.28 to $7.20 per ton in gold, both free and with tellurides with high grade patches, associated with pyrite, copper pyrite, and galena.

Development: by 3 shafts, one showing 4' of $100 ore at 80' in depth. Equipped with mining plant purchased from Porcupine-Imperial.

Reported Dec., 1921 that 400,000 shares were underwritten by Dr. S. G. Abbott at 25c. and balance at 50c.

HAYDEN GOLD MINES, LTD. **ONTARIO**

Address: 509 Brisbane Bldg., Buffalo, N. Y. **Mine address:** Schumacher, Ont. Wm. H. Hayden, mgr.

Property: in Ogden Twp., Porcupine area, Timiskaming district, S. of Timmins, developed by 375' shaft and equipped with mining plant. After several years idleness, mine was dewatered in Dec., 1921, and lateral work begun on 100', 200' and 300' levels..

HEIGHT OF LAND MNG. SYNDICATE **ONTARIO**

Address: 23 Jordan St., Toronto, Ont. **Mine address:** Seseikinika, Ont. Percy Ashley, mgr.

Property: 2 claim groups, one on island in Seseikinika lake and the other at Junction of Benoit, Melba and Maisonville Twps., in Rourke area, Timiskaming district.

HERMINA MINING CO. **ONTARIO**

Office 109 5th St., Calumet, Mich. **Mine office:** Massey, Ontario, Canada.

Officers: Edw. J. Hall, pres.; Chas. Schenk, v. p.; Lucas Hermann, sec.; W. B. Anderson, treas.; preceding, with Ole Olson, Frank Schroeder, Paul Tritschler, Geo. E. Perley and T. H. Pollack, directors.

Inc. June, 1903, in Ontario. **Cap.** $2,500,000; shares $12 no par, $8 paid and $4.50 assessable. Total assessments to date, $2.45 per share; 71,000 shares issued. Annual meeting, fourth Tuesday in June.

Property: 1,040 acres near Massey, on which shafts were sunk and ore

developed. Company mined a small amount of copper ore some years ago but has been idle since.

HERRICK GOLD MINES, LTD. **ONTARIO**

Address: c/o A. J. Sutherland, 10 King St., East, Toronto, Ontario.

Mine address: Shiningtree, Ont.

Officers: A. H. Chapin, pres.; F. C. Sutherland, v. p.; E. M. White, sec.-treas., with E. A. Snowman, Dr. J. T. Herrick, G. C. Crean, H. H. Sutherland, directors. F. L. James, mgr.

Inc. April, 1919, in Ont. **Cap.** $2,000,000; $1 par; 478,000 shares in treasury, March, 1921. Chartered Transfer & Executor Co., Toronto, registrar and transfer agent.

Property: 6 claims, 275 acres, on the W. side of S. end of Michiwakenda lake, adjoining the Wasapika mine on the N. W., in the McMurchy Twp., West Shiningtree area, Sudbury district, 20 miles N. E. of Westree on the C. N. Ry. A quartz-calcite vein fills a vertical fault fissure that was traced for 1,000' through conglomerate slate, rhyolite, and a reddish lamprophyre. In some characteristics, it is similar to the Kirkland Lake deposits. Visible gold, accompanied by pyrite, calcite, chlorite, and talc, occur in dark seams in the quartz.

Development: by a 50' shaft, said to show 54" of rich ore; and 3,000' of diamond drilling to depth of 800', exposing 22' of ore said to average $15 per ton. In the winter of 1919-20, a good camp was built and further development work is under way.

HILL GOLD MINING CO., LTD. **ONTARIO**

Mine address: Matheson, Ont.

Inc. May 13, 1918, in Ontario. **Cap.** $3,000,000.

Property: in Beatty Twp., Painkiller Lake district, about 10 miles from Matheson. Some development work was done in 1918 and 1920; idle 1921.

HOLLINGER CONSOLIDATED GOLD MINES, LTD. **ONTARIO**

Offices: 85 Bay St., Toronto, and Timmins, Ontario.

Officers: Noah A. Timmins, pres.; D. A. Dunlap, v. p.-treas.; J. B. Holden, sec., with L. H. Timmins, W. L. McDougald, and J. R. Timmins, directors. A. F. Brigham, general manager; C. G. Williams, general supt.; E. L. Longmore, mill supt.; R. W. Robbins, mech. supt.; A. W. Young, prod. supt.; R. T. Regnell, develop. supt.; Benjamin Richards, mine inspector.

Inc. 1916, in Ontario. **Cap.** $25,000,000; $5 par; 4,920,000 issued. Toronto Genl. Trusts Corp. and Montreal Trust Co., transfer agents. Guardian Trust Co. and Montreal Safe Deposit Co., registrars.

Company is a consolidation of the Hollinger Gold Mines, Ltd., Acme Gold Mines, Ltd., Millerton Gold Mines, Ltd., and Claim 13,147 of the Canadian Mng. & Finance Co., Ltd.

Stock was issued as follows: 200,000 shares in treasury; 2,400,000 to Hollinger shareholders; 2,100,000 to Acme shareholders; 100,000 to Canadian M. & F. Co. shareholders.

Comparative General Balance Sheet:

Assets.	1918	1919	1920
Mining Properties	$21,150,244	$21,150,244	$21,150,244
Plant	2,076,463	1,814,625	1,500,000
Development	761,936	408,250	.....
Deferred Dev. Chgs	276,186	.....	.....
Material and Supplies	452,937	327,352	501,315
Cash	125,430	531,466	279,330
Victory Loan	1,625,000	2,500,000	3,869,132
Other Current & Misc	96,256	362,319	596,483
Bullion Assets, etc	257,299	550,136	283,131
Total	$26,821,751	$27,644,392	$28,179,634

Liabilities.

	1918	1919	1920
Capital Stock	$24,600,000	$24,600,000	$24,600,000
Current	150,464	204,139	338,126
Reserves		112,000	112,000
Surplus	2,071,287	2,670,377	3,144,912
Total	$26,821,751	$27,644,993	$28,179,038

Comparative Profit and Loss Statement:

	1918	1919	1920
Gold and Silver Produced	$5,752,371	$6,722,207	$6,930,626
Other Income	155,957	340,832	372,985
Total Income	$5,908,328	$7,063,099	$7,303,611
General Charges	$296,105	$303,563	$342,133
Mining Charges	1,875,761	2,055,210	1,831,647
Milling Charges	685,644	863,844	931,948
	$2,857,510	$3,222,617	$3,144,128
Gross Operating Profit	$3,050,818	$3,840,482	$4,016,262
Deprec., Taxes, etc	462,255	1,519,192	1,343,017
Net Profit	$2,588,563	$2,321,290	$2,673,374
Dividends	1,230,000	1,723,000	2,214,000
Added to Surplus	$1,358,563	$599,290	$461,374

Total receipts for first 7 months of 1921 were $5,120,950, with a surplus after dividends of $431,921.

Dividends: initial of 1% in July, 1912; 1% quarterly to March, 1917, when rate was increased to 1% every 8 weeks; payments suspended in June, 1917, but resumed in 1918 and continued at 8 week periods to Aug., 1920, 4% remainder of that year; 1% on Jan. 28, 1921, and 1% every 4 weeks thereafter. Extra dividends of 1% were paid Dec. 31 of 1918, 1919 and 1920. Total to Dec. 31, 1921, $16,558,000.

Property: the Hollinger mine, 11 claims, 440 acres, patented in Tisdale Twp. Porcupine, and other holdings mentioned; also oil lands in Kansas acquired in 1919 and representing an investment of $115,915.

Company is reported (late 1921) to have taken options on claims at Elbow lake, Manitoba, and on the Burke (q. v.) claims in West Shamrock area, Ontario.

Geology: the chief rock of the entire area consists of basalt in the S. E. portion and the common greenstone of the Keewatin series in the N. W., while between these two areas, approximately 2,000' apart, lies an area of basalt schist and an area of greenstone schist, which have been intruded by a quartz-feldspar porphyry. The porphyry has not, except near its marginal contacts with the older rocks, proved of value as a source of gold, yet it is believed that its occurrence has had a definite influence upon the mineralization and concentration of gold values in the older rocks. It is within the area between the basalt and the greenstone that the gold bearing veins are found. Orebodies consist of quartz veins and country rock containing gold and pyrite. Veins do not have well defined walls and as the bearing has been very irregular, a vein consisting largely of quartz in one place may consist of quartz veinlets and intervening schist a short distance away. The veins are practically vertical. Of a total of 77 veins proved, 38 veins have been developed.

Ore reserves estimated December 31:

	Tons	Value	Gross Value
1920	4,087,083	$10.20	$41,719,670
1919	4,392,000	9.09	39,928,000
1918	4,489,080	9.15	41,080,005
1917	4,494,510	8.95	40,231,435
1916*	3,938,540	8.68	34,185,535
1915**	1,846,000	9.65	17,824,800
1915	1,600,800	10.02	16,031,600
1914	1,162,960	11.49	13,358,420
1913	845,300	13.71	11,604,800
1912	664,540	17.48	11,271,400
1911	462,000	22.14	10,230,000

* For consolidated properties. ** Reserves re-calculated as a basis for consolidation.

Development: to depth of 1,250′ by eleven shafts, one of 1,250′ being on the old Hollinger claim. Development is very extensive with levels at 100′ intervals, but by far the greater part of work and production is confined to ground above the 800′ level. Reported that a new 6-compartment shaft is contemplated. Adverse labor conditions and the high price of supplies led to a curtailment of development in 1918, all work below the 800′ level being stopped, yet new work for that year totaled 25,611′; 22,643′ in 1919 and 18,103′ in 1920. Company employed 1,207 men in 1919, an average of 1,025 in 1920; and 1,750 in 1921.

Equipment: includes a 200-stamp mill with cyanide plant, having a daily capacity of 3,500 tons, or 17 tons per stamp; this stamp duty has been made possible by addition of auxiliary rolls between gyratories and stamps. Mill capacity is to be increased by 35% or more in 1920; and stamps may be entirely discarded. The gold is largely free and the ore easily treated by simple crushing by stamps and regrinding in tube-mills, preparatory to cyanide treatment. Power is obtained from a central plant built by the C. M. & F. Co.

Production and Costs (per ton of ore milled):

	Tons Milled	Average Value	Mining Costs	Milling Costs	General Charges	Assay Tailing	Value Recovered
1920	650,205	$9.93	$2.84	$1.46	$0.52	$0.38	$6,219,664
1919	711,822	9.73	2.88	1.22	0.43	0.33	6,722,226
1918	578,755	10.24	3.24	1.18	0.51	0.30	5,752,371
1917	508,139	8.67	2.96	1.02	0.46	0.31	4,261,939
1916	601,854	8.84	2.19	0.97	.....	0.40	5,073,401
1915	334,750	10.11	2.18	0.99	.....	0.40	3,169,813
1914	208,936	13.67	2.70	1.22	.....	0.56	2,719,354

In 1919, with the mill running 69% normal, the mine produced an average of $134,440 weekly. In 1920, mill handled only about 1,700 tons per day because of power shortage. The net yield was $9.56 per ton compared with $9.40 in 1919.

Hollinger has become one of the world's greatest gold mines and, in the matter of production, stands second to the Homestake only on the American continent. The company deserves much credit, because in years gone by it worked the mine under adverse conditions.

HOWREY CREEK MINING CORP. LTD. **ONTARIO**

Address: 77 Victoria St., Toronto, Ont. **Mine address:** Gore Bay, Ont.

Officers: Glenn C. Bull, pres.-treas.; A. L. Kemp, v. p.-mgr., with S. A. Erwin, Wm. Benziger and W. A. Werrett, directors.

Inc. 1920 in Ontario. **Cap.** $1,000,000.

Property: 4 claims, in Howrey creek district, 6½ miles E. of Willisville on the Algoma Eastern R. R. An adit is being driven on the main vein reported to be 18″ wide at shallow depth, and carrying gold, platinum and arsenic.

Equipment: includes compressor, boiler and blacksmith shop. About 17 men employed.

HUDSON BAY MINES, LTD. ONTARIO

Office: New Liskeard, Ont. **Mine office:** Cobalt, Ont.

Officers: A. A. McKelvie, pres.; Wm. H. Kinch, v. p.; F. L. Hutchinson, sec.-treas.; with F. L. Bapst, Thos. McCamus, H. P. Burgard, and C. L. Sherrill, directors. D. McPhail, mgr.

Inc. July 16, 1909, in Ontario. **Cap.** $3,500,000; $5 par; outstanding September 1, 1915, $3,380,425. **Bonds:** $35,000 authorized and outstanding. Controls Dome Lake Mining & Milling Co., Ltd., and Kirkland Hudson Bay Mines, Ltd. Trusts & Guarantee Co., Ltd., Toronto, transfer agent and registrar. Traded in on Toronto Stock Exchange.

Company was operating subsidiary of Timiskaming & Hudson Bay Mng. Co., but latter was dissolved in 1919.

Financial statement for year ending Aug. 31, 1921, shows total revenue of $17,418, and expenditures, $37,766, leaving a deficit of $20,347. Assets other than plant and property at Cobalt, Kirkland Lake and Gowganda, include Dome Lake $353,022, Kirkland-Hudson Bay $44,000, accounts and bills receivable $23,877, ore $2,660. Current liabilities including $35,000 bonds were $43,000. Surplus, $96,591, compared with $117,526 for previous year.

Dividends: total to 1919 was $778,909, last one of 2½% paid August 31, 1913.

Property: 9 claims, 340 acres, at Cobalt, in Coleman Twp.; 160 acres at Gowganda and 200 acres at Kirkland Lake.

Development: in 1920, amounted to 262' of crosscuts, 107' of drifts and 40' of raising. Results of exploration in 1921 do not warrant further expenditure, unless price of silver advances to a marked degree.

No work was done in 1920 and 1921 on the Gowganda property or at Camp No. 2, or at Kirkland Lake, owing to unsatisfactory labor conditions and high costs.

Ore reserves: as of Aug. 31, 1921, estimated at 4,896 tons in place and broken, containing 48,960 oz. silver.

Equipment: complete mining machinery and a 20-stamp mill.

Production: in 1919, mill treated 21,102 tons, extracting 104,926 oz., or at the rate of 79.27%. Milling cost was $43,136 and total cost $81,577, or $3.93 per ton; in 1920, output was 20,308 tons, mined at a cost of $55,234, or $2.72 per ton. Milling cost was $39,834, or $1.96 per ton for 20,308 tons, yielding 95,444 oz., an extraction of 76.92%.

Mining operations at Cobalt ceased in April, 1921, but mill, which had closed down in Oct., 1920, was again started in Aug., 1921, to clean up broken ore.

Company's Cobalt claims have about reached exhaustion and management reports that ore in sight is of too low grade for profitable exploitation with existing silver prices, costs and method of treatment. Holdings in other fields are however considered valuable.

HUDSON COPPER CO., LTD. ONTARIO

Address: Rm. 810, 7 Water St., Boston, Mass. **Mine address:** Havilah, Ont. Angus McDonald, mgr.

Inc. Nov. 18, 1916. **Cap.** $2,000,000.

Property: the Havilah mine, near Rock lake, Aberdeen Twp., Algoma district. Ore carries copper, gold and silver. One shipment of nickel-free copper ore was made in 1918. Presumably idle.

HUGHES McELROY GOLD MINES, LTD. ONTARIO

Address: 503 C .P. R. Bldg., Toronto, Ont. **Mine address:** Boston Creek, Ont. Chas. Hughes, mgr.

Property: in McElroy Twpe., Boston Creek area, Timiskaming district, developed to depth of 250'.

HUNTON CONS. GOLD MINES, LTD. ONTARIO

Successor to Hunton-Kirkland Gold Mines, Ltd.

Office: J. W. Young, sec.-treas., Langford, Blk., Haileybury, Ont. **Mine address:** Kirkland Lake, Ont.

Officers: Thos. Birt, pres.; David Elliott, v. p.; J. Walter Young, sec.-treas.; with Henry M. Porteus (mgr.) and A. E. Hunton, directors.

Inc. in Ontario. **Cap.** $3,000,000; $1 par; 1,500,000 shares issued. Trusts & Guarantee Co., transfer agent and registrar.

Company is a reorganization of the Hunton-Kirkland made Feb., 1922, by which capital was increased from $2,500,000 to $3,000,000, and its holdings augmented by addition of the 2 Gibson-Duncan claims on W. and Slaght-Solomon fraction on E., owners of which receive 410,000 and 90,000 shares of new company respectively. Hunton-Kirkland stockholders receive 1,000,000 shares.

Property: 2 claims, 80 acres, 1 mile S. of the S. W. end of the Kirkland Lake, Teck Twp., Kirkland Lake area, Timiskaming district. A porphyry dike intrudes the schistose sedimentary rock, and mineralization occurs along the S. contact extending into both formations. An open-cut was made along a series of 1 to 3" quartz veinlets, which intersect the sediments and porphyry. A 100' shaft is said to have followed this mineralization. Free gold was seen at 30'. Diamond-drilling showed gold to a depth of 254'. This zone is 300' long on the surface.

By the acquisition of the Gibson-Duncan and Slaght-Solomon tracts, company's property covers about one mile of the E.-W. zone of mineralization.

Development: by shallow shaft, to be sunk to 300' depth. Equipped with a boiler, hoist and compressor.

HUNTON-KIRKLAND GOLD MINES, LTD. **ONTARIO**

Succeeded by Hunton Cons. Gold Mines, Ltd., which see.

HURONIAN BELT CO., LTD. **ONTARIO**

Officers: F. H. Hamilton, chairman; with E. Turk, E. T. McCarthy, H. B. Hooper, directors.

Inc. March, 1914, in Ontario. **Cap.** £200,000. Company acquired, in 1914, all the interests of the Huronian Belt Syndicate, Ltd.; and has an interest in the Porcupine V. N. T. Gold Mines, formerly the North Thompson. Also has claims in Northern Ontario and near Great Slave Lake.

The Associated Gold Mines of Western Australia holds 379,220 shares in the Porcupine V. N. T., and the Huronian is entitled to 25% of any profit made by the Associated company on selling these shares.

INTERNATIONAL MOLYBDENUM CO., LTD. **ONTARIO**

Out of business. See Volume XIV.

INTERNATIONAL NICKEL CO., THE **ONTARIO**

General office: Constable Hook, Bayonne, N. J. **Executive office:** 67 Wall St., New York. **Operating office:** J. L. Agnew, gen. mgr. and J. C. Nicholls, gen. supt., Copper Cliff, Ont. **Refinery office:** John More, mgr., Port Colborne, Ont.

Officers: Chas. Hayden, chairman of the Board; Robt. C. Stanley, pres.; J. L. Ashley, sec.-treas.; with W. N. Cromwell, A. Jaretzki, W. E. Corey, A. D. Miles, Wm. T. Graham, W. H. Brownson, Britton Osler, J. L. Agnew, Thomas Morrison and S. Prosser, directors. Alex J. Watson, asst. sec.-treas.

Inc. September, 1912. Is a consolidation of International Nickel Co. and Colonial Nickel Co., and owns entire stock of the International Nickel Co. of Canada, Ltd., formerly Canadian Copper Co. Company also owns all issued stock of Huronian Co., Ltd., Ontario, the Societe Miniere Caledonienne, New Caledonia, and Nickel Corporation, Ltd., England.

Cap $8,912,600, 6% non-cumulative preferred stock, $100 par, and $41,834,600 common stock, $25 par. The authorized share capital is $12,000,000 and $50,000,000, respectively. There were 16,121 stockholders, July, 1921.

Stock is listed on the New York Stock Exchange. Bankers Trust Co., New York, transfer and dividend agent. Guaranty Trust Co., New York, registrar. Shares: 26 high, 11 low in 1920; 17 high, 11¼ low in 1921.

Comparative Statement of Income Account and Balance Sheets, years ending March 31:

Year	Total Income	General Expenses	Taxes	Depreciation	Mineral Exhaustion	Net Profits
1922(c)	$364,275	$311,874	$70,128	623,951(b)	.....	*$641,278
1921..	5,166,581	487,351	491,380	1,577,312	580,837	2,029,705
1920..	6,365,472	565,847	912,564	1,592,582	548,742	2,745,734
1919..	11,211,521	750,336	2,214,027	1,337,644	986,884	5,922,630
1918..	16,181,501	610,024	3,590,836	984,000	855,553	10,139,988
1917..	16,979,608	801,498	628,873	936,000	1,039,941	13,573,296
1916..	14,340,966	870,860(a)	.....	1,721,828(b)	.....	11,748,279
1915..	7,230,760	449,319	68,055	720,000	385,315	5,398,671
1914..	6,566,787	376,665	61,147	641,915	687,395	4,792,665
1913..	6,929,107	477,862	64,445	553,449	498,472	5,035,308
1912..	5,088,966	217,778	4,775	497,520	139,782	3,581,960

(a) Includes taxes; (b) includes mineral exhaustion; (c) for 9 months; * loss.

	Balance for Dividends	Preferred Dividends (6%)	Common Dividends	%	Balance to P. & L.
1921.....	$2,029,699	$534,756	.....	..	$1,494,943
1920.....	2,745,734	534,756	.....	..	2,210,978
1919.....	5,922,630	534,756	$4,183,460	10	1,204,414
1918.....	10,129,988	534,756	7,530,228	18	2,065,004
1917.....	13,557,970	534,756	10,040,304	24	2,982,910
1916.....	11,748,279	534,756	9,431,803	—	1,781,720
1915.....	5,598,071	534,756	4,753,937	12½	309,778
1914.....	4,792,665	534,756	3,803,150	10	454,759
1913.....	5,020,305	534,755	3,491,049	10	994,501
1912.....	3,581,960	534,749	2,143,412	13	903,799

A 10% stock dividend was paid November 1, 1915.

Assets: March 31, 1921, were $64,938,704, which included properties, $47,726,912; liabilities included capital stock, $50,747,200; current, $1,944,249; funds, $661,078; surplus, $11,886,177.

Dividends: as in above table. The distribution on common stock was passed in June, 1919, breaking a continuous record dating back to 1900.

Copper-nickel properties consist of mines with an estimated developed reserve of 20,000,000 tons, smelting plants at Copper Cliff, Canada, handling 3,500 tons daily, separating and refining plants at Constable Hook, Bayonne, N. J., and Port Colborne, Ont. The company's new rolling mills, under construction 1920-1922, near Huntington, W. Va., have been built entirely from surplus. They will specialize in Monel metal, a product with important possibilities.

Property: company is the world's largest producer of copper nickel ores and copper nickel matte. Ore was discovered 1886, mining commenced 1900, and smelters were started in 1901. It consists of about 13,000 acres, mostly on the south range of the Sudbury nickel belt. The ore consists of a mixture of chalcopyrite, pyrrhotite and pentlandite in a norite gangue. The ore may be massive sulphides, as in the Creighton mine, or disseminated sulphides scattered through the gangue, as in Crean Hill mine. The Creighton orebody has a pitch (45°) length of 2,500', varies in length from 400 to 1,000', and in width from 100 to 375'. For geology see Eng. & Min. Jour., Vol. 101, No. 19.

The Creighton mine has 3 incline shafts with vertical depth of 1,000'. Open pit mining was practised until 1912, when underground stoping began. The mine is developed to the 18th, but main shaft reaches beyond the 23rd level, a total inclined depth of 1,941'. Below the 6th level, shrinkage stoping has been adopted from crosscuts connecting with main drifts in the footwall.

The No. 3 incline shaft, with 5 compartments, handles the entire output. No. 2 shaft being used for handling men and supplies only. Tramming on the main levels is by electric locomotives, with 4-ton cars.

Primary crushing of ore is done underground. The crushers are the jaw type 42x30" and are set at 6". Shafts are equipped with electrically driven hoists operating in balance, mechanical appliances being in use for quick loading of skips. All buildings are of concrete, steel and brick, fireproof construction.

Secondary crushing is carried out in the ore-house, which has a capacity of 500 tons per hour, followed by screening and hand sorting on picking belts. Concrete bins of 3,000 tons capacity are situated under the picking belts.

The electric hoist is operated on the Ilgner system, hoisting 9-ton skips at 2,500' per minute. The mine has 4 compressors, each of 5,000 cu. ft. capacity, and sufficient for 150 drills. Production is 3,500 tons per day; total production of Creighton, 8,874,780 tons at end of 1919.

The Crean Hill mine, about 2 miles east of the Victoria, has an inclined 4-compartment shaft, 780' deep. The production was about 450 tons daily.

Surface equipment includes rock-house for crushing and sorting ore, power house, workshops, warehouses, etc.

The Creighton, 6 miles from Copper Cliff, is now the only operating mine; for official description, see Can. Inst. M. & M. Bul., July, 1920. See item for August, 1920, for official description of Copper Cliff smelting plant.

No. 2 mine at Copper Cliff, is developed to a depth of 860', and produced about 200 tons of sorted ore per day. Equipment is similar to that at Crean Hill.

The International through the Huronian Co., a subsidiary, has a hydro-electric plant at High Falls, 30 miles from Copper Cliff, utilizing an effective head of 85', which yields about 13,000 k. v. a. The current is transmitted at 33,000 volts.

The Creighton ore, which is high in sulphur, goes in part to Wedge roasters and reverberatory furnace, but largely to the roast yard, 9 miles from Copper Cliff, where sulphur is reduced to 10%. The yard is about 7,500' long and contains space for 122 roast beds, using wood as fuel. Since 1919, an unloading bridge has been used; ore is re-loaded by steam shovel, taken to the smelter, and dumped into bins.

The blast furnace building contains 8 furnaces, 5 of which are 4' 2"x17' long, a 3' 6" jacket having been inserted between the upper and lower tiers to lower settlers sufficiently to receive molten converting slag.

The charge of raw and roasted ores is practically self-fluxing; about 10½% coke is used. The slag carries about 32.5% silica. This matte averages 26% copper-nickel.

The reverberatory department contains a fine grinding plant, 4 Wedge roasters and 2 reverberatories, one working. The ore is ground in ball mills and roasted in Wedge furnaces. The reverberatory furnace smelts about 500 tons in 24 hours. It burns pulverized coal, crushed so that 85% will pass 200 mesh and is blown in by fan blast; about 80 tons a day is consumed. Matte averages 16% copper-nickel; slag contains about 33% silica.

Matte is blown in 6 basic converters of the horizontal type, exactly as in the conversion of copper matte, but is stopped as soon as the iron is eliminated. Final product contains 24% copper, 55% nickel, and 0.5% iron. Slag contains 27% silica, and 4% copper-nickel, most of it recovered in settlers. Matte is cast into iron molds, broken up, and treated in the International company's Canadian refinery at Port Colborne, Ontario, and at Bayonne, N. J.

The Port Colborne refinery, near the Lake Erie entrance of the Welland Canal erected at a cost of $5,000,000, produces 15,000,000 lb. of nickel and 8,000,000 lb. of copper yearly. The plant finished in June, 1918, is described in Eng. and Mining Journal, March 8, 1919. A small amount of platinum-palladium, etc., is produced as a by-product.

An increasing market for Monel metal and nickel in rolled forms will be supplied by company's Huntington plant.

The year ended March 31, 1917, was the company's most profitable year since that time earnings have rapidly fallen. Demand ceased when the Armistice was signed and operations were cut to ⅓ normal, but were gradually increased toward the end of the fiscal year 1920 to 60% capacity and remained so for next six months, but were thereafter curtailed until March, 1921, when operations were at about 20% capacity, and finally on Sept. 1st, all mines and plants were shut down for an indefinite period. Reported at about the same time that officers of the subsidiary, International Nickel Co. of Canada, had resigned and the Toronto offices definitely closed. Also, it is rumored that the Bayonne refinery will be abandoned.

International Nickel is a splendidly managed property with a promising future.

ISLET EXPLORATION CO., LTD. **ONTARIO**

Address: 509 Alworth Bldg., Duluth, Minn., or care F. S. Wiley, Port Arthur, Ont.

Officers: J. L. Washburn, pres. ;A. Mac Washburn, v. p.; Frank B. Randall, sec.-treas., all of Duluth, Minn. D. C. Peacock, mgr.

Inc. 1920 in Ont. **Cap.** $250,000; $10 par.

Property: company has acquired control of the "Woods Location", comprising 10,000 acres at Port Arthur, Sibley Twp., Thumder Bay district, ½ mile off the main shore of Lake Superior, including the Silver Islet mine, situated on an island 80' in diameter and credited with a production of $3,000,000 in silver, when operated 50 years ago. Property owned by Nepigon M. & Lands Co.

Development: to depth of 1,265' in old workings. The Silver Islet mine was unwatered in 1920 and new work begun on July 1, 1921, on old 4th level (200' deep). A 1,200' crosscut to cut 3 known veins, was 700' long in October and has encountered a well mineralized zone showing lead, zinc and iron sulphides. Company is also sinking a shaft on Edward's island, 9 miles to the E., said to expose arsenical silver ore.

IXION MINES, LTD. **ONTARIO**

Address: 26 King St., Toronto, Ont. A. S. Muirhead, sec.

Inc. April 26, 1915, in Ontario. **Cap.** $100,000.

Property: the Cochrane mine in Cochrane Twp., Sudbury district under lease to Timiskaming Mng. Co., Ltd. Ores are silver-cobalt-nickel.

JAMES ROBERTSON, LTD. **ONTARIO**

Owns the Galetta, operated by its subsidiary, **Kingdon Mining, Smelting & Mfg. Co., Ltd.**, which see.

JUPITER MINES, LTD. **ONTARIO**

Succeeded, 1915, by the McIntyre-Jupiter Mines, Ltd., which is fully described in Vol. XII. See Mc Intyre Porcupine Mines, Ltd.

KALGOORLIE-KIRKLAND GOLD MINES, LTD. **ONTARIO**

Inc. Dec. 1919 and liquidated October, 1920. See **Kirkland Kalgoorlie Mine.**

KEELEY SILVER MINES, LTD. **ONTARIO**

Address: 65 Broad St. Ave., London, E. C. 2, England; or J. Macklintosh Bell, mgr., Keeley mine, Silver Centre, Ont. J. W. Bryant, supt.

Officers: Edw. Hooper, pres., with Alfred H. Collier, E. Turk and Jas. C. Williamson, directors. Thos. Mallinson, sec.-treas.

Inc. Feb. 9, 1920 in England. **Cap.** £170,000; 10s. par; 265,830 shares outstanding of which 80,000 are owned by Associated G. M. of W. A., and 40,000 each by Erdlich Proprietary and Siberian Proprietary.

Property: 2 patented claims, 80 acres in South Lorrain Twp., Timiskaming district. Ore carrying native silver, occurs in fissure veins in diabase and greenstone, with pay shoots from 30-200' long. Milling ore averages 23 oz. silver and high-grade runs up to 700 oz. silver and 220 lb. cobalt per ton.

Development: to depth of 435' by 4 shafts with 900' of workings, said to

have blocked out 27,000 tons containing 700,000 oz. silver and 275,000 lb. cobalt. Work has been largely confined to the Wood's and No. 6 veins.

Equipment: includes hoists, 12-drill compressor and 60-ton mill with flotation unit.

Operations were carried on from March 15 to Oct. 13, 1920, at a cost of £16,749 and resumed in April, 1921. Shortage of power and labor conditions have retarded development.

Production: of a small tonnage of high grade was made in 1920. The mill, which was placed in commission in October, 1920, operated for 30 days and shut down for lack of power. For 4 months in 1921 ending Nov. 1, 1921, total output from ore and concentrate was 263,000 oz. silver.

KENABEEK CONS. SILVER MINES, LTD. **ONTARIO**

Dead; see Vol. XIV. Succeeded by **Triangle Silver Mines, Ltd.**, which see.

KENYON COPPER MINES, LTD. **ONTARIO**

Address: Rm. 3, Bk. of Toronto Bldg., Toronto, Ont. **Mine address:** Massey, Ont. J. F. Flynn, mgr.

Property: the Kenyon mine in May Twp., Sudbury district. Ore carries copper, gold and silver.

Option on property of Massey Station Mng. Co. held in 1917, was not exercised. Company inactive.

KERR-ADDISON MINES, LTD. **ONTARIO**

See **Canadian Associated Goldfields, Ltd.**

KERR LAKE MINES, LTD. **ONTARIO**

A reorganization, November, 1917, of the Kerr Lake Mining Co., of New York. Owns entire capital stock of its operating subsidiary, Kerr Lake Mining Co., Ltd., which see below. The change was made to eliminate the expenses and taxes of the New York holding company.

Company owns also a 150,000 share interest in Wettlaufer Lorrain Silver Mines; 837,498 shares of capital stock of Caribou Cobalt Mines Co., a majority interest (1,001,000 shares) in the Tahoe mine, Utah, and ⅔ interest (95,238 shares) in the Rimu Gold Dredging Co. The two first named are separately described; see below for the two last.

New York office: 61 Broadway. **Mine office:** Cobalt, Ont.

Officers: Adolph Lewisohn, pres.; Sam. A. Lewisohn, v. p.; E. H. Westlake, sec.-treas.; with J. H. Susmann, J. Parke Channing, D. M. Steindler, H. S. Carpenter, Theo. L. Herrmann, and Wm. B. Joyce, directors. Mine manager, H. A. Kee.

Inc. 1917, in Ontario. **Cap.** $3,000,000; par $5. Reduced September, 1919, to $2,400,000; par $4. Bankers Trust Co., New York; Federal Trust Co., Boston; Trusts and Guarantee Co., Ltd., Toronto, transfer agents; Equitable Trust Co., New York; Old Colony Trust Co., Boston; Union Trust Co., Ltd., Toronto, registrars.

Balance sheet of August 31, 1921, shows assets, $3,552,838, which includes Kerr Lake Mng. Co., Ltd., $2,400,000; U. S. Liberty Bonds, $148,635; accounts receivable, $160,916; investment in other mining properties, $839,500; cash, $3,787. Liabilities include capital stock, $2,400,000; Kerr Lake Mng. Co., $31,582. Surplus $1,114,214.

Income account shows dividends received from Kerr Lake Mng. Co., $590,000; interest, $14,529; and exchange, $5,714. Expenses were $131,264. Year's surplus was $178,980.

Dividends: paid by predecessor and present companies total $8,310,000 to Aug. 31, 1919, in addition to a capital distribution, Sept., 1919, of $1 per share; none paid in year ended Aug., 1920; $300,000 paid in year ended Aug., 1921: $75,000 on Oct. 15, 1921; $75,000 on Jan. 15, 1922.

Due to the impending exhaustion of the mine at Cobalt, company has begun to embark in other mining ventures.

Kerr Lake Mining Co., Ltd.

Office: 61 Broadway, New York. H. A. Kee, gen. mgr., Cobalt, Ont. Entire stock issue owned by Kerr Lake Mines Ltd., of Ontario.

Balance sheet of August 31, 1921, shows assets $1,573,854, which include mining property, $55,000; plant, $34,282; supplies, $14,638; cash $14,862; investment in Canadian and U. S. bonds, etc., $1,380,098; Kerr Lake Mines, Ltd., $31,582. Liabilities: 400 shares of capital stock at par, $100, $40,000; accounts payable, $3,878; accrued wages, $2,333; reserve for outstanding liabilities and taxes, $125,000, leaving a $1,402,641 surplus after dividends of $590,000.

Total proceeds from ore sales for year were $94,306; interest $20,034, exchange $17,531; dividends received $7,350. Operating expenses were $145,555, including $16,500 for Hargrave property. Operating profit for the year was $50,265.

For sake of comparison, assets on Aug. 31, 1920, were $2,324,933; ore sales $998,749; and profit $618,052.

Dividends: for years ended Aug. 31; total to 1915, $6,808,000; $650,000 in 1917; $650,000 in 1918; $653,000 in 1919; $1,000,000 in 1920; $590,000 in 1921; total $10,367,000.

Property: one patented claim and two fractional claims, 17 acres in Coleman Twp., Nipissing district, Cobalt.

Company cooperated with Crown-Reserve Mng. Co. [illegible] Crossing Kerr Lake, and has a joint-ownership with it in the Drummond section.

In 1921, the adjoining 80 acres of Hargrave Cons. Mines was purchased. This mine is developed to depth of 375' and is said to have produced better than 500,000 oz silver.

Geology: for description of these features see Nipissing Mines Co. The ore occurs in small vertical fissure veins in Huronian slate and conglomerate, both veins and ore being of the character typical of the Cobalt district. The ore-shoots vary from a few feet to 400' in length and occur in an area of about 8 acres.

Development: to depth of 550' by several vertical shafts, with a total of 63,232' of underground workings. New development for the fiscal year, 1921, amounted to 3,341', compared with 2,969' in 1920. Operations were curtailed from Dec. 1920, but development continues, and up to mid-1921, were largely confined to No. 3 Diabase vein. Ore extracted from the Hargrave has already repaid purchase price. Later work has failed to find new veins of importance.

To test the ground below the diabase the winze was sunk on the Keewatin vein to a depth of 150' below No. 6 level, or 475' below the surface. The winze is entirely in the Keewatin formation below the diabase contact, and 3 levels driven from the winze show the vein to be weak and less mineralized as it leaves the contact, confirming the general belief that commercial ore is probably confined to the diabase near or above the contact.

Ore reserves: estimated on Aug. 31, 1920, to be 150,000 oz silver in shipping ore and like amount in milling grade. A 75,000 ton dump to be treated by Dominion Reduction Co. should yield $1 profit per ton.

Equipment: includes 12-drill air compressor, hoist, sorting and [illegible] plant of 125 tons daily capacity, fully equipped machine shop and a pot smelting furnace to melt the rough metallics into bullion, installed in 1915.

Production: for year ended Aug. 31, 1921, amounted to 194,352 oz. silver and 17,096 lb. cobalt. Total cost of production per oz. was 56.04c. in 1920, as against 40.81c. in 1919.

Ore reserves at Kerr Lake are approaching exhaustion, and though acquisition of the Hargraves had improved the situation somewhat, operations were indefinitely suspended in early 1922.

Tahoe Mine-Utah.

Property: in Boxelder county, 26 miles S. of Oakley, Idaho, from where electric power is secured. The mine is said to contain 87,000 tons of ore, assaying 18 oz. silver and 80c. gold in shallow workings.

Equipment: includes 150-ton mill.

Production: began Dec. 1919, and in about 21 months was 983,008 oz. silver and 1,868 oz. gold. Mill is treating about 100 tons daily.

Rimu Mine- New Zealand.

Property: about 1,150 acres, near Hokitika, Province of Westland, South Island, N. Z.

The total prospected area consists of 880 acres, with 63,000,000 cu. yd. proved, of which 30,714,000 cu yd. are estimated to average 16.07c. and 32,407,000 cu. yd., 10.04c. per cu. yd. There is also an additional 20,000,000 cu. yd. of dredgable ground.

Equipment: electrically driven dredge with bucket capacity of 10 cu. ft. will handle 7,000-8,000 cu. yd. per day.

Dredging operations began Sept. 12, 1921.

KERR LAKE MINING CO. **ONTARIO**

Reorganized, November, 1917, into **Kerr Lake Mines, Ltd. of Ontario,** which see.

KINGDON MINING, SM. & MFG. CO., LTD. **ONTARIO**

Subsidiary of, and operating company for, James Robertson, Ltd.

Address: 314 Beaver Hall Hill, or P .O. Box 1210, Montreal, Quebec. **Mine address:** Galetta, Ont.

Officers: C. M. Robertson, pres.; J. J. Milne, sec.-treas.; A. G. Munich, man. dir.; John E. Hardman, cons. engr.; R. R. Rose, supt.

Inc. 1919, in Ontario. **Cap.** $750,000. No bonded debt or liabilities.

Property: the Galetta, or Kingdon mine on Chats island, in the Ottawa river, in Fitzroy Twp., Carleton county, 5 miles E. of Amprior, formerly operated by Jas. Roberston, Ltd. The mine has a 5½′ vein in a fault fissure in crystalline limestone. Ore contains grains, clusters and crystal aggregates of galena in calcite and barite, with but little zinc.

Development: by new 3-compartment shaft, 426′ deep, with over 3,500′ of work on No. 2, 3 and 4 levels. Mine is exhausted above 2nd level, and principal ore reserves are between 3rd and 4th levels, the latter being 1,350′ long, and from which a winze has been sunk to 550′ in first class ore.

Equipment: includes hoist, 10-drill compressor, and 250-ton concentrator using jigs and tables making an 80% lead and a small amount of zinc concentrate. A smelter with open-hearth furnace produces 18 tons crude pig yds. of dredgable ground.

Production: about 1,500,000 lbs. lead in 1918 and over 3,000,000 lbs. in 1921. Mine was operated 1919-20, but figures of output are not available.

KING EDWARD MINE **ONTARIO**

Owned by J. S. Dobie and Mary C. Dobie, Thessalon, Ont.

Closed down indefinitely.

KING KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 26 Adelaide St. W., Toronto, or Kirkland Lake, Ont.

Officers: C. F. Jordan, pres.-mgr.; E. L. Wettlaufer, v. p.; A. B. Crosby, treas.; G. M. A. Davison, sec., with John Swartz, D. Sprague and Duncan McLellan, directors. Ernest Craig, supt.

Inc. 1920, in Ontario. **Cap.** $5,000,000; $1 par; 3,070,000 shares in treasury, Dec. 1, 1921.

At a reorganization meeting Nov. 28, 1921, capital was increased from $2,500,000 to $5,000,000, outstanding stock being exchanged on a share for share basis, and 450,000 shares being paid for Ferguson claims.

Property: the Montgomery group of 7 claims, 309 acres, S. W. of Mud lake and east of Kirkland lake, in Teck Twp., Timiskaming district. A number of narrow quartz veins have been found in feldspar porphyry. One vein, 1 to 12″ wide, has been traced for 250′ on the surface, showing visible gold in one shoot 12′ long. The quartz carries iron pyrite, galena, and calcite. Also, the 2 adjoining Ferguson claims, 80 acres, acquired late in 1921.

Development: by surface work and an 80′ shaft. A mine plant is being installed.

KIRK GOLD MINES, LTD. ONTARIO

Address: 911 Kent Bldg., Toronto, Ont. **Mine offices:** Kirkland Lake and Leeburn, Ont.

Officers: John Black, pres.; Major Birkett, mgr. at Kirkland; M. Bean, supt. at Leeburn.

Cap. $4,000,000, increased from $2,000,000; par $1.

Property: 3 claims, in Lebel township, Kirkland Lake area, Timiskaming district, adjoins the King Kirkland. Owns claims also in Aberdeen Twp., Algoma district. Both are prospects.

KIRKLAND COMBINED MINES, LTD. ONTARIO

Address: 26 Adelaide St. W., Toronto, Ont. **Mine address:** Kirkland Lake, Ont.

Officers: W. F. Greene and A. W. Greison, directors; J. E. Day, mgr.

Inc. in 1919.

Property: Day group of 2 claims adjoining the Sylvanite on the N., and corner the Tough-Oakes on the N. W. First prospected in 1913, reverted to the Crown, and re-staked late in 1919. A fault-zone along the porphyry-lamprophyre contact contains veinlets of quartz and iron pyrite, with gold at a few points. Drilling showed the zone to be mineralized to depth of 200'.

Development: by 200' shaft, a 106' crosscut south and several hundred feet of drifts.

KIRKLAND-HUDSON BAY GOLD MINES, LTD. ONTARIO

Controlled by Hudson Bay Mines, Ltd.

Address: Box 51, New Liskeard, Ont. **Mine address:** Kirkland Lake, Ont. F. L. Hutchinson, sec.

Property: 2 claims, in Teck Twp., Kirkland Lake area, Timiskaming district, between Lake Shore and Townsite mines, said to contain several promising veins.

The labor strike of 1919 stopped development work and management is now awaiting more favorable operating conditions.

KIRKLAND KALGOORLIE MINE ONTARIO

Address: Kirkland Lake, Ontario.

Property: also called the Honer mine, 1 claim, just west of the Hunton-Kirkland, a mile S. of the S. W. end of Kirkland lake. Sediments are intruded by narrow dikes of red porphyry, striking N. E.-S. W. One quartz vein was traced for 300' on the surface. The best ore was on the footwall side in narrow seams of quartz. Iron pyrite is visible. A shaft was sunk, machinery erected, and a camp built in 1920.

KIRKLAND LAKE EXPLORATION, LTD. ONTARIO

Office: Pinners Hall, Austin Friars, London, Eng.

Officers: C. H. Villiers, pres.; H. J. Hollingsworth, and R. D. La Berr, directors. E. C. Wheater, sec.

Inc. January, 1914, in England, to acquire mining properties in Ontario, Canada. **Cap.** £150,000; £1 par; 26,000 issued. On June 30, 1916, assets included stocks and bonds, £10,320; interest in the Kirkland Lake district, £1,650. Organization expenses, £5,498; exploration etc., £12,091; cash, £116.

Property: in Swastika district, near Porcupine, and an interest in claims adjacent to the Tough Oakes mine. Is a holding company, inactive several years.

KIRKLAND LAKE GOLD MINING CO., LTD. ONTARIO

Is a subsidiary of Beaver Cons. Mines, Ltd.

Mine address: W. M. Sixt, supt., Kirkland Lake, Ont.

Address: 810 Lumsden Bldg., Toronto, Ont.

Officers: F. L. Culver, pres.-mgr.; Wm. Thos. Mason, v. p.; R. Graham, sec.-treas.; H. E. Tremain, asst. sec.; with F. L. Lovelace, directors.

Cap. $2,000,000; $1 par; all issued; 1,743,050 shares are owned by Beaver Cons. Mines, Ltd. Shares quoted at 26c. low, 56c. high, in 1921 on Toronto

Exchange. Union Trust Co., Ltd., Toronto, transfer agt. and registrar. Annual meeting in August.

Annual report for fiscal year ending May 31, 1921, shows assets, $1,693,331, including, property, $1,000,000; cash, $9,586; bullion on hand, $21,619; liabilities include, capital stock, $2,000,000; bills payable, $361,400; current accounts, $22,438; P. & L. balance, $28,958. Income was $313,201, including $255,115 from ore sales; expenditures were $278,211, with a net operating profit of $11,081, after deducting for depreciation and accrued interest.

Property: 362 acres in Teck Twp., Kirkland Lake area. Development work has been confined to one claim on a vein which has been traced 1,400' on surface and proved to 900' level underground.

Geology: the vein is principally in the porphyry and syenite that lies adjacent to a band of conglomerate, greywacke, and quartzite. The best ore is a bright red porphyry, or syenite, through which there are ribbons of quartz carrying tellurides, copper pyrite, iron pyrite, molybdenite, graphite, calcite, and native gold. The main vein is recognized by the presence of fault-planes, and the area between the main faults is much disturbed. There is great irregularity in mineralization. The best ore is on the footwall.

Development: by two shafts, 900' and 520' (main) deep, connected and with levels 100' apart. During 1919-'20, total workings reached 4,420', and orebody had been opened for 300' on the 400' and for 260' on 500' level, and had been proved to 700' depth; average stope width was 16'. In following 12 months, the orebody was developed on 700' and 900' levels, and diamond drilling was done from the latter. Values on 900' level range from $3 to $60. Total openings to June, 1921 were 6,882. On March 1, 1920, estimated reserves between 300 and 700' levels were 120,000 tons.

Equipment: includes steam plant, electric motors, double-drum hoist, a 12-drill and smaller compressors and a 150-ton mill, completed in 1918, with an 8' Hardinge mill, Dorr classifier, tube mill and cyanide plant.

Production: years ended May 31, 1920, (5 mos.), 14,636 tons yielding $107,071, and $40,354 additional from dump, etc.; 1921, 42,822 tons from mine and 2,657 tons from dump yielded $277,007.

KIRKLAND LAKE PROPRIETARY, LTD **ONTARIO**

Fully described in Vol. XIV. Succeeded in 1919 by **Kirkland Lake Proprietary (1919) Ltd.**, which see.

KIRKLAND LAKE PROPRIETARY (1919) LTD. **ONTARIO**

Address: H. J. Guntrip, sec., Finsbury Pavement House, London, E. C., or Box 480, Cobalt, Ont.

Mine address: Chas. A. Richardson, mgr., Kirkland Lake Ont.

Directors: G. R Bonnard, chairman; K. H. Campbell, R. Simpson, C. R. E. Jorgensen, M. G. Latilla and Sir B. Blood. S. C. Thomson, cons. engr.

Inc. October 21, 1919, to acquire holdings of Kirkland Lake Proprietary, Ltd. **Cap.** £1,000,000; shares £1 par; 699,398 shares issued.

Company was formed to acquire holdings of Kirkland Lake Proprietary, Ltd., Tough-Oakes Gold Mines, Ltd., Sudbury Syndicate, Ltd., and Aladdin Cobalt, Ltd. Holdings of Burnside Gold Mines, Ltd., were later amalgamated and control obtained of the Sylvanite Gold Mines, Ltd. With exception of the Aladdin claims at Cobalt, these properties are in the Kirkland Lake area, Timiskaming district. They are described under individual titles. No detailed report of parent company is as yet available.

KIRKLAND MUNRO GOLD MINES, LTD. **ONTARIO**

Address: care F. C. Sutherland & Co., 12 King St. E., Toronto, Ont.
Mine address: Kirkland Lake, Ont. L. C. Platt, sec.

Inc. May 14, 1918, in Ontario. **Cap.** $2,000,000.

Property: in Teck Twp., Kirkland Lake area, Timiskaming district.

KIRKLAND-PORPHYRY GOLD MINES, LTD. **ONTARIO**

Fully described in Volume XIV. Company went into voluntary liquidation in 1920 and assets were purchased by **Orr Gold Mines, Ltd.**, which see.

KIRKLAND SECURITIES, LTD. **ONTARIO**

Address: Kirkland Lake, Ontario, Canada.

Is holding company for **Lake Shore Mines, Ltd.**

KIRKLAND TOWNSITE GOLD, LTD. **ONTARIO**

Address: Haileybury, Ont. **Mine address:** Kirkland Lake, Ont. H. Horne, mgr.

Property: in Teck Twp., Kirkland Lake area, Timiskaming district, shows a well defined conglomerate-porphyry contact. The ore is gold-bearing quartz.

KITCHENER KIRKLAND MINES, LTD. **ONTARIO**

Address: 22 George St., Kitchener, Ont. **Mine address:** Kirkland Lake, Ont. C. W. Fenk, mgr.

Property: in Teck Twp., in the Goodfish section of Kirkland Lake area, Timiskaming district.

KITCHIGAMI GOLD DEV. CO. **ONTARIO**

Company dissolved. Fully described in Volume XIV.

LA BELLE KIRKLAND MINES, LTD. **ONTARIO**

Address: Sun Life Bldg., Toronto, Ont. **Mine address:** Kirkland Lake, Ont. F. C. Loring, mgr.

Property: the Gibson group of claims at Goodfish lake, Kirkland Lake area, said to show molybdenite and gold ore in Keewatin formation. Developed to depth of 350′ by shafts and crosscuts, showing several 2′ stringers of high-grade ore. Diamond drilling totaling 5,000′ is said to indicate ore to 700′ depth.

Equipment: includes compressor and hoist good for depth of 1,000′. Suspended operations July, 1917, pending financing.

LAFAYETTE SILVER MINES, LTD. **ONTARIO**

Address: Kent Bldg., Toronto, Ont. **Mine address:** Gowganda, Ont. Newton Bigbee, mgr.

Property: 2 claims, 4101 and 4102, in Nicol Twp., Gowganda area. Ore is silver-bearing.

LAKE MATACHEWAN GOLD MNG. CO., LTD. **ONTARIO**

Address: 502 Kent Bldg., Toronto, Ont. **Mine address:** Elk Lake, Ontario.

Officers: Geo. Collins, pres.; Amos Tipling, v. p.; J. C. M. German, sec.-treas.; with Geo. A. Benton and Ed. J. Hayes, directors. E. Sommerville, mgr.

Inc. in Ontario. **Cap.** $2,000,000; par $1; 1,000,000 treasury shares. Snook & Dixon, of Toronto, are underwriters.

Property: 3 claims in Powell Twp., Elk Lake (Matachewan) area, and joins Matachewan Gold Mines on N. The formation is largely schistose sedimentaries cut by narrow porphyry dikes. Ore is quartz carrying sulphides with gold. Claims were drilled winter of 1919-20.

LAKE SHORE MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ont.

Officers: Harry Oakes, pres. and man. dir.; A. G. Slaght, v. p.; W. H. Wright, 2nd v. p.; Dr. W. P. St. Charles, treas.; with C. E. Wettlaufer, J. B. Tyrrell and A. E. Wende, directors. Kirkland Securities, Ltd., sec.; R. C. Coffey, mgr.

Inc. February 25, 1914, in Ontario. **Cap.** $2,000,000; par $1; all issued. Trusts and Guarantee Co., Ltd., Toronto, transfer agent and registrar. Traded in on Toronto Exchange. Price record $1.15 to $1.20, Aug., 1921.

Dividends: last (No. 9) of 2% on Nov. 10, 1921; total since 1918, $400,000.

Balance sheet, Nov. 30, 1920, shows assets of $1,369,465, which includes bullion on hand, $144,015; supplies, $56,978; Victory bonds, $50,000; buildings and equipment, $158,031; property, development and organization expense, after charging off $270,000 for exhaustion, $952,638. Current liabilities total $56,052; capital stock discounted $1,332,203; surplus $22,017.

Income account shows, $528,028, of which $483,701 was from ore sales; expenditures totaled $234,992; net profit was $104,992, after deducting $120,000 for exhaustion and $10,000 for taxes. The total operating cost was $15.51 per ton.

Property: 4 claims and 4 fractions, 171 acres, the Lake Shore gold mine, on Kirkland Lake, in Teck Twp., adjoins the Teck-Hughes and Orr properties on the east. There are several veins, and the orebodies vary in width up to 11'. Ore occurs chiefly in a reddish porphyry. Faulting is frequent. Constant assaying is necessary to follow the shoots.

Development: by 600' shaft and several thousand feet of workings. In the year ending Nov. 30, 1920, new work totaled 1,130', with 18,702 tons of broken ore in stopes, averaging $28.27 per ton, or $520,575. Crosscuts on the 200' and 400' levels have been driven under the lake. Most work has been done at 200', where the No. 2 vein is opened for 1,500', the greater part in ore. During 1921, work was concentrated on the 400 and 600' levels, the main production coming from the 400' level.

Equipment: purchased electric power, 7-drill electrically-driven compressor, fully equipped shaft-house, heating plant, shops, dwellings, assay office, and treatment plant employing crusher, ball-mill,, tube-mill, classifiers, and continuous decantation cyanide plant.

Production: during fiscal year ending Nov. 30, 1920, was 18,889 tons, averaging $25.61, or $483,701; to Nov. 30, 1921, 21,621 tons yielding $460,186. During Dec. 1921, mill handled 2,004 tons of ore, recovering $70,854.

LA MINE D'OR HURONIA, LTD. **ONTARIO**

Described in Volume XIV. Property acquired by **Argonaut Gold, Ltd.,** which see.

LA ROSE CONSOLIDATED MINES CO. **ONTARIO**

Dissolved in 1918, La Rose Mines, Ltd., assuming liabilities and assets of the holding company.

LA ROSE MINES, LTD. **ONTARIO**

Office: 260 St. James St., Montreal, Quebec. **Mine office:** Box 926, Cobalt, Ont.

Officers: D. Lorne McGibbon, pres Shirley Ogilvie, v. p.; S. J. Le Huray,sec.-treas., with E. W. Nesbitt, Edwin Hanson, David Fasken, W. M. Dobell and W. A. Black, directors. G. C. Bateman, gen. mgr.

Inc. in Ontario. **Cap.** $7,500,000; $5 par; reduced November, 1917, to $1,500,000, par $1. Bankers Trust Co., New York, and Royal Trust Co., Toronto and Montreal, transfer agents. Guaranty Trust Co., of New York, registrars. Annual meeting, 2nd Wed. in April. Stock listed on Toronto Stock Exchange. Quoted in 1920, high 53½c., low 25c.; in 1921, 38c. high, 16¼ low.

In 1918, took over all assets and liabilities of the holding company, La Rose Cons. Mines Co. It owns 97,269 shares, 90% of University Mines, Ltd.

Combined financial statement of La Rose and University Mines for 1921 shows total receipts for ore shipments, $552,754; other income, $59,363; value of ore in transit, Dec. 31, 1920, $210,626; value of ore in transit, Dec. 31, 1921, $77,527; operating expenses, $352,930; net profit, $126,089.

Balance sheet of La Rose Mines as of Dec. 31, 1920.

Assets: total $31,130,255, which includes: mines, mining claims, etc. (including 97,269 shares of stock in University Mines, Ltd.), $1,456,151; advances of Univ. Mines, Ltd., $77,544; buildings and equipment, $41,645; supplies, $217,488; cash in banks, $132,372; call loans, $58,245; Victory Loan investment, $100,550.

Liabilities: capital stock $1,500,000; surplus, $500,667; reserve, Univ. Mines, Ltd., $34,230; accrued expenses on ore, $30,771; accounts payable, $12,565; unpaid payroll, $4,715; reserve for depreciation, $45,000; surplus, $500,667. Net current assets, Dec. 31, 1921, were $555,910.

Dividends: total $7,505,410; last in April, 1918. La Rose Cons. Mines Co. paid $5,911,640 during its existence.

Property: 6 patented claims, 359 acres, at Cobalt, Coleman Twp., includes the La Rose, Princess, Lawson, University and Fisher-Eplett mines, all practically worked out, and the Violet mine which adjoins the O'Brien on the east. A boundary dispute with the O'Brien company was settled by the Supreme Court in 1920.

Development: in 1920 amounted to 2,336', confined to La Rose, Violet and Princess mines; in 1921 it was 5,241', including that on the University. The Fisher-Eplett and Lawson mines were not operated, 1920-21. Late in 1921, results on 530' level of the Violet were encouraging and an ore shoot, 5' wide and 225' long, is said to average 30 oz. silver; a winze is being sunk. Reported that La Rose mine was flooded by inflow from Cobalt lake in December.

Equipment: complete and modern in all respects. Ore is treated at mill of Bailey Silver Mines, Ltd.

Production: total, to end of 1920, 40,058 tons of ore and concentrate, yielding 25,205,092 oz. silver, with net returns of $13,230,728. During 1921, from La Rose and University, 36,365 tons of ore averaging 15.7 oz. per ton were treated, yielding 659 tons of concentrate containing 570,970 oz. silver.

Production:

Year	Prod. Oz. Silver	Net Value	Cost Prod. per oz..c	Net Sell Price per oz..c.	Net Profit	Dividends	Surplus
1921	637,042	$390,958	46.00	63.54	$126,089	.....	$550,910
1920	410,445	313,995	73.27	83.41	13,279	.....	500,667
1919	289,317	356,124	105.00	117.00	30,204	.....	514,424
1918	288,556	268,525	87.17	99.83	45,544	$30,000	484,046
1917	437,338	328,751	68.64	82.94	71,372	320,000	509,927
1916	740,065	449,734	46.39	64.89	164,744	333,000	.....
1915	1,135,142	526,996	31.64	50.88	230,662	436,000	.....
1914	1,368,247	637,555	37.20	53.92	217,979	918,000	.....

Production figures for 1921 include those of the University mine.

La Rose is a liquidating property, unless new properties are acquired. Numerous properties have been examined, but none was under option.

University Mines, Ltd.

Controlled by La Rose Mines, Ltd.

Cap. $1,000,000.

Balance sheet for year ending Dec. 31, 1920, shows assets, $1,077,715, including property, $1,000,000; buildings, $8,117; railway siding, $1,172; liabilities include, due La Rose Mines, Ltd., $77,544. Income from ore sales was $74,027; other income, $8,327; expenses, $95,183; operating loss, $12,828. The total deficit is $68,426.

During 1920, La Rose did 2,263' of development work on the University mine, opening up a new body of milling ore and a 3" vein of high grade. Management estimates 3,000 to 4,000 tons of broken ore in stopes.

Shipments in 1920 amounted to 6,086 tons mill ore averaging 10.3 oz., or 49,294 oz. silver, and 20.6 tons high grade ore, averaging 2,500 oz. per ton, a total of 100,895 oz. silver. In July, 1921, the mine was reported shipping 2 cars daily to the Bailey mill.

LA SANTA LUCIA GOLD MINES, LTD. ONTARIO

Merged with Cartwright Goldfields, Ltd., to form Blue Quartz Gold Mines, Ltd., which see.

LAWSON MINES, LTD. ONTARIO

Company dissolved and property now a part of La Rose Mines, Ltd., which see.

LEBEL CRYSTAL LAKE GOLD MINES, LTD. **ONTARIO**

Address: 157 Bay St., Toronto, Ont. **Mine address:** Kirkland Lake, Ont. Hy. S. Rose, mgr.

Property: at Crystal lake, Lebel Twp., Kirkland Lake area. Early in 1921, company planned to expend $50,000 on exploratory work.

LEBEL LODE, LTD. **ONTARIO**

Address: Cobalt, Ont. **Mine address:** Kirkland Lake, Ont.

Officers: A. J. Post, pres., Cobalt; W. Langden Hayden, v. p. 54 Wall St., New York; Chas. Mickle, v. p.; G. W. Dixon, sec.-treas., with Dr. G. A. Schmidt, G. L. Brewer and Gordon Cameron, directors

Inc. 1921, in Ontario. **Cap.** $2,000,000; $1 par; 1,499,971 shares in treasury.

Property: 3 claims, 100 acres, in Lebel township, Kirkland Lake area, N. of the King Kirkland, said to show gold values at surface.

A prospect.

LEBEL ORO MINES, LTD. **ONTARIO**

Address: 8 Bk. of Toronto Bldg., Toronto, Ont. **Mine address:** Kirkland Lake, Ont. Rolf Hurd, mgr.; W. F. Greene, supt.

Property: in Lebel Twp., eastern section of Kirkland Lake area, covers the McGee gold-bearing vein developed by a shaft, 50′ deep, in early 1921. Ore is said to be of commercial grade at surface.

LIGHTNING RIVER GOLD MINES, LTD. **ONTARIO**

Address: Box 639, Haileybury, Ont.

Officers: W. J Lucy, pres.-mgr.; W. J. Morrison, v. p.-cons. engr.; Udney Richardson, sec.-treas.; with Dr. J. A. Wilson, Geo. Wallace, W. M. Cochenour and L. B. Howey, directors.

Inc. Feb. 1920, in Ontario. **Cap.** $3,000,000; par $1; 1,400,000 treasury shares. Montreal Trust Co., registrar. Annual meeting, Feb. 21, 1922. As of Sept. 7, 1921, 96,040 shares were sold for about $34,236.

Property: the Howey-Cochenour-Willians group of 8 claims in Holloway Twp., 4 claims in Egan Twp., and 6 claims in Maisonville Twp., of which 8 claims are patented; total of 720 acres. The two first named are about 40 miles apart in the Larder Lake area, and the third group is in Bourke's area, all in Timiskaming district. The H.-C.-W. claims, 10 miles S. of Abitibi lake, show a narrow quartz vein and stringers in a sheeted zone, near a basalt-rhyolite contact, with a dip of 23°. The ore carries pyrite with which fine gold is associated; it is said to assay $27 and upward for widths of 12 to 18″, over a distance of 200′. Developed by 70′ shaft and trenching; equipped with boiler and hoist. The two other groups have been explored on the surface only.

As frankly stated, these are prospects.

LORRAIN CONSOLIDATED MINES, LTD. **ONTARIO**

Office: 42 Broadway, New York. **Mine address:** Matheson, Ont.

Officers: D. M. Steindler, pres.; J. M. Cohen, mgr.

Mark Harris & Co., Standard Bank Bldg., Toronto, Can., were underwriters of 250,000 shares of stock.

Property: in So. Lorrain Twp., in area of same name, is said to show a vein 5-8″ wide of calcite and smaltite on which 260′ shaft has been sunk. At about 65′ vein dipped out of shaft but it was again found at 263′. No commercial ore encountered yet.

Development: work in progress, 1917, but stock is considered a speculation pure and simple. Idle several years.

MAJESTIC GOLD MINES, LTD. **ONTARIO**

Address: 213 Carlton St., Toronto, or care Chas. Gregory, Parry Sound, Ont. **Mine address:** Matheson, Ont.

Officers: M. A. Attalah, pres.-mgr.; Chas Gregory, sec., with S. Lattief, directors.

Inc. Jan. 24, 1921 in Ontario. **Cap.** $1,000,000; $1 par.

Property: in Beatty and Coulson townships, Munro area, also an option

on Craig-Pollard claims on Miles lake, W. of West River station, in the Howrey Creek area, said to show an 8' quartz vein.

Developing with 7 men at last account.

MAPES-JOHNSTON SILVER MINES CO. ONTARIO

Dead, and property acquired by **Brant Mines, Ltd.**

MARCH GOLD, LTD. ONTARIO

Address: care Chas. B. Jakes, 202 Lumsden Bldg., Toronto, Ont. **Mine address:** So. Porcupine, Ont. A. J. Brant, mgr.

Property: in Deloro Twp., Porcupine area of the Timiskaming district, near the Maidens-MacDonald mine of the Coningas company, from which a mining plant was obtained. Operations began mid-1921 and in November it was reported that $20,000 was available for exploratory work and 16 men employed.

MASSEY STATION MINING CO., LTD ONTARIO

Office: 801 Dominion Bank Bldg., Toronto. Mine near Massey, Ont.

Officers: Wallace Nesbitt, pres.; S. H. P. Pell, v. p.; Britton Osler, sec.: preceding, with Robt. Means Thompson and Miss I. M. Innes directors.

Inc. April 24, 1901, in Ontario. **Cap.** $300,000; $100 par; fully issued. Company is said to have expended about $300,000 on development and equipment.

Property: 840 acres, Crown granted, including 480 acres timber land in Salter township, Sudbury district, about 3 miles from a railway.

Geology: the tract is covered by steeply dipping beds of quartzite and schist, crossed by a mineralized zone a mile long. This contains lenticular deposits of quartzose material containing disseminated particles of copper glance, bornite, and in depth chalcopyrite. The two lenses developed are 10' wide, and the 50,000 tons of ore developed is said to assay 3 to 5% copper, with $1 to $2 gold per ton. See Lincoln, in "Eng. & Min. Jour." of August 4, 1917.

Development: by shaft 600' deep and several levels. Also 130' tunnel.

Equipment.: includes a 200-h. p. steam and electric plant, with 2 Lidgerwood hoists, a 6-drill compressor and 15 buildings.

A 50-ton experimental mill, using the Elmore vacuum oil flotation process, with Blake and centrifugal crushers and 3 Jenckes and Wilfley tables, was built ten years or so ago, but property closed down in 1907 owing to failure of mill to make expenses.

Property was under option to Kenyon Copper Mines, Ltd. at beginning of 1917, but reverted to the owners. The ore can undoubtedly be treated by flotation methods, but development of larger reserves is needed.

MATACHEWAN GOLD MINES CO. ONTARIO

Is a reorganization of the Colorado-Ontario Development Co.

Address: 2 Toronto St., Toronto, Ont. **Mine address:** Elk Lake, Ont.

W. J. Boland, sec.; W. H. Seaman, mgr.; E. Craig, supt. of exploration.

Inc. Oct. 17, 1918, in Ontario. **Cap.** $4,000,000.

Property: 5 claims, includes the Otisse gold mine, the Robb Clement and Berry Dunn claims, in Powell Twp., Matachewan (Elk Lake) area, on the Montreal river, 23 miles N. E. from Elk Lake, the terminus of a branch of the T. & N. O. Ry. The Otisse was operated in 1918 under lease by the Colorado-Ontario Development Co.

Geology: the chief rocks near the orebodies are dark grey, altered basalt and associated fragmental rock, which when altered, are speckled with iron pyrite. What is known as the Otisse ore is a light grey rock that has been altered from a dark basaltic rock. It carries abundant iron pyrite, and quartz in minute veinlets.

Development: by extensive trenching, 15,000' of drilling, 2 shafts and 1,000' of lateral work on the 200' level.

Idle since June, 1920, pending development of hydro-electric power.

McGUIRE KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 157 Bay St., Toronto, Ont. **Mine address:** Kirkland Lake, Ont. K. A. McRae, supt.

Inc. March 3, 1919, in Canada.

The prospectus issued by the company gives the charter but has very little other information. Original incorporators were Lena Adams, bookkeeper; Mary Winnifred Hunt, stenographer; K. A. McRae, engineer; Vera Marion Gray, teacher; Mabel Gray, teacher, and Edward Martin, inspector, all of Toronto. The first three are directors.

Company was organized to purchase 3 mining claims in Larder Lake district for 150,000 shares. Reported 1921 to own property in Lebel Twp., Kirkland Lake area.

McINTYRE EXTENSION MINES, LTD. **ONTARIO**

Property and assets of this company purchased by **McIntyre Porcupine Mines, Ltd.** (which see), by payment to minority shareholders of 294.000 shares in exchange for 955,501 shares of McIntyre Extension Mines, Ltd. See Vol. XII for description of property, and history of company.

McINTYRE-JUPITER MINES, LTD. **ONTARIO**

Property and assets of company purchased by the **McIntyre Porcupine Mines, Ltd.** (which see), by payment to minority shareholders of 316,298 shares of McIntyre Porcupine Mines, Ltd., in exchange for 943,893 shares of McIntyre-Jupiter Mines, Ltd. See Vol. XII for description of property and of organization.

McINTYRE PORCUPINE MINES, LTD. **ONTARIO**

Offices: Standard Bank Bld., Toronto, and Schumacher, Ontario.

Officers: J. P. Bickell, pres.; W. J. Sheppard, v. p., with J. B. Tudhope, Jos. Errington and N. S. Dunlop, directors. M. P. Van der Voort, sec.; H. G. Laux, treas.; L. J. Pashler, asst. sec.; R. J. Ennis, gen. mgr.

Inc. March 16, 1911, in Ontario. **Cap.** $4,000,000; $5 par; being changed from $1 par in 1921, increased from $3,000,000 in 1917, when company purchased properties and assets of McIntyre Extension Mines, Ltd., and McIntyre Jupiter Mines, Ltd. Payment amounted to 610,298 shares for both mines. McIntyre-Porcupine shares issued total 3,640,283. The capital of the three amalgamated companies was $7,500,000, $7,398,878 issued Outstanding bonds were retired at maturity August 15, 1918.

Toronto General Trusts Corp. and Security Transfer & Registrar Co., New York, transfer agents and registrars. Annual meeting, usually in October. Listed on New York Stock Exchange.

Dividends: 3 of 5% in 1917 including initial on Feb. 15; 3 of 5% in 1918; 2 of 5% in 1919; 3 of 5% in 1920; 3 of 5% in 1921; and total of $2,540.698. In 1922, 5% was paid on Jan. 2.

Shares sold as high as.

Comparative General Balance Sheet, years ending June 30:

Assets.

Year	Plant and Equip.	Capital Devel.	Invest-ments	Disc. on Sec. Sold	Current	Total
1921...	$5,065,003	.....	$740,734	.....	$ 862,603	$6,668,340
1920...	4,848,485	.....	57,502	.....	1,619,388	6,525,375
1919...	4,688,682	.....	197,163	.....	728,992	5,614,837
1918...	4,616,811	.....	104,117	.....	393,679	5,125,344
1917(b)	4,432,250	.....	100,000	.....	319,530	4,851,780
1916...	2,921,991	209,508	175,036	211,992	151,963	3,670,490
1915(a)	2,799,035	209,508	.....	214,492	104,670	3,327,705

(a) 15 months, ending March 31. (b) 15 months, ended.

	Liabilities.					
	Capital Stock	Bonds	Current	Reserves	Profit and Loss	Total
1921..	$3,640,283	.....	$303,829	$1,078,020	$1,646,208	$6,668,340
1920..	3,640,283	.....	544,576	958,832	1,381,684	6,525,375
1919..	3,640,283	.....	122,377	688,445	1,163,732	5,614,837
1918..	3,610,283	$4,500	106,181	532,207	872,173	5,125,344
1917..	3,610,283	11,000	87,597	400,996	741,903	4,851,780
1916..	2,999,985	31,000	111,989	144,466	383,050	3,670,490
1915..	2,986,985	54,500	114,704	4,989	166,527	3,327,705

Comparative Operating Account, years ending June 30:

		Disbursements			Profit and
	Receipts	Mine	Mill	Miscel.	Loss Account
1921	$1,904,326	$613,926	$207,190	$267,648	$815,530
1920	2,315,894	577,084	197,317	261,260	818,021
1919	2,745,990	510,727	182,530	369,381	683,350
1918	1,729,842	607,208	161,201	281,071(c)	680,361
1917(b)	1,693,040	526,200	159,005	285,185(c)	725,790
1916	775,821	265,622	102,389	80,286	327,524
1915(a)	749,234	319,203	101,354	95,923	232,752

(a) 15 months, ending March 31. (b) 15 months ended June 30. (c) Includes depreciation.

Property: located on the south, west and north sides of Pearl Lake, Tisdale Twp., comprises 347 acres, of which 113 acres are under Pearl Lake and Gillies Lake. The area added by acquiring the Extension and Jupiter mines was 127 and 79 acres, respectively. The immediate object of amalgamation was to secure the right to use the Extension main shaft for deeper exploration of the McIntyre property on N. side of Pearl Lake, as development work had revealed large orebodies at 1,000′ depth in both mines.

Geology: the tract shows a broad band of schistose quartz porphyry, between two areas of altered volcanic schist, basalt and associated lavas.

Exploration has shown that the best gold ore occurs in the altered volcanic schist, at or near the quartz porphyry contact; development in the quartz porphyry away from the contact has not shown much gold. Orebodies are lenticular in form and very irregular, the shoots consisting of quartz more or less interbanded with mineralized schist. The discovery of orebodies has been rendered difficult by the presence of compression faults which have displaced portions of the ore as much as 130′. Eighty per cent. of ore milled is heavily mineralized schist.

Development: by 2 shafts, 1,625′ and 2,000′ deep, making McIntyre the deepest gold mine in Canada, with stations at 1,125′, 1,250′, 1,375′, 1,500′, 1,625′ and 1,700′. Total work, 72,000′ at end of March, 1921, not including 50,000′ of diamond drilling. Vein system has been opened up on the 1,375′ and 1,500′ levels and explored by drilling to depth of 1,700′. Two new veins each about 8′ wide and carrying $7 gold per ton, were cut on the 1,375′ level.

Ore reserves:

	Tons	Average Value	Total Value
June 30, 1921	624,422	$10.25	$6,392,394
June 30, 1920	502,682	11.13	5,595,500
June 30, 1919	433,057	11.00	4,777,324
June 30, 1918	459,276	9.80	4,490,432
June 30, 1917	443,617	11.14	4,943,034
March 31, 1916	201,920	11.12	2,247,128
March 31, 1915	109,693	7.79	854,436

Equipment: property is well equipped with hoisting and milling plants, including a 550-ton cyanide mill, in which a 95% recovery is obtained by grinding the ore in cyanide solution and giving a short period of agitation. A new 250-ton mill unit was being (Jan. 1922) installed, which will be particularly adapted to the treatment of carbonaceous ore of which a considerable tonnage has been opened. This makes a total mill capacity of 750 tons per day. In 1919-20, an electric hoist to handle 3 tons from depth of 3,000' was added.

Production:

	Tons Milled	Value per ton	Rec. %	——Costs per ton—— Mine	Mill	Total	Profit per ton
1921....	171,916	$11.67	94.9	$3.57	$1.21	$6.33	$4.75
1920....	188,835	11.52	95.6	3.06	1.04	5.48	5.54
1919(d).	179,874	9.76	95.2	2.89	1.01	5.08	4.21
1918(d).	178,327	10.05	95.6	3.26	0.90	5.15	4.90
1917(c).	195,307	10.00	95.4	2.99	0.89	4.78	5.22
1916(a).	105,758	7.71	95.6	2.51	0.96	4.28	3.09
1915(b).	85,654	8.87	94.4	3.72	1.18	6.02	2.85
1913....	31,979	7.85	89.8	...	...	...	...
1912....	14,500	7.00	75.0	...	...	...	...

(a) Year ending March 2. (b) 15 months, ending March 31. (c) 15 months ended June 30, 1917. (d) Year ending June 30.

In first 18 months of operation, the Blue Diamond Coal Company showed a net deficit of $157,127, but initial expenditures are reported to have been heavy.

Mine development during the past few years has been very satisfactory as the veins on the lower levels show as much commercial ore as the upper workings, and lateral development of the upper levels has opened up entirely new orebodies. These results and the acquisition of adjoining properties, assures a long productive life to the company, which is now one of the three big gold producers of Canada.

An option obtained in 1918 on controlling interest in the Newray property adjoining the Plenaurum, expired in 1921, work on that mine having failed to disclose orebodies of commercial grade.

Company acquired in 1920 a 50% interest in the Blue Diamond Coal Mine, Ltd., situated at Brule, Alberta; the latter company holds an option on 50% of the capital stock of Canadian Coalfields, Ltd. The Timiskaming Mng. Co. has joined forces in this venture.

At prices prevailing in April, 1922, the shares were selling on a basis of $16,000,000 for the mine. According to the Canadian Mng. Journal, "the mine must produce $32,000,000 to realize a reasonable return to those who buy stock at the prevailing price."

As recent diamond drilling has shown an indicated tonnage far in excess of the amount of ore reserves of $6,000,000 gross, it is not improbable that the above figure may eventually be realized.

McIVOR GOLD MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ont. Harry Oakes, mgr.

Property: at Beatrice lake, Teck Twp., Kirkland Lake area, near Swastika and about 3 miles from Kirkland Lake, developed by 100' shaft. Continuation of development was planned for summer of 1921.

McKINLEY-DARRAGH-SAVAGE MINES OF COBALT, LTD. ONT.

Offices: Trusts Guarantee Bldg., Toronto, and Cobalt, Ont. Treasurer's office: 100 Sibley Block, Rochester, N. Y.

Officers: J. R. L. Starr, pres.; Thos. W. Finucane, v. p.; Harper Sibley, treas.; A. G. Beckwith, asst. treas., with H. W. Sibley, Jas. S. Watson, T. R. Finucane, (gen.-mgr.), directors; J. H. Spence, sec., Toronto; H. C. McCloskey, res. mgr.

Inc. 1906, in Ontario. **Cap.** authorized, $2,500,000; issued, $2,247,692;

$1 par. Registrar: Columbia Trust Co., New York; transfer agt. Security Transfer & Registrar Co., New York. Annual meeting, in 1922, March 9. Traded on New York Curb. Prices 46c. low, 75c. high in 1919; 18c. to 65c. in 1920; 10c. to 30c. in 1921.

Comparative General Balance Sheet:

Assets.

Year	Mine and Plant	Savage Mine and Plant	Bennett Claim	Current	Inv. etc.	Total
1921....	.....	.....	.....	$ 24,863	.....	$2,381,617
1920....	$2,144,203	.....	.....	357,797	.....	2,502,000
1919....	2,160,764	.....	.....	579,100	.....	2,739,864
1918....	2,171,247	.....	.....	454,615	$56,872	2,682,734
1917....	2,199,449	.....	.....	398,660	11,849	2,609,958
1916....	1,381,560	$686,055	$100,000	455,073	6,600	2,628,333
1915....	1,385,728	689,104	100,000	444,166	7,731	2,626,729
1914....	1,402,798	694,168	100,000	447,852	7,716	2,652,534

Liabilities.

Year	Capital Stock	Surplus	Reserve Govt. Tax	Current	Total
1921.....	$2,247,692	.....	.....	$ 90,061	$2,381,617
1920.....	2,247,692	$122,735	$21,233	110,340	2,502,000
1919.....	2,247,692	365,602	25,092	101,478	2,739,864
1918.....	2,247,692	281,197	22,535	131,310	2,682,734
1917.....	2,247,692	242,514	30,000	89,752	2,609,958
1916.....	2,247,692	264,943	17,500*	98,197	2,628,333
1915.....	2,247,692	280,299	2,500	96,238	2,626,729
1914.....	2,247,692	313,935	4,000	86,907	2,652,534

Comparative Statement of Operations:

Year	Gross Oper. Profit	Deductions	Net Oper. Profits	Interest	Total Net Profits
1920..	*$17,469	$60,972	*$78,441	$37,867	*$40,574
1919..	373,758	47,313	326,445	27,683	354,128
1918..	342,167	46,505	295,662	13,056	308,719
1917..	299,126	43,977	255,150	4,645	259,795
1916..	304,637	28,967	275,670	6,634	282,304
1915..	260,424	28,991	231,433	5,224	236,657
1914..	328,850	30,876	297,974	9,678	307,652
1913..	816,025	53,098	762,927	8,560	771,487

* Loss.

Dividends: 2% in 1907; 9% in 1908; 10% in 1909; 15% in 1910; 50% in 1911; 50% in 1912; 32% in 1913; 18% in 1914; 12% in 1915; 1916, 1917, 1918 and 1919; in 1920, 3% quarterly to Oct. 1; none since. Total 265%, or $5,889,028.

Property: 1 claim, 40 acres, the McKinley-Darragh mine in Coleman Twp., at southern end of Cobalt lake; 1 claim, 40 acres, the Savage mine, on the east side of Cart lake; 40 acres in Bucke Twp., the Bennett claim. The McKinley-Darragh, which adjoins the Nipissing and La Rose holdings, has been the most important producer. Deepest workings are at 400', where the contact with the Keewatin formation is exposed.

Development: work in McKinley amounted to 8,200' in 1918, the largest footage of any year. This large amount of exploration was responsible for the increased costs, but it served to find several payable orebodies. Several small veins were developed in the lower levels of the mine, but no large orebodies of importance were found. There is only a small area of favorable ground on the lower levels yet to be explored. The Savage is practically worked out.

In 1919 and 1920, total extensions were 5,893', and 108,158 tons of

milling ore were hoisted, much the larger part from the McKinley. As ore remaining in this mine averages about 9 oz., it cannot be profitably mined with a silver price as of Dec. 31, 1920.

Equipment: includes a 200-ton concentrator and a flotation unit for treatment of tails.

Ore reserves: estimated January 1, 1919, to contain 852,754 oz. of silver compared with 1,076,182 oz. January 1, 1918, and 1,714,302 oz. January 1, 1917. On Jan. 1, 1920, ore reserves were 1,077,411 oz. of silver; and one year later reported that about 25,000 tons of broken ore were available, plus a considerable tonnage blocked out, but only a little of it profitable with silver at 60c.

Costs at the McKinley-Darragh mine:

		Costs			
Year	Tons Milled	Mines	Mill	Mktg.	Total
1920	63,892	$3.12	$2.51	$1.06	$8.86
1919	56,570	3.01	2.11	1.54	9.48
1918	67,020	2.75	1.53	1.19	7.36
1917	68,142	2.47	1.33	1.06	6.93
1916	62,676	1.98	0.95	1.08	5.15
1915	50,912	1.78	0.93	1.01	4.71
1914	45,098	2.22	1.44	1.70	6.99
1913	48,761	2.44	1.39	1.88	7.37

Extraction on all ore milled was 86.9% in 1913; in 1914, 85.1% on McKinley ore and 64.1% on Savage ore; 80.9% in 1915; 86.98% in 1917; 87.23% in 1918; 84.27% in 1919; 75.77% in 1920.

Production:

	Ounces Silver Shipped			Cost	Profit
Year	McK.-D.	Savage	Total	per oz.	per oz.
1920.	627,630	.....	.....	0.8562	*$0.0502
1919.	767,798	.....	.....	0.7193	0.3872
1918.	904,543	.....	.....	0.6842	0.3130
1917.	1,020,545	.....	.....	0.5052	0.3268
1916.	1,055,996	.....	.....	0.4073	0.2664
1915.	803,717	256,419	1,060,136	0.2871	0.2210
1914.	1,051,925	208,121	1,260,046	0.3130	0.2310
1913.	1,672,431	556,066	2,228,497	0.2230	0.3690

* Loss.

Total silver shipped to end of 1920 was about 19,520,565 oz.

Silver prices realized were 99.72c. in 1918; 110.65c. in 1919; in 1920, 64.25c. to 131c.

Because of low price of silver and lack of power, mine was shut down on Dec. 31, 1920; the situation at the end of 1921 was no better.

MERCER SILVER MINES, LTD. ONTARIO

Out of business, described in Vol. XIII.

METALS CHEMICAL, LTD. ONTARIO

Out of business. Described in Vol. XIV. Property sold to **Ontario Smelters & Refiners, Ltd.**

MILLER-ADAIR MINES, LTD. ONTARIO

Address: 26 Adelaide St. W., Toronto, Ont. **Mine address:** Shining-tree, Ont. Jas. E. Day, pres.

Property: 2 claims in McMurchy Twp., Sudbury district, adjoins the Wasapika on N., exposes the Ribble vein crosscutting pillow lava schist, and said to be 5′ wide. The vein filling is quartz carrying fair gold values.

MILLERETTE SILVER MINING CO., LTD. ONTARIO

Property became a part of the Miller Lake O'Brien mine, which see under **M. J. O'Brien, Ltd.**

MILLER INDEPENDENCE MINES, LTD. ONTARIO

Address: Germantown, Ohio.

Mine address: W. E. Simpson, gen. mgr., Boston Creek, Ontario.
Officers: Wm. Stroop, pres.; John C. Schaeffer, sec.; Edward Rettick, treas.; with Geo. Ozias, O. B. Brown of Dayton, Ohio, J. A. Read, Adam Begrad and Frank Groch, directors.
Inc. November 17, 1915, in Ontario. **Cap.** $500,000; increased to $700,000 in 1918; $1 par; 650,000 shares outstanding. Annual meeting, Feb. 2, 1922.
Property: 160 acres in Pacaud Twp., Boston Creek district.
Geology: the vein cuts through fine grained "pillow" lava and hornblende schist with a feldspar-porphyry dike on the hanging wall. The ore is white quartz, containing specks of pyrite, galena and telluride of gold. **Reserves:** not extensive, but of good grade.
Development: by 4 shafts, the deepest 500', from which level, crosscut was driven 487' to open principal zone of mineralization. Also by drilling from 500' level.
Equipment: includes a mill, recently enlarged to 75 tons daily capacity, using Groch flotation unit, 5-drill compressor, 4 boilers, 2 hoists, etc. Electric power is used.
In August 1920, 46,000 shares were offered to stockholders at $3.80 per share, being the balance of a block of 100,000, the sale of which was authorized by the Ohio Dept of Securities, but which were not disposed of owing to the prevailing financial conditions. Because of this and of many unpaid subscriptions, operations were suspended, May, 1921. Later a bond issue of $50,000 was fully subscribed and development resumed.

MILLER LAKE O'BRIEN MINE **ONTARIO**
See **M. J. O'Brien, Ltd.**

MILLER LAKE SILVER STAR MINES, LTD. **ONTARIO**
Address: Rm. 12, 99 St. James St., Montreal. **Mine address:** Gowganda, Ont. J. J. Frickey, mgr.
Inc. 1920, in Ontario. **Cap.** $2,000,000.
Property: in Nicol Twp., Gowganda area, Timiskaming district.

MILLERTON GOLD MINES, LTD. **ONTARIO**
Merged into **Hollinger Cons. Gold Mines, Ltd.**

MINAKER KIRKLAND GOLD MINES, LTD. **ONTARIO**
Address: G. A. Bagshaw, Haileybury. **Mine address:** T. J. Flynn, mgr., Kirkland Lake.
Inc. in Ontario. **Cap.** $1,500,000; $1 par.
Officers: G. A. Bagshaw, pres.; Frank L. Mapes, v. p. F. Haak, sec.-treas., both of Rochester, N. Y.; with Edward Moir, Marcelles, N. Y., and John Kavanagh, Rochester, directors.
Property: four claims in Teck Twp., adjoining the Lake Shore on the S., is said to show a number of gold bearing veins, on one of which a shaft has been sunk to depth of 175'.
No recent information.

MINES SERVICE CORP., LTD. **ONTARIO**
Office: Cochrane Bldg., Sudbury, Ont.
Officers: A. B. White, pres.; F. Woods, v. p.; M. J. Connor, sec.-treas., with S. E. Wright, Thos. Saville and Jas. Fouriezos, directors.
Inc. 1921, in Ontario. **Cap.** $100,000; par $1; 60,000 treasury shares; 20,000 shares offered for sale at par, March, 1922.
The objects of the corporation are: the employment of a prospector to locate meritorious properties, to develop them, and to act as a clearing house for its own and other properties.
Property: 16 claims in the Shining Tree gold area, Sudbury district, near Whanipatae lake, shows a 15' vein in a quartzite-conglomerate contact, carrying free gold. Development is to begin in 1922.

MINING CORPORATION OF CANADA, LTD., THE **ONTARIO**
Office: 1514 Bank of Hamilton Bldg., Toronto. For Central Operat-

ing Co., address 1514 Trader Bk. Bldg., Toronto. **Mine address:** M. F. Fairlie, Box 918; Cobalt, Ont.

Officers: J. P. Watson, pres.; W. R. P. Parker, 1st v. p.; G. M. Clark, 2nd v. p. with E. H. Rose, Thos. Plunkett, C. E. Traffard and J. G. Watson, directors. W. W. Perry, sec.; Scott Turner, cons. engr.; C. E. Watson, mgr.; M. F. Fairlie, mill mgr. London advisory com.; A. C. F. Fitzgeorge, chm.; T. W. Inwood and R. F. Eden

Inc. Nov. 23, 1916. **Cap.** $8,300,250; par $5; all issued; succeeding company of same name, incorporated March 20, 1914, with capital of $2,075,000, par $1. Stockholders of old company received new stock to the amount of $4 for each $1 of old: and stockholders of the Canadian Mng. Corp., Ltd., the original holding company (English) and now liquidated, received one share of new M. C. C. for each share of C. M. C. held.

London transfer agency: 14 Copthall Ave., London, E. C. Traded in on Toronto Stock Exchange; price range, $2.12-$4 in 1918; $1.50-$2.50 in 1919; $1.05-$2.20 in 1920; 95c.-$1.22 in 1921.

April 1, 1914, the Mining Corp. of Canada acquired the mining properties formerly operated by the Cobalt Townsite Mng. Co., Ltd., Cobalt Lake **Mng. Co. Ltd.,** City of Cobalt Mng. Co. Ltd., and the Townsite Extension Mines, Ltd., total area, 200 acres, at Cobalt. In 1915, the property of the Little Nipissing Mining Co., 40 acres, was acquired.

Owns entire capitalization, $250,000, of Cobalt Reduction Co., Ltd., operating a 300-ton mill and 140-ton cyanide plant. Company also owned all the capital stock of **Canadian Industrial Minerals, Ltd.,** operating a fluorspar mine at Madoc, Ont.; this venture was dropped in December, 1920, with a net loss of $225,000. In spring of 1920, purchase of **Buffalo Mines, Ltd.,** 40 acres, was completed by the General Examining & Development Co., a subsidiary, all shares of which are owned by the Mining Corp. The Central Operating Co., Ltd. (q. v.), operates holdings of **Foster Cobalt Mng. Co.** under a lease, and the Texas Yankee Girl Mng. Co., Ltd. (q. v.), operating in the Nelson division of British Columbia, are also subsidiaries. In 1921, corporation leased the Haileybury-Frontier in So. Lorrain Twp., which see for description.

Comparative Balance Sheet, years ending December 31:

Assets.

	1920	1919	1918
Cash in banks and office	$ 419,057	$ 538,282	$ 300,823
Ore in transit and on hand	145,712	99,130	144,954
Due from smelters	77,560	229,077	89,665
Treasury bills and war loans	342,574	441,166	1 517,805
Bonds	67,829	148,121	101,574
Demand loans	207,520	.....	18,064
Accounts receivable	13,000	12,991	117,318
Debentures—Can. Industrial Minerals, Ltd.	239,561	208,468	86,000
Buildings, equipments, stores, etc.	302,484	294,233	291,564
Due by Cobalt Red. Co., Ltd	344,165	384,866	373,177
Shares, Cobalt Red. Co., Ltd	249,083	249,083	249,083
Optional and other properties, etc.	409,402	257,437	330,035
Russian prospects	285,816	256,000	240,471
Mining rights	7,553,124	7,553,124	7,553,124
Gen. Exam. & Devel. Co., Ltd	1,009,799	1,040,373	.....
Total	$11,666,686	$11,712,350	$11,413,657

Liabilities.

Capital stock	$8,300,250	$8,300,250	$8,300,250
Profit and loss account (balance at credit)	3,268,628	3,311,577	3,025,347
Accounts, dividends, taxes, royalties pay	97,808	100,523	88,060
Total	$11,666,686	$11,712,350	$11,413,657

Comparative Profit and Loss Account, years ending December 31:

	1920	1919	1918
Balance forward from preced. year	$3,311,577	$3,025,347	$3,448,378
Profit at mines	715,645	826,042	990,473
Other income	77,825	274,293	273,031
Total	$4,105,047	$4,125,682	$4,711,882
Office expenses, salaries, etc	96,217	103,856	69,897
Government royalties, taxes etc..	117,683	87,730	267,847
Dividends and bonuses	622,519	622,519	1,348,791
Total	$836,419	$814,105	$1,686,535
Balance to balance sheet	$3,268,628	$3,311,577	$3,025,347

Dividends: in 1916, 25% and 2½ bonus; in 1917, 18¾%; in 1918, 16¼%; in 1919, 37½%; in 1920 37½%. The total is $5,499,275.

Property: the City, Lake and Townsite have been the principal mines at Cobalt, but are gradually being worked out. Acquisition of the adjoining 40 acres of the Buffalo materially increased company's total reserves; this mine between 1913 and 1919 produced over 7,000,000 oz. of silver, and while greater part of high grade has been mined, a large tonnage of low grade ore is left.

Geology: ores occur in narrow calcite veins in Huronian conglomerate and Keewatin formation. The high-grade ore in 1918 assayed 1953 oz. silver per ton, the milling ore, 35 oz. silver per ton, and average of total ore treated was 41 oz. per ton.

Development: a 3 years' extensive exploration was completed 1918 and extensions in 1919 were only 606'. Work in 1920 proved satisfactory and drilling operations indicated the existence of new ore. Total openings are over 22 miles. Mining costs, including development and exploration, were $4.76 per ton in 1920, compared with $5.26 in 1919 and $7.30 in 1918.

Ore reserves: at end of 1919 were 38,735 tons carrying 1,307,220 oz. of silver, compared with 28,950 tons and 830,940 oz. silver for 1920. There were about 350,000 tons of tailing in Cobalt lake in 1919, reduced to 275,000 tons in 1920. The Buffalo mine is credited in 1920 with 1,350,060 oz. silver contained in 74,653 tons of ore. The total reserve tonnage includes 45,286 tons broken ore.

Equipment: in addition to plant of Cobalt Reduc'n Co., includes Buffalo mill under lease from General Ex. & Devel. Co., equipped to treat high and low grade ore; has cyanide and flotation units and is connected by aerial tram with Cobalt Lake. The Buffalo mill was leased in 1920 to the Coniagas Mines. Early in 1921, capacity of Cobalt Reduction mill was increased from 160 to 300 tons.

Company had 200 new properties under consideration in 1919 and 300 in 1920, principally in Canada. Those under option in British Columbia have proved generally disappointing. In Manitoba, a majority interest in the **Flin Flon** (q. v.) property was purchased in May, 1921. Limited exploration continues in search of radium ore in Butt Twp., Ont. Except for the lease on the Foster mine, there are no new developments in Northern Ontario. Company-owned graphite and molybdenite properties in Canada remain inactive.

In 1917, a quartz gold property in the Yenisei district of Siberia, was bought, after considerable development had been done, but due to the political condition of the country the mine was closed temporarily. The affairs of the British American Mng. Co., in which the Mining Corp. had a 45% interest, have been wound up. In 1920, options were taken on properties in Mexico and Nicaragua.

Mines and mill were closed down for about 3 months early in 1921, owing to low silver price; mill capacity was increased during this period.

Production: ore is treated at the Cobalt Reduction Co's plant.

Year	Tons ore treated	Oz. Silver per ton	Extraction per cent.	Total Oz. silver Rec.	—Total costs— per ton	per Oz.
1920	51,918(a)	30.66	91.69	1,459,643	$20.06	62.60c
1919	35,410(a)	35.52	94.12	1,183,760	20.78	59.78
1918	42,482(a)	41.01	95.71	1,667,344	24.51	60.96
1917	84,085	56.49	94.43	4,485,541	19.26	36.11
1916	114,392	42.29	92.14	4,457,440	13.43	34.46
1915	132,879	37.86	90.72	4,563,957	10.15	29.57

(a) Does not include 17,632 tons tailing treated with a total silver recovery of 40,908 oz., or 58.04%, in 1918; 28,494 tons of tails yielding 46,892 oz. silver, or 48.45%, in 1919; 71,476 tons yielding 204,375 oz., or 73.01%, in 1920.

Production, to 1921, totals 32,217,505 oz. Reported that much of 1921 production came from the Buffalo mine.

The company is one of the largest silver producers in Canada. Its 3 Cobalt properties are nearing exhaustion, but under present management there seems little doubt that with the acquisition of other good mines, the company will continue paying dividends.

MOFFAT-HALL GOLD MINES, LTD. **ONTARIO**

Address: care W. T. Hall, Haileybury, Ont. **Mine address:** Kirkland Lake, Ont.

Officers: Fred. C. Bidgood, pres.-mgr. director; Lloyd R. Moffatt, v. p., with R. Y. Campbell and Bruce Williams, directors. Wm. S. Hall, sec.-treas.

Inc. 1920 in Canada. **Cap.** $3,000,000. $1 par.

Property: 12 claims, 414 acres, in Lebel Twp., Kirkland Lake area. Reported developing, 1920-21.

MOLYBDENUM PRODUCTS, LTD. **ONTARIO**

Address: J. J. Gray, sec., 760 Keele St., Toronto, Ont. **Mine address:** Wilberforce, Ont.; M. B. R. Gordon, mgr.

Officers: W. J. L. McKay, pres.; with P. J. Dwyer, directors.

Inc. July 12, 1918 in Ontario. **Cap.** $1,075,000.

Property: in Monmouth Township, near Wilberforce, said to have large body of ore, assaying 0.7% molybdenum, which is mined and treated in 200-ton mill, completed Dec., 1918. Idle.

MOND NICKEL CO., LTD.,THE **ONTARIO**

Secretary's address and sales office: D. Owen Evans, 39 Victoria St., London, S. W., England. **Mine office:** Coniston, Ontario. **Refining works:** Clydach, Glamorganshire, Wales.

Directors: R. L. Mond, chairman; Viscount Erleigh, Sir E. J. Griffith, Saxton W. A. Noble, Sir Robert A. Hadfield, Emile S. Mond, Dr. Carl Langer, Robt. Mathias and Sir Edmund Walker. S. V. Corless, Canadian mgr.; Oliver Hall, mine supt.; A. Sharp, supt., Carson mine; J. F. Robertson, supt. of smelting works.

Inc. September 20, 1900, in Great Britain. **Cap.** £3,400,000, including £500,000 in 7% cumulative pref'd shares; par £1; £2,000,000 non-cumulative 7% preferred shares of £1 par, and 900,000 commmon shares, £1 par. Original capital, £600,000, increased July, 1908, to £850,000; in £500,000

cumulative 7% preferred shares, £5 par; £300,000 ordinary shares, £1 par, and £50,000 deferred shares, £1 par; total issued capital £750,000. Reorganized July 22, 1914, with authorized capital of £2,400,000, in shares of £1; 500,000 being in 7% cumulative preferred shares; 1,000,000 in 7% non-cumulative preferred shares, and 900,000 ordinary shares increased 1918 to present capital. Fiscal year with April 30.

Debenture stock: £375,000 first mortgage 5's, redeemable at 105 on or before Jan. 1, 1935, issued against stock of old company, and £500,000 6's, due at 101 before Dec. 31, 1924. In spring of 1921, an issue of £1,300,000 mortgage debenture stock 8's was made; secured by trust deed and due at 104 between Jan. 1, 1926 and Nov. 1, 1941; the issue of £500,000 6's will be repaid out of the proceeds.

Dividends: 7% has been paid regularly on preferred shares; dividends on ordinary shares; 6% in 1905; 10% in 1906; 12½% in 1907; 15% in 1908, 1909 and 1910; 16¼% in 1911 and 1912; 21¼% in 1913; 35% in 1914; 20% in 1915 and 1916, on new capital; 20% less tax in 1917; interim of 1s per share, less tax; final of 3s per share free of tax in 1918; interim of 1s per share free, paid on Feb. 5 and final of 2s 6d on Aug. 1, 1919; same amounts on Feb. 5 and Aug. 6, 1920; in 1921, 1s per share tax free was paid on Aug. 12.

Property: over 14,000 acres in the Sudbury district, and mining rights on about 12,000 acres near to and including Bruce Mines, about 29,000 acres in all. In the Sudbury district the Levack, Garson, Victoria, Worthington, Bruce copper-quartz mines are worked. The Blizzard, Frood Extension, Kirkwood and North Star are held in reserve. The Bruce mine is opened by several shafts producing quartzose-copper ore, used as flux in the converters.

Development: the Levack mine, purchased in 1913, is opened by a 5-compartment inclined shaft, 590′ deep, with 7 levels. In 1918, ore had been developed on 5 levels, and proved to a depth of 1,400′; reserves estimated at 6 to 8,000,000 tons of ore.

The Garson mine has a 3-compartment 1,000′ shaft. Diamond drilling has proved ore to 1,300′ depth.

The Victoria for a long time the company's chief producer is the deepest mine in Canada. At last accounts the 3-compartment shaft had reached the depth of 2,600; and was being sunk to 3,000′ depth.

The orebody at the Worthington mine, 750′ deep, is a mixture of very high-grade ore and rock, which is close sorted. The orebody is a brecciated basic dike and not typical of the Sudbury deposits. (For geology see Economic Geology, Vol. X, No. 6.)

The North Star shaft is 400′ deep. The Blizzard mine was worked by open-pits.

The Frood Extension mine has a 4-compartment shaft, 1,000′ deep, levels at 400, 750, and 900′. The main orebody lies at 1,000′ depth. Work at this mine was stopped when the war started.

The copper-nickel ratio in the ore from these different mines varies widely.

Smelter: the 1,500-ton smelter at Coniston, Ont., 7 miles E. of Sudbury, blown-in May 15, 1913, has 4 blast furnaces, 50x240″, and 4 Pierce-Smith basic converters with shells 10′ in diameter and 25′ 10″ long. Ores are smelted in blast furnaces and matte bessemered to a rich matte containing 41% copper, 41% nickel, 17% sulphur, and less than 1% iron. This product is shipped to the company's refinery at Clydach, in Swansea Valley, South Wales, where the metals are separated and the nickel is refined by the Mond process.

Refining works: at the Clydach works the matte is dead-roasted and treated with dilute sulphuric acid, which permits the extraction of about 65% of the copper and 2% of the nickel. The residue, after drying, assays 45 to 60% nickel, and is treated in charges of 500 kgs. with water-gas, in a

reduction tower, at a temperature of about 300° C. This tower has shelves and the ore is moved from shelf to shelf by automatic rakes, the lower shelves being cooled. After treatment in the reduction tower the charge is transferrd to a volatilizing tower and treated with carbon monoxide at a temperature of about 100° C. The residue therefrom is returned to the reducing tower and the charge goes forward and back between the 2 towers for 10 to 15 days, and when 60% of the nickel has been volatilized, as nickel carbonyl, the residue of the charge is returned to the roasting furnace. The nickel carbonyl is treated in a decomposing apparatus, wherein the metal is recovered in granules, assaying 99.4 to 99.8% nickel, and the copper is turned out as bluestone of which the company markets considerable quantities for agricultural purposes.

All the Canadian plants are up-to-date and operated electrically by power from 3 hydro-electric plants, 2 of which are the property of the Lorne Power Co., a subsidiary of the Mond Nickel Co. The growth of the company's operations within the past several years has been phenomenal.

Production: the mine output for 1911 was 163,352 tons, 117,658 tons in 1912, 408,638 tons in 1915, 361,335 tons in 1917, 382,913 tons in 1918. Metal production is not reported, but unofficial estimates four years ago placed the annual output at about 4,000,000 lb. fine copper and 5,000,000 lb. nickel, with a possible maximum production of 10,000,000 lb. copper and 15,000,000 lb. nickel. A small amount of platinum is also produced, amounting to 4,465 oz. in 1918.

After the Armistice, finished stocks accumulated and in 1919, company's operations were curtailed, but in 1920, production was gradually brought back to normal.

MONETA PORCUPINE MINES, LTD. **ONTARIO**

Office: 420 Bank of Hamilton Bldg., Toronto, Ont. **Mine office:** Timmins. Ont.

Officers: Sir H. M. Pellatt, pres.; D. M. Steindler (42 Broadway, N. Y.), v. p.; with J. A. Murray and A. G. Kirby, directors. C. H. Manaton, sec.-treas.

Inc. in Ontario. **Cap.** $2,000,000; par $1; 1,541,000 shares issued. Company registers and makes transfers.

Property: 120 acres in Tisdale Twp., Porcupine area, Timiskaming district, adjoins Hollinger on W., is said to show several promising gold-quartz outcrops.

MONTREAL KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 46 Bank of Ottawa Bldg., Montreal. **Mine address:** Kirkland Lake, Ont.

Inc. March 2, 1918. **Cap.** $1,000,000.

Property: the Killoran group of 4 claims in Teck Twp., Kirkland Lake area, adjoins Ontario Kirkland on S., developed by an 100′ shaft sunk in 1918. On Nov. 1, 1921, sale of 75,000 shares at 25c. was authorized, proceeds to be used for plant and resumption of operations.

MOOSE MOUNTAIN, LTD. **ONTARIO**

Offices: 17 Battery Pl., New York, and Sellwood, Ont.

Officers: Chas. E. Herrmann, pres., with J. J. Mitchell, J. B. Dennis, A. L. Harnes and Chas. H. Smith, directors. A. J. Anderson, Sellwood, Ont. mgr.; W. R. Cox, 120 Broadway, New York, cons. engr. and sales agent.

Inc. in Ontario. **Cap.** $2,000,000; par $100. Transfers made at company's New York office.

Property: the Magpie and other Moose Mountain iron mines, about 5,000 acres, at Sellwood, Hutton Twp., Larnark county, 30 miles W. of Sudbury, on Can. Natl. Railway, opened in 1908. Eleven orebodies, 80 to 250′ wide and 400 to 6,000′ long, have been uncovered; the country rock is schist. The ore is a finely disseminated magnetite.

Development: by tunnels, up to 400′ long; total workings, 2,000′, to a depth of 200′. Overhand shrinkage stoping is employed.

Ore reserves: estimated to be 100,000,000 tons, assaying 35% iron and 0.08% phosphorus.

Equipment: includes electric power, double drum hoist two 2,000′ compressors, 800-ton concentrator and briquetting plant, making a briquette averaging 66% iron and 0.012% phosphorus.

Production: 40,444 tons in 1915; 5,338 tons in 1916, none in 1917; 26,777 tons in 1918; 38,287 tons in 1919. Total to 1922, about 500,000 tons of cobbed ore, concentrate and briquettes.

MURRAY-MOGRIDGE MINES, LTD. ONTARIO

Address: Union Bk. Bldg., Toronto, Ont. **Mine address:** Bourkes, Ont.

Officers: Gideon Grant, pres.; G. F. McFarland, v. p., with F. B. Carvell, Douglas Murray, J. R. L. Starr, W. W. Sloan, Wm. I. Banfield, D. D. Grant and J. L. McDowell, directors. A. E. Marks, sec.-treas.; G. G. Thomas, manager.

Cap. $4,000,000; $1 par. Listed on New York Curb, Security Transfer and Registrar Co., transfer agents.

Is a reorganization of the Murray-Mogridge Co. The shareholders of old company received 1,928,870 shares of new stock and New York interests took 200,000 shares, at $1 a share, the proceeds to be used to pay off all obligations and to give funds for the development. Reported in November, 1919, that $100,000 had been paid in.

Property: about 680 acres, at Wolke Lake in Maisonville Twp., near Bourkes' Siding on the T. & N. O. Ry.

Development: by 200′ and 100′ shafts, also 300′ of drifting, said to disclose 6 quartz veins. Work suspended owing to lack of funds, in 1920.

NATIONAL MINES, LTD. ONTARIO

Address: E. C. Whitbeck, sec.-treas., 17 Ellwood Bldg., Rochester, N. Y.

Operated under lease, the King Edward mine, idle several years.

NEPIGON MINING & LANDS CO. ONTARIO

Owns Woods Location, a 10,000 acre tract in Sibley Twp., under option to the **Islet Exploration Co.**, which see.

NEW EXTENSION MINES, LTD., THE ONTARIO

Address: 1512 Bk. of Hamilton, Toronto, Ont. **Mine address:** New Liskeard, Ont. W. W. Perry, sec.

Inc. Oct. 23, 1918, in Ontario. **Cap.** $150,000.

Property: in Casey Twp., Timiskaming district.

NEW PORCUPINE IMPERIAL MINES, LTD. ONTARIO

Successor of Porcupine Imperial Mines, Ltd. H. L. Taylor, pres.

Cap. $3,000,000; $1 par. Holders of Porcupine Imperial stock received one share of new stock for two shares of old company's stock.

Property: ¾ mile S. W. of Dome Lake, in Porcupine area, is said to show several veins of gold ore under development for several years by 115′ shaft with about 500′ of workings. Some diamond drilling has also been done. No recent information.

NEWRAY MINES CO., LTD. ONTARIO

Office: Jas. E. Day, sec.-treas., 26 Adelaide St., W., Toronto, Ont. **Mine address:** Timmins, Ont.

Officers: B. J. Bixby, pres., Buffalo, N. Y.; H. L. Tudor, v. p.; C. P. Charlebois and W. F. Funk, directors

Inc. in Ontario. **Cap.** $1,500,000; increased to $3,000,000 in 1918; $1 par; 1,318,000 issued. U. S. Corporation, New York, and Imperial Trusts Co., Toronto, registrars and transfer agents. Traded in on Toronto Stock Exchange.

Is a reorganization of the **Rea Consolidated Gold Mines, Ltd.**; stock being exchanged at the rate of 1½ shares new stock for each share of Rea Consolidated stock.

Property: North ½ of lots 6 and 7, Concession III, about 320 acres;

comprise the Rea mine, at Porcupine, 1½ miles from Schumacher, the nearest railroad station. The well-defined quartz fissure veins strike N. E. and dip N. W.; ore-shoots occur as lenses in and along shear zones.

Development: 2-compartment vertical shaft, sunk 420′ on vein, with levels at 200, 300 and 400′. The oreshoot is cut and displaced by a fault at depth of 240′; below the fault the vein is not of the same character. The orebody above the fault was stoped for about 300′ in length, 4½′ wide, and 200′ in depth and is said to have produced 19,500 tons of ore, averaging $11 per ton. Diamond drilling is said to have cut 12′ of quartz showing free gold at 630′ vertical.

Equipment: includes 10-stamp mill, hoist, 6-drill compressor, pumps and boiler.

Production: 11,607 tons of ore yielding $125,000 in bullion in 1915. It resumed treatment in May, 1917. Output in 1918 was 401 tons of $3.78 ore.

In 1917, property was taken under control by the Crown Reserve company of Cobalt, but option was relinquished in 1918 and McIntyre-Porcupine Mines, Ltd. then took an option on 1,500,000 shares at 45c. per share, which expired in 1921.

Inactive because of lack of funds.

NICHOLS CHEMICAL CO., LTD. **ONTARIO**

Subsidiary of **General Chemical Co.**

Office: 222 St. James St., Montreal, Canada.

Property: the Northern Pyrites mine on Vermillion Lake at North Pines, shows veins averaging 45′ in width for 1,000′ in length with strike N. E. and dip 55° N. W. Mine said to have the largest pyrite deposit under development in Canada.

Equipment: includes 2-mile aerial tram, hoist, compressor and concentrating mill. Shipments to the United States are made via Graham on the Grand Trunk Pacific R. R. and the Great Lakes. Employs 130 men. Company does not publish financial or statistical reports.

About 95,000 tons of pyrite produced in 1915; 103,337 tons in 1918. Work resumed in Oct., 1919, after having been shut down.

Company also operates the Goudreau pyrite mine, shipments from which in 1918, amounted to 90,613 tons. About 200 men employed under Gerald G. Dobbs, supt., at last accounts.

NIPISSING EXTENSION MINES, LTD. **ONTARIO**

Address: Imperial Bank Ch., Toronto, Ont. **Mine address:** Cobalt, Ont.

Officers: A. J. Young, pres.; W. E. Stevenson, v .p.; with Albert Loening; J. W. Pickup, and Abbott Kimball, directors. E. H. Birkett, mgr.

Inc. 1919, in Ontario. **Cap.** $3,000,000, issued $2,000,000.

Company has purchased property formerly owned by **Nipissing Ext. Mng. Co.,** 40 acres in Peterson Lake section of Coleman Twp., and property once owned by **Farah Mng. Co.,** 53 acres, also at Cobalt.

No recent information.

NIPPISSING MINES CO. **ONTARIO**

Company's assets and business acquired in September, 1917, by the Nipissing Mines Co., Ltd., of Ontario. Nipissing Mines Co., described in Vol. XIII.

NIPISSING MINES CO., LTD. **ONTARIO**

Company took over assets and business of the Nipissing Mines Co., of Maine, which controlled the Nipissing Mining Co., Ltd., see below.

Head office: Excelsior Life Bldg., Toronto, **New York office:** 165 Broadway.

Officers: E. P. Earle, pres.; Alex Fasken, sec.; P. C. Pfeiffer, treas. **Directors:** E. P. Earle, W. H. Brouse, R. T. Greene, David Fasken, August Heckscher, John H. Black and R. B. Watson.

Inc. July 18, 1917, in Ontario. **Cap.** $6,000,000; par $5; all issued. Transfer agents; Bankers Trust Co., New York, Old Colony Trust Co., Boston; and Toronto General Trusts Corp., Toronto. Registrars: The New

York Trust Co., N. Y., State Street Trust Co. Boston and Toronto General Trusts Corp., Toronto. Listed on Boston Stock Exchange, New York Curb and on Toronto Stock Exchange.

Nipissing Mines Co., Ltd. is a holding company, owning the entire stock of the Nipissing Mining Co., Ltd.

Annual report, December 31, 1921, shows total receipts $945,407, including $935,000 dividends on stock of Nipissing Mining Co., Ltd.; total disbursements were $936,590, including $900,000, paid in dividends. Assets, January 1, 1921, were $6,368,817, including capital stock of the Nipissing Mining Co., Ltd., $6,000,000; dividends receivable from The Nipissing Mining Co., Ltd., $360,000; cash $8,817.

Dividends: 46 paid by Nipissing Mines Co. (Maine Corp.) 1906-1917, was 269%, or $16,140,000. Ten paid by Nipissing Mines Co., Ltd. (Ontario Corp.), 1917-'19, 80%, on $4,800,000, making a total of 349%, equal to $17.45 per share, or $20,940,000. Distributions in 1920, were $1,800,000; in 1921, $1,140,000; or grand total of $23,280,000 (388%); in 1922, $360,000 was paid in January.

As the management realizes that the original Nipissing holdings are nearing exhaustion, the company is actively searching for new properties.

Exploration on 1,000 acres of oil lands in Clay county, Texas, acquired in 1919, proved disappointing and work stopped. The oil property near Osawatomie, Kansas, controlled by the company, has shown fair results. In 1920, a majority interest of the **Croton Magnetic Iron Mines**, owning iron mines at Brewster, N. Y., was purchased, and in 1921 an option was taken on the Rochester Veteran claim in the Porcupine gold area, adjoining the Hollinger. Other Canadian properties have been, or are being, considered.

Nipissing Mining Co., Ltd., The

Head and mine office: Cobalt, Ont. **New York Office:** 165 Broadway. Entire stock issued owned by Nipissing Mines Co., Ltd.

Officers: David Fasken, pres.; E. P. Earle, v. p.; with John H. Black, R. T. Greene and R. B. Watson, gen. mgr., directors. Alex Fasken, sec.; P. C. Pfeiffer, treas.; Hugh Park, mgr.; J. J. Denny, mill mgr.

Inc. 1904, in Ontario. **Cap.** $250,000; shares $100 par; all issued.

Comparative General Balance Sheet:

Assets.

Year	Property and Equip.	Investm'ts.	Ore and Bullion	Other Current	Total
1921.....	$284,719	$207,657	$1,031,047	$3,146,700	$4,670,123
1920.....	320,666	247,338	1,629,711	3,192,689 (g)	5,390,404
1919.....	364,226	178,755	1,093,111	3,975,227(f)	5,611,321
1918.....	629,203	380,000	1,496,784	2,237,006(e)	4,742,994
1917.....	662,741	529,123	1,320,839	1,368,866(d)	3,881,569
1916.....	652,605	279,123	1,198,473	962,072(c)	3,092,273
1915.....	689,974	33,430	944,932	784,892(a)	2,453,228
1914.....	746,887	69,520	1,129,539	416,350(b)	2,362,296

Cash, (a) $776,854 (b) $391,292. (c) $952,082. (d) $1,364,458. (e) $2,233,526. (f) $2,036,563. (g) $793,531.

Liabilities.

Year	Capital Stock	Accounts Payable	Accrued Expenses	Dividends Payable	Surplus	Total
1921..	$250,000	$184,270	$24,610	$360,000	$3,851,243	$4,670,123
1920..	250,000	708,247	15,113	600,000	3,817,044	5,390,404
1919..	250,000	365,834	22,535	600,000	4,372,952	5,611,321
1918..	250,000	398,954	52,337	600,000	3,441,702	4,742,994
1917..	250,000	271,157	28,814	600,000	2,731,599	3,881,569
1916..	250,000	195,515	36,632	610,000	1,980,126	3,092,273
1915..	250,000	103,909	13,058	300,000	1,786,261	2,453,228
1914..	250,000	190,522	18,998	300,000	1,602,776	2,362,296

Comparative Income Account:

Year	From ore	Total	Cost Production	Net Profit	Dividends	Surplus
1921	$1,869,566	$2,000,520	$1,031,322	$969,199	$935,000	$3,851,243
1920	2,503,224	2,641,653	1,362,562	1,279,091	1,835,000	3,817,044
1919	3,752,084	3,856,458	1,080,208	2,776,250	1,845,000	4,372,952
1918	4,040,446	4,119,568	1,475,832	2,525,104	1,815,000	3,441,702
1917	3,756,890	3,828,311	1,129,408	2,686,472	1,935,000	2,731,599
1916	3,027,669	3,076,228	1,024,745	2,028,866	1,835,000	1,980,126
1915	2,222,256	2,256,432	815,005	1,441,427	1,220,000	183,485
1914	2,516,065	2,558,733	971,112	1,587,621	1,235,000	343,715

Dividends: paid to January, 1921 total $23,640,000 or 394%.

Property: 8 claims, 846 acres at Cobalt, Ontario, Canada, has over 100 fissure veins, from ½" to 12' in width, occurring in Huronian conglomerate or Keewatin formation. The ore carries silver, with cobalt, arsenic, nickel and mercury.

Development: total work in 1919 amounted to 7,717', compared with 7,815' in 1918. There are 10 working shafts on the property. The lowest, or No. 64 shaft is 1,003' deep; work there in 1919 gave no ore. Since the beginning of 1919, several orebodies have been found, all of which have proved up well.

During 1920, little in the way of new veins was found, but the older veins, which continue to be the main sources of ore production, proved better than expected. Hereafter operations will be conducted through 2 principal shafts, one on each side of the lake. Extensions in 1920 totaled 8,213'. During 1921, development work opened promising shoots of high grade silver ore in veins No. 64 and 251. Extensions amounted to 6,352'.

Exploration work on the Rochester claim has not exposed ore of commercial value, but 7 holes have been drilled and the work is to be continued.

Ore reserves: on Jan. 1, 1922, were 1,444 tons of high-grade and 58,044 tons of low-grade ore, assaying 1,313 and 19.1 oz. silver; total silver was 3,004,939 oz. compared with 3,568,127 oz. in 1920.

Equipment: includes a 40-stamp mill for low-grade ore, cyanide plant, air compressors, power house, hoists, tramway, etc. A flotation plant of 10 Callow cells treats tailings.

A new regrinding plant was added in 1920 and an additional recovery of nearly one ounce of silver is effected. Both high-grade and low-grade ores now go to the stamps.

Production:

Year	Ore, tons	Silver Per ton, oz.	Total silver, oz.	Sell price, cts.	Cost Per oz., cts.
1921.....	80,722	39.1	3,156,775	.....	28.53
1920.....	82,719	41.6	3,332,303	72.58	37.40
1919.....	66,354	49.9	2,905,474	113.71	35.61
1918.....	81,257	44.2	3,701,416	99.14	39.02
1917.....	74,187	61.6	4,212,248	83.19	25.12
1916.....	77,915	53.9	4,044,668	68.79	24.14
1904-1919..	.....	....	56,023,955	.....	.....

Nipissing is the largest company, has most extensive holdings of any company in the Cobalt district and is an exceedingly well managed corporation.

NORTHCROWN PORCUPINE MINES, LTD. **ONTARIO**

Is a merger, May 15, 1920, of properties of **Porcupine-Crown Mines, Ltd.**, and of **Thompson-Krist Mng. Co., Ltd.**; the former remains a holding company with a ⅔ interest in new company.

Mine address: H. J. Stewart, mgr., Timmins, or Cobalt, Ont.

Offices: Dominion Exp. Bldg., 145 St. James St., Montreal and 18 Toronto St., Toronto.

Officers: (same as Porcupine-Crown), John W. Carson, pres.-mgr. dir.; Wm. T. Gear, 1st v. p.; Jas. G. Ross, 2nd v. p.; Jas. Cooper, sec.-treas., with J. R. L. Starr, J. B. Bertram, Percy Galt, A. G. Gardner and Ziba Gallagher, directors.

Inc. April, 1920, in Ontario. **Cap.** $3,000,000; $1 par; Porcupine-Crown and stockholders of Thompson Krist received 2,000,000 and 1,000,000 shares, respectively, new company receiving $30,000 cash, in addition to property holdings.

Property: Porcupine-Crown patented claim, 40 acres, and adjoining Thompson-Krist claims, 120 acres, in Deloro Twp., Porcupine area; and under option from May, 1919, the 4 claims of Canadian-Kirkland Gold Mng. Co., Ltd., (q. v.) in Teck Twp., Kirkland Lake area. At Porcupine, quartz ore occurs in veins in schist, carrying free gold and sulphides; main orebody is 5′ wide and 1,100′ long.

Development: to depth of 1,100′ by vertical shaft. In 1917, a serious cave cut off 3 levels and operations were suspended, June, 1918; total new work was 700′. During 11 months of 1919, former company was again active, but in a small way. At beginning of 1920, ore reserves had an estimated value of $500,000. At Kirkland lake, work was also on limited scale in 1919, and apparently was suspended altogether during 1920-'21; but in January, 1922, reported that operations on the Canadian-Kirkland were to resume.

In Jan., 1922, it was reported that company was in financial difficulties, due to the alleged default of Thompson-Krist to meet certain obligations.

New company in 1920 uncovered two new veins on the 500′ level of T.-K. and began 1,900′ crosscut on same level of P.-C. ground. Mill was operated part of year.

Equipment: includes 150-ton cyanide mill. Total cost per ton ore was $5.47 in 1916, and $7.07 in 1917.

Production:

	Tons Treated	Value Per Ton	Extraction	Net Value Bullion
1918	10,907	$9.64	97.09%	$124,474
1917	37,722	10.97	97.09%	.....
1916	51,273	12.11	97.14%	571,652
1915	41,326(a)	14.46	97.70%	613,565
1914	40,857	17.18	97.26%	689,151

(a) Not including 5,093 tons tailing, assaying $3.15 per ton, treated with an extraction of 85%.

Company is under same management as Porcupine-Crown and Crown Reserve.

All operations were suspended in June, 1921.

NORTH DAVIDSON MINES, LTD. ONTARIO

Now **Beaumont Gold Mines, Ltd.**, which see.

NORTH DOME MINING CO. ONTARIO

Dead. Company was controlled by Timiskaming Mng. Co., which later purchased property at a forced sale.

NORTHERN COPPER & NICKEL MINES ONTARIO

Address: 704 Merchants Bank Bldg., Winnipeg, Manitoba, or Ingolf, Ont.

Officers: A. F. Hardy, pres.; C. J. Diebold, v. p.; J. H. Hicks, sec.-mgr.

Cap. $2,000,000.

Property: 1,640 acres, includes the Olive mine, in Rainy River district, near Mine Centre, Ont., and close to the Manitoba line. The main vein occurs in a dike of porphyritic felsite and carries free gold.

Developed by 250' shaft. The mine was fully equipped and in operation about 20 years ago.

NORTHERN CUSTOMS CONCENTRATOR, LTD. **ONTARIO**

Office: 702 Excelsior Life Bldg., Toronto, Ont.

Officers: A. J. Young, pres.; C. J. Booth, v. p.; L. O. Walton, sec.-treas.; C. J. B Armstrong, supt.; F J. Bourne, man. dir., and cons. engr.

Cap. $250,000; 248,008 shares issued.

Company sold its custom mill at Cobalt to **Bailey Silver Mines, Ltd.** and now owns stock control of the Bailey-Silver and the **South Easter Mng. Co., B. C.**

NORTHERN PYRITES CO. **ONTARIO**

Property owned by the **Nichols Chemical Co.**, which see.

NORTH THOMPSON (ASSOCIATED) GOLD MINES, LTD. **ONT.**

Merged, 1917, into **Porcupine V. N. T. Gold Mines, Ltd.**, which see.

NORTH WOODS MINING CO. **ONTARIO**

Office: 115 Broadway, New York.

Officers: John C. Hicks, pres.; Ernest Sharp, v. p.; W. W. Stevens, sec.; Charles S. Rees, treas.

Inc. 1914, in Ontario. **Cap.** $2,000,000; $1 par; all issued. Shares closely held.

Property: 27 claims, 1,080 acres, in Tisdale, and Whitney townships, in heart of the Porcupine district, close to the principal mines.

Development: only nominal exploration has been done owing to abnormal conditions. In the fall of 1919 some drilling was done.

O'BRIEN, LTD., M. J. **ONTARIO**

Main Ontario office: 511 Union Bk. Bldg., Ottawa. **Mine offices:** Cobalt and Gowganda, Ont.

Officers: M. J. O'Brien, pres.; J. A. O'Brien, v. p.; J. G. Dickenson, mgr. Staff for O'Brien mine: A. E. McKee, sec.-treas.; A. D. Campbell, engr.; D. W. McLeod, supt.; L. McEwen, mill supt. Staff for Miller Lake O'Brien mine: Alex. Starke, sec.-treas.; H. G. Kennedy, supt.; G. Barkhouse, mill supt. D. J. McCarthy, mgr. at Goudreau, Ont.

Company has license, Jan. 17, 1918, to operate in Ontario.

Cap. for use in Ontario, $12,000,000. It controls the **Renfrew Gold Mines, Ltd.**, and **Scheelite Mines, Ltd.**, of Nova Scotia, the Storm Cloud mine in Arizona and property in Missouri and Mexico. All of these will be found described elsewhere in this volume.

Property: includes the O'Brien silver mine at Cobalt and Miller Lake O'Brien silver mine, near Gowganda, together 560 patented acres; an interest in the Bansall silver group, in Haultain Twp., 2 miles N. E. of Gowganda, and an option on the McCarthy-Webbs gold group in Sault Ste. Marie section of the Algoma district. The Bonsall has an 118' shaft and was being worked 1918-'19.

O'Brien Mine

A group of claims in Coleman Twp. near Cobalt lake and adjoining Nipissing on N. E., has been a steady silver producer for many years and in 1919, was reported to have 5 years' ore reserves in sight.

Ore: occurs in conglomerate, Keewatin and diabase and contains silver, cobalt, arsenic and nickel.

Development: by 6 shafts to depth of 800', with 10 miles of crosscutting, raising, drifting and winzing.

Equipment: includes 200-ton concentrator and cyanide mill.

Production: 1,237,345 oz. of silver shipped from 51,892 tons of ore in 1914; 1,137,000 oz. from 65,000 tons in 1918; 1,170,000 oz. from 54,000 tons in 1920.

Miller Lake O'Brien Mine

A group of claims, including the Millerette, in Nicol Twp., Gowganda area, near and N. W. of Miller lake, has been the leading silver producer in the Gowganda district.

Development: by 525′ shaft and extensive workings.

Equipment: includes hoists, 20-drill compressor, and a mill; a hydro-electric plant between Gowganda and Burke lakes is equipped with 2 turbines and a 500-h. p. generator.

Production: figures not available, but reported to be 631,671 oz. in 1918 and 708,872 oz. in 1919. The district is credited with a total production from 1908-1920, of 5,430,152 oz., mainly from this mine.

O'BRIEN MINE ONTARIO

See **M. J. O'Brien, Ltd.**

O'CONNOR SILVER MINES, LTD. ONTARIO

Address: Rm. 34, Imperial Bk. Bldg., Toronto, Ont. **Mine office:** Cobalt, Ont. Frank Callaghan, mgr.

Property: in lot 6, concession IV, Coleman Twp., Timiskaming district. This presumably is the same company which in 1918-'19 was reported to have issued exaggerated statements describing its mineral holdings. It is to be hoped that a reformation has taken place.

ONTARIO-KIRKLAND GOLD MINES, LTD. ONTARIO

Address: Haileybury, Ont. **Mine** address: Kirkland Lake, Ont.

Officers: Frank Huth, pres.; Wm. H. Meyers, v. p.; A. J. Bolton, treas., with Walter E. Hurd, Ralph Hurd, (mgr.) M. Y. Krauss and Wm. J. Yeoell, directors. W. A. Gordon, sec.; R. C. Coffey, cons. engr.

Inc. 1918, in Ontario. **Cap.** $1,500,000; par $1; outstanding 1,470,000 shares. Trusts and Guarantee Co., Toronto, registrar and transfer agent. Annual meeting, in June.

Property: 2 patented claims, 88½ acres, in Teck Twp., S. E. of Lake Shore mine, Kirkland Lake area. Ground shows gold bearing quartz veins, 4 to 8′ wide, in porphyry and conglomerate. Ore assays $8 to $28 per ton, with milling ore averaging about $15 p. t.

Development: by two 470′ shafts, one of 3 compartments, with 4,000′ of crosscutting and drifting on 150′, 300′ and 450′ levels. Ore reserves estimated to be 100,000 tons.

Equipment: electric power, 2 hoists, 440 cu. ft. compressor, and 100-ton mill completed late in 1921. First bullion shipped in Feb., 1922.

ONTARIO PORCUPINE EXPL. CO. ONTARIO

Address: c/o E. Loring, mgr., Haileybury, Ont. **Mine address:** Timmins, Ont.

Property: in S. W. part of Mountjoy Twp., Porcupine area, one mile from Timmins. A heavy overburden of sand and gravel prevents the usual surface work. Extensive drilling was done late in 1920, but no detailed information received since.

ONTARIO SMELTERS & REFINERS, LTD. ONTARIO

Address: Welland, Ont. F. J. Hickling, mgr.

Inc. Feb., 1920, in Ontario. **Cap.** $750,000; $500,000 outstanding. In March, 1920, $250,000 of 7% 1st mortgage bonds were authorized; $210,000 issued.

In 1921, company acquired plants of **Metals Chemical Co.** (see Vol. XIV), near Welland, and of the **Standard Sm. & Ref. Co.** at Chippewa. The former includes furnaces and refinery for producing nickel and cobalt salts from residues and ores. Also owns the Ogistoh mine in Powell Twp., Elk Lake area. Timiskaming district.

OPHIR COBALT SILVER MINES, LTD. ONTARIO

Address: W. M. Alexander, 608 Lumsden Bldg., Toronto, Ont. **Mine office:** Cobalt, Ont.

Inc. in Ontario. **Cap.** $1,500,000; $1 par; 1,370,000 shares issued. Trusts & Guarantee Co., Toronto, transfer agent and registrar.

Property: in Coleman Twp., developed to depth of 582′ with almost a mile of workings. The mine was developed while under option by the Mng. Corp'n. in 1918 and the Nipissing M. Co. in 1919.

ORE CHIMMEY MINING CO., LTD. **ONTARIO**

Office: 100 Clyde Block, Hamilton, Ont. **Mine office:** Northbrook, Frontenac county, Ont.

Officers: A. E. Fletcher, pres.; F. E. Misener, v. p.; O. E. Dores, sec.-treas.; with C. H. Siple, S. G. McKay, H. A. Baldwin, R. W. Thomas, Chas. Zinn and S. A. Fletcher, directors. W. G. Anderson, gen. mgr.; J. R. Mougin, mill mgr.

Inc. October 11, 1909, in Ontario. **Cap.** $1,200,000; par 40c. Increased April, 1918, from $600,000. Annual meeting, last Tuesday in October. The property was bought for 850,000 shares of stock.

Property: about 1,200 acres, in Barrie Twp., Frontenac county, Eastern Ontario district, 50 miles from Kingston and about 11 miles from Kaladar, the nearest C. P. R. R. station. Claims show conglomerate, quartzite and schist, reported to have a vertical interbedded, jasper vein, of the so-called "iron formation" 2′ to 18′ wide on the surface, with hornbende schist on the hanging to N. E. and conglomerate and quartzite to S. E., and a basaltic footwall. In 1918, company acquired the Big Dipper mines, a gold property of about 1,240 acres.

Development: by 403′ shaft, with total workings of 2,000′. Crosscut at 400′ is reported to have disclosed a vein of sulphide ore carrying galena and chalcopyrite with gold-silver values.

Equipment: includes three 100-h. p. boilers, two 1,000 cu. ft. compressors, a hoist, 20-stamp mill with amalgamating plates, tables and a magnetic separator. The mill capacity is about 200 tons a day. An electric plant was under construction at last account.

ORE EXTENSION MINING CO., LTD. **ONTARIO**

Address: Vineland, Ont., Canada.

Officers: David Fretz, pres.-mgr.; S. Spiece, v. p.; Geo. Laws, sec.-treas., with J. O. Moore and S. R. Lupton, directors, at last report.

Inc. November 1, 1913, in Ontario. **Cap.** $1,500,000; shares 50c par.

Transfer office: 354 Hudson St., Buffalo, N. Y. Annual meeting, 2nd Thursday in January.

Property: 167 acres at Northbrook Lenox and Addington counties, said to show gold-silver-lead-zinc-copper ore, in six veins, from a few feet to 40′ wide, in diorite and schist. Developed by a shaft 53′ deep. A prospect.

ORR GOLD MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ontario, Canada.

Inc. 1917. **Cap.** $3,000,000.

Property: the Orr claims, adjoining the Teck-Hughes and Lake Shore mines at Kirkland Lake. Under option to the defunct Kirkland porphyry from 1917–20.

Development: by vertical shaft, 420′ deep, with 4 levels. No. 1 vein, 300′ long on the surface, is 400′ on the bottom level. A 700′ crosscut was driven on this level to reach a parallel vein which outcrops 575′ to the south. Work has been suspended since the miners' strike of 1919.

OXFORD COBALT SILVER MINES, LTD. **ONTARIO**

Address: Woodstock, Ont.

Officers: A. H. Wilson, pres.; J. R. Shaw, v. p.; Geo. F. Mohon, sec.; with J. W. Russell, (mgr.) and A. T. McNeil, directors. E. A. Rea, treas.

Inc. 1919, in Ontario. **Cap.** $1,000,000; par $1; outstanding 590,000 shares. Annual meeting, Sept. 19, 1921. Assets as of Sept. 1, 1921 were $526,316; liabilities $452,151; cash $617.

Property: 2 claims, 41 acres, in Coleman Twp., Timiskaming district, shows fissure veins containing silver, cobalt, and nickel. Also, 20 acres of the Waldman tract and 40 acres additional, both adjoining, acquired late in 1921, for 150,000 Oxford shares.

Development: by 153′ shaft and 150′ of crosscutting and drifting. A new shaft on the Waldman was down 75′ in Jan. 1922, and had opened narrow

shoots of high grade cobalt ore in a wide fractured zone in the Keewatin formation. Planned to continue shaft to contact with underlying diabase.

Equipment: complete, costing $10,900.

PALMER-PAINE MINING CO. **ONTARIO**

Address: 405 Royal Bk. Bldg., Toronto, Ont. B. P. Paine, pres., Niagara Falls, Ont. **Mine address:** N. K. Morrison, supt., Gowganda, Ont.

Organized, 1919, to operate the T. C. 177 claim near the Miller Lake-O'Brien mine, which was formerly operated by the T. C. 177 Mining Co. Several veins are said to have been opened to a depth of 200' and low-grade silver ore found, though but little ore of commercial grade has been found.

Equipment: includes hoist, compressor and boiler.

PARAGON-HITCHCOCK SILVER MINES, LTD. **ONTARIO**

Address: Collingwood, Ont., Canada. **Mine office:** Wabun, Ont.

Officers: Donald McKay, pres.; W. R. Hitchcock, v. p.; T. R. Gilpin, 2nd v. p.; David Melville, sec.; W. T. Herrington, treas.; E. H. Hitchcock, C. W. Pitt, W. A. Hamilton, R. Feigehen, J. P. Welsh (mgr.), directors.

Inc. May 22, 1917, in Ontario. **Cap.** $2,000,000; par $1; 990,000 treasury shares; 1,100,000 shares pooled with McKay as trustee. Annual meeting in February.

Property: 4 claims in Tudhope Twp., near rail, and 2 claims, 4 miles away, in Willet Twp., in Elk Lake area; total of 245 acres.

Geology: the 4 Hitchcock claims comprise a heavily-timbered, low-lying tract, with diabase showing as the only rock exposure. Four well-defined silver-bearing veins can be traced through this exposure. Four veins have also been uncovered on the Paragon group; the ore is quartz and calcite carrying fair silver values.

Development: on Hitchcock by 200' shaft with 2 levels; on Paragon by 160' shaft with crosscuts.

Equipment: boiler, hoist, and compressor at each camp.

PARRY SOUND COPPER MINING CO., LTD. **ONTARIO**

Office: 500 Germania Life Bldg., St. Paul, Minn. **Mine office:** Parry Sound, Ont.

Officers: Frank Johnson, pres.; Otto Monson, sec.-treas.; preceding, with John Ogren, A. Linderholm and F. X. Benning, directors.

Inc. March 23, 1899, in Ontario. **Cap.** $5,000,000; shares $1 par; issued, $4,500,000. Liabilities are given at $45,000 floating indebtedness. Annual meeting, second Tuesday in August.

Property: the McGowan and Wilcox mines, 10 claims, 1,000 acres, one-half freehold and one-fifth held subject to a $3,000 mortgage, on the eastern shore of Georgian bay.

The Wilcox mine has 4 parallel veins in a zone a quarter mile wide. The mine has a 145' shaft sunk on a 20' vein in granite-gneiss, traceable 1,000', carrying auriferous and argentiferous bornite, assaying 2.8 to 11% copper. There also is an opencut, 20x150', 18' deep, showing 3% chalcopyrite ore.

The McGowan mine has shafts of 100', 100' and 250', and a 150' crosscut tunnel, showing bornite and occasional chalcopyrite, with quartz gangue. A smelter shipment of 240 tons of selected ore returned 17% copper and $5 per ton in combined gold and silver.

Equipment: includes a 10-stamp mill, hoisting machinery and several buildings. Idle.

PATRICIA SYNDICATE. **ONTARIO**

Address: Boston Creek, Ont.

Property: a lease on the Boston Hollinger, 80 acres, in Pacaud Twp., Boston Creek area. Main vein of bluish quartz said to be 2 to 4' wide, and developed to a depth of 200'. Ore is free-milling and said to assay $20 to $22 gold per ton; it was treated in a 40-ton mill with a 92% recovery.

The plant was destroyed by fire in 1919 and after the death of C. A. O'Connell, the manager, the property reverted to original owners. Reported

under option to T. J. Flynn in 1922. Sir Chas. Ross was held liable for all debts of the Syndicate incurred by the management, amounting to about $35,000.

PAYMASTER MINE **ONTARIO**

See Porcupine Paymaster and Premier Paymaster companies.

PEARL LAKE GOLD MINES **ONTARIO**

Bankrupt. Property acquired, 1915, by **McIntyre Extension Mines, Ltd.**, a subsidiary of the McIntyre-Porcupine Mines, Ltd.

PEERLESS GOLD MINING CO., LTD. **ONTARIO**

Address: c/o Alex. McKinnon, sec., 591 St. Catherine St. W., Montreal. **Mine address:** Boston Creek, Ont.

Property: the Mondeau mine in Boston Twp., Boston Creek area, developed by 250′ shaft, said to cut a 4′ vein.

PENN CANADIAN MINES, LTD. **ONTARIO**

Address: 1011 Chestnut St., Philadelphia, Pa., or P. G. Grant, 52 Broadway, New York, or Box 90, Cobalt, Ont.

Officers Wm. J. Haines, pres.; A Beard, sec.-treas.; with J. D. Haines, E. C. R. Laidlaw, S. D. Wright, A. S. Elliott, directors. C. A. Filteau, mgr.

Inc. April 24, 1912, in Ontario. **Cap** $1,500,000; $1 par; 1,349,705 issued.

Dividends: $175,461 to end of 1917.

Property: the Cobalt Central silver mine at Glen Lake, in Cobalt district, adjoins Nipissing on S.

Development: by 22,152′ of drifts, crosscuts, raises and winzes.

Equipment: includes mill with 6 Wilfley tables, ball mills, and 75-h. p. motor. The output in 1918 was 29,910 tons of ore.

The mine was closed in 1919 and was under option to F. C. Sutherland & Co., Toronto. Has same management as Peterson Lake.

PETERSON LAKE SILVER-COBALT MINING CO., LTD. **ONTARIO**

Officers: 301 Royal Bank Bldg., Toronto and Cobalt, Ont.

Officers: W. A. Lamport, pres.; J. E. Carter, v. p.; with D. E. Kennedy, A. B. H. Morre, C. A. McLean, W. G. H. Browne, Alex. G. Cumming, Jas. C. Haight and C. M Nickel, directors. P. M. Goff, sec.-treas.; C. A. Filteau, mgr.

Inc. 1906, in Ontario. **Cap.** $3,000,000; $2,900,000 common, $100,000 pfd.; $1 par; 233,730 common, and 86,838 pfd. shares in treasury. Trusts & Guarantee Company, Ltd., Toronto, transfer agent. Listed in Toronto; removed from listing of New York Curb, Dec. 30, 1920. Annual meeting 3rd Monday in May.

1,000 shares sold for $80 the lot at public auction in New York on Dec. 22, 1920.

Comparative General Balance Sheet: (year ending April 30)

Assets.

	Property	Dev. Expl.	Plant Supplies	Other	Total
1921....	$2,309,323	$159,971	$63,229	$416,449	$2,948,972
1920....	2,309,323	159,971	61,522	423,986	2,954,802
1919....	2,309,323	136,666	43,654	5,150	2,494,802
1918....	.....	.....	.....	.....	.....
1917....	2,309,323	136,666	15,382	49,934	2,510,780
1916....	2,309,323	136,666	16,897	223,920	2,686,807
1915....	2,463,507	136,666	19,701	177,033	2,642,723

Liabilities.	Capital Stock	Current	Surplus	Total
1921.....	$2,802,270	$36,123	$110,579	$2,948,972
1920.....	2,802,270	24,645	127,887	2,954,802
1919.....	2,401,820	13,395	79,587	2,494,802
1918.....	2,401,820	.....	.....	.....
1917.....	2,401,820	1,234	107,726(a)	2,509,546
1916.....	2,401,820	7,610	277,377	2,686,807
1915.....	2,401,820	8,690	232,213	2,642,723

(a) Profit and loss.

Comparative Income Statement:

	Royalties on Ore	Misc. Inc.	T'l Expend	Profit
1921	$42,287	.....	$59,496	$17,209*
1920	89,919	$2,168	43,787	48,300
1919	15,877	4,996	16,913	3,959
1918	.....	.....	.....	.....
1917	9,940	5,210	58,705	43,555*
1916	296,498	6,685	89,892	213,291
1915	191,156	9,826	60,557	140,424

*Net loss.

Dividends: fiscal year ending April 30, 1915, No. 1 to 4 inc., $108,127; April 30, 1916, No. 5 to 8 inc., $168,127, No. 9 to 11 inc., $126,096. Last one, Jan. 2, 1917. Total is $462,063.

Property: 224 acres underlying Peterson Lake at Cobalt, almost surrounded by holdings of the Nipissing Co.

All leases given by company, including those held by the Seneca-Superior Silver Mines and Mercer Silver Mines, have expired.

Development: the Peterson Lake area has been prospected through shafts No. 2 and 3 and the Nova Scotia territory opened up; several veins have not been found here, but to date commercial ore has not been found in paying quantities. Extensions for 12 months ended May, 1920, totaled 253', and 366' to May, 1921.

Reserves on April 30, 1921, were 126,000 oz. of silver in mine and dumps.

Equipment: includes a 100-ton mill erected in 1918 to reduce tailings, but treatment found to be unprofitable on that scale; in 1919-'20, capacity was increased to 300 tons and agreement made with Dominion Reduction Co. to operate mill on a cost plus 35c. profit basis.

Production: in 1913:, 1,230,732 oz. silver; in 1914, 1,608,550; in 1915, 2,230,295; in 1916, 11,204 oz. Mine in 1920 shipped 2.173 tons of ore with 67,521 oz. silver content. Peterson's share of 2 month's milling operations was 40 tons of concentrates carrying 5,436 oz. silver.

Two years litigation between the company and the Dominion Reduction Co., resulted in a judgment awarding to the company 250,000 tons of slime in Peterson Lake, derived from the company's ore, and valued at $1,473,186.

The new mill was started Sept. 9, 1920, but because of the depressed silver market, all operations ceased Dec. 18. For past 5 years company has been in one difficulty after another, but management apparently has perseverance.

In spring of 1921, stockholders were urged to take up preference shares. This plan presumably failed, for in November, $100,000 certificates were offered, to be secured by entire silver reserve and to be redeemed with first profits.

PINEL KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 90 Concord Ave., Toronto, Ont. **Mine address:** Swastika, Ont. C. E. Pinella, pres.; J. W. Morrison, mgr.

Inc. 1920, in Ontario. **Cap.** $4,000,000.

Property: the Pinel group, 700 acres, in eastern part of Lebel Twp., Kirkland Lake area, Timiskaming district. Ore is gold-bearing.

PITTSBURGH-LORRAIN SYNDICATE **ONTARIO**

Address: 402 Curry Bldg., Pittsburgh, Pa., or Box 1000, Haileybury, Ont. **Mine address:** Silver Centre, Ont. W. L. Curry, sec.; H. F. Strong, mgr.

Property: the Curry mine, and a lease on adjoining holdings of Wettlaufer Lorrain Silver Mines, Ltd., in South Lorrain Twp., So. Lorrain area, said to show rich silver ore in pockets.

Development: on Curry, by 2 shafts, 110 and 400' deep. The Wettlaufer is opened to the 4th level.

Idle 1919-'21.

PORCUPINE-CROWN MINES, LTD. **ONTARIO**

Offices: Dominion Exp. Bldg., St. James St., Montreal, Quebec.; 18 Toronto St., Toronto.

Officers: J. W. Carson, pres. and managing dir.; W. I. Gear, 1st v. p.; J. G. Ross, 2nd v. p.; with C. A. Smart, J. W. Ross, A. G. Gardner, R. W. Redford, F. S. Meighen, Ziba Gallagher and J. H. Thom, directors. James Cooper, sec.-treas.; John Reid, asst. sec.-treas.; Samuel W. Cohen, Cobalt, Ont., cons. engr.

Inc. in October, 1913. **Cap.** $2,000,000; $1 par. Sixty per cent of capital stock owned by Crown Reserve Mining Co., Ltd. Crown Trust Co., Montreal and Toronto, registrar and transfer agent. Traded in on New York Curb, and on Toronto Stock Exchange.

Balance sheet of Dec. 31, 1920, shows net profit of $17,797, which with balance brought forward gives a surplus of $242,532. Assets include $2-096,895 investments in other companies, and cash, $124,017.

Dividends: 3% quarterly was paid from 1914 to August, 1917. Total to that date was 42%, or $840,000.

On May 15, 1920, properties were transferred to a new company, **Northcrown Porcupine Mines, Ltd.** (q. v.), in which Porcupine-Crown holds a ⅔ stock interest and becomes a holding company only.

PORCUPINE-DAVIDSON GOLD MINES, LTD. **ONTARIO**

Is a reorganization of **Davidson Cons. Gold Mines, Ltd.,** effective Aug. 24, 1921.

Address: 4 & 5 King Edward Hotel Bldg., Toronto, Ont. **Mine address:** Geo. E. Bent, mgr., South Porcupine, Ont.

Officers: Arch, Mitchelson, pres.; Robt. Fennell, v. p.; R. E. Evans, sec.-treas., with Hugh H. Sutherland, Robt. Starke, J. J. Davis, A. W. Filmer and Inigo Brassey Freeman-Thomas, directors.

Inc. 1921, in Ontario. **Cap.** £1,000,000, of which £375,000 is preferred stock; par 5s; £175,000, in treasury. For its assets, old company receives £175,000 pfd. and £450,000 com. stock, plus £50,000 cash, and becomes a holding company only. Remaining pfd. stock, £200,000, will provide working capital and was in part underwritten at time of reorganization. The enterprise has had the backing of Mitchelson & Co., London bankers.

Property: 10 claims, patented, 420 acres in Tisdale Twp., Porcupine area, Timiskaming district, 2¾ miles N. of So. Porcupine, shows a 5½′ vein of gold-bearing quartz in Keewatin complex.

Development: by 600′ shaft, 7,000′ total workings and 500′ of drilling. In 9 months ended June, 1920, former management expended $144,000 on development work; drift on 500′ level was extended 615′. Ore reserves are estimated to be 350,000 tons of $11 ore.

Equipment: includes 10-stamp amalgamation mill. A 500-ton mill is planned.

Production: under former management, 3,831 tons yielding $27,089 in 1919; 3,003 tons yielding, $11,210 in 1920.

The mine, which had been closed down since June, 1920, was dewatered in Sept., 1921, in preparation for an active development campaign by new company.

PORCUPINE EXCELSIOR MINING CO., LTD. **ONTARIO**

Mail returned 1919, from former address, Porcupine, Ont., Canada.

Officers: P. Cameron, pres.; Wm. Duncan, sec.; G. L. Wheeler, asst.

Property: claims, Nos. 13890, 13891 and 900 P. in Shaw Twp., Nipissing district, formerly owned by the Tommy Burns Mining Co.

PORCUPINE GOLD REEF MNG. CO. **ONTARIO**

Address: 24 King St., W., Toronto, Ont. **Mine address:** Schumacher, Ont. G. E. R. Curry, sec.

Inc. Jan. 10, 1910, in Ontario. **Cap.** $1,000,000.

Property: the Gold Reef mine in N. W. part of Whitney Twp., Porcupine area of Timiskaming district, shows gold-bearing E.-W. veins.

PORCUPINE KEORA MINING CO., LTD. **ONTARIO**

Address: 304 Confederation Life Bldg., Toronto. **Mine office:** Timmins, Ont.

Officers: W. B. Gunton, pres.-mgr.-director; J. R. Nese, v. p.; W. E. Smith, sec.-treas., with W. C. Fox and Geo. Mulholland, directors.

Inc. 1912, in Ontario. **Cap.** $2,000,000; $1 par; $1,950,000 outstanding. Union Trust Co., Ltd., Toronto, registrar and transfer agent. Listed on Standard Stock Exchange of Toronto.

Property: 5 claims, 200 acres in Whitney Twp., Porcupine area, 5 miles N. E. of the Hollinger and 3 miles N. E. of the Dome.

Development: by incline shafts and extensive drifts to depth of 250'. Diamond drill work and underground development is said to show 40' of $6 ore. Three drill holes indicate the existence of two comparatively long and wide shoots of high-grade ore in No. 5 and 6 veins, at incline depths of from 250 to 480'. Results are considered to be favorable for development of a tonnage of ore in No. 5 vein. Is regarded as a property of merit, with promising prospects.

PORCUPINE MIRACLE MNG. CO., LTD. **ONTARIO**

Address: So. Porcupine, Ont. G. I. Miller, pres.

Inc. May 18, 1911. **Cap.** $2,000,000, increased in 1921 from $1,000,000; par $1.

Property: in Langmuir Twp., Porcupine area., Timiskaming district, developed by 85' shaft and equipped with mining plant and small mill. Drilling done in 1920 disclosed a wide zone of mineralization. Operations are to be resumed in summer of 1922.

PORCUPINE PAYMASTER MINES, LTD. **ONTARIO**

Address: A. S. Fuller, pres.-gen. mgr., South Porcupine, Ont. **Main office:** 312 Temple Bldg., Toronto.

Inc. Nov. 19, 1919, in Ontario. **Cap.** $2,000,000; all but 5 shares owned by Premier Paymaster Mines Co. (q. v.), but Porcupine Paymaster is the operating company.

Property: 3 patented claims, 110 acres, in Deloro Twp., Porcupine area, 1 mile S. W. of the Dome mine, includes ground formerly operated by Standard Gold Mines, Ltd. and that of the McLean Gold Mines, Ltd. Also, the Hoyt property in Tisdale Twp.

Tract shows quartz porphyry intrusive in greenstone schists, and cut in turn by quartz veins. The ore is unique in camp, being an altered pyritized porphyry, containing much tourmaline and with gold values, which are fairly uniform over a width of 55'. . Very rich gold ore was extracted from pockets in the quartz veins, in the early history of the camp, but the new orebody lies to the south of the old workings.

Development: by 2 shafts, 100 and 216' deep; a crosscut on 200' level uncovered a mineralized zone, up to 98' wide, with average value of $5 per ton in gold. Total workings by former companies, 800'. In 1922, shaft was sunk to 400' level, and orebody is to be opened up on that level.

Equipment: includes large boiler plant, hoist, compressor, etc.

Is regarded as an attractive development proposition.

PORCUPINE PREMIER GOLD MINES, LTD. **ONTARIO**

Probably dead. See Vol. XIV. In 1916, had lease on mine of Standard Gold Mines; in 1920, stockholders were given privilege to exchange stock on equal basis for that of **Premier Paymaster**, which see.

PORCUPINE VIPOND MINES, LTD. **ONTARIO**

Merged, 1916, into **Porcupine V. N. T. Gold Mines, Ltd.**, which see.

PORCUPINE V. N. T. GOLD MINES, LTD. **ONTARIO**

Is a merger of the Porcupine Vipond and North Thompson companies, stockholders of which received share for share in stock of new company.

Mine address: Schumacher, Ont.

Offices: 50 E. 42nd St., New York City, 901 Lumsden Bldg., Toronto.

Officers: Hy. M. Pellatt, pres.; J. McIntosh Bell, v. p.-gen. mgr.; with

J. W. Bain, J. H. Black, R. T. Shillington, W. H. Stafford and Denis Stairs, directors. T. S. H. Giles. sec.-treas.

Inc. Dec. 5, 1916, in Ontario. **Cap.** $3,000,000; $1 par; 475,000 treasury shares. The Associated Gold Mines of Western Austrailia holds 667,700 shares. Transfer agts., Security Transfer & Registrar Co., New York, and British and Colonial Land and Security Co., Toronto; the latter also registrar. Stock traded in on Toronto Stock Exchanges. At public auction in New York on Dec. 22, 1920, 25,000 shares were sold at 8 cents each.

Property: about 160 acres, adjoining the Hollinger on the west, in Tisdale Twp., Porcupine area. Claims show several quartz veins, one cut on 600' level reported to average 20' in width, with pay ore about 11' wide. Formation is amygaloidal basalt.

Development: by 600' shaft, with recent work an the 400 and 600' levels.

Ore reserves: estimated to be 130,000 tons of $9.50 ore.

Equipment: includes hoist, 2 compressors, hydro-electric and steam power, and 100-ton mill, which employs the continuous decantation process and is equipped with crusher, 6' Hardinge ball mill, classifiers, Dorr agitators and Dorr thickeners.

Production: 15,134 tons of ore yielding 3,977 oz. gold in 1918.

Operations ceased entirely in July, 1918. Reported in summer of 1920 that offer of Hamilton B. Wills to underwrite 600,000 shares, at average price of 3134 c., had been accepted, but one block of 200,000 shares, at 15c. per share only was issued. Funds are needed to sink shaft to 900' and to increase mill capacity.

Operations to be resumed about April 1, 1920.

PORCUPINE WHELPDALE MINES, LTD. **ONTARIO**

Address: B. J. Simons, sec., 911 Royal Bank Bldg., Toronto.

Cap. $2,500,000; $1 par.

Property: north half of Lot 11 in Tisdale Twp., Porcupine, opened by a 114' shaft and equipped with steam boilers, hoist, compressor, etc.

No recent information.

PORT ARTHUR COPPER CO., LTD. **ONTARIO**

Address: 904 Bk. of Hamilton Bldg., Toronto, Ont. **Mine address:** Mine Centre, Ont.

Officers: Fred M. Connel, pres.; J. F. Hewitson, v. p.; J. A. M. Alley, sec.; W. H. Connel, mgr.

Inc. Dec. 6, 1916, in Ontario. **Cap.** $2,500,000.

Property: the Hewitson mine at Shoal lake, Rainy River district, 4 miles W. of Mine Centre, developed by an inclined shaft.

Equipment: includes 100-h. p. boiler, hoist and 500' compressor.

The mine was a small producer in 1916, but apparently idle since 1918.

PREMIER PAYMASTER MINES CO. **ONTARIO**

Offices: Suite 402, 79 Milk St., Boston, Mass., and Rm. 209, 15 Front St., Reno, Nev.

Mine office: B. M. Walton, supt., So. Porcupine, Ont.

Officers: E. H. Walker, pres.; A. S. Fuller, v. p.-gen. mgr.; Frank G. Wright, sec.-treas., with J. A. Frohock and D. B. Pattison, directors.

Inc. July, 1920, in Nevada. **Cap.** $2,500,000, $1 par; assessable, 869,156 shares outstanding. A 5¢ assessment was called Jan. 1, 1921 and assessment No. 3 of ten cents per share was payable Jan. 14, 1922. Metropolitan Trust Co., Boston, transfer agent; Old South Trust Co., Boston, registrar.

Is a holding company, owning all but 5 shares of capital stock of Porcupine Paymaster Mines, Ltd., which see. Stockholders of Porcupine Premier Gold Mines, Ltd. (q. v.) had privilege to exchange shares on an equal basis for stock of Premier Paymaster.

Stock sales in 1922 were at 75¢ and later at $1 a share. Company reported financed for all development planned in 1922.

Is an attractive speculation.

PRESTON EAST DOME MINES, LTD. **ONTARIO**

Office: 7 Melinda St., Toronto, Ont., Canada.

Officers: Lt. Col. D. M. Robertson, pres.; Gordon Taylor, sec.-treas., with C. L. Sherrill, R. T. Shillington and D. L. White, Jr., directors.

Inc. 1911, in Ontario. **Cap.** $3,000,000; $1 par; 2,500,000 shares outstanding. Stock listed on New York Curb. Toronto General Trusts Corporation, Toronto, transfer agent.

Property: 3 claims, patented, in Tisdale Twp., Porcupine area, adjoining the Dome Mines, Ltd.

Ore: which occurs in narrow veins in quartz-porphyry, carries coarse gold, associated with pyrite and zinc-blende. Company is idle, pending result of new development on the Dome Mines property.

PRIMO SILVER COBALT MINING CO. **ONTARIO**

Address: 400 McKinnon Bldg., Toronto, Ont., care S. W. Barber. **Mine address:** A. S. Stevens, mgr., Cobalt, Ont.

Inc. 1921 in Ontario. **Cap.** $1,000,000; $1 par; 500,000 shares given S. W. Barber, for the mine.

Property: Barber mine in Coleman Twp., near Latchford, developed by 2 shafts. Seven veins have been opened containing silver and cobalt.

Equipment: installed Oct. 1921, includes 2 boilers, hoist and compressor.

PROSPECTOR'S DEVELOPMENT CO., LTD. **ONTARIO**

Dead; see Vol. XIV.

QUEEN LEBEL GOLD MINES. **ONTARIO**

Address: Kirkland Lake, Ont.

Officers: G. A. Wanless, pres.; David Goss, v. p.; V. W. Hattin, sec.; Harry Brannif, treas., E. B. Wood, gen. mgr., with Chas. Hamblin, directors.

Inc. 1921 in Ontario. **Cap.** $2,000,000; $1 par.

Property: 160 acres, at Gull lake, Lebel twp., Kirkland Lake area, 1½ miles E. of the Tough Oakes. Reported Jan., 1922, that 4,000' trenching had exposed 6 veins. Vein No. 5 assayed $1 to $33 in gold and 37 oz. silver across 5'.

R. A. P. GOLD MNG. CO. OF BOSTON CREEK, LTD. **ONTARIO**

Address: Sun Life Bldg., Toronto, Ont. **Mine address:** Boston Creek, Ont.

Inc. Jan. 29, 1917, in Ontario. **Cap.** $2,500,000; par $1.

This company was incorporated presumably as successor to the R. A. P. Prospecting, Developing and Mng. Syndicate, which in 1915 was operating the R. A. P. mine in Boston Twp., Boston Creek area, under management of John Papassimakes, and in 1916 sold part of holdings to the Boston Creek Mng. Co. (q. v.), allowing the latter to use the R. A. P. shaft and plant. A disagreement between the companies caused the stoppage of operations. Reported that a consolidation would be effected, but no recent information received.

RAPP MINING DEVELOPMENT & PROSPECTING CO. **ONTARIO**

See Vol. XIV.

REDDICK GOLD MINING CO., LTD. **ONTARIO**

Formerly Dr. Reddick, Larder Lake Mines, Ltd.; property acquired in 1914 by **Goldfields, Ltd.**, which see.

REEVES-DOBIE SILVER MINES, LTD. **ONTARIO**

Address: 426 Powers Bldg., Rochester, N. Y. or Martin H. Jacobs, Gowganda, Ontario.

Inc. June, 1917. **Cap.** $2,000,000; $1 par.

Property: in Milne Twp., Gowganda area, on which intermittent work has been carried on since 1908, and several shipments of ore and concentrates made.

Development: by open-cuts, the largest being 70' long and 16' wide, and by 200' shaft. Ore carries from 30 to 50 oz. silver per ton.

Equipment: includes steam power, stamps, ball-mill, and flotation plant of 45 tons daily capacity.

Late in 1920, company went into hands of a receiver and 213 bags of

concentrate in transit were seized to satisfy a judgment against the company for wages.

REGENT MINES, LTD. **ONTARIO**

Address: Taylor St., Sarnia, Ont., or Ed. E. Oliver, supt., Elk Lake, Ont.

Property: Regent mine in James Twp., near Elk Lake. A shaft is being sunk on a 2′ vein of silver ore.

RELIANCE SILVER MINES, LTD. **ONTARIO**

Consolidated in 1919 with Hargrave Silver Mines, Ltd., to form **Hargrave Cons. Mines, Ltd.**

RENFREW MOLYBDENUM MINES, LTD., THE **ONTARIO**

Formerly **Algunican Devl. Co.**, with headquarters in Belgium.

Address: Renfrew. Ont. **Mine address:** W. M. Weigel, gen. mgr., Mount St. Patrick, Ont.

Officers: Jean Vanophen, pres., 24 Rue Batalliere, Paris, France; A. E. Guyotte, v. p.; R. Le Aprohon, sec.; P. C. Neault, treas.

Inc. Dec. 8, 1913, in Ontario. **Cap.** $1,500,000.

Property: in Brougham Twp., Renfrew county, shows molybdenite disseminated with pyrite and pyrrhotite in pyroxenite in a limestone-pegmatite contact. One orebody said to be 40′ wide and 600′ long; molybdenite content of ore about 0.95%.

Development: by 2-compartment shaft, 150′ deep, and 3 working levels.

Production: in 1916, 1,248 lb. of concentrate; in 1917, 57,254 lb. of concentrates from 3,656 tons of ore; in 1918, 35,561 lb. of concentrates.

Equipment: includes hoist, compressor, and mill with Elmore unit having capacity of 35 tons, with 95% extraction.

Idle.

RIGHT OF WAY MINES, LTD. **ONTARIO**

Dead; see Vol. XIV. This company, incorporated 1909 as successor to **Right of Way Mng. Co., Ltd.**, became financially involved; J. P. Langley was appointed receiver in fall of 1921, and property sold to Right of Way Syndicate, which see. Address of former company was care Jas. D. Cunningham, sec., Central Chambers, 46 Elgins St., Ottawa, Ont.

RIGHT OF WAY SYNDICATE **ONTARIO**

Successor in 1921 to Right of Way Mines, Ltd.

Address: Cobalt, Ont.; John Matheson, supt. Company sponsored by E. J. Daly of Montreal.

Property: 3½ acres adjoining La Rose mine, by lease from the Government, and mining rights on 3½ miles of the right-of-way of the T. & N. O. Ry. Under former companies, the mine produced a large amount of silver and over $550,000 was paid in dividends up to 1917. In recent years little rich ore has been found, but mine is said to contain some milling ore and exploration of other veins may prolong its life. It is developed by shafts to depth of 465′.

ROGNON GOLD MINES, LTD. **ONTARIO**

Address: care J. N. Beckley, Rochester, N. Y. Reported that the Rognon mine has been taken over by **Contact Bay Mines** (q. v.); the Rognon company is therefore presumably dead.

ROMINCO MINES CO. **ONTARIO**

Address: Rochester, N. Y.

Organized, 1919, to operate the Big Four group in the Gowganda silver area. In developing silver-bearing veins, reported to have opened a pyrite deposit, 22′ wide and carrying 44% sulphur.

RUBY OPERATIVE COBALT MINES, LTD. **ONTARIO**

Succeeds Ruby Silver Mines.

Address: care P. J. Hart, sec., Cobalt, Ont. **Mine address:** No. Cobalt, Ont.

Officers: Clifford H. Moore, Cobalt, pres., with Dr. E. W. Mitchell, E. F. Armstrong, Kenneth McDonald and B. Hartly, directors.

Inc. 1920. **Cap.** $1,500,000; $1 par; 750,000 shares in treasury.

Property: Ruby mine in Bucke Township, Cobalt district, developed by

100′ shaft. Mine was closed down in 1907 and reopened under present management in 1920.

ST. ANTHONY GOLD MINES, LTD. **ONTARIO**

Office: 2 Toronto St., Toronto, Ont.

Officers: C. L. Campbell, pres.-mng. dir.; W. J. Boland, sec.-treas.; with Homer L. Gibson, Dr. A. F. Demary and J. F. Boland, directors, all of Toronto. Chas. Randall, mgr.

Inc. Sept. 19, 1921, in Ontario. **Cap.** $3,000,000; $1 par; 1,500,001 shares outstanding. **Bonds:** $112,000 first mortgage, dated Sept. 30, 1921, due in 6, 9, 12 and 18 months. Transfer agt. and registrar, Security Transfer & Registrar Co., New York. Stock listed on New York Curb. Annual meeting, 2nd Tuesday in February.

Property: 7 claims, 400 acres, on Sturgeon lake, Thunder bay district, said to show several veins carrying gold values up to $12 per ton, with an estimated ore reserve of $1,250,000 in value. Equipment includes a 150-ton mill. Past production reported to be $200,000.

Property has been leased for several years, the **Thunder Mng. Co.** (q. v.) operating the mine in 1918. Newly organized company is said to be financially equipped to properly operate the property.

SANDERSON KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 207 Robinette Chambers, Toronto, Ont. **Mine address:** Kirkland Lake, Ont. Edw. Orser, mgr.

Property: 100 acres in Lebel Twp., Kirkland Lake area, near the Tough Oakes mine. Exploration was to begin spring of 1921.

SCHUMACHER GOLD MINES, LTD. **ONTARIO**

Head office: 85 Bay St., Toronto, Ont. **Mine office:** Schumacher, Ont.

Officers: F. W. Schumacher, pres.; F. L. Culver, v. p.; J. Y. Murdoch, sec.-treas.; H. E. Tremain and C. A. Covert, directors. T. J. Harwood, mgr.

Inc. July 16, 1914, in Ontario. **Cap.** $2,000,000; $1 par; 1,850,000 issued. Traded in on Toronto Stock Exchange. Price range 16½ to 30c. in 1920; 17½ to 35c. in 1921.

Financial reports for fiscal years ended 1920 and 1921 were not issued, but balance sheet as of Feb. 28, 1922, shows total assets $1,940,903, of which current are $10,588 and discount on shares, $202,500; liabilities include current, $27,648; reserve for depreciation, $10,919. Surplus was $52,335. Operating account, June 30, 1920, to Feb. 28, 1922, shows receipts, $706, and expenditures $15,697.

Property: the Schumacher mine, at Porcupine, adjoining the McIntyre on the W. for ⅛ mile, and the Acme mine of the Hollinger Consolidated for ⅜-mile. Vein outcrops are numerous and extensive, occurring in an E.-W. ore zone 1,000′ wide. The No. 1 vein is traceable for 1,150′, with width of 50 to 60′.

Development: to depth of 700′, with about 12,000′ of work at main or working shaft. Two orebodies cut on the 600′ level by diamond drilling have not yet been mined. A second shaft was 400′ deep in December, 1919.

Reserves: 99,425 tons, averaging $6.78 per ton.

Equipment: includes 180-ton mill containing Hardinge and tube mills, and 300-ton continuous decantation cyanide plant.

Production: March 31, 1917, to March 31, 1918, 45,373 tons of ore yielding $259,365. Output in the calendar year 1918 was 4,463 oz. gold from 19,098 tons of ore.

Reported refinanced 1922, and operations to be resumed.

SCOTTISH ONTARIO SYNDICATE **ONTARIO**

Address: Porcupine, Ont.

Property: in N. W. part of Whitney Twp., Porcupine area, shows E.-W. veins in altered basalt. Vein filling is a mixture of calcite, tourmaline and quartz, carrying pyrite with associated gold. Developed to depth of 90′. Mine was to be reopened in summer of 1921, after an idleness of some years.

SENECA SUPERIOR SILVER MINES, LTD. **ONTARIO**

In liquidation; described in Vols. XII and XIII.

SHAMROCK CONSOLIDATED MINES, LTD. ONTARIO

Offices: 93 Queen St., East Toronto, Ontario, Canada and Cobalt, Ontario.

Officers: J. C. Hammond, pres.; with G. W. Arnold, W. L. Adams, and Thomas Wisker, directors.

Inc. June 25, 1915, in Ontario. **Cap.** $1,000,000; $1 par; all issued. Imperial Trusts Co., Toronto, and Security Transfer & Registrar Co., New York, transfer agents and registrars. Listed on Standard Stock Exchange of Toronto.

Property: the Shamrock mine, N. of and adjacent to the Beaver Consolidated, in Coleman, Twp.

Development: by 417′ shaft and 4,000′ of workings, with levels at 100′, 200′, 300′ and 400′.

SILVERADO MINING CO. ONTARIO

Address: 306 Wright Ave., Toronto, Ont. **Mine address:** Gowganda, Ont. D. R. O'Gorman, mgr.

Cap. $3,000,000, increased in 1921 from $1,000,000; par $1; about 2,000,000 treasury shares.

Propery: 560 acres in Milner Twp., Gowganda area, shows a number of silver-bearing veins. Exploration was underway during 1921.

SILVER BULLION CO. ONTARIO

Address: Gowganda, Ont.

Property: the Silver Bullion mine in Nicol Twp., Gowganda silver area, near Leroy lake.

SILVER ISLET MINE ONTARIO

See **Islet Exploration Co., Ltd.**

SILVER LEAF MINING CO., LTD. ONTARIO

Address: 84 St. Francois Xavier St., Montreal. **Mine address:** Giroux Lake, Cobalt, Ont.

Officers: Norris P. Bryant, pres.; Hershey S. Bryant, v. p.; Andrew C. Dunn, sec.-treas., with Chas. H. Isard and Gordon H. Benson, directors.

Inc. 1906, in Ontario. **Cap.** $5,000,000; $1 par; all issued. Transfer agt., Toronto Agency, Ltd.

Property: the Silver Leaf silver mine, 48 acres, at Kerr Lake, Coleman Twp., adjoins holdings of **Crown Reserve Mng. Co.,** which operated the mine as lessee for 10 years, expiring October, 1919. Development is fairly extensive and production has been considerable.

Idle for past 3 years.

SILVER MINES EXPLORATION CO. ONTARIO

Dead. Organized, and later absorbed, by **General Development Co.**

SKEAD GOLD MINES, LTD. ONTARIO

Mine office: M. L. Bouzan, supt., Englehart, Ont. **Office:** Toronto, Ont.

Officers: D'Alton McCarthy Gilpin, pres., 112 Stair Bldg., Toronto; Louis C. Park, and Aaron Tybush, v. p's.; Jas. Brebner, treas.; H. J. Bolitho, sec.; with B. Satiloff, Jas. Brown and Hy. Mallue, directors. C. Wm. Evans, mgr.

Inc. Oct. 9, 1919, in Ontario. **Cap.** $5,000,000; $1 par; Trusts and Guarantee Co., Toronto, transfer agt. and registrar.

Property: 55 claims, 2,200 acres, in 5 parcels, in Skead Twp., Larder Lake area, the two larger parcels bordering E. and W. on Lake St. Anthony. Surface shows quartz stringers of a few inches and veins up to 64′ wide in a porphyry formation; the value is largely in gold assaying up to $30.

Is a prospect with but one 40′ shaft, besides which stripping and trenching only has been done. Reported, fall of 1921, that mine equipment would be installed on a 6 claim parcel S. W. of the lake which shows gold and copper.

SOUTH KEORA MINES, LTD. ONTARIO

Address: 901 C. P. R. Bldg., Toronto, Ont. **Mine address:** Timmins, Ont. J. H. C. Waite, mgr.

Offering of 100,000 shares of stock at 15¢ each was made in June, 1921.

Property: in Whitney Twp., Porcupine area, developed to 250', at which level vein is said to be 35' wide.

SOVEREIGN PORCUPINE MINES, LTD. **ONTARIO**

Address: 12 King St. E., Toronto, Ont. **Mine address:** Timmins, Ont. C. W. Moodie, pres.-gen. mgr.; L. C. Platt, sec.

Inc. April 24, 1911 in Ont. **Cap.** $1,000,000; par $1.

Property: in Tisdale Twp., Porcupine area. No record of work done.

SUDBURY SYNDICATE, LTD. **ONTARIO**

Address: R. Simpson, Liquidator, Finsbury Pavement House, London, E. C. 2, England.

Registered in 1914, with capital of £50,000 (£25,000 issued) to acquire oil and mineral lands; company, agreed in 1919 to wind up its affairs and turn assets over to **Kirkland Lake Proprietary (1919), Ltd.**, on basis of 5 Kirkland to 4 Sudbury shares. Company's main holdings were its shares of Burnside and Tough Oakes companies.

SUPERIOR COPPER CO., LTD. **ONTARIO**

Office: Sault Ste. Marie, Ont. **Mine office:** Superior Mine, via Algoma Central Railway, Algoma, Ont.

Officers: G. R. Nicholson, pres.; Thos. Chitty, v. p.-sec.; Emory W. Clark, treas.

Inc. September 13, 1901, in Ontario. **Cap.** $3,000,000; originally $1,500,000; increased, 1903, to $2,000,000, and again July 29, 1907; shares $10 par; issued, $2,402,160. By a special act of the provincial parliament of Ontario, the stock was made assessable. Total assessments to December 31, 1910, were $132,080.52. Security Trust Co., Detroit, registrar and transfer agent. Annual meeting, second Thursday in June.

Property: 11 claims, crown granted, 800 acres, in Algoma district show granite and chlorite schist cut by fissure veins 10' to 20' wide. The quartz contains chalcopyrite and a little chalcocite. Selected ore averages 4% copper, 1 oz. silver and 40c. gold per ton.

Development: includes a 400' shaft and 949' tunnel, a 189' tunnel and many surface cuts.

Mine reported to show 4,000 tons of ore on the dump, with 140,000 blocked out, apparently a serious over-estimate.

Equipment: includes a 150-h. p. steam plant, 12-drill compressor, engine house, and a 50-ton concentrator.

Idle since December, 1908.

SWEDISH-CANADIAN GOLD MINING CO., LTD. **ONTARIO**

Address: care J. A. Johnson, Bk. of Hamilton Bldg., Toronto, Ont. **Mine address:** Mine Centre, Ontario.

Officers: Geo. W. Fowler, pres.; H. R. Drummond Hay, v. p.; J. P. Hanson, sec.-treas., with N. T. McMillan, W. D. McKay and C. R. Fitch, directors. J. A. Johnson, mgr.; F. A. S. Carnegie, engr.

Property: at Shoal lake, Rainy River district, 6 miles S. of the Canadian National Railroad, acquired in December, 1919.

Development: by 1,000' of shaft work with 2,000' drifts and crosscuts, said to have developed a large tonnage of $14 ore.

Equipment: includes 20 stamp mill with cyanide plant; a 1,600' earial tram is to be constructed.

SYLVANITE GOLD MINES, LTD. **ONTARIO**

Subsidiary of **Kirkland Lake Proprietary (1919), Ltd.**

Chas. A. Richardson, mgr., Kirkland Lake, Ont.

Inc. June, 1913, in Ontario. **Cap.** $3,000,000; $1 par; increased 1921 from $2,000,000, $5 par, under a reorganization agreement by which shareholders of old company receive 5 shares of new stock for each of old, the remaining 1,000,000 shares being held under 2 years' option by Kirkland Lake Proprietary and American financiers on an equal basis. The former had previously acquired 80,000 shares of old company, equivalent to 400,000 new shares.

Property: 5 claims, 228 acres, includes the Wright and Robbins claims, between the Tough-Oakes and Wright-Hargreaves gold mines, in Teck Twp., Kirkland Lake area. The vein is in feldspar-porphyry along fracture zones. Ore consists of altered porphyry and quartz veinlets.

Development: by 120′ shaft and a few hundred feet of workings.

Idle since 1919, but late in 1921, preparations were underway to sink shaft.

SYMMES-YOUNG SILVER MINES, LTD. **ONTARIO**

Company was incorporated in August, 1919 **Cap.** $2,000,000; par $1.

TASH-ORN GOLD MINES, LTD. **ONTARIO**

Office: 929 Calvert Bldg., Baltimore, Md. **Mine address:** Tashota, Ont.

Officers: Jos. Castelber, pres.; L. H. Nachman, v. p.; L. B. Bernei, sec.; J. L. Orn, treas.

Inc. August 2, 1916, in Ontario. **Cap.** $3,000,000; par $1; 2,454,929 shares issued. U. S. Corporation Co., New York, transfer agent.

Property: at Tashota and Kowkash, Thunder Bay district, where the discovery of rich gold ore in 1917, was followed by a boom.

Idle several years.

TAYLOR MOLYBDENITE MINE **ONTARIO**

Address: 123 Bay St., Toronto, Ont. **Mine address:** Renfrew, Ont.

Property in Renfrew county is owned and operated by A. W. Taylor, who has shipped ore that assayed 5.3 to 6% molybdenum. A concentrator treats the lower grade ore making an 86% product, with a 92% recovery.

Idle.

T. C. 177 MINING CO. **ONTARIO**

Succeeded by **Palmer-Paine Mng. Co.**, which see.

TECK-HUGHES GOLD MINES, LTD. **ONTARIO**

Office: 14 Wall St., New York. **Mine office:** Kirkland Lake, Ont.

Officers: C. L. Denison, pres.; R. W. Pomeroy, v. p.; Geo. C. Miller, with A. W. Johnston and J. F. Thompson, directors Wm. C. Himrod, treas.; D. L. H. Forbes, gen. supt.

Inc. April, 1913 in Ontario. **Cap.** $4,000,000; $1 par; 1,720,000 issued. **Bonds:** $600,000. Prudential Trust Co., transfer agent and registrar. Traded on Toronto Stock Exchange. Stock sales ranged 18½c. to 32c. in 1920; 15¾c. to 17½ in 1921.

At a special reorganization meeting, Dec. 7, 1921, capital was increased from $2,500,000 to $4,000,000, 4 new being issued for every 5 old shares held. Also a new issue of $600,000 five year 7% bonds, plus $35,000 cash, was authorized to take up old issue of $500,000, due Oct. 1, 1920, but not retired, and on which defaulted interest was $135,000. Shareholders had the first, and bondholders the second, call on all unissued stock at 15c. per share, the latter having privilege of paying in bonds.

Statement for year ended Aug. 31, 1921, shows an expenditure of $291,956, including depreciation and depletion. Gross revenue was $344,806, leaving net profit of $52,840. Current assets were $202,000 and current liabilities, $22,000.

Property: 115 acres, in Teck Twp., Kirkland Lake area, adjoining the Elliott-Kirkland and Lake Shore mines.

Geology: the veins occur largely in porphyry and syenite. Ore is found as shoots, between two prominent faults. It is composed of brecciated syenite, porphyry and quartz, and carries gold, pyrite, copper pyrite, and molybdenite. The gold content is erratic, but averages about $10 per ton.

Development: by 4 shafts, the main one being 600′ deep, with over 11,000′ of workings. Recent work is said to be encouraging, especially on 600′ level. Ore reserves, Sept. 1, 1921, estimated to be 98,000 tons averaging $9.28 per ton.

Equipment: hoist, 10-drill compressor, and milling plant, including ball and tube mills, cyanidation by counter current decantation, and Oliver

filter. Mill capacity increased from 100 to 150 tons per day early in 1922. Electric power is supplied by the Northern Ontario Light & Power Co. of Cobalt, whose power plant is 65 miles distant.

Production: commenced in March, 1917, wac continued until July, 1918, when property was closed on account of war conditions; reopened late in 1918. From Aug. 31, 1917, to July 2, 1918, the mill treated 15,879 tons ore of an average value of $7.87 per ton. In 1919, property produced 18,387 tons of ore, yielding $169,590. Total production to end of 1919 amounted to $316,882. In first 6 months of 1921, 16,073 tons of ore treated, yielded $166,230, with a net operating profit of about $5.35 per ton.

TEMISKAMING MINING CO., LTD. **ONTARIO**

Company dissolved in 1919.

Described in Volume XIV.

Assets of T. & H. B. distributed and charter surrendered in 1919, shares of **Hudson Bay Mines, Ltd.** (q. v.) held by T. & H. B., distributed pro rata to shareholders.

TEMISKAMING & HUDSON BAY MINING CO., LTD. ONTARIO

Office: 603 Standard Bank Bldg., Toronto.

Mine address: Gordon F. Dickson, gen. mgr., Cobalt, Ont.

Officers: J. P. Bickell, pres.; J. B. Tudhope, v. p.; with W. Linton, W. J. Sheppard, N. S. Dunlop, S. Johnston and Jos. Errington, directors. M.

Inc. 1906 in Ontario. **Cap.** $2,500,000; $1 par; all issued. Union Trust Co., Toronto, transfer agent; Chartered Trust & Executor Co., Toronto, registrar. Annual meeting about October. Listed on Standard Stock Exchange, Toronto. Stock range 21½ to 51½c. in 1920; 17½ to 28c. in 1921.

In addition to Cobalt and Porcupine properties, company in October, 1920, joined with McIntyre-Porcupine in purchasing **Blue Diamond Coal Co., Ltd.** Brule, Alberta, on a 50-50 basis. Negotiations begun in 1919 relative to Dolly Varden mine were not carried through.

Dividends: 15% in 1908; 6% in 1909; 11% in 1910; 9% in 1911; 12% in 1912; 3% in 1913; none in 1914; 3% in 1915; 9% in 1916; 12% in 1917; 3% in 1918; none in 1919; 4% in 1920; and none in 1921; a total of $2,159,156.

Comparative General Balance Sheets, to Dec. 31 of each year until 1921, then to June 30:

Assets.

	Current	Property	Const'n.	North Dome	Other Invest.	Total
1921..	$177,780	$2,427,803	$153,260	.....	$474,661	$3,233,504
1919..	949,608	2,427,803	275,845	.....	.....	3,653,256
1918..	870,114	2,427,802	271,743	$321,684	2,120	3,893,463
1917..	835,342	2,427,802	104,183	321,684	2,120	3,850,116
1916..	579,599	2,427,802	259,168	320,408	2,120	3,589,097
1915..	462,488	2,581,884	105,192	320,408	2,120	3,472,091
1914..	83,501	2,560,658	104,616	317,908	2,120	3,070,923

Liabilities.

	Cap. Stock	Depreciation	Profit & Loss	Current	Total
1921.....	$2,500,000	.....	$728,253	$5,251	$3,233,504
1919.....	2,500,000	$155,459	864,017	33,780	3,653,256**
1918.....	2,500,000	128,551	922,739	18,369	3,893,463*
1917.....	2,500,000	101,377	814,557	36,655	3,850,116*
1916.....	2,500,000	75,591	671,000	19,978	3,589,097*
1915.....	2,500,000	49,674	896,860	25,556	3,472,091
1914.....	2,500,000	23,747	527,996	17,059	3,068,802

* Includes $322,528 contingent a/c re North Dome property and Cobalt

mines hospital shares for 1916 and 1917; $323,804 for 1918. **Included dividend of $100,000.

Comparative operating account, to Dec. 31 of each year until 1921, then to June 30:

	Receipts	Expenses	Profits
1921**.....	$230,774	$366,539	*$187,245
1919.....	361,325	290,877	70,448
1918.....	425,015	289,620	135,395
1917.....	875,782	331,440	544,342
1916.....	708,877	355,987	352,870
1915.....	732,263	262,471	469,731
1914.....	146,649	228,071	*81,422
1913.....	438,455	320,881	117,574

* Deficit. **For 18 months.

Property: includes the Gans and Red Jacket claims in Coleman Twp. at Cobalt, and the North Dome property in the Porcupine area. Also company has a lease on holdings of Ixion Mines, Ltd. (q. v.) in the Sudbury district.

Ore: at Cobalt, high-grade silver, containing arsenic and smaltite. Oreshoots occur in veins where they cut contact of the Keewatin formation with a diabase sill. Pay ore is found in shoots.

Development: by 1,600′ vertical shaft. During 1919, extensions at Cobalt were 2,283′, and in 1921 to July, 1,316′, but results of development, even in the Gans area from which much had been hoped, were discouraging. Earlier exploration of the lower contact was also unsatisfactory.

Equipment: includes a compressor for 20 drills, a Nordberg hoist with 6′ drums and capacity of 2,500′. Electric power is hydraulically generated. The 40-stamp mill is equipped with concentrating machinery and a 125-ton flotation unit.

Production: 11,744,065 oz. of silver from 1907 to November 30, 1920. The yield in 1918 was 420,076 oz.; in 1919 243,037 oz.; in 1920, 243,029 oz. silver.

Operations at Cobalt were suspended in November, 1920, and are not likely to be resumed, although there is a possiblity of developing medium grade ore with silver above 70c. per ounce. Company is endeavoring to find other properties; but its coal land venture has apparently not been thus far successful, the Blue Diamond company reporting a deficit of over $150,000 for first 18 months operations. See Vol. XIV for more complete description of Timiskaming.

THACKERAY GOLD MINES, LTD. **ONTARIO**

Address: 244 Bathurst St., Toronto, Ont. **Mine address:** New Liskeard. **Cap.** $2,000,000; par $1.

Property: claim groups in Thackeray, Maisonville and James Twps., Larder Lake area. Timiskaming district. Also reported to own 250 acres in Lebel Twp., Kirkland Lake area. Company has apparently been inactive since Jan. 1, 1921.

THESAURUS GOLD MINES, LTD. **ONTARIO**

Office: Toronto, Ont. **Mine address:** Elk Lake, Ont. J. C. Nelson mng. dir.

Property: the Nelson group in Baden Twp., Elk Lake area, at northerly end of Matchewan lake, shows a series of narrow quartz veins in granite, developed by shaft and trenching. The ore is gold-bearing. A prospect.

THOMPSON-KRIST MINING CO. **ONTARIO**

Property merged with that of Porcupine Crown Mines, Ltd. (q. v.), to form **Northcrown Porcupine Mines, Ltd.** (q. v.), the first named becoming holding company.

The Thompson-Krist company, which was incorporated Nov. 6, 1917, with a capital of $2,500,000, still retains its corporate existence, and received a ⅓ interest in Northcrown Porcupine. Late in 1921, it was alleged that company had not completely met the terms of the merger agreement.

THREE STARS SILVER MINES, LTD. **ONTARIO**

Successor to Calumet & Montana Cons. Mng. Co.

Address: H. A. Oswald, Cobalt, Ont.

Officers: H. A. Oswald, pres.-mgr.; K. J. Schumacher, v. p.; H. R. Mendis, sec.-treas.; with R. G. Collins and Chauncey W. Martin (910 So Michigan Ave., Chicago), directors.

Organized in early 1918. **Cap.** $3,000,000; par $5.

Property: the Airgoid, or Cyril lake, claim in Coleman Twp., said to show fissure veins in diabase carrying silver ore.

Development: by 225′ shaft and 500′ total workings.

THUNDER MINING CO., LTD. **ONTARIO**

Out of business. See Vol. XIV.

TIP TOP MINE **ONTARIO**

Address: Col. S. W. Ray, owner, 10 Cumberland St., S., Port Arthur, Ont. **Mine address:** Kashaboiwe, Ont.

Property: 4 claims, freehold, 336 acres, in Thunder Bay district, 6 miles by rail S. W. of Kashaboiwe station, Canadian Northern railway. The claims are near Round lake, and show schist, quartzite and greenstone of Keewatin age, cut by quartz porphyry dikes. The ore occurs in lenses 5 to 40′ wide, in the felsite and quartz porphyry. One body of chalcopyrite and pyrite ore, stoped for 8 to 25′ wide and 70′ long, yielded 4,000 tons of ore said to have averaged 5.3% copper.

Development: by 208′ incline shaft, dipping 70° N., with workings on 4 levels, estimated to show 45,000 tons of ore, of 4 to 6% copper.

Equipment: includes a 150-h. p. steam plant, with 50-h. p. hoists, and a 6-drill air compressor. See Ontario Bureau of Mines Report, 1911, p. 209. Idle several years.

TISDALE GOLD MINING CO., LTD. **ONTARIO**

Inc. October, 1910, in Ontario. **Cap.** $500,000; shares $5 par: See **Dobie Mines, Ltd.**

TOMMY BURNS GOLD MINING CO. **ONTARIO**

Presumably dead. See Vol. XIV. Owned all but 5 shares of capital stock of its operating company, Tommy Burns Gold Mines, Ltd, of Nova Scotia, also dead. Its property holdings included 134 acres near Brookfield, Nova Scotia, and 8 patented claims, 310 acres, in Shaw Twp., Porcupine area, Timiskaming district, Ontario. The latter have in some way been acquired by the **Triplex Gold Mines, Ltd.**, which see. Apparently, Triplex is no more favorably regarded than was Tommy Burns.

TOUGH-OAKES GOLD MINES, LTD. **ONTARIO**

Is a holding company. **Office:** 119 Finsbury Pavement, London, E. C. 2, Eng. **Mine office:** Kirkland Lake, Ont.

Officers: G. R. Bonnard, chairman; R. Simpson, E. H. R. Trenow, directors. C. O. Connell, mine mgr.; H. J. Almond, sec.

Inc. in England, Jan., 1914. **Cap.** £500,000; shares £1; 230,007 outstanding. Organized to acquire 426,388 fully paid shares of company of same name, registered in Canada, with a capital of $3,000,000 (£600,000), in $5 shares, together with an option on a further 85,555 shares at 15s. each and 85,555 at 20s. On Feb. 28, 1919, company had 426,843 shares of Canadian company.

During 1915, two dividends of 2½% each were paid by the Canadian company and during 1916, four dividends of 2½% each.

For details of property see Canadian company.

TOUGH-OAKES GOLD MINES, LTD. **ONTARIO**

Controlled by English company of same name, which see.

Head office: Toronto, Ont. **Mine office:** Kirkland Lake, Ont. Liquidator, R. Simpson, Finsbury Pavement House, London, E. C. 2., England.

Officers: Albert Burt, pres.; Chas. A. Richardson, v. p., with Dr. R. J. Robbins, E. S. Gordon and J. Y. Murdock, directors. M. E. Green, sec.-treas. C. A. Richardson, mgr., Hugh Leggatt, res. eng.

Inc. 1913, in Ontario. **Cap.** $3,000,000; par $5; 531,500 issued: 426,843 shares owned by Tough-Oakes Gold Mines, Ltd. (English). Operations for 1919 gave a net loss of $105,934.

Company is in voluntary liquidation, property being merged with others to form **Kirkland Lake Proprietary (1919) Ltd.**, which see. Tough-Oakes stockholders to receive one K. L. P. share for each 2 shares of T. O. held.

Dividends: to July, 1917, totaled $391,125.

Property: 5 claims, 185 acres in Teck Twp., Kirkland Lake area. Eleven veins were opened on the surface. No. 2 being 370′ long; No. 3, 830′ and No. 6, 1,460′ in porphyry, of which 740′ assayed $12 per ton across 60″. In 1912, 1913 and 1914, several hundred tons of very rich ore was shipped. The veins developed since average about 5′ in width.

Development: by 500′ shaft and extensive workings. The main shoot in No. 2 vein is 250′ long on the 300′ level.

Equipment: includes a 120-ton milling plant, using ball and tube-mills and the counter current decantation system of cyanidation.

Production: in 1918 was 22,000 tons yielding gold and silver worth $139,683.

Idle several years owing to litigation over control, but operations were resumed in 1921, and mine is being worked by Kirkland Lake company in conjunction with adjoining Burnside property through latter's shaft.

TRETHEWEY SILVER-COBALT MINE, LTD. **ONTARIO**

See Vol. XIV. Succeeded by **Castle-Trethewey Silver Mines Co.**, in January, 1922.

TRIANGLE SILVER MINES, LTD. **ONTARIO**

Succeeds Kenabeck Cons. Silver Mines, Ltd.

Address: care C. H. Cline, Cornwall, Ont. **Mine address:** Kenebeck, Ont. W. H. Jeffery, mgr.

Property: includes the Veteran claim in Auld Twp., Elk Lake area, Timiskaming district, showing 2 veins in Keewatin formation which have yielded some high-grade silver ore.

Development: by 150′ shaft and 200′ of laterals.

Equipment: includes two 40-h. p. boilers and 4-drill compressor.

Early in 1922, an effort was being made to refinance company.

TRIPLEX GOLD MINES, LTD. **ONTARIO**

Address: Major D. B. Harrison, fiscal agent, Hotel Bancroft, Worcester, Mass.

Officers: Chas. B. Post, pres.; Andrew G. Hildreth, v. p.; Gordon H. Ganthier, v. p.; Mathew Thomas, sec.-treas., with Chas. S. Averill, Milton Roblee, Wm. H. Dalton, Wm. Marshall Moore and D. B. Harrison, directors.

Inc. in Ontario. Registered and licensed under the laws of Ontario and of Massachusetts; par $1.

Property: 25 claims, 1,010 acres, in Shaw Twp., Porcupine district, including the former holdings 8 claims, 310 acres of Tommy Burns Gold Mining Co. Company issues no details as to capitalization or exactly what claims are owned, and whether under option, or paid for. The literature is calculated to attract the unwary and those who invest in the company's shares will, we fear be bitterly disappointed. Stock offered as a Founders bonus partnership at 50c a share.

Reported early in 1922, that old mill of Casey-Cobalt had been purchased with the inference that its acquisition was for ornamental, rather than for useful purposes.

According to John MacMartin, consulting engineer of the company,

the claims show 5 veins and a "sulphide dike," whatever this may be, that is said to be 5,500′ long and 140′ average width, carrying $7.50 per ton (in what?) The statement quoted says there are 6,551,22 tons of ore of total value $55,791,000, which is quite interesting, if true, as it makes all other gold mines mere infants by comparison.

The old adage "Let the buyer beware", seems to fit this case.

TWO LAKES COPPER MINING CO., LTD. **ONTARIO**

Idle. **Office:** Oil City, Pa. **Mine office:** Sowerby, Algoma, Ont.

Officers at last report: Dr. E. L. Dickey, pres.; S. F. Amsler, v. p.; D. G. Bailey, sec.; J. C. Wilkins, treas.; F. W. Bailey, gen. mgr.; preceding, with J. W. Russell, C. W. Coulter, G. W. Freeman and Edw. Schwabenbake, directors.

Inc. October 12, 1906, in Ontario. **Cap.** $500,000; $1 par; issued, $270,000. Annual meeting, first Tuesday in November.

Lands: 8 claims, 1 fractional, 300 acres, freehold, including the Robinson and Tupper mines, 8 miles from Thessalon, and 4 from a railway. The property shows pre-Cambrian slate, conglomerate and greenstone, carrying a number of fissure veins 3 of 2 to 10′ estimated average width, carrying sulphide ores of about 4.5% copper, with small quantities of silver and gold.

Development: by shafts of 50′, 25′ and 10′.

Equipment: includes a 60-h. p. boiler and 35-h. p. hoist. At last reports the management was planning further development as soon as the financial situation improved, but is apparently still adhering to a once popular "watchful waiting" policy.

UNION MINING CORPORATION **ONTARIO**

Address Timmins, Ont. R. W. Winton, pres.; C. Denker, mgr.

Property: in Whitesides Twp., about 25 miles S. W. of Porcupine. Sinking a 500′ shaft, down 300′, Nov., 1921, with lateral work under way on 150′ and 300′ levels. About 30 men employed on surface and underground work. Drilling is contemplated.

UNITED KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: Haileybury, Ont. **Mine address:** Kirkland, Ont.

Officers: R. T. Shillington, pres.; W. G. Ellis, v. p.; H. A. Day, sec.-treas., with Levi Dodge and Ed. Kert, directors.

Inc. in Ontario. **Cap.** $2,000,000; $1 par; 1,000,000 issued.

Property: 135 acres near the Teck-Hughes mine, Kirkland Lake district. Geologic conditions are said to be similar to adjacent producers.

Development: by surface prospecting; No. 1 shaft being sunk in September, 1917.

Company may have fair prospects, but has received considerable over-optimistic advertising by brokers. No recent information.

UNIVERSITY MINES, LTD. **ONTARIO**

Is a subsidiary of the **La Rose Mines, Ltd.**, which see.

VICTORY SILVER MINES, LTD. **ONTARIO**

Address: care W. P. Blair, St. Catharines, Ont. **Mine address:** Cobalt, Ont.

Officers: A. Patterson, pres.; P. E. Hetherington, sec.-treas.; J. A. McVichie, mgr.

Inc. 1920 in Ontario. **Cap.** $2,000,000; shares $1 par.

Property: the old Hylands mine, near the Adanac, in Coleman Twp., developed by 200′ shaft. A wide vein was uncovered late in 1921, carrying cobalt ore with low silver value.

VINDICATOR GOLD MINES, LTD. **ONTARIO**

Address: Buffalo, N. Y. **Mine address:** Kirkland Lake, Ont. Albert Wende, treas.

Inc. Feb. 8, 1918. **Cap.** $1,000,000.

Property: the Vindicator mine in Teck Twp., Kirkland Lake area, Timiskaming district.

VIOLET MINING CO. **ONTARIO**

Company dissolved. Property taken over by **La Rose Mines, Ltd.**, which see.

WACHMAN MINING & MILLING CO., LTD. **ONTARIO**

Office: Dryden, Ont. N. Wachman, mgr. **Cap.** $500,000.

Company was organized in 1918, by Robert Wachman, 4439 So. Michigan Bldg., Chicago, Ill., to acquire 2,100 acres of mineral lands at Wabigoon lake, Kenora district.

Main vein of tract is said to be 4" to 3' and traceable 2,540', and to show silver and free milling gold ore for a length of 400'. Developed by 2 shafts, 50' and 100' deep.

Company said to have spent $100,000 in development work. In August 1921, company was in financial difficulties and a share holders' committee was treating with creditors.

WAKENDA MINES, LTD. **ONTARIO**

Address: 26 Adelaide St. W., Toronto, Ont. **Mine address:** Shining Tree, Ont. Jas. E. Day, pres.

Property: the Shining Tree mine in McMurchy Twp., Wasapika section of the West Shining Tree area, Sudbury district. Also, the Anzac mine in Tisdale Twp., Porcupine area, Timiskaming district. Ores are gold-bearing.

Company is apparently affiliated with the Miller-Adair Mines, Ltd.

WASAPIKA CONSOLIDATED MINES, LTD. **ONTARIO**

Address: Geo. R. Rogers, pres.-gen. mgr., Bank of Hamilton Bldg., Toronto, Ont. Martin Fasset, supt., Shining Tree, Ontario.

Inc. 1920, in Ontario as a reorganization of the Wasapika Gold Mines and adjoining properties, old shareholders receiving 3 new shares for each old one held. **Cap.** $6,000,000; $1 par. In July, 1920, 2,000,000 treasury shares were offered at 10c each, "in view of the speculative nature of the enterprise."

Property: the Ribble group of 6 claims on the S. of Michiwakenda lake, West Shining Tree gold area, 20 miles N. E. of Westree on the C. N. Ry. Contains a schist zone with quartz lenses, up to 4' wide, and irregular narrow veins of crushed quartz, cut by veinlets of pink calcite. Free gold is visible. Surface sampling is reported to have exposed 800' of $9 ore across 4 feet.

Development: by 200' shaft and several hundred feet of workings. An E. crosscut at 100' depth exposed on the footwall 5' of $12 ore, and on the hanging wall $3 to $11 ore. The shaft cut the vein at 160'.

Equipment: steam power, hoist, sawmill, shop and camp. A 100-ton mill is planned.

WASAPIKA GOLD MINES, LTD. **ONTARIO**

Listed in Volume XIV. Reorganized 1920 as the **Wasapika Consolidated Mines Ltd.**, which see.

WEST DOME CONSOLIDATED MINES **ONTARIO**

Head office: 420 Traders Bank Bldg., Toronto.: **Mine office:** So. Porcupine Ontario. F. J. Hamilton, mgr.

Officers: Sir Henry M. Pellatt, pres.; Hugh Blain, v. p.; C. H. Manaton, sec.-treas. ,with J. A. Murry, R. L. Baker & Co., and G. A. Stimson, directors.

Inc. 1915, in Ontario, to take over property and assets of the West Dome Mines Co. **Cap.** $3,000,000; $1 par; all issued. Listed on New York Curb and in Toronto. Security Transfer and Registrar Co., transfer agent.

Property: 176 acres, in Tisdale Twp., Porcupine area, adjoins Dome mine on W. Idle from 1912 to 1915, after fire destroyed many lives besides surface equipment worth $75,000. Property shows a quartz vein proven to depth of 1,800'. There are also 8 other veins as yet undeveloped.

Development: by 70° incline shaft, 365' deep, sunk on a quartz vein

that averages 5′ in width and in some places 8′. Workings total about 4,000′. Reserves in September, 1917, were estimated to be worth $2,000,000, the ore assaying $6.17 to $8 per ton. In 1918, a test run of 300 tons ore was made at the Dome Lake mill. This ore assayed $9.55, and an 86% recovery, or $8.21 was saved. Milling and transportation cost $6.05, and indirect charges were $1.23, so that the net profit was only 93c. per ton. Under normal conditions costs would not exceed $6, and mine could be operated with a profit of $3.55 per ton, but 93c. being too low for safety, mine was closed down.

Equipment: includes 12-drill compressor, electric motors and transformers, 4 boilers, drills, etc.

A consolidation is planned with Dome Lake M. & M. Co.

WEST KIRKLAND GOLD MINES, LTD. **ONTARIO**

Office: 157 Bay St., Toronto. **Mine address:** Kirkland Lake, Ont.

Officers: Edward Martin, pres. and gen. mgr.; Jas. Rogers, v. p.; T. R. Black, sec.-treas.; with S. Hurd and R. Hurd, directors.

Inc. June, 1919, in Ontario. **Cap.** $500,000.

Property: 720 acres, in Kirkland Lake mining district, said to show several gold bearing quartz veins on which but little work has been done.

WEST TREE MINES, LTD. **ONTARIO**

Main office: 905 Bank of Hamilton Bldg., Toronto, Ont. **Business office:** Rm. 10, 26 Adelaide St. W., Toronto. **Mine office:** Coyne, P. O. Ontario.

Officers: Senator Geo. W. Fowler, pres.; C. S. Corson, v. p.; Gideon Grant, sec.-treas.; with W. D. McKay (mgr.), W. J. J. Butler, Geo. R. Rogers, and A. E. Way, directors.

Inc in Ontario. **Cap.** $3,000,000; par $1; treasury 800,000 shares. Dealt in on New York Curb, shares sold 15c. low (November), 37c. high, June, 1919.

Property: 4 claims, 183 acres, adjoining the Wasapika Mines, in the West Shining Tree gold area, 20 miles N. E. of Westree on the C. N. Ry. Prospectus issued states that there are 15 veins on the property, all with free gold showing in quartz, which occur in schistose bands. The veins are cut by narrow diabase dikes.

Development: by 10,000′ of stripping and 3 shafts, one being 100′ deep. Sampling gave $8 per ton.

Property is an attractive prospect that requires further development to prove its real value.

WETTLAUFER LORRAIN SILVER MINES, LTD. **ONTARIO**

Office: 61 Broadway, N. Y. **Mine office:** South Lorrain, Ont.

Officers: H. Lockhart, jr., pres.; D. M. Steindler, v. p.; E. H. Westlake, sec.-treas.; the foregoing, and T. L. Herrmann, J. H. Susmann, W. J. Magavern, Wm. J. McWhiney, J. L. Mitchell and Herman Cook, directors. H. A. Kee, mgr.

that averages 5′ in width and in some places 8′. Workings total about

Inc. November, 1908, in Ontario **Cap.** $1,500,000: $1 par; outstanding, 1,416,590 shares, of which Kerr Lake Mines, Ltd. owns 150,000. Annual meeting, fourth Monday in January. Bankers' Trust Co., New York, and Trusts & Guarantee Co., Ltd., Toronto, transfer offices; Security Transfer & Registrar Co., New York, registrar. Listed on New York Curb.

Dividends: total $637,465.

Balance sheet for 1920 showed total assets, $1,506,172, including $50,977 U. S. Liberty Bonds and $5,640 cash, with a net surplus of $89,090.

Operations ceased in 1913, owing to exhaustion of ore, and efforts to find other bodies in the property practically abandoned.

During recent years the company's properties were operated under a lease by the Pittsburg Lorrain Syndicate, but no work was done in 1920.

WHITE KIRKLAND GOLD MINES, LTD. **ONTARIO**

Mine address: Kirkland Lake, Ont.

Officers: Donald B. White, pres., care McGibbon Lumber Co., Sarnia, Ont., Garnet Hodgins, v. p.; Allan B. Reynolds, treas.; J. E. Lloyd, sec.

Inc. 1921. **Cap.** $500,000.

Property: 130 acres in Teck Twp., Kirkland Lake area. To be developed.

WHITE RESERVE MINING CO., LTD. **ONTARIO**

Address: 15 Toronto St., Toronto. **Mine address:** Latchford, Ont.

Officers: J. A. McAndrews, pres.; A. E. Marks, sec.; with S. B. Playfair, directors. Leonard G. Smith, mgr., Haileybury, Ont.

Inc. June 17, 1914, in Ontario. **Cap.** $1,000,000; par $1; all outstanding.

Property: 3 claims, 2 patented, 130 acres, in Twp. of Whitson, Maple Mt. district, and 40 acres, in Twp. of James, both said to show fissure veins in diabase; silver, cobalt and nickel ore occurs in shoots of variable size and with a wide range of value.

Development: by several shafts, deepest 140′, and total workings of 1,500′. No ore is mined as work is confined to development and exploration in order to block out ore reserves.

Equipment includes hoist and 9-drill compressor.

Beginning with fall of 1920, claims in Whitson Twp., have been under option to the **National Mng. Corp.** (q. v.) of England, which has been drilling the ground under direction of J. B. Tyrrell, of Toronto, with Chas. S. Fyfe, supt. The National company has a branch office at 802 Lumsden Bldg., Toronto.

WHITE ROCK MINING CO., LTD. **ONTARIO**

Address: Box 1,300, Sudbury, Ont. **Mine address:** Coyne P. O. Ont. Wm. McVittie, mgr.

Cap. $1,000,000; par $1; 450,000 treasury shares.

Property: the White Rock, or Saville-McVittie, claims in McMurchy Twp., Wasapika section of the West Shining Tree area, Sudbury district, adjoins West Tree holdings on S. E. A quartz vein from a few inches to 6′ wide occurs in pillow lava, traceable for 2,600′.

Development: by 2 shafts, 1,000′ apart, and some lateral work.

Equipment: includes small mining plant, 2-stamp mill and saw-mill.

WOOD-KIRKLAND CO. **ONTARIO**

Address: care Geo. W. Morres, 1118 Prudential Bldg., Buffalo, N. Y. **Mine address:** Kirkland Lake, Ont. J. Murphy, supt.

Inc. February, 1920. **Cap.** $2,000,000; $1 par.

Property: 300 acres, in Lebel Twp., Kirkland Lake district, developed by 100′ shaft. Vein cut at 50′ and 100′ shows gold and silver values.

WRIGHT-HARGREAVES MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ontario.

Officers: Oliver Cabana, Jr., pres.; Edwin Lang Miller, v. p.-sec.; Gerard F. Miller, treas.; with Albert Wende (mng.-dir.), Oliver G. Donaldson, Ralph Hockstetter, Chas. G. Duffy and Harcourt Ferguson, directors. J. E. Grant, supt.

Inc. June 16, 1916, in Ontario. **Cap.** $2,750,000; $1 par; all outstanding. Transfers made by company; Chartered Trust & Executor Co., Toronto, registrar. Annual meeting, Sept. 6.

Balance sheet, Dec. 31, 1921, shows current assets, $349,419, and liabilities, $172,027. Gross earnings for 8 months of mill operation, $486,282. Initial dividend of 5% paid Jan. 2, 1922.

Property: 4 patented claims, 152 acres, on most easterly point of Kirkland Lake, Teck Twp., Temiskaming district, N. E. of Lake Shore mine. First gold discovery in Kirkland Lake area made on these claims about 1911. The mineralized zone can be traced for 2,400′ in feldspar-porphyry, with low values at surface, but enrichment taking place 400′ deep. The main vein is 5 to 20′ wide; ore value is $15-$16 in gold.

Development: by two shafts, 950′ apart, but connected; total workings, 3,100′. Six thousand tons of broken ore available, Oct. 1, 1921. Four

levels have been opened and main shaft is being deepened; had reached 550′ on Feb. 1, 1922.

Equipment: includes 100 h. p. hoist, compressor and a 150-ton cyanide mill completed fall of 1920.

Production: to Sept. 1, 1921, $241,618 (about 5 mos.).

Work was suspended from mid-1919 to May, 1920, owing to a strike and general conditions; from that time until May, 1921, mine was generally idle awaiting completion of mill and headframe. Prospects are considered good.

QUEBEC

ALBERT COPPER CO. **QUEBEC**

Office: 25 Broad St., New York. **Mine office:** Capelton, Sherbrooke county, Quebec. Organized to take over the mining interests of the **Nichols Copper Co.** in Quebec.

ASCOT MINING CO. **QUEBEC**

A close corporation owning an old copper mine near the Eustis mine, in Ascot township, Sherbrooke county, Quebec. See Vol. XII.

BLACK LAKE ASBESTOS & CHROME CO., LTD. **QUEBEC**

In liquidation.

Directors: J. A. Jacobs, M. Arnado, Leon Schinasi, W. G. Ross, and John W. Cook.

Annual report for 1920 shows an operating profit of $161,097, and a surplus of $1,510 after deducting for depreciation, interest, etc.

Property: asbestos holdings at Black Lake and the Caribou chrome mine in the Coleraine-Caribou district. Work at latter definitely stopped in mid-1920, and plant dismantled in following year.

BRITISH MINERALS CORPORATION, LTD. **QUEBEC**

Address: 605 McGill Bldg., Montreal. **Mine address:** Amos, Que. S. E. Melkman, mgr.

Owns the Siscoe mine, located on an island in Lake De Montigny, Dubuisson Twp., Temiskaming county, 40 miles by river from Amos, on the National Transcontinental Ry. Mine shows quartz veins and stringers in diorite and greenstones. Veins are from 22″ to 10′ in width. Developed by shallow shafts, deepest 100′. An 8-ton sample assayed $39.64 gold per ton. Property is considered worthy of exploration.

CANADIAN WOOD MOLYBDENITE CO. **QUEBEC**

Described in Vol. XIII. Property taken over, 1917, by **Dominion Molybdenite Co.**, which see.

CANADIAN ZINC PRODUCTS CO., LTD **QUEBEC**

Address: Eastern Twps. Bldg., Montreal. **Works address:** Notre Dame des Anges, Que. L. D. Adams, gen. mgr.

Operates a zinc oxide plant. Under same management as **Zinc Co., Ltd.**

DOMINION MOLYBDENITE CO. **QUEBEC**

Absorbed the Canadian-Wood Molybdenite Co.

Address: care W. J. Boland, pres., 2 Toronto St., Toronto, Ont. Harold Fisher, of Ottawa, is manager.

Inc. 1917. **Cap.** $500,000.

Property: the Moss mine, near Quyon, Pontiac county.

Development: by opencuts, exposing molybdenite in reddish gneissoid granite. A 200′ shaft has stopes connecting with the open cuts. The ore is principally finely disseminated in flakes of ½″ or less, and is hand sorted. Present company did 12,000′ of diamond drilling which is said to have blocked out considerable ore.

Equipment: includes 150-ton mill, using crushers, dryers, ball mills and Callow flotation machines. Ore containing as low as 1% MoS_2 gives 95% recovery.

Production: from March, 1917, to January, 1919, over 43,000 tons of 1% ore had been mined and milled. Mine was closed down in July, 1919, on account of the poor market for molybdenum.

EASTERN MINING & MILLING CO. QUEBEC

Address: 903 Bk. of Hamilton Bldg., Toronto, Ont. **Mine address:** Eastman, Que.

Officers: Fred M. Connell, pres.; K. A. McPhadyen, sec.

Property: the Huntingdon copper mine, 409 acres, in Bolton Twp., Brome county. The ore deposit is a well mineralized mass of greenstone between serpentine and schist. The mineral is chalcopyrite.

Development: by tunnels. Company has a 250-ton flotation plant built to treat the 50,000 tons of ore on the dumps. Up to first week in February, 1919, the mill had treated 6,000 tons assaying about 2% copper. Concentrates were shipped to Nichols Copper Co. The plant was closed down for several months in 1919, was reopened, and again closed, March, 1920. Mine is believed to have a considerable reserve of low grade ore.

EUSTIS MINING CO. QUEBEC

Office: Eustis, Sherbrooke county, Quebec. W. E. C. Eustis, 131 State St., Boston, Mass., pres., sec.-treas.; F. M. Passow, mgr.

Inc. 1878, in Quebec, and operated as a close corporation.

Property: in Ascot Twp., near Sherbrooke, carries 4 parallel interbedded lenses of cupriferous pyrite in talcose schist, crossed by diorite dikes, the cupriferous belt being traceable for 2 miles. Lenses are 3 to 60′ in width, averaging about 2.5% copper, up to 60 cts. per ton in combined gold and silver values, and 40% sulphur, but with considerable variations, ore occasionally carrying up to 50% sulphur. Footwall vein, or lens 4 to 20′ thick, 50 to 100′ long. Main vein 20 to 60′ thick, 100 to 120′ long. Shaft vein, 3 to 15′ thick, 50 to 100′ long. No. 1 vein 2 to 25′ thick 20 to 120′ long. Footwall and shaft lenses richest in copper, averaging 4 to 8% while others carry 2½% copper with 42 to 48% sulphur. Property is primarily a producer of pyrite, for the sulphuric acid trade.

Development: the mine, opened 1870, and producing for 80 years, has a 7x7′ crosscut tunnel, 1,000′ long and a 3,450′ incline with average dip of 45°, and double skip tracks. The mine is dry, most of the water coming from surface and the upper stopes, but the limited quantity of mine water is very acid, and contains copper in solution, which is precipitated as cement copper on scrap iron as it leaves the tunnel, through which it is conducted by a launder. Mine is served by the Boston & Maine railway.

Equipment: includes a 150-h. p. electric hoist, good for 3,500′ depth, and two 8-drill, 2-stage air compressors, 1 run by steam and 1 by electricity.

The 300-ton mill, three-fourths mile from the mine, is connected therewith by an electric tram, equipped with three 3-ton cars. The mill has a 150-h. p. electric equipment. Ore sufficiently rich for shipping is reduced to 2½″ size, and concentrated ore is reduced to ⅛′ size, by crushers and ball mills, going thence to an 8-compartment classifier with spigots discharging to 8 Wilfley tables. Middlings from coarsest tables are returned to ball mills and from finer tables, to the re-crushing department.

Selected ore and concentrates are shipped to various acid works, and there burned for sulphur, the cupriferous cinder remaining being shipped to the Norfolk smelter, where it is treated for copper. Production was about 30,000 tons of cupriferous pyrite yearly.

After 40 years continuous operation, mine was closed in March 1919, to await improved market conditions.

FEDERAL ZINC & LEAD CO., LTD. QUEBEC

Address: Guarantee Bldg., 285 Beaver Hall Hill, Montreal, Quebec.

Officers: T. O. Lyall, pres.; J. C. Beidelman, v. p.-gen. mgr.; with Hon. J. L. Perron and P. D. L. Lyall, directors. E. A. Wright, sec.-treas.

Cap. $3,000,000; $5 par; $2,210,000 issued.

Property: owns 800 and leases 400 patented acres, in Lemieux Twp., 45 miles back of Cascapedia, Gaspe peninsular. Examined in 1918 by Walter Harvey Weed and Adhemar Mailhiot. Well mineralized fissure veins cut through slates intruded by quartz-porphyry, and by later basic rocks. Ore consists of sphalerite and galena in quartz and spar

Development: by 2,300′ of drift and crosscut work, with tunnel entrance; level connects with shaft now down 257′. Crosscutting on the 250′ level cut several veins, showing richer ore than the orebody exposed on the 100′ level, 5′ running over 50%. Machinery for a 400-ton mill was installed, 1921-22. A 42-mile road from mine to railroad was to be completed in 1922. Property considered good. Was active in 1921.

INDIAN-PENINSULAR MOLYBDENUM CO., LTD. **QUEBEC**

Name changed in 1920. Formerly the Indian-Peninsular Mng. Co.

Offices: W. E. Simpson, Cobalt, Ont., and 1011 Chestnut St., Philadelphia, Pa.

Officers: W. J. Haines, pres.; P. G. Grant, v. p.; with S. D. Wright, W. H. Storey, A. W. Porter, directors.

Inc. July, 1918, in Ontario. **Cap.** $1,000,000; $1 par: all issued; non-assessable. Annual meeting, Friday before first Monday in September.

Is a holding company and controls the St. Maurice Mines Co., Ltd., which see.

MARTIN GOLD MINING CO., LTD. **QUEBEC**

Address: Amos, Que. A. Allard, sec.; J. P. Martin, mgr.

Property: in the Hurricanaw district, 40 miles by river from Amos, on the National Transcontinental Ry., consists of parts of lots A and 37, ranges VIII and IX, Dubuisson Twp., Temiskaming county. Shows a quartz vein in greenstone, 2 to 10′ wide, exposed for over 700′ by stripping and trenching.

Development: 125′ vertical shaft with 75′ of drifting on vein at bottom level. In 1918, company built and operated a small experimental 10-stamp mill. Ore is said to have yielded good gold value, but work was discontinued in July, 1919, on account of financial difficulties.

MUTUAL CHEMICAL CO. OF CANADA, LTD. **QUEBEC**

Address: Hugh B. Lee, supt., Black Lake, Quebec.

Property: the Belanger mine, 250 acres in Coleraine Twp., Megantic county. Ore is chromite occurring in serpentine.

Development: by shaft, deepest 200′, with workings on 90′ and 190′ levels exposing ore for 500′ in length with crosscuts each 50′.

Equipment: includes an electric hoist, compressor, and 100-ton mill, making an 80% extraction. Concentrate assays 50% chromic oxide.

Closed down since January, 1921.

NORTH AMERICAN MAGNESITE CO., LTD. **QUEBEC**

Address: 36 Board of Trade Bldg., Montreal, Quebec.

Officers: E. Liersch, pres.; C. L. Higgins, v. p.; W. J. Phelps, sec.-treas.; with C. O. Clark, L. N. Benjamin, A. W. Gifford, A. Letang, and Jas. N. Laing, directors, all of Montreal. W. P. Boshart, supt., Calumet, Quebec.

Cap. $200,000; par $100; issued $186,000.

Property: 300 acres, in Greenville Twp., Argenteuil county, said to have 1,000,000 tons of magnesite. Mining is by open-cut methods.

NORTON MINING CO. **QUEBEC**

Office: Coaticook, Quebec. A. O. Norton, pres. and mgr.; W. Jenkin, mine supt.

Property: 600 acres, freehold, except 150 acres, title covering only mining rights, includes the Suffield, King, Silver Star, and Marrington mines,

in Ascot township, 7 miles from Sherbrooke, with railroads within 2 miles on either side.

The mines show 3 lenses, of 3 to 20′ width, 1 proven to depth of 400′, estimated by owner to average 4 to 5% copper, from a trace to 10% zinc, 5 to 25 oz. silver, and $1.50 gold per ton. The King mine has a 165′ incline shaft with about 500′ of workings. The Suffield mine has a 350′ shaft with about 1,200′ of workings, showing ore assaying 3% to 4%, and combined gold and silver values of $2 to $12 per ton, with about 25% sulphur. The Marrington mine, 100 acres, 1½ miles from Suffield, and about 1 mile from Capelton is opened by a 260′ shaft with about 400′ of drifts, developing a lens about 75′ wide at surface, said to carry at depth 5 to 7′ of good ore. Little development work has been done since August, 1914, and no shipments have been made from the property.

Equipment: includes 100-h. p. boiler, a 50-h. p. hoist, compressor and 100-ton flotation mill. Property considered promising.

QUEBEC MEGANTIC COPPER CO., LTD. **QUEBEC**

Address: Senator Pope, pres., care Quebec Legislature, Montreal, Que. Company inc. in 1921 and stock offered public.

Property: a copper prospect in Halifax township, Megantic county, Que., showing stringers of copper oxide in a zone impregnated with oxides. Developed by shallow shaft and by surface stripping, proving mineralization for several hundred feet.

ST. MAURICE MINES CO., LTD. **QUEBEC**

Subsidiary of Indian Peninsular Molybdenum Co.

Office: W. E. Simpson, Cobalt, Ont., and 1011 Chestnut St., Philadelphia, Pa.

Officers: W. J. Haines, pres.; A. E. Doucet, v. p.; W. H. Storey, sec.-treas., with W. E. Simpson, S. D. Wright, A. W. Porter, and P. G. Grant, directors.

Inc. June, 1916, in Quebec. **Cap.** $750,000; $100 par; all issued; non-assessable. Annual meeting, first Monday in September.

Property: 5 claims, 683 acres, at Indian Peninsula on Lake Keewagama Temiskaming county, 20 miles S. of Amos on the National Trans. Ry. Ore carries molybdenite and is treated in a 100-ton mill.

TETREAULT MINE **QUEBEC**

Address: 416 Power Bldg., Montreal. **Mine address;** Notre Dame des Anges, Que. Pierre Tetreault, owner; J. P. Tetreault, mgr.

Property: in Montauban Twp., Portneuf county, shows a narrow zone of highly altered limestone surrounded by amphibolites and schist with intrusions of gneiss and pegmatite. The ore is limestone carrying zinc and lead. Developed by shafts.

That portion of property under lease to the Zinc Company, reverted to Tetreault in spring of 1921.

WEEDON MINING CO., LTD. **QUEBEC**

Office: 263 St. James St., Montreal. C. W. Cushman, supt., Weedon, Quebec.

In 1915 acquired the property of the East Canada Smelting Co., at Weedon from the Precious Metals Corporation of New York.

Property: 375 acres in Weedon Twp., Wolff county. Has produced 260,000 tons of cupriferous pyrite ore, mined for sulphur as well as copper in the last 8 years. Average assay is 3.3% copper, 40.8% sulphur, trace of lead, 0.77% zinc, 0.5 oz. silver, and 20c gold per ton.

Geology: ore occurs in two lenses in schist. Main orebody is 570′ long and from 15 to 45′ wide, with dip of 45° N. E., and course N. 37° E.

Development: by two shafts 700 and 900′ deep, and 13 levels driven to the limits of the ore. **Reserves:** on January 1, 1921, were about 200,000 tons.

Equipment: 2 air hoists (60-h. p.), one 150-h. p. electric hoist, 2 com-

pressors (one electrically driven, 1,600 cu. ft. capacity), and all necessary buildings, shops, etc.

The zinc mine is developed by one 400′ shaft. It is equipped with a 250-ton concentrating mill using tables, flotation unit, and magnetic separation. Produces zinc concentrates containing 42% zinc and lead concentrates averaging 60% lead, 65 oz. silver, and $13 gold per ton.

Transportation: at copper mine 3½ miles of aerial tram to railroad, costing 7c. per ton.

At zinc mine there is 4 miles of teaming. Mining costs at copper mine in 1916 including development and all overhead charges were $2 per ton. Complete cost at zinc mine of concentrates, f. o. b. cars, was $6 per ton of crude ore.

Production of copper in 1916, 5,640,000 lb. Mine output in 1919 about 80 to 100 tons daily, or 25% of that in 1917-18.

The copper mine was shut down May, 1921, after continuous operation since 1910. Reported that a fair amount of low grade ore is still available.

ZINC COMPANY, LTD. **QUEBEC**

Address: 263 St. James St., Montreal. **Mine address:** Notre Dame des Anges, Que. L. D. Adams, gen. mgr.

Property: the Notre Dame mine in Montauban Twp., Portneuf county. The ores are zinc-lead. Work on the Tetreault mine, under lease, ceased April, 1921, and property turned back to owner.

Company under same management as Canadian Zinc Products Co.

SASKATCHEWAN

BEAVER LAKE GOLD MNG. CO. **SASKATCHEWAN**

Mail returned, 1919, from Prince Albert, Saskatchewan, Canada.

Property: 32 claims acquired in 1914, from the Prince Albert Expl'n Co., on the north shore of Beaver Lake, 118 miles from Le Pas, the nearest R. R. point, on the Can. Northern Ry., out of Winnipeg.

On the Prince Albert claim, at the contact of the Huronian schist and Laurentian diorite, a 48″ quartz outcrop can be traced for a considerable distance. A 70′ incline shaft, sunk on the vein, is said to show a 4 to 5′ vein averaging $16 in gold and 2 oz. silver per ton. Probably idle.

YUKON TERRITORY

Gold is the outstanding metal in the Yukon, and practically all is derived from alluvial deposits. The estimated value of the gold production for 1921 is $1,250,000, somewhat larger than the previous year. The grand total is $173,780,000.

ALASKA CORPORATION **YUKON**

Address: Carcross, Y. T. E. R. Wilcox, supt.

Property: 7 claims, 284 acres, the Big Thing group on Windy arm, Conrad district, 7 miles S. of Carcross, shows a fissure vein, 4′ wide, in granite, carrying gold-silver ore. Developed by shaft and tunnel, with total workings of several thousand feet. Equipped with 2 boilers, hoist, 2 compressors, etc. Has been a producer.

ANACONDA MINING CO. **YUKON**

Address: Whitehorse, Y. T. O. Dickson, mgr.

Property: 3 claims, 114½ acres, 3½ miles N. W. of Whitehorse, covering a granite-limestone contact. Copper ore occurs in lenses, with 15′ maximum width. Developed by shallow workings.

ATLAS MINING CO. **YUKON**

Dead. In February, 1916, holdings were taken over by the **Yukon Copper Co., Ltd.**, which see.

BIG CREEK MINING CO., LTD., THE YUKON

Subsidiary of **The North West Corporation,** which see

CALDER MINING CO., LTD., THE YUKON

Subsidiary of **The North West Corporation,** which see.

CANADIAN KLONDYKE MINING CO., LTD. YUKON

On November 22, 1917, the Granville Mining Co. (which see), the bond-holding company, applied for a receiver for the Canadian Klondyke Mining and Canadian Klondyke Power companies.

Address: Dawson, Yukon Territory. A. Baird receiver, F. P. Burrall, mgr.

Inc. March 5, 1913, in Canada. **Cap.** $8,000,000 shares $5 par; $6,000,000 issued. When the receiver took over the property on January 5, 1918, total liabilities (excluding claims of litigants) were $662,038, which included $158,570 in wages. Balance sheet of December 31, 1918, showed current assets of $506,900, and current liabilities of $30,569; total assets, $4,156,837. The profit and loss statement for the year showed a gross profit on operation of $216,963. Gold returns were $452,648, and total income was $487,120; operating charges absorbed $270,157. Net profit to surplus was $44,570.

Property: 151 placer claims and hydraulic lease No. 18, about 26,000 acres, in the Klondyke valley, with total production to date of nearly $12,000,000.

In 1918, company operated 3 dredges which handled 4,300,910 cu. yds. at a total cost of 10.28c., and yield of 11.19c. per cu. yd., compared with a cost of 14.46c. and yield of 14.76c. in 1917, and cost of 14.22c. and yield of 14.21c. in 1916.

Equipment: includes 10,000-h. p. hydro-electric power plant 3 dredges with 17½ cu. ft. buckets, having a daily capacity of 10,000-16,000 cu. yds. Oxy-acetylene plant, electric furnace, and adequate shop equipment.

COPPER KING MINE YUKON

Address: Whitehorse, Y. T. J. P. Whitney, owner.

Property: 2 claims, 91 acres, 3½ miles N. W. of Whitehorse, covers a limestone fragment, 600'x1,200', surrounded and underlaid by granite. Orebodies, lenticular in shape and of 5' average width, occur in limestone; the ore carries bornite and chalcopyrite, with gold and some silver. Developed by tunnel and shaft; equipped with boiler, hoist and compressor.

DOMINION MINING CO., LTD., THE YUKON

Subsidiary of **The North West Corporation,** which see.

EAGLE GROUP YUKON

Address: care R S. Ames, Dawson, Y. T. **Mine address:** Mayo, Y. T. B. C. Sprague, owner.

Property: 8 claims on Eagle gulch, ¾ mile from mouth of Dublin gulch, Duncan district. Ore is gold-bearing, assaying up to $27,31. Developed by tunnel.

GRAFTER COPPER MINING CO. YUKON

Address: R. Lowe or J. P. Whitney, Whitehorse, Y. T.

Geo. Armstrong, E. A. Dixon, J. P. Whitney, Robert Lowe, and W. C. Pedlaw, owners.

Property: 1 claim, Crown-granted, 47 acres, elevation 3,822', 1 mile N. of the Arctic Chief, near Whitehorse, has a 7-mile wagon road to the terminus of the White Pass & Yukon R. R.

Mine lies in an area of alternating bands of limestone and diorite, with aplitic cross dykes. **Ore:** consists of magnetite containing bornite and chalcopyrite, with a garnet-augite gangue. Ore is estimated to carry 8% copper and $3 gold per ton. Mine opened 1900, but idle until 1907, has a shaft about 90' deep with 150' of workings, including some stopes nearly to the surface.

Equipment: includes steam power. Estimated 200 tons of high-grade

copper ore on dumps. Operations resumed in 1915 and over 15,000 tons of 6% copper ore shipped to Tacoma smelter since then. Idle 1920.

GRANVILLE MINING CO., LTD. YUKON

Head office: 8 Old Jewry. London, E. C., England. **American office:** 233 Broadway, New York. Receiver, E. Dexter, 21 Ironmonger Lane, E. C. 2, London, Eng.

Officers: F. A. Govett (chairman), W. E. Martyn, E. Birkenruth, A. C. Beatty, W. Trask; Lord Brabourne, J. S. Wetzlar, directors; F. deM. Cunyngham, sec.

Inc. Aug. 11, 1911, in England. **Cap.** £1,500,000; shares £1 par; 1,410,000 shares outstanding. 5,864 shares sold for $45 the lot at public auction in New York on Dec. 16, 1920; 20,000 sold on Dec. 31, for $10 the lot.

In 1911 company bought the Treadgold placer properties in the Yukon, for £206,000 cash, £100,000 debentures, and 1,200,000 shares. Part of the property was sold to the Canadian Klondyke Mining Co. (which see), which guaranteed the Granville company a minimum income of $240,000 per annum up to February 28, 1928.

Assets consist of $1,646,000 6% convertible debentures and $2,175,000 shares (out of $8,000,000) in the Canadian Klondyke and 798,034 shares in the North-West Corporation, Ltd.

In April, 1917, the courts appointed a receiver for the company at the request of the Gold Felds American Development Co. (which see), the holding company that acquired the American interests of the Consolidated Gold Fields of South Africa, Ltd. The receivership was granted to protect secured creditors from possible actions by unsecured local creditors of the Canadian Klondyke Mining and Power companies, and to prevent forfeiture of the North West company's claims.

On November 22, 1917, the Granville Mining Co., as bondholder, applied to the court at Dawson for a receiver for the Canadian Klondyke Mining and Canadian Klondyke Power Companies, alleging failure to issue bonds for a loan of $1,350,000, or to pay interest thereon, etc. The Granville company also applied for a receiver for the North West Corp'n, which is now being reconstructed with £215,000 additional working capital.

KENO HILL, LTD. YUKON

A subsidiary of **Yukon Gold Co.**, and described thereunder.

NEW NORTH WEST CORPORATION, LTD. YUKON

Succeeds **The North West Corporation, Ltd.**, Which see.

NORTH-WEST CORPORATION, LTD., THE YUKON

Office: 8 Old Jewry, London, E. C., England. F. de M. Cunynghame, sec.-liquidator. E. Dexter, receiver and mgr., 21 Ironmonger Lane, London, E. C. F. P. Burrall, mgr.

Directors: A. C. Beatty, chairman; Lord Brabourne, F. A. Govett and W. Trask.

Originally incorporated July 1, 1913, with capital of £1,500,000; shares £1 par; 1,349,715 issued. Also £150,000 of 7% debentures £80,000 outstanding; plus certificates of indebtedness to be issued, £38,675; receiver's notes, £80,000; and unsecured creditors, £13,061.

Cap. $1,500,000 income notes; $1,500,000 pfd. A stock, $1,275,000 pfd., B. stock carrying a cumulative dividend of 8%, ranking after the A. issue, but in priority to $4,000,000 of com. stock.

Reorganized in 1921 as New North West Corporation, Ltd., under Canadian laws, to acquire the assets and undertaking of the North West Corporation, not less than 95% of all the Canadian Klondyke Power Co., a subsidiary of the Granville Mining Co., and No. 1 dredge of the Canadian Klondyke Mining Co. The new company shall purchase from the Corporation its assets and property for $364,123 income notes, $320,000 pfd. A and $608,000 pfd. B. stock and $3,467,430 com. stock. There will be issued for cash $860,000 income notes, subscribers to receive by way

of bonus 100% in pfd. A. stock. The position will then be; issued capital $1,346,123 income notes, $1,320,000 pfd. A. and $1,167,600 pfd. B. stock, and $3,897,430 com. stock.

The above scheme was sanctioned by the British Courts in Jan., 1921.

Property: the Corporation owns or controls over 1,000 placer claims on the Indian River watershed of the Klondike region, covering about 60 miles along Dominion, Gold Run, Quartz and Sulphur creeks, and Indian river. The known richer deposits have been mined, where frozen, by ordinary hand methods, but the remainder is to be worked by mechanical methods.

	Big Creek Mining Co.	Calder Mining Co.	Dominion Mining Co.	Indian River	Sulphur Mining Co.
% Owned	90	90	90	100	84
Mining claims	162	62	290	345	149
Miles along river	6	2	20	20	15
Production cu. yd.	540,000	.....	1,866,000	.....	.....
Yield per y,d cents	53	.....	60	.....	.....
Reserves, cu. yd.	8,000,000	2,000,000	1,240,000	3,000,000	5,000,000
Average per yd. cents	57	52	77	.....	50
Methods of future Operations	stripping and dredging	stripping and dredging	Dredging	stripping and dredging	dredging

OLIVE MINE — **YUKON**

Address: care R. Fisher, Dawson, Y. T. **Mine address:** Mayo, Y. T. Tolmie, Kiney, et al, owners.

Property: one claim in Dublin gulch, Duncan district, shows a quartz vein, 5 to 12′ wide, in schist near its contact with granite, developed by tunnel on vein. Ore value $9 to $50 in gold.

SHAMROCK MINE — **YUKON**

Address: Minto Bridge, Y. T. **Mine address:** Mayo, Y. T. Stewart & Catto, owners; John S. Stewart, mgr.

Property: 4 claims on Dublin gulch, Duncan district, show 2 quartz veins, 3 and 8′ wide, in a schist-granite contact. The ore is gold-bearing Is developed by 2 tunnels.

SULPHUR MINING CO., LTD., THE — **YUKON**

Subsidiary of **The North West Corporation,** which see.

TALLY-HO MINING CO. — **YUKON**

Address: 326 Exchange Bldg., Boston, Mass. C. J. Irvine, mgr.; Robinson, Yukon, Canada.

Officers: John H. MacAlman, pres.; Henry B. Robinson, v. p.; Chas. Harvey, treas., with Chas. H. Keene, directors.

Inc. in Maine. **Cap.** $100,000.

Property: nine claims, 450 acres, on Tally-ho Mtn., Wheaton district, 17 miles from the R. R. at Robinson. Ore occurs in quartz veins showing gold, silver and lead values.

Slightly developed and without equipment.

VALERIE MINING CO. — **YUKON**

Address: 929 Main St., Vancouver, B. C. **Mine address:** Whitehorse, Y. T. A. B. Palmer, mgr.

Property: one claim, 46 acres, 6 miles due S. of Whitehorse. Chalcopyrite ore occurs in lenses along a lime-grano-diorite contact. Developed by 200′ shaft and equipped with boiler and hoist. Inactive during 1920.

VENUS MINE, THE — **YUKON**

Address 373 Colman Bldg., Seattle, Wash. **Mine address:** care T. B. Landers, supt., Conrad, Yukon Ter.

Property: 8 claims, 345 acres, on Windy arm, Conrad district, 12 miles

from Carcross, shows a fissure vein, 4½′ wide, in granite. Ore is gold and silver bearing. Developed by shaft and tunnel, with several thousand feet of total workings.

Equipment: includes hoist, compressor, 1½ mile aerial tram and 100-ton concentrator. Has been a producer.

WAR EAGLE MINE YUKON

Address: R. Lowe, Whitehorse, Y. T.

Property: 132 acres, 7 miles W. of Whitehorse, shows an orebody 25′ wide with limestone and diorite walls. Ore carries bornite and chalcopyrite. Developed by 2 shafts and laterals. Idle 1920.

YUKON COPPER CO., LTD. YUKON

Idle several years.

Officers: Dr. Alfred Thompson, pres.; W. D. Greenough, v. p., White Horse, Y. T.; Jas. Smiley, sec.-treas., Ottawa, Can., at last accounts.

Inc. Nov., 1915, in Canada. **Cap.** $200,000; shares $100 par; all issued. Company took over holdings of the Atlas Mining Co.

Property: 10 claims, 720 acres, in the valley of Porter creek, 4 to 7 miles west of White Horse, include the Pueblo group of 420 acres, and the Carlisle group of 300 acres.

The Pueblo concession, located 1899, was sold to the White Horse Copper Co. That company immediately bonded it to the British American Corp'n, who relinquished bond in 1901, and property reverted to locator, H. E. Porter. In 1906, the Yukon Pueblo Mines Co. of Spokane, bought the concession, transferring it in 1911 to the Atlas Mining Co., controlled by Greenough Bros. of Spokane.

Geology: the Pueblo orebody is an irregular shaped mass 400′ long and 200′ wide, running N. W.-S. E. and raking north. It is enclosed in crystalline limestone, near a granite contact, and apparently the limestone replaced by the orebody was cut by granite dikes, traces of which remain. There also is a porphyry dike of 3 to 4′ width, crossing the orebody, decomposed and showing copper stains. Ore is essentially cupriferous hematite, varying in texture from compact to coarse, with some alteration, and with irregular silicification. The copper sulphides in the hematite have been largely altered into carbonates, oxides, and silicates, only a little chalcopyrite having been found to depth of 100′. Principal ore mineral is malachite, disseminated in hematite, with considerable chrysocolla, and some cuprite occurring in veinlets and small masses. Ore ranges from 1 to 10% in copper, and 700 tons of roughly sorted ore sent to the Crofton smelter, carried 5% copper, 1.25 to 2 oz. silver and some gold per ton.

Development: by a 400′ shaft and 28 prospect diamond drill-holes, totaling 3,796′. Employed 100 men at last accounts.

The Carlisle mine, 2 miles from the Pueblo, has a vein 15′ wide, with a high-grade paystreak up to 4′ in width of bornite and chalcopyrite. Developed by shafts of 50′ and 137′.

Equipment: includes steam power, a 10-drill air compressor and necessary mine buildings. Mine has a spur line to the White Pass & Yukon railway, built 1910.

Production: in 1914 was 250 tons of ore per day, shipped to the Tacoma smelter from the Pueblo mine. Property considered promising.

YUKON GOLD CO. YUKON

See under this title in **United States** section of this volume.

YUKON SILVER-LEAD MINING CO. YUKON

Address: G. F. Johnson, 817 South El Molino Ave., Pasadena, Calif.

Inc. in the Yukon. **Cap.** $250,000; $1 par. Shares offered at $1.00 per share.

Property: the Lookout claim, with option on 5 claims adjoining, on Lookout mountain, 40 miles from Mayo, in central Yukon. See Yukon Gold Co. for description of transportation and geology.

Development: late in 1919, work consisted of several short adits, raises, winzes, and drifts, about 1,000′ in all. Galena occurs as streaks and masses.

There is some carbonate. Several samples assayed from 23.20 to 40.60% lead, 28.80 to 45.57 oz. silver and up to 0.03 oz. gold per ton.

NEWFOUNDLAND

ANGLO-NEWFOUNDLAND DEV. CO., LTD. NEWFOUNDLAND

Address: Grand Falls, Newfoundland. Mining properties transferred to **Terra Nova Properties, Ltd.**, which see.

BUCHAN'S MINE NEWFOUNDLAND

Idle. **P. O.:** Millertown, Newfoundland. Wm. Scott, gen. manager.

Property is owned by the **Terra Nova Properties, Ltd.**, and described under that name. This company is a subsidiary of the Anglo-New Foundland Development Co., which has a timber and mineral concession over about a million acres in the center of the island near Grand Falls.

No mining done, 1921.

GREAT GULL LAKE COPPER CO. NEWFOUNDLAND

Address: T. E. Wells, pres., Little Bay, Newfoundland.

Property: 16 claims, said to show considerable chalcopyrite ore, containing 2-15% copper.

GREAT NORTHERN COPPER CO. NEWFOUNDLAND

Office: 11 Broadway, New York City. **Mine office:** Twillingate, Newfoundland.

Officers and directors: H. R. Warnock, pres.; H. G. Terry, M. L. Fonquet, and A. P. Hays, v. p.'s; C. H. Hill, sec.; Obadiah Hodder, treas. and gen. mgr.

Inc. 1905. **Cap.** $100,000; shares $1 p[illegible]

Notre Dame Copper Co. and Hodder Supply Co. of Pittsburg, in 1912. Reorganized January, 1917, and incorporated in South Dakota with capital of $5,000,000; shares $1 par, 4,033,000 issued.

Lands: 526 acres, freehold, on Twillingate, North Island, on the eastern coast of Newfoundland, in the vicinity of the Tilt Cove mine. Company claims a vein 160' wide, uncovered for one-half mile and tested to depth of 200', carrying chalcopyrite, averaging over 2% copper. Management estimates ore reserves of 9,000,000 tons with 500,000 tons blocked out.

Ores: of this district, as developed elsewhere, average about 4% copper, 50% sulphur and $1.50 gold per ton, and are somewhat bunchy, with sphalerite frequently found in connection with the chalcopyrite.

Development: by open-cut, with a 120' shaft in ore.

Equipment: includes 800-h. p. steam plant, hoist, with a tram line and 2,000-ton ore bins on the sea. Has 1,500-ton coarse crushing plant and 150-ton concentrator.

No record of recent operations.

HYDRO-ELECTRIC SMELTING CO. NEWFOUNDLAND

Developing an old copper property on Little Bay, Newfoundland, at last accounts.

PILLEYS ISLAND PYRITE CO. NEWFOUNDLAND

Dead. See Vol. XII.

REID-NEWFOUNDLAND CO. NEWFOUNDLAND

Address: St. Johns, Newfoundland.

Property: a copper mine at New Bay, Newfoundland, under development since 1907, but has never been a producer. Company owns and operates 1,000 miles of railroad and 15 steamship lines in Newfoundland.

SCOTIA MINE NEWFOUNDLAND

Property: at Wabana, Newfoundland, produces 1,100 tons of iron ore daily. Equipped with 8 mechanical loaders.

TERRA NOVA PROPERTIES, LTD. NEWFOUNDLAND

Secretary and office: E. A. Sursham, 18 St. Swithins Lane, London, Eng. **Mine office:** Millertown, Newfoundland. Sir Mayson M. Beeton,

chairman; William Scott, gen. mgr. at Grand Falls, Newfoundland. Is a subsidiary of the Anglo-Newfoundland Development Co., Ltd.

Company owns rights over about 2,500 sq. miles, held by 99-year lease, in the central part of Newfoundland, surrounding Red Indian lake. The principal property is Buchan's River mine, about 5 miles W. of the lakes on the N. shore. Ore occurs in sericitic schists formed of volcanic grits, the vein having strike of N. 51° E. and dipping about 30°.

Development: consists of a 370′ shaft with several levels, having long drifts on the vein. The one orebody thus far found varies from 5 to 10′ in thickness, is 350′ long, horizontally, and 370′ in downward extension. The ore is a complex sulphide carrying 2.36% copper, 8.14% lead, 20.38% zinc, 6.70 oz. silver and $2.72 gold per ton.

Examined and reported on by W. H. Weed.

YORK HARBOUR MINE **NEWFOUNDLAND**

Idle. **Former address:** York Harbour, Birchy Cove, Bay of Islands, N. F. The mine, 4,000′ from the bay, at elevation of 1,000′ carries cupriferous pyrite. The ore is compact and close-grained with 2% to 4.5% copper and 38 to 41% sulphur, the sulphur being valuable for the manufacture of acid.

Development: by 360′ main shaft sunk at an angle of 72° to the S. E., practically the same as the dip of the ore lenses. Levels are opened at 60′ intervals, with drifts driven S. W. along the strike of the orebodies.

Equipment: included a 250-h. p. steam plant, with a 50-h. p. Flory hoist and an 8-drill Norwalk high-altitude air compressor. Company supposedly bankrupt and property has been closed down for years.

MEXICO

The Federal Bureau of Mines had in 1921 a record of about 70,000 mining properties, but nearly 3,000 of these claims were subject to forfeiture for non-payment of taxes, the Mexican mining law requiring such payments every four (4) months, to hold title even to patented claims.

The importance of the Republic as a metal producing country is shown by the following official figures, issued by the Inciativa de la Rey de Ingresos.

Metal Production of Mexico

	1920	1919	1918	1917
Gold	$15,265,568	$15,248,575	16,824,700	9,000,000
Silver, ounces	66,516,354	62,681,987	62,517,000	35,000,000
Copper, tons, 2,000 lb.	55,629	66,661	83,233	52,348
Lead, tons, 2,204 lb.	84,200	78,645	88,503	46,612

Production in 1921 was 13,576 short tons copper, 66,686 short tons lead, 64,465,347 ounces silver.

ABUNDANCIA MINING CO., S. A. **SONORA**

Option on Abundancia claim, near Puertocitos, 5 miles W. of Cananea, surrendered and company out of existence. See Vol. XIII.

ADARGAS, S. A.; CIA MINERA, SAN PASCUAL DE LAS **CHIHUAHUA**

(Adargas Mining Co.)

Office: 15 John St., New York City.

Operating address: El Paso, Texas. W. A. Seamon, gen. mgr. **Local address:** Jimenez, or Estacion Dolores, Chih., Mex.

Property: an old Spanish mine in southern Chihuahua, 15 miles S. W. of Jimenez, worked to water level, 240′, and abandoned in 1898; reopened in 1920.

Geology: orebodies occur at southern end of the Sierra de las Adargas, in Cretaceous limestone cut by dikes of porphyry and andesite. One of the dikes widens from 100′ to 600′ in a distance of 1,000′ and is highly miner-

alized, but the ore usually occurs along the contact, mostly in limestone. The carbonate ores of the upper levels run 15-30% lead, 12-30 ounces silver and 0.2 to 0.5 oz. gold. The deeper ores carry 55% lead and 60 oz. silver.

Development: by 450′ main shaft and extensive workings. Unwatered in 1921. A power line 45 miles long is under construction and the property and machinery reconditioned, 1922.

Employed between 100 and 250 men in 1921.

AFRIC CORPORATION, LTD. — **MEXICO, D. F.**

Address: J. E. Frank, 23 Broad St. House, London, E. C., England.

Inc. Aug., 1920, as a reorganization of **Cons. Mines of El Oro Ltd. Cap.** £100,000; £1 par; 93,550 shares issued credited as 17s. paid in exchange for 189,100 fully paid £1 shares of Cons. Mines.

Property: 490 acres at El Oro, Mex., and additional holdings in Gold Coast Colony, Africa.

AGUASCALIENTES COPPER SMELTER — **AGUASCALIENTES**

Owned by **American Smelting & Refining Co.**

Office: 120 Broadway, New York. **Operating address:** C. L. Baker, gen. mgr., El Paso, Texas. **Works address:** F. H. Peyton, supt., Aptdo. 137—A, Aguascalientes, Mexico.

Has an annual capacity of 480,000 tons.

AGUILA CONSOLIDATED MINING CO. — **JALISCO**

Address: 185 Summer St., Boston, Mass.

Mine address: Hostotipaquillo, Jalisco, Mex. Chas. P. Bowker, mgr.

Officers: D. E. Makepeace, pres., Attleboro, Mass.; E. B. Estes, sec.; J. A. Floyd, treas.

Inc. 1917, in Arizona. **Cap.** $1,200,000; shares $1 par. Company is a reorganization of the Aguila Amalgamated Mining Co., described Volume XI, and which succeeded the Mazeppa Cons. Mining Co. Stockholders in the old company were given the option of exchanging their holdings on a basis of 1 share of new for each 5 shares of old and payment of 4c. per share of new stock.

Property: the Aguila mine, near Cinco Minas, said to have a 600′ shaft, 500′ adit and over one-half mile of workings and to show ore assaying from $100 to $160 per ton, mainly in gold and silver.

Company not producing at last report.

AHUMADA LEAD CO. — **CHIHUAHUA**

Address: J. C. Greenway, Warren, Ariz.

Officers: L. D. Rickett, pres.; John C. Greenway, v. p.; H. C. Dudley, v. p.; John F. Bankerd, sec.-treas., with W. D. Thorton, directors.

Inc. March 4, 1921, in Delaware. **Cap.** $1,000,000; $1 par; 783,351 shares outstanding.

Property: 28 claims, 25 patented, 1056 hectares, in Los Lamentos Mountains 42 miles E. of Villa Ahumada, Chihuahua, Mex. Company also owns the entire capital stock of the **Compania Minera de Plomo,** S. A., and the **Compania Minera de la Corona,** S. A., also a majority interest in the Erupcion Mng. Co., which owns the Compania Minera Erupcion y Anexas, S. A. Ore occurs as mantas of silver-lead sulphides and carbonates in lime, averaging 30% lead and 5 oz. silver.

Development: by 2,200′ of tunneling and incline shaft, with about 10,000′ of workings.

Mining is done by open stope method. Shipments to date total 15,000 tons of ore.

A 45 mile railroad is being built by the Erupcion and Ahumada companies to connect with the Mexican Central R. R., north of Villa Ahumada.

AJUICHITLAN MINING & MILLING CO. **PUEBLA**

Probably dead. Property at Toliman, Queretero, Mexico. Described in Vol. XIII.

ALMOLOYA MINING CO. **CHIHUAHUA**

Office: 19 Cedar St., New York. **Mine office:** Baca, Chihuahua, Mexico.

Officers: Nils O. Bagge, pres.; W. H. Schlofield, v. p.; C. I. Morey, sec.-treas.; preceding officers and W. M. Jermyn, directors.

Inc. 1903, in Arizona. **Cap.** $2,000,000; shares $1, in $800,000 participating non-cumulative 10% preferred stock, and $1,200,000 common stock, all outstanding. New York Trust Co., registrar. Holds title to lands through Minas de Almoloya, S. A., a Mexican corporation.

Property: 177 hectares, including the San Enrique group adjoining the Cigarrero mine, and 4 other groups, about 4 miles from Baca, in the Allende district, with rail transportation over a standard-gauge line to the Cigarrero mine.

Geology: the Sierra de Almoloya is an isolated mountain range, about 9 miles long and 2 wide, carrying limestone beds of the Comanche series of the Lower Cretaceous, extensively fractured by several systems of faulting, with shear zones of 50 to 90 metres width, principal zones being the northeast system, of Eocene age, of which the most prominent is the San Pedro fault zone, and the N. 40° W. system of Miocene age, which are the sources of large and rich ore chambers, the most important orebodies occurring at the intersection of these faults. Lands adjoin the Cigarrero mine on the northeast, and carry the extension of the San Pedro fault, proven by diamond drilling to occur between the 800′ and 900′ levels.

Ore so far found has been in pockets, in leached shear zones, carrying low copper values, which are expected to increase at depth, with about 30% lead, 700 grams silver and 8 to 80 grams gold.

Development: several shafts, deepest 700′, and 4 tunnels, longest 1,600′. Present development is confined to the San Enrique and Exploradora groups, having 1,186′ of shafts and winzes, with 2 main and several shorter tunnels, and a total of 4,400′ of workings.

Equipment: includes gasoline and air power, with one 15-h. p. and two 60-h. p. hoists. Electric current is to be used as soon as available.

Past operations have been almost entirely along the San Pedro fault which shows ore in depth. Revolutionists practically stopped all work in 1913, holding the superintendent for ransom in April and stopping mail and telegraphic service. Work will be resumed when conditions are again stable.

ALVARADO MINING & MILLING CO. **CHIHUAHUA**

Offices: Richard Fay Parker, sec. and treas.; 60 State St., Boston, Mass.; R. F. Lilley, asst. treas., Mills Bldg., El Paso, Texas.

Mines and reduction plant: Parral, Chihuahua, Mexico; T. G. Hawkins, Jr., v. p. in charge of operations. Rogers, Mayer & Ball, cons. engrs.

Officers: A. J McQuatters, pres.; Gordon Dexter, v. p.; with J. Dudley Clark, Elton Parks, J. H. Carnahan, J. R. Hall, H. S. Brown, L. W. Mayer, E. A. Potter, Jr., Geo. J. McCarthy, F. Remington, F. W. Clifford, Junius Beebe, and Dr. Leonard Wheeler, directors.

Inc. 1910, in Maine. **Cap.** $24,000,000; $20 par; 343,491 shares issued; increased 1920, from $6,000,000; par $5. **Dividends:** $2 per year, payable 50c. quarterly beginning April, 1920. Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, transfer agents; State Street Trust Co., Boston, and N. Y. Trust Co., New York, registrars. The American Engineering & Operating Co., in which Alvarado M. & M. Co. holds a 20% interest, worked the property from October, 1917 to Sept. 30, 1919 for 30% of net profits.

In March, 1920, 130,000 shares were offered to the public at $22.50 per share.

Comparative General Balance Sheet:

Assets.

Year	Property	Invests.	Cons. & Devel.	Misc.	Current	Total
1921.....	$7,175,559	$288,810	.....	$428,379	$593,308	$8,485,056
1920.....	7,191,244	258,976	.....	343,930	953,682	8,747,832
1919.....	6,589,859	85,210	.....	.....	1,171,766	7,846,835
1918.....	6,482,439	55,000	.....	4,142	366,206	6,907,787
1917.....	.....	.....	.....	.....	.....	.....
1916.....	.....	.....	.....	.....	.....	.....
1915.....	5,455,935	.....	$1,099,388	20,000	536,310	7,111,634
1914.....	5,455,935	.....	910,616	30,073	371,495	6,768,120

Liabilities.

Year	Cap. Stock	Bonds and Notes	Res. for Bond Conv.	Misc.	Current	P. & L. Surplus	Total
1921	$6,867,820	$100,000	.....	$1,290,226*	$159,342	$67,667	$8,485,055
1920	6,869,820	.....	.....	1,298,315	256,170	323,527	88,747,832
1919	4,542,515	852,500	$568,337	1,375,809	240,725	266,949	7,846,835
1918	4,305,025	1,172,000	1,376,139	.....	54,623	.....	6,907,787
1917	.....	.....	.....	.....	.....	.....	.....
1916	.....	.....	.....	.....	.....	.....	.....
1915	4,305,025	996,700	665,333	124,730	355,191	644,655	7,111,634
1914	4,305,025	1,007,100	665,333	129,000	289,354	371,603	6,768,120

* Reserves, include $779,013 for depletion of mines, $384,470 for depreciation and absolesence and $126,744 for accounts against Mexican government.

Comparative Operating Statement.

Year	Gross. Earnings	Oper. Costs	Oper. Profits	Deductions	P. & L. Surplus
1921.....	$518,146	$503,047	$15,099	$257,969	$242,869**
1920.....	2,266,859	1,312,099	954,760	236,848	717,911**
1919.....	2,741,774	1,225,875	1,515,899	220,749	1,295,150**
1918.....	2,118,607	1,169,309	949,297	181,639	767,658**
1917 }					
1916 }	759,059	863,441	.....	155,632	260,014*
1915.....	1,296,631	871,156	425,475	132,423	293,052
1914.....	871,156	650,629	412,567	243,046	169,521

* Deficit. ** No deduction made for depreciation, depletion and administration expense.

Of the 1916-'17 deficit, $21,977 was assumed by Am. Eng. & Op. Co.; in 1918 and 1919, its proportionate share of the earnings was $221,445 and $213,067, respectively. During the year 1920 company retired all the outstanding 1st mortgage, 6% convertible gold bonds amounting to $852,500.

Dividends: 3 payments of 50c. during 1920.

Property: 4 groups of mines 285 acres at Parral, including the Presena, Las Cruces and Palmilla properties, the latter including the famous Palmilla bonanaza mine of Pedro Alvarado. The first two are old mines which were worked in former days by Mexicans. The ore occurs in fissure veins in andesite.

In 1920, company acquired a controlling interest in the **Silver Reef Cons. Mines Co.** and the **Utah Silver Reef Mng. Co.**, owning important properties in Silver Reef district, Washington county, Utah. Company also has an option on the Parral & Durango R. R.

Development: new work in 1921 totaled 4994′ compared with 15,175′ in 1920. The Alfarena 3-compartment shaft was sunk to the 10th level (1,126′ deep) and the Fontanena 550′ shaft enlarged to 3-compartments and sunk 119′ in 1921.

The Canabena mine was equipped with electric power hoists, pumps, etc., and dewatering begun 1921. The shaft 425′ deep, is thought to have untouched reserves of 20 oz. ore below the 185′ level.

Equipment: includes 2,000′ compressors two double drum electric hoists, centritugal pumps, a 1,200 ton mill with 600-ton cyanide plant, and 50-ton flotation mill; roasting furnaces are to be added during 1921. Employs over 1,000 men. Electric power obtained from the Mexican Northern Power Co.

Production:

Year	Ore to Mill Metric tons	Gm. Per Ton Silver	Gold	Contents Silver oz.	Gold oz.
1921	74,711	.....	....	.....	.....
1920	196,496	.....	....	.....	.....
1919	176,095	.....	....	2,038,736	1,591
1918	157,340	.....	....	.....	.....
1916 and 1917	76,389	.....	....	.....	.....
1915	128,612	530.2	1.19	2,192,444	4,932
1914	82,728	548.1	1.06	.....	.....
1913	118,383	570.1	0.79	.....	.....

Reserves estimated by Franklin W. Smith in 1919 as 2,086,000 tons positive ore averaging 9.2 oz. silver and 2,592,000 oz. probable ore averaging 8.7 oz. silver.

Company's operations were seriously hampered for several years by the Mexican revolution, operations in 1916 being carried on for but 42% of the time. The Villista forces occupied Parral on November 5, 1916; seized the cyanide mill and mines, which they operated for 15 days, producing 45 bars of gold and silver bullion; 96 additional bars were stolen and the property robbed to the extent of $300,000. Many of the office and operating records were destroyed. In 1916 and 1917, operations were stopped 4 times, the mine being operated but 7 months out of 24. Since then, the property has been in almost continuous operation, reaching 9.53, 92.8 and 93.7% of full time, respectively, in 1918, 1919 and 1920.

AMAJAC MINES CO. NAYARIT

Office: 320 First Natl. Bank Bldg., Sunbury, Pa. Walter J. Pentland, mgr., Ixtlan Del Rio, Nayarit, Mex.

Officers: W. L. Barclay, pres.; J. I. Higbee, v. p.; C. A. Sidler, sec.-treas., with M. F. Quinn, Hon. John V. Tesher, Geo. L. Stearns and Dr. M. A. Tarumianz, directors.

Inc. Dec. 17, 1909, in Delaware. **Cap.** $2,500,000; $1 par; 50,000 shares in treasury.

Property: the Refugio, Animas, and Tres Estrellas mines in the Hostotipaquillo district. The Refugio mine, 125 acres, was worked for 25 years prior to its acquisition by present owners, down to the 500′ level. The main vein has a width of 5′ to 15′ with well-defined walls. Ore contains gold and silver with average assay value of $15.00 per ton. The Animas property, 144 acres, lies west of the Refugio and is apparently on the same vein. The ore is said to contain 20 ounces silver and $3 to $5 gold per ton.

Development: at both mines is by means of tunnels, the Animas having over 2,500′ of workings. The Tres Estrellas property, 120 acres, is a mile from the mill and has not been developed at depth.

Equipment: includes a 15-stamp mill and a 50-ton cyanide plant. Also a hydro-electric power plant and compressors.

The revolution in Mexico has interfered with operations, and the mill has not yet been put into operation, although development at the mines continues. Employs 100 men.

AMAZON GOLD CO. **DURANGO**

Probably defunct. Formerly operated the Candelaria silver mine near Chacala, Durango. See **Cia Rest de Baca Ortiz.**

AMERICAN ENGINEERING & OPERATING CO. **CHIHUAHUA**

Controlled by **Alvarado M. & M. Co.,**

This company operated the Alvarado M. & M. Co.'s properties, under lease, paying a royalty of 30% on all ore extracted. The contract was cancelled in September, 1919.

Reported 1920 operating a property at Portola, Calif., adjoining the Walker mine of the Anaconda Copper Mng. Co.

AMERICAN-MEXICO MINING & DEVELOPING CO. **DURANGO**

Mine office: Velardena Cuencame, Durango, Mexico. W. H. Williams, mgr.

Inc. 1902, in So. Dakoto. **Cap.** $3,000,000; $1 par.

Property: in the Velardena district, Dgo., includes Los Libres mine, developed by 134' shaft and reported in operation to May, 1921. Shipments made to the smelter at Velardena.

Past history of company fully given in Copper Handbook, Vol. X.

AMERICAN SMELTING & REFINING CO. **CHIHUAHUA**

Operating office: Mills Bldg., El Paso, Tex. C. L. Baker, gen. mgr., J. R. Woodue, asst. gen. mgr., Walter M. Drury, mgr., Mexican Mining Dept., El Paso.

Extensive holdings in Chihuahua and elsewhere in Mexico are described under company's name in U. S. section of this book.

AMERICAN ZINC EXTRACTION CO. **CHIHUAHUA**

Address: Parral, Hdgo., Chihuahua, Mexico.

A. E. Swain, mgr., at last accounts.

Property: the Tajo mine, and 100 ton mill near Parral.

AMPARO MINING CO. **JALISCO**

Office: 541 Drexel Bldg., Philadelphia, Pa.

Mine office: Etzatlan, Jalisco, Mexico. Jas. H. Howard, gen. mgr.

Officers: A. F. Bracher, pres.; W. H. Kister, and A. S. Miller, v. p.'s, with Henry Freund, J. H. Stopp, F. W. Stanton, Alfred Gratz, G. B. Reimensnyder, J. H. Scott, L. H. Adler, Jr., and C. K. Smith, Jr., directors. J. S. Williams, sec.-treas.

Mine Staff: Wm. Howard, asst. mgr. and mill supt.; Chas. A. Joyce, mine supt. W. R. Askew, chief engineer; Maj. A. F. Dick-Cleland, supt., of Explor'n Co. and the Canyada.

Inc. 1902. **Cap.** $2,000,000; $1 par; reduced from $3,000,000 in 1907.

Financial Statement years ending December 31:

Year	Revenue	Net Profit	Dividends	Assets Current	Liabilities Current
1920.....	$1,748,381	$231,756*	$400,000	$1,104,101	$79,854
1919.....	2,146,605	494,878	360,000	1,307,179	.....
1918.....	1,707,197	308,595	300,000	1,470,256	174,710
1917.....	1,220,964	178,065	320,000	1,293,455	517,850
1916.....	1,297,236	456,970	400,000	1,377,538	428,056

* Includes $115,128 for depletion of mineral deposits. Net profit 1920 was $114,416 which with surplus as of Jan. 1, 1920 totals $1,421,596, less dividend of $400,000, left surplus of $1,021,596.

Dividends: as above, 3% Jan. 31, 1921; 2½% July 30, 1921.

Property: the Amparo group includes the Canada, La Union, San Juan, Amparo, San Domingo and Natividad mines, and Rancho Embocado of 4,390 pertenencias, 7 to 9 miles S. of Etzatlan, State of Jalisco.

San Domingo and Natividad mines, and Rancho Embocado of 4,390 pertenencias, 7 to 9 miles S. of Etzatlan, State of Jalisco.

Development: by general shaft to depth of 1,300'; also has an auxiliary shaft. New work in 1916 totaled 10,501'; 9,806' in 1917; and 13,690' in 1918. The orebody at 1,100' was good, but the shoot was very spotty on 1,300' level. In 1920, good ore was cut on the 1,600' level and a large tonnage of probable ore developed.

Ore reserves: of positive, probable and prospective ore have varied from 750,000 tons in 1908, to 472,350 in 1916; 481,572 in 1917; and 481,000 in 1918, only there is an increase in positive ore. Shrinkage stoping is practiced, resulting in reduction of costs. 439,000 in 1919 depleted 81,745 tons in 1920. Shrinkage stopes held 77,514 tons May 22, 1921.

Equipment: a 1,000 hydro-electric plant; machinery electrically driven throughout, including hoists, compressors, 65 drills, underground hoists, pumps, sorting plant, aerial tram, telephone line. The 500-ton mill contains crushers, 80 stamps, 6 tube-mills, concentrators, Dorr classifiers, Pachuca tanks, and 3 Oliver filters. The Merrill-Crowe vacuum system was installed in 1920, in the cyanide department.

Production:

Year	Tonnage	Silver, oz.	Gold, oz.	Extract., %	Total Cost
1920.....	149,518	1,258,985	27,176	87.2	$9.03
1919.....	127,037	1,249,722	33,959	88.3	11.51

Operating costs in 1920 were $9.03 per ton, compared with $11.51 per ton in 1919. Tonnage crushed and treated in 1920 averaged 403 tons per day, compared with 355 in 1919. In 1921, for period Jan. 2rd. to May 22, mill ran 140 days treating 59,673 tons or 426 metric tons ore per day, that averaged $9.71 per ton.

Company operated mill at capacity in 1921, employing about 1,000 men.

ANGANGUEO, NEG. MIN., DE **MICHOACAN**

Controlled and managed by A. S. & R. Co., 120 Broadway, New York City.

Operating office: Mills Bldg., (A. S. & R. Co.), El Paso, Texas. **Mine Address:** Angangueo, Mich., Mexico.

Operating staff: Alex W. Edelson, supt.

Property: the San Cristobal and Carmen silver-copper mines, near Angangueo, Mich.

Equipment: includes steam power, compressor and 150-ton concentration mill. Employs 175 men.

Output formerly 200 tons per day.

ANITA COPPER MINES CO., S. A. **SONORA**

Office: Fundicion, Sonora, Mexico. Geo. M. Ryall, pres.; T. C. Kirkland, asst. gen. mgr.

Inc. 1904, in Mexico, as a subsidiary of the Douglas Copper Co. Now owned by Pacific Smelting & Mining Co., which see.

ANITA MILL **DURANGO**

E. F. Knotts, owner and general manager, Guanacevi, Durango.

This custom plant at Guanacevi, Durango, has a 50-ton amalgamation concentration mill and flotation equipment. Mill has crusher, 15 stamps, ball mill and steam boilers. Employs 100 men normally.

ANTIMONY CORPORATION **HIDALGO**

Address: Room 1210, 71 Broadway, New York City.

Officers: Chas. F. Rand, pres.; Jos. S. Fay and Olof Wenstrom, v. p.'s; Chas. F. Smith, sec.-treas., with Freeman Hinckley, Robt. A. Manning and Geo. Tyson, directors. Olof Wenstrom, mine mgr.

Inc. Feb. 15, 1916, in Delaware. **Cap.** $1,000,000; shares $5 par; 100,000 preferred; issued 10,000 preferred, 100,000 common, no bonds. Late in 1921, company acquired all the holdings of the Cortez Associated Mines, by stock

exchange, paying 1 share of Antimony for 4 shares of Cortez stock. The Cortez company's only property therefore is 68.750 shares of Antimony common stock.

Property: 48 hectares, 120 acres patented, Zimapan, State of Hidalgo, Mex., contains a large deposit of antimony ore carrying jamesonite, consisting of 50.8% lead and 29.5% antimony, and carrying silver. The occurrence is fully described by W. Lindgren and W. L. Whitehead, Econ. Geol., July, 1914, p. 435, and R. W. Raymond, E. & M. Journal, January 2, 1915, p. 9.

Operations were suspended in April, 1917, due to bandits and excessive taxation. The great lead-antimony deposit mass does not seem to persist, but a silver-lead-antimony vein was disclosed, which would be valuable were it in the United States.

Cortez holdings: 1,079 pertenencias, 2,666 acres, in 4 groups, in the districts of Jacala Zimapan, and Ixmiquilpan, about 20 miles distant. The lands include the entire old mining camp of Jacala.

The Jacala property shows thickly bedded blue limestone intruded by granular monzonite with alteration along the contact and mineralization of the metamorphosed limestone by copper and silver-lead sulphides. The intrusive mass is 1¼ miles long and 700′ wide. The contact zone carries numerous orebodies showing chalcopyrite and magnetite below the 300′ zone of oxidization.

Careful exploration has shown that most of the ore-shoots are low in copper and carry but 1 to 3 oz. in silver. Main development is by the Cortez 1,770′ tunnel, which has opened up about 35,000 tons of pyritic ore containing magnetite and chalcopyrite, the average copper contents being 1.72%. Several hundred thousand tons may possibly be developed here, and as the ore contains 50% iron, it will be valuable for a flux.

The Humboldt, Cortez, Abeja and Santa Maria show promise of making producing mines. The Humboldt has a magnetite-garnet outcrop, explored by the 1,304′ Humboldt tunnel with drifts and a 130′ incline winze, mostly in ore. The Santa Maria 394′ shaft has developed a body of soft, leached copper-bearing gossan of 6,000 sq. ft. area. This shaft will connect with the Humboldt tunnel.

Small replacement deposits of silver-lead ore in limestone also occur at Jacala, but the Carmen mine is the only one of promise. This well-known producer, 1½ miles north of Jacala, yielded 40 oz. silver-lead ore for many years. The mine workings are on the contact between limestone and porphyry and developed a replacement chimney of silver-lead ore in limestone, worked by an incline shaft to a depth of 900′. The company's new work has not yet cut the downward continuation of this ore shoot.

The San Nicholas group includes the Soledad and Ensino Largo mines.

Zimapan lies in a broad, arid valley with the 4,000′ deep Moctezuma canyon 9 miles west and the 3,000′ deep Toliman canyon 6 miles west. The mines lie in the Toliman canyon and on the ridge between it and the Moctezuma river. The ore deposits lie around a large intrusion of monzonite porphyry either as contact deposits carrying copper, or silver-lead deposits in the surrounding limestone, especially along fissures and intrusive dikes. The latter form pipes, or chimneys, either vertical or inclined. The copper properties at this place are practically undeveloped, but a contact deposit showing disseminated copper pyrite, zinc blende and galena, promises to develop a large tonnage.

The mines have been closed down since 1913, owing to revolutionary disturbances, during which period all supplies were stolen and machinery destroyed.

ARADOS COPPER CO. **CHIHUAHUA**

Address: Clarence W. Hoyt, pres., 185 Devonshire St., Boston, Mass.

Property: about 2,000 acres were taken over 1910 from Chihuahua Copper Co. and Quo Vadis Copper Co.

The Quo Vadis and other groups show numerous contact veins between

limestone and porphyry, ranging from 2 to 40′ in width, development work said to have yielded enough ore shipped to pay for machinery in use on these properties, ore averaging better than 5% copper.

The Chihuahua group has several shallow shafts, and 9 tunnels with about 1,500′ of workings, estimated by management to show several thousand tons of ore.

Equipment: includes a 25-h. p. hoist, good for 500′, and small Gardner air-compressor, and necessary mine buildings.

Idle several years owing to political disturbances, but president states that property will be vigorously and systematically developed as soon as conditions in Mexico warrant. Company is controlled by strong interests who are successful copper producers, and stock is privately held by a few people.

ARIO COPPER CO. MICHOACAN

Mine office: Ario de Rosales, Ario, Michoacan, Mexico.

Officers: Frederick Moser, pres.; Geo. H. Walsh, Jr., treas.; A. P. Stramler, supt.

Cap. $2,000,000; shares $10 par. Holds lands through Ario Copper Co., S. A. **Inc.** April 13, 1907, in Mexico. **Cap.** 500,000 pesos.

Property: 126 hectares, including the Flora, Roma, Bohemia, San Antonio and San Valentin mines, old properties showing silver and copper ores, about 5 miles from the Inguaran mines, on the projected line of the Morelios Tacambaro railway, partly constructed.

Development: principal work is on the Flora and Bohemia mines, with 7 shafts aggregating 500′ depth, and 12 tunnels, aggregating 2,600′ length. La Roma has ore assaying up to 25% copper. Equipment includes steam and gasoline power. Patzcuaro, 70 miles distant, is the nearest railway point.

Idle at last accounts, owing to political disturbances.

ARNOLD MINING CO. SONORA

E. D. Arnold, pres.; A. O. Koppes, mgr., at last accounts.

Property: Del Pilar mine, about 35 miles N. W. of Cananea, developed by a 400′ shaft, showing ore said to carry 10% copper. Employs about 25 men. Property reported sold to the Manhattan Development Co., for $88,000, 1913, but no confirmation has been obtained.

ASARCO COPPER AND LEAD SMELTER DURANGO

Owned by the American Smelters Securities Co.

Office: 120 Broadway, New York. **Operating address:** C. L. Baker, gen. mgr., El Paso, Texas. **Works address:** G. P. Robinson, supt., Velardena, Dgo., Mexico.

Has an aggregate annual capacity of 400,000 tons.

ASIENTOS MINING CO. AGUASCALIENTES

Idle on account of unsafe conditions at Asientos, Ocampo, Aguascalientes, Mex. Chas. Adler, v. p.; Abram Rapp, gen. mgr., at last accounts.

Inc. 1898, in Delaware. **Cap.** $1,000,000; shares $10 par; non-assessable; fully issued.

Lands: 190 acres, including the old Nopensada and Alta Palmira mines, and the Veta Grande and Refugio mines. The Nopensada, a considerable producer in early days, carries slightly argentiferous copper ore, of about $40 per ton average value. The Alta Palmira mine, having a 450′ shaft, produced auriferous and argentiferous copper ore. The Refugio mine shows ore carrying up to 10% copper and 1,100 grams silver per metric ton, with small gold values.

Equipment: includes a 150-h. p. steam plant and hoist.

ASUNCION CO. GUANAJUATO

Address: care Geo. W. Bryant, Apt. 86, Guanajuato, Mex.

Property: 1,716 acres, in La Luz district, near Guanajuato, developed by 20 shafts. Plan installing compressor plant and air drills. Shipping high-grade and milling ore in 1921.

AUGUSTIAS DOLORES Y ANEXAS, S. A.; NEG. GUANAJUATO

Office: Gilberto Luno, gen. mgr., Pozos, Guanajuato, Gto., Mex.

Address: E. Castelazo, mgr., Mineral de Pozos, Gto., Mex.

Property: the Augustias, San Francisco and Dolores mines, 360 pertenencias, carrying strong veins containing silver ore.

Equipment: includes steam power plant, compressor, and 200-ton cyanide mill. Employs 200 to 250 men.

AURORA SILVER MINES CORPORATION SONORA

Mail returned from last address: H. J. Schwartz & Co., fiscal agent, 25 Broad St., New York.

Officers: B. G. Warner, pres.; A. C. Bauer, v. p.; W. D. Murray, sec.; William Kinnie, treas., with George Greig and Charles Brophy, directors, at last accounts.

Inc. in Delaware. **Cap.** $1,000,000; $5 par; fully paid.

Property: a group of silver mines at Tecoripa, Sonora, Mexico, including La Aurora, La Providencia. El Pilar, and Aurora Anexas, 12 hectares, situated 20 miles from Cumuripa, on the Southern Pacific. Under Mexican ownership the mines produced rich ore.

Development: to depth of 400′ and 60′ winze. Four headings were in rich ore at last reports; with good shoots of milling ore. The main vein is 3 to 4′ wide. Dumps contain 10,000 tons of $34 ore, which it is estimated can be treated at $8 per ton.

Equipment: steam power, hoist good for 1,000′, and mill moved from another mine 18 miles distant.

AURORA Y ANEXAS, MINERA LA ,S. A. CHIHUAHUA

Owns the Aurora mine, with 160 hectares, in the Cuchillo district, near Coyame, Chihuahua; and the **Justicia copper** mine, four miles east of Marquez station on the Kansas City, Mexico & Orient railroad. These properties were purchased from Don Francisco Diaz in 1908, by the late Ernesto Madero.

Owing to conditions in Mexico, it is impossible to get recent information.

AVINO MINES, LTD. DURANGO

Office: 638 Salibury House, London, E. C. 2, England.

Mine office: Wm. Roberts, gen. mgr., Gabriel, Durango, Mexico.

Officers: Lionel W. Harris, chairman; Frank F. Fuller, sec.; Edw. Hooper and A. Glencross, directors. Hooper, Speak & Co., cons engrs. 5 London Wall Bldgs., London.

Inc. March 6, 1909, in Great Britain. **Cap.** £100,000, in 1,000,000 priority shares and 1,000,000 ord. shares of 1s par; issued 500,000 priority shares and 978,429 ordinary shares.

Is a second reconstruction of Avino Mines of Mexico, Ltd., which was organized February 13, 1899, which was the successor of Alvino Syndicate, reorganized February 24, 1903, as successor of company of same name, Ltd. Present company took possession of property August 1, 1909. Stockholders of old company were given 1 ordinary share, par 1s, full paid, for each fully paid £1 share of the old company with the right to buy priority stock at par, share for share. After payment of 200% on priority shares. they rank equally with ordinary shares. Shares are listed on the London Stock Exchange.

Accounts for year ending June 30, 1920, show a profit of £1,398; cash and war loans, £6,078; ore on hand, £472; ore on dump, £2,081; debtors, £743; creditors, £694 debit balance, £12,210.

Property: the Avino, or Socovon silver-copper-gold mine, 166 acres, at Avino 10 miles from Gabriel, State of Durango, on the Mexican International railway, the nearest rail point.

The mine has a 900′ shaft and 1,050′ tunnel, with several large tajos or pits, one being nearly 400′ in width and of considerably greater length. Ore is a complex mixture of auriferous and argentiferous lead and copper

sulphides. Reserves were reported June, 1913, as 113,167 tons, averaging 1.8% copper, 9.7 oz. silver and $6 gold per ton.

Production: for 14 months to June 30, 1920, was 43,350 long tons of ore, of which 18,094 tons shipped, yielded 910,499 lbs. fine copper, 261,000 oz. of silver and 993 oz. gold giving a profit of £4,338.

Equipment: includes a steam and a 300-h. p. electric plant, operated by a gas engine. The lixiviation and concentration mill is idle as the recovery was poor, but a new plant is planned. In present operations, only selected ore is mined and shipped to smelters.

The mine has experienced managers and was operated successfully in 1920-21.

AZTEC CONSOLIDATED MINING CO. SONORA

Offices: Illinois National Bank Bldg., Springfield, Ill.; Las Cruces, New Mexico; and Tucson, Arizona.

Officers: F. C. Emery, pres.-mgr.; Harris Krupp, v. p.; W. W. Beckley, sec.-treas., with D. G. Campbell and L. R. Taylor, directors.

Inc. March 16, 1915, as Aztec Silver Mining Co., but name changed Feb. 25, 1916. **Cap.** $500,000; 10c par. In May, 1918, company offered shares at 60 cents.

Company controls the Sonora Exploration Co. and Compania Minera Consolida Los Aztecas, S. A.

Property: embraces 241 claims, covering the 22 mines enumerated in the company's circular, including the Aztec group, about 18 miles N. W. of Hermosillo, in Sonora, Mexico. The workings are shallow, but are said to show either copper, gold, or silver-lead ores at nearly every mine.

Development: it is claimed that there is a total of 30,000′ of work showing 6 to 8% copper ore, carrying silver and gold. One property carries mica, another molybdenite, and another manganese.

Equipment: includes a 300-h. p. steam plant, with hoist installed in 1912, and a 10-drill air-compressor. There are 20 buildings, including an engine-house, shops, store, office and about 15 dwellings. The smelter has a 100-ton hot-blast pyrite furnace and was operating steadily in 1917.

Management estimated 70,000 tons of ore in the mine.

Company has an immense area to exploit and to pay taxes on.

AZTEC SILVER MINING CO. SONORA

Name changed in 1916 to **Aztec Consolidated Mining Co.**, which see.

BACA ORTIZ; COMPANIA RESTAURADORA DE DURANGO

Property is the Candelaria mine, Tepehuanes, Santiago Papasquiaro, Durango, Mexico, carrying auriferous and argentiferous copper ore. Idle on account of revolution, 1912-19, but reported producing in 1920.

BACIS GOLD & SILVER MINING CO., LTD. DURANGO

Office: W. McNeill, sec., 1 London Wall Bldgs., London, E. C. 2, England.

Mine address: Bacis, Durango, Mex. Jose M. Villanueva, mine supt.; Fred. A. Voorhees, mill supt.

Directors: C. W. Milne, chairman; J. C. Reid, D. D. Milne, and J. Stone.

Inc. June 7, 1904, in Great Britain. **Cap.** £50,000; 5s par; 193,875 issued. Debentures: £20,000 of 10% pre prior lien debentures, due Jan. 1, 1924 with 50c premium; £25,000 of 10% income bonds, due 1930; £15,000 of 10% income debenture bonds, due 1930; and £15,000 prior-lien debentures due 1930. Interest on bond issue overdue since 1907.

Accounts for year ended Aug. 31, 1921, showed an operating loss of £18,429; cash and debtors, £3,853; creditors £19,155; accrued interest, £41,771; debit balance, £124,405.

Property: several gold and silver mines, together with water and timber rights near Bacis, on the Quila river, Durango.

Development: 2,500′ tunnel.

Equipment: includes mining plant and a mill with 40 stamps and 200-ton cyanide plant.

Operations were resumed in February 1920. Employs 250 to 500 men.

BARRANCA MINES (MEXICO), LTD. **SONORA**

Office: A. O. Smith, sec., 80 Gracechurch St., London, E. C. 3, England.

Directors: G. A. Stockfield, chairman; A. Bulle and W. Blount.

Inc. Oct. 2, 1906, in Great Britain. **Cap.** £190,000 in 120,000 10% cum. preference shares, 5s. par; and 160,000 ordinary shares of £1 par; 87,500 preference and all ordinary shares issued.

Financial statement for period April 30, 1914 to April 30, 1920, showed mining expenditures, £13,987; development, £27,671; London expenditures, £10,937; debtors, £6,200; creditors, £9,363.

Property: 150 acres of gold and silver-bearing claims in the Hermosillo district. A concentrating mill and cyanide plant is available. Work was suspended in mid-1913, owing to revolutionary disturbances.

BATOPILAS MINING CO. **CHIHUAHUA**

Address: 47 Cedar St., New York City. **Mine office:** Batopilas, Chihuahua, Mexico. John R. Harbottle, gen. mgr. in Mexico.

Officers: F. D. Merchant, pres.; N. F. Palmer, v. p.; W. M. Brodie, v. p.; L. H. Scott, treas.; E. W. A. Jorgensen, sec.-asst. treas., with Robt. M. Currier, Geo. W. Field, Gates W. McGarran, Jas. Marwick, Geo. Rowland, Edw. L. Stevens and Chas. F. Scott, trustees. Walter M. Brodie, 47 Cedar St., New York City, cons. engr.

Inc. 1887, in New York. **Cap.** $9,000,000; $20 par; 446,599 issued. Bonds: authorized $1,000,000, 1st mtge. 6's, dated Dec. 1, 1887, for 15 years, outstanding $366,500. Bonds were extended to December 1, 1927; interest has been paid to June 1, 1918. Shares listed on the New York and Boston Stock exchanges. Annual meeting, third Tuesday in April. Central Union Trust Co., New York, and State St. Trust Co., Boston, transfer offices. Farmers Loan & Trust Co., New York and Old Colony Trust Co., Boston, registrars. Shares, sold, $1 low, $1¼ high in 1918; $1⅛ low, $2 high in 1919; $½ low and $1⅜ high, in 1920; $⅝ low and $1 high, in 1921 to June.

Dividend: one of 12½c a share was paid December 31, 1907.

Records at Batopilas were destroyed in 1916, but company hopes to issue financial statements by Jan 1, 1922. Gross receipts from bullion sales were $109,060 in 1920 and $48,500 in first 6 months of 1921.

Property: concessions to 61 square miles of richly mineralized lands near Batopilas, in the Andres del Rio mining district, in the extreme southwestern part of the State of Chihuahua, Mexico. When 1913 began the company had titles in the silver zone for 2,137 acres, and in the auriferous zone, 20 miles up the river, for 140 acres. On account of the revolution it has been impossible to comply with the provisions of the contract covering what is known as the concession. Company surrendered all but 300 pertinencias believed to be the most valuable of former holdings.

Ore: native silver occurring with calcite in veins in diabase. The San Miguel property contains many veins, some of which have been worked for more than 100 years. The main veins are the San Antonio, Cancio, Cinco de Mayo, Diablo, Carmen, and Veta Grande now worked out.

The low grade ore from the San Miguel mine, which produces ¾ of silver output, averages about 10 oz., and that from the Porfirio Diaz Tunnel group about 7⅓ oz.

Development: over 10 miles of adit levels and 77 miles of workings. The principal mines are the Porfirio Diaz Tunnel on the Todos Santos Group, the San Miguel mine, El Escritorio, and El Camuchin. Work at El Escritorio and El Camuchin was unsatisfactory in 1913 and they were closed down. The P. D. tunnel is 7,200' long, and with extensions, 9,600'.

Equipment: two mills, viz; the San Antonio mill with 100 stamps and

a daily capacity of 200 tons, electric light plant and air-compressor, all run by Pelton wheels capable of furnishing 850-h. p.

The San Miguel mill contains a 25-stamp battery for high-grade ores, cyanide plant, amalgamating pans, refining plant machine-shop, foundry, office buildings, dormitories, boarding house, etc.

Power obtained from the Batopilas River by means of a dam 704' long and an aqueduct 9,900' long. The water after being used in the San Antonio plant, is siphoned under the river and runs to the San Miguel Hacienda, where 32-h. p. is developed by turbines.

Production and profits has been as follows:

Year	Ore Treated, Tons	Silver Oz.	Operating Profits
1921 (6 mos.)	.....	82,400	.....
1920 (9 mos.)	.....	133,000	.....
1919 (6 mos.)	.....	40,000	.....
1918	.....	.....	.....
1917	.....	.....	.....
1916	.....	3,000	.....
1915	.....	156,862	.....
1914	6,630	188,087	$10,556
1913	20,887	374,174	60,068
1912	34,032	564,398	80,046
1911	33,073	516,688	17,409*
1910	43,612	730,697	106,238*

*Deficit.

During first 6 months of 1921, mill heads averaged 7.28 oz. of silver. Extraction was 82.2%.

At a special meeting called in August, 1916, company's charter was amended, authorizing the management to conduct mining operations in the United States. Company did some exploration work near Joplin, Mo., in 1918, but results were unsatisfactory. It also has options on coal lands in Missouri.

Except for the year 1913, company's activities were practically suspended from 1910 to 1920. From September, 1915, to December, 1919, property was in care of about 40 loyal Mexicans who operated on a ⅛ royalty basis, which barely sufficed to meet company expenses. In December, 1919, the manager returned to the mine, renovated the cyanide plant and has since made small monthly silver shipments.

Employs 500 men.

BIG FOUR MINING CO. **CHIHUAHUA**

Address: Pittsburgh, Pa.

Officers: J. Scott, pres.; W. J. Martin, sec.-mgr.

Inc. 1904, in Arizona. **Cap.** $1,000,000; par $1.

Property: the Santa Fe Polyferno groups, 20 hectares, near Parral, Hidalgo, Chihuahua.

BLAISDELL COSCOTITLAN SYNDICATE **HIDALGO**

Address: 1344 Flower St., or Pacific Electric Bldg., Los Angeles, Calif.

Works office: P. A. Babb, mgr., Apto. 92, Pachuca, Hidalgo, Mex.

Company is re-treating old silver-gold-copper bearing patio tailings at Pachuca in a 125-ton chloride volatilization plant. The kiln is 125' long, 8' internal diameter and heats the ore to nearly 1,000 degrees C., using 10 gal. of 20,000 B. T. U. oil per short ton, when treating 125 tons of ore daily.

BOLEO; COMPAGNIE DU **BAJA CALIFORNIA**

American office: Cunard Bldg., Market St., San Francisco, California.

Secretary and office: M. Georges Odier, 56 Rue de Province, Paris, France. Mine at Santa Rosalia, Sur. Baja California, Mex. Directors: Albert Mirabaud, pres.; William d'Eichthal, Marquis de Montaigu, Henri

Puerari, Ernest Tambour, Charles de Wendel, P. Gal, and Alex. Tombelaine. R. Plonin, resident mgr. in California.

Inc. May 16, 1885, in France. **Cap.** f12,000,000; shares f100 par. There are also 46,000 founders' shares. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud, and owns a considerable share interest in the Compagnie d'Inguaran is exempt, until December 17, 1925, from all federal and local taxes, except stamp taxes; is exempt, until 1935, from export and import duties on fuel consumed: is exempt, until 1942, from custom duties and local duties.

Report for year ended Dec. 31, 1919, showed operating profit f6,570,353; dividends absorbed, f4,800,000; founders shares, f1,147,013: directors percentage, f101,776; to reserve, f521,564. Total reserve funds, f15,200,000. Profits for 1920 (11 months) were $940,000. Balance sheet of Dec. 31, 1920, showed assets, (francs at par) $9,060,000 which includes fixed assets, $380,000; investments, $540,000: acc'ts receivable, $1,000,000; cash $1,832,000; inventories, $5,200,000; deferred charges, $108,000. Liabilities, include capital stock, $2,400,000; notes and accounts payable, $1,060,000; reserves, $2,440,000, profit for year, $940,000.

Five per cent of the net profit goes into the reserve fund, 8% to the ordinary shares and 2% of the remainder to the directors. Of the balance then left, 77% goes to the ordinary shares and 23% is divided among 46,000 founders' shares. The result is that ordinary stockholders get 73½% of the profit, founder shareholders. 19½%, and directors 2%.

Bond issue: $1,000,000 8% gold debentures sold to an American syndicate in April, 1921, due $200,000 annually, March 1, 1926-March 1, 1930.

Dividends: f62.5 in 1901; f62.5 in 1902; f104.16 in 1903; f135.41 in 1904; f200 in 1905; f312.5 in 1906; f200 in 1907; f25 in 1911; f36 in 1912. with f34.1 for founders' shares; f35 in 1913, with f21 for founders' shares; f22 in 1914, with f10.90 for founders' shares; f40 in 1915, with f24 for founders' shares; f75 in 1916; f40 in 1917; f25 in 1918; f40 in 1919.

Property: 11 groups, 20,000 hectares and 598,600 hectares grazing land, five steamships and stock interests in the Compagnie des Mines de Huaron, Soc. Minerais et Metaux and Compagnie d'Inguaran. The mines lie in three different arroyos at a distance of about 19 miles from the plant, the latter being at the port of Santa Rosalia, where a harbor has been enclosed by breakwaters built of poured slag. The ores are in the form of 3 "mantos" or bedded deposits, slightly inclined, resting on an extensive stratum of conglomerate. The predominant minerals are the oxides and silicates of copper, with many rare species, some containing antimony. The deposits dip at angles between 10° and 15° toward the sea, that is to the east. Water found at a shallow depth, is raised by large centrifugal pumps. The roof is soft and is subject to caving, which renders the problem of timbering the stopes somewhat difficult and costly. A force of 3,500 workmen is employed, and a population of 11,000 persons depends upon the operation of the property. The region is a desert, nearly destitute of vegetation, and incapable of cultivation. The ores comprise a remarkably varied series of oxidized copper minerals in which the metal occurs in combination with silver, lead, cobalt, manganese and other metals. The oxide is melaconite, more or less mixed with manganese and iron oxides; below water level covellite and copper glance occur.

Owned by Canario Copper Co.

Mail returned marked "Unknown" from former address: Room 23 First National Bank Bldg., Douglas, Ariz. **Mine address:** Nacozari, Sonora, Mexico.

Management: same as El Canario Copper Co.

Property: Batamoti mine, containing 63 pertenencias, situated about 7 miles west of Purica station which is on Nacozari railroad, about 10 miles north of Nacozari, Sonora, Mexico.

Geology: the Batamoti vein is from 350 to 500′ wide and heavily mineralized on the surface for a length of 2,000′. The wall rocks consist of andesite and monzonite. The mineralization occurs in acid-porphyry and tufaceous rocks. The orebody is cut off on the west by a large quartz-porphyry dike, and on the east by an extensive granite-porphyry intrusion.

Development: old workings consist of 300′ shaft and several tunnels embracing about 6,000′ mining work, mostly in the andesite on the footwall side of the main orebody. New work consists of 350′ crosscut tunnel. Presumably idle several years.

CANDELARIA MINING CO. CHIHUAHUA

Office: 111 East 34th St., New York.

Officers: A. S. Dwight, pres.; D. E. Moran, v. p.; C. I. Reeves, sec.-treas.; and H. J. Stehli, directors

Property: in the State of Chihuahua, but details not obtainable

CARACAHUI MOUNTAIN COPPER CO., LTD. SONORA

Office: 3222 Jefferson St., Kansas City, Mo. Mine near Llano, Magdalena, Sonora, Mexico.

Officers: M. H. Greene, pres. and gen. mgr.; Chas. M. Howell, v. p.; H. J. Sprink, sec.-treas., with T McClure, J. C. Brewer, Thos. James and Wm. R. Berryhill, directors.

Inc. May 20, 1907, in Arizona. **Cap.** $1,500,000; $1 par; issued 964,000. Annual meeting, first Tuesday in June.

Property: 2 groups, 50 hectares, 9 miles S. E. of Llano, shows copper-bearing veins in granite.

Development: by shaft of 50′ and 410′, and a 195′ crosscut tunnel.

Equipment: includes a 40-h. p. boiler and 8x10″ hoist good for 1,000′ depth. Idle since 1910, but company has no bonded indebtedness, pays all taxes and expects to resume work as soon as taxation and economic conditions in Mexico, permit working.

CARMAN CONSOLIDATED COPPER CO. SONORA

Address: Joseph Backus, of Virginia, Minn., pres., reported to have taken over the property for an indebtedness of $50,000 in 1916, and to be planning organization of new company.

Mine near Arizpe, Sonora, Mex.

Inc. 1906. **Cap.** $500,000, increased to $750,000; shares $2.50 par. Held title to lands through Compania de Oro y Plata, S. A., inc. in Mexico.

Property: 351 pertenencias, 877 acres, in 9 groups, in the vicinity of the Pedrazzini and Chispas mines, show several strong silver veins, with 1,911′ of workings. The Carman and Don Placido groups have dumps carrying about 1,100 tons of ore, claimed to average 4.65% copper, 62.2 oz. silver and 0.21 oz. gold per ton. Shipments to El Paso smelter returned from $82.98 to $4,575 per ton.

The following rare minerals are peculiar to this deposit: boleite, an oxychloride of lead, copper and silver; cumengeite, oxychloride of lead and copper; fosgeneite, a chlorocarbonate of lead; spherocobaltite, a carbonate of cobalt. Practically every known oxidized ore of copper occurs here, as well as those of lead, manganese and iron. Gypsum is abundant and native sulphur occurs. All minerals occur in an unctuous, decomposed tuff, locally called soap-clay.

There are 3 workable beds, the upper averaging about 3′ in thickness, the middle 2 to 3′, and the bottom, 2 to 10′. The middle bed carries oxide and carbonate ores in oolitic concretions, known locally as **boleos; hence** the name of the mine. The lowest bed, partly below in the water line, carries sulphide ores, as well as oxides and carbonates. This bed, called No. 3, has been the chief source of ore supply of the property. It averages a meter thick, from a few inches up to 16′ in different parts of the property. The ore is disseminated through the tuffs in thin, irregular veins, with clay gouge, and has a marked concentration toward the bottom of each bed, where the ore forms compact layers of 6 to 12″.

Development: the mine is worked by tunnels 15 to 200 meters above sea level, and by 7 shafts, varying from 150' to 500' deep, with extensive underground workings.

Owing to the peculiar occurrence of the ore, drilling is done by hand, the ore is hand-sorted, and about half the output is machine-briquetted at a cost of only about 18 cents per ton, the argillaceous gangue serving as a natural binder.

Equipment: the mines have complete steam and electric plants, generating upwards of 2,500-h. p. from steam engines, of which 2,000-h. p. is transformed by two 500-k. w. 3-phase current generators and two 250-k. w. 3-phase generators. The Santa Rosalia electric plant furnishes power for hoisting, traction engines and a lighting system having 50 arc lights and a number of incandescent lamps. The climate is tropical, and the country extremely arid. Potable water is brought from a reservoir on the Yaqui plateau, through a 16,074-meter pipe-line, having pumps at Santa Agueda and Santa Rita. The mines and works are connected by a 30-kilometer private railway, equipped with 9 locomotives and 250 cars.

Compania del Boleo treats 1,000 metric tons daily, the ores averaging from 4 to 5% copper. There are 7 blast-furnaces in operation, with a capacity of 200 tons each per 24 hours. The ores are mainly oxidized and contain a large amount of moisture as delivered to the smelter. The products shipped are black copper assaying 93% in that metal and matte containing 63% copper.

The smelter handled 356,700 tons of ore in 1911; 360,000 tons of ore, yielding 12,650 tons of copper in 1912; 374,350 tons, yielding 13,000 tons copper in 1913; 324,000 tons, yielding 11,480 tons of copper in 1914; 317,000 tons, yielding 11,500 tons of copper in 1915; 290,000 tons, yielding 11,000 tons of copper in 1916; and 258,400 tons, yielding 9,225 tons metal in 1917; 263,700 tons, yielded 9,400 tons copper in 1918; 194,800 tons, yielded 8,000 tons copper in 1919; 3,527 tons copper in 1920 to (Sept. 30). In 1921, output was reduced to about 100 tons per month. Reserves of ore amount to 6 year's suppy.

The company's policy of secretiveness concerning mine operations, together with its refusal to permit inspection by visiting engineers and geologists, has made it impossible to give detailed information concerning a unique ore deposit and its exploitation. The property is one of exceptional merit and has been ably managed for many years. About 1,300 to 3,500 men employed. Company has been able to continue operations uninterruptedly despite revolutionary disturbances in Mexico.

BONANZA MINING CO. S. A. SONORA

Office: Cananea, Sonora, Mexico.

Officers: T. Evans, pres.; C. T. Knapp, v. p.; Geo. Young, sec.-treas.; Casey Stites, asst. sec.-treas.; and R. E. Howe, directors. Is the operating Mexican corporation of the Superior Bonanza Mining Co., which see.

Inc. June 7, 1904, in Mexico. **Cap.** authorized and issued , 10,000 pesos; par value of shares $10 (Mexican). Holds title to the mineral properties of that company, located near Imuris, Sonora, Mex., consisting of 106 pertenencias, or approximately 262 acres. Controlled through stock ownership by Cananea Cons. Copper Co. Contains a silicious ore, low in copper content, but with some gold. Mine has not been worked for the past two years.

BORDA ANTIGUA Y ANEXAS, S. A.; CIA MINERA MICHOACAN

Office: Mutual Life Bldg., City of Mexico, D. F. Mex.

Mine address: A. C. Norton, mgr., Apto. 20, Tlalpujahua, Mexico.

Officers: Lic. J. R. Aspe, pres.; H. E. Bourchier, treas.

Staff: Vicente Roqueni, Tlalpujahua, Mich., mine supt.; Domingo Begona, mill supt.

Inc. 1912, in Mexico. Cap. P. 1,800,000; par P. 50.

Property: the Borda gold-silver mines, near Tlalpujahua, Mich., developed by shafts and extensive underground workings.

Equipment: electric power, compressors, etc.

Mill: 30 stamps and tube mill, and 100-ton cyanide plant. Employs 400 men.

BOSTON-MOCTEZUMA MINING CO. **SONORA**

Address: W. C. Humphrey, Nacozari, Sonora.

Directors: C. P. Vaughn, Ira Vaughn, and Oliver Cutts of Philadelphia; and L. V. Banker of Newton, Mass. Organized in Mass., December, 1919.

Property: the Cieneguita silver mine, 20 miles S. of Nacozari, developed by several thousand feet of tunnels, opening large quantities of $10 ore.

BOSTON SONORA MINES CO. **SONORA**

Probably dead.

Inc. about Dec., 1911, in Arizona, by Thomas Patterson, Wm. A. Clark, H. C. Wilderson, James V. Howard and Royal B. Young, all of Massachusetts. **Cap.** $1,000,000; shares $5 par.

Property: at Cananea, Mexico, includes several claims near the Calumet-Sonora (Carnegie Lead & Zinc Co.) ground, crossed by several replacement veins showing bunches of good ore in the shallow pits and prospect shafts thus far put down. Is a prospect only.

BUENA TIERRA MINING CO., LTD. **CHIHUAHUA**

Office: H. F. Wreford, sec., 24 Lombard St., London, E. C. 3, England. R. M. Raymond, cons. engr., 61 Broadway, New York City.

Directors: R. T. Bayliss, chairman; Marquess of Ormande, W. McDermott, J. H. M. Shaw, and L. M. Cockerell.

Mine office: A. C. Bronker, gen. mgr., 1209 Mills Bldg., El Paso, Texas.; W. V. S. Dwelly, supt.

Inc. Feb. 10, 1912, in England. **Cap.** 330,000 shares, £1 par; all issued and fully paid. Notes amounting to £66,000, carrying 10% cumulative interest for 5 years, were offered in Dec., 1920, repayable at 25% premium. Issue underwritten and taken up by Exploration Co., Ltd.

Dividends: 5% each in 1912 and 1914; nothing since.

Property: acquired from the Exploration Co. of England and Mexico, Ltd., the Buena Tierra mine, 89 acres, in the Santa Eulalia district, Chicuáhua, 15 miles S. E. of Chihuahua. Purchase price was £300,000, payable £178,201 cash, £121,799 in fully-paid shares. Property reported on by R. T. Bayliss and R. M. Raymond.

Report for year ending Dec. 31, 1920 showed, receipts, £17,682; expenditures, £52,302, compared with receipts, £22,847 and expenditures, £38,285 in 1919. Total deficit Dec. 31, 1920 was £39,346.

Ore principally lead and zinc carbonates assaying 10 oz. silver 15% lead and 25-50% zinc. There is also a low-grade mixed sulphide. Orebodies occur in limestone lying almost flat, but instead of following the fissures, spread out in flat beds near them, their average width is 30', average thickness, 40'. The Chorro orebody has a depth of over 1,000'. Developed orebodies are most numerous at 450' depth, but most of the mines have ore down to a depth of 1,300'. Ore reserves estimated in 1917 as 281,500 tons. Ore contains an excess of iron, and is a desirable mixture.

Development: by shafts; Buena Tierra shaft is 1,600' deep. Raises are put up from the levels at intervals of 75-200' and the ore is mined in small bunches, little powder being required and practically no timber. Recent work amounted to 4,099 meters in 1919 and 4,196 meters in 1920. In addition five holes were drilled totaling 2,408' at a cost of $6,158 in 1920.

Production:

Year	Tons Smelted	Av. Ag. oz.	Av. pb. %	Total Cost	Net Value	Profit & Loss
1919.....	9,067	11.73	12.92	$143,610	$90,050	x$53,560
1920.....	6,927	8.6	9.69	180,414	63,049	x117,365

* Loss.

Operations were resumed in May, 1918, but Mexican troubles have interfered with production during the past few years and property has not been steadily operated. Lead ore is shipped to the A. S. & R. Co.'s smelters at Chihuahua or El Paso, and the zinc ore to the United States.

Operations were suspended June 30, 1921, owing to high cost of development work and low price of silver and lead ore.

Employs 250 men normally.

BUENA VISTA GOLD MINING CO. **CHIHUAHUA**

Owned by **El Rayo Mines Co.**, which see.

BUEN DESPACHO Y ANEXAS, CIA EL **MEXICO**

Address: C. Duarte, mgr., Apto. 624, Mexico City, Mex.

BUFA MINING, MILLING & SMELTING CO. **SONORA**

Office: 1030 Van Nuys Bldg., Los Angeles, California. Mine at La Bufa, Sahuaripa, Sonora, Mexico.

Officers: Wm. E. Richardson, pres. and gen. mgr.; H. A. Sibbet, v. p.; Baron W. Riley, sec.

Inc. 1902, in Arizona. **Cap.** $1,500,000; shares $1 par. Has paid 5 dividends, last being $60,000, July, 1905.

Property: 123 acres, showing 6 fissure veins, 2 of which average 4' width, are opened by a 600' incline.

Ore: said to assay 10% copper, 10% lead, 4% zinc, 150 oz. silver and $2.50 gold per ton. Values are in argentiferous tetrahedrite and copper sulphides.

Development: shafts of 300' and 600', and a 225' tunnel, with 8,000' of workings; 20,000 tons of high-grade ore said to be blocked out, with low-grade ore on the dump.

Equipment: includes a 120-h. p. plant, with hoists, air compressors and 7 power drills.

The 35-ton concentrator has a small sampling mill attached. There also is a 20-ton leaching plant. The smelter, at the mine, includes 10-ton and 25-ton reverberatory furnaces. Product is matte carrying 50% copper, 600 to 800 oz. silver and 1.5 oz. gold per ton, shipped by burro to Aguascalientes, via Guaymas, for refining. Production, 1906, was about 750,000 lb. fine copper.

Secretary reported in Feb., 1920, that mine had not been operated for over 10 years, due to the revolution.

BUTTERS COPALA MINES **SINALOA**

Address: Chas. Butters, pres., 6272 Chabot Rd,. Oakland, Calif.

Mine address: Paul Crawford, mgr., Copala, Sinaloa, Mex.

Property: a silver mine at Copala, 60 miles from Matzatlan, Sinaloa, Mex.

Equipment: steam-electric power, compressor, etc., with 400-ton mill, having 60 stamps, tube mills and cyanide department. Employs 150-200 men.

CADENA DE COBRE MINING CO. **SONORA**

Address: care C. A. McDonald, sec.; Bisbee, Ariz. **Mine office:** Sahuaripa, Sonora, Mex.

Officers: Emil Marks, pres.; C. H. Holz, v. p.; N. Newman, treas.; R. F. Koehler, J. Pennypacker and John Treu, directors; Arthur Houle, cons. engr.

Inc. Jan. 5, 1905. **Cap.** $1,000,000; shares $1 par.

Property: 83 hectares, in Los Chinos mountains, on the Yaqui river, shows iron outcrops up to 300' in width.

Development: by the 96' Bisbee tunnel, showing ore assaying 4 to 25% copper. Idle on account of revolutionary disturbances in Mexico.

CALERA MINING CO. **CHIHUAHUA**

Controlled by Howe Sound Co., 665 Fifth Ave., New York City. **Mine office:** Wm. J. Quigley, v. p.-mgr.; El Paso, Texas.

Inc. in New Jersey. **Cap.** $200,000; $1 par; 194,774 shares issued of which 172,857 are owned by Howe Sound Co.

Property: La Prieta mine, 3 claims, 140 acres, at San Isidro, Chihuahua, Mex. The ore is a silver-lead-zinc sulphide averaging 3-4 oz. silver per ton and amenable to flotation. The mine was under development until 1912, but has since been idle owing to revolutionary disturbances. Control

was acquired by Howe Sound company in November, 1920, and operations resumed, 1921.

Mill: 100-ton concentrator. Owns 6-mile narrow gauge railway line.

CANANEA CONSOLIDATED COPPER CO., S. A. SONORA

Is the Mexican operating company of the **Greene-Cananea Copper Co.** (q. v.).

CANARIO COPPER CO. SONORA

Address: care Cameron Michel & Co., 8 West 40th St., New York.

Officers: James P. Harvey, pres. and mgr.; F. O. Schellenberg, v. p.; T. M. Simonton, sec.; Jacob Schaefer, Jr., treas. Directors: James P. Harvey, F. O. Schellenberg, Wm. McDermott and B. A. Packard.

Inc. in Arizona, with capital of 2,000,000 $1 shares; 600,000 issued; but re-incorporated in Delaware, with capital of $20,000,000; shares $10 par value; 800,000 issued. Registrar & Transfer Co., New York, transfer agent. Commercial Trust Co., New Jersey, registrar. The company owns all the capital stock of **El Canario Copper Co., S. A.** and **Mountain Consolidated Copper Co., S. A.** both of Mexico.

El Canario Copper Co.

Owned by Canario Copper Co., a Cameron, Michel promotion.

Address: Nacozari, Sonora, Mexico; and Room 23, First National Bank Bldg., Douglas, Arizona.

Management: James P. Harvey, gen. mgr.; J. E. Coker, supt.

Property: includes El Canario mine, 15 miles east; and the Lillie and the Lilie Segunda mines, 3 miles west of Nacozari, Sonora. El Canario adjoins La Caridad of the Moctezuma Copper Co. Geologic report of the Lillie made by C. H. Dunning, gives but little data on which to base an opinion.

El Canario ores carry enargite, and run from 2 to 18% copper, with some silver. The property is crossed by the El Caridad vein and two east-west cross-veins. An 800′ tunnel, whose face is 500′ below outcrop, has not yet cut the intersection of veins as planned.

The Lillie Mine has a vein from 40 to 60′ wide, which consists of a replacement of limestone between quartzite, intersected and paralleled by acid-porphyry dikes. The vein outcrops boldy for several thousand feet.

Development is by tunnels; No. 3 will gain a vertical depth of 600′, and is expected to enter the ore-zone 500 to 600′ from the portal, and 500′ under the large high-grade ore stope above in the No. 1 tunnel. Thirty-three cars of high-grade ore have been shipped to the Copper Queen smelter at Douglas, Arizona, from surface workings.

The Lillie Segunda mine joins the Lillie mine on the south. The main 250′ shaft on the north end of the orebody, encountered sulphide ore at a depth of 20′ and extending to a depth of 100′ where the foot-wall zone was encountered. The ore averaged 2.25% copper, with 1.75 oz. silver per ton. The 100′ crosscut shows ore for 110′ and was extended to intercept another oreshoot. The 250′ level encountered commercial ore at a point 310′ from the shaft.

Equipment: the main shaft is equipped with 60-h. p. hoist and compressor, capable of furnishing about 1,300′ cu. ft. of air per minute. An air pipe-line has also been extended to the Lillie No. 3 tunnel.

The Lillie and Lillie Segunda mines embrace 278 pertenencias. A tunnel-site has been located on the east side of Lillie Segunda mountain, where an air-compressor and other machinery will be installed to drive a 3,000′ tunnel to crosscut the Segunda orebody 700′ below the surface. The tunnel-site is 1½ miles from Nacozari. Development is said to be highly favorable, and it looks as if the Lillie Segunda would make up for the disappointing results in other properties owned by this company.

Mountain Consolidated Copper Co., S. A.

Owns the Batamoti Copper mine 8m N. W. of Nacozari.

CARMEN COPPER CO. DURANGO

Office: 316 W. 42nd St., New York.

Mine office: Mineral del Carmen, El Oro, Durango, Mexico.

Officers: Geo. Moeser, pres.; R. D. Kent, sec.-treas.; F. C. Alley, special agent. Louis Burgonia, supt., 2732 San Diego St., El Paso, Texas.

Inc. in New York. **Cap.** $750,000; shares $100 par.

Property: includes El Carmen mine, 160 hectares, and a considerable acreage of miscellaneous lands, 45 miles from Rosario, the nearest rail point.

The mine carries silver-bearing copper ores, with considerable development, said to have opened up 50,000 tons of 25 to 30 oz. silver ore.

Equipment: includes steam power, compressors and 100-ton mill with 40 stamps, 3 crushers and Frue vanners.

Operations resumed in 1920 after an idleness of several years. Employs 200 men.

CARMEN GUANAJUATO GOLD MINING CO. — **GUANAJUATO**

Controlled by the **Guanajuato Cons. M. & M. Co.**, which owns 51% of the issued stock.

Address: 52 Vanderbilt Ave., New York City.

Property: 48 pertenencias at Guanajuato, Gto. and a 10-stamp, 50-ton mill.

Closed down in 1920 owing to political disturbances.

CARMEN SYNDICATE — **SONORA**

Dead. Was subsidiary of **Proprietary Mines Co.** Fully described in Vol. XIV.

Syndicate relinquished option on Carmen group, April, 1920. Property purchased by **Florence Divide Mng. Co.**, which see.

CARNEGIE LEAD & ZINC CO. — **SONORA**

Office: C. Peterson, sec., 701 Oliver Bldg., Pittsburg, Pa.

Mine address: H. Sinclair McKay, mgr., Cananea, Son., Mexico.

Officers: J. H. Sanford, pres.; D. T. Helm, v. p.; J. F. Edmonds, v. p.; R. B. Haverstick, treas., with E. M. Love, W. M. Henderson and C. W. Stilson, directors.

Inc. March 3, 1915, in Arizona; amended July 17, 1918. **Cap.** originally $500,000; increased 1918 to $1,000,000, and in 1920 to $2,000,000; $5 par; $877,020 issued. Bonds authorized, $250,000 first-mortgage, 10-year, 7%, dated October 1, 1917; $244,000 issued. Registrar: Colonial Trust Co., Pittsburg. Stock transferred at company office. Annual meeting second Tuesday in June. Listed on Pittsburg Stock Exchange.

Company is a reorganization of the Calumet & Sonora Mining & Milling Co., described in Vol. XI.

Financial Statement, years ended May 31:

Assets.

Year	Current	C. & S. Acct.	C. & S. Stock	Accumulated Earnings, etc.	Bonds and ore reserve	Property, Construction, etc.	Total
1920.....	$37.704	$690.875	112.450	.....	.....	$1,132,919	
1919.....	17.530	330.064	120.316	40.479	.....	.....	508.390
1918.....	171.253	.....	.....	.....	$86,429	248.281	505.963
1917.....	102.926	.....	.....	.....	122.450	151.964	377.340
1916.....	72.620	.....	.....	.....	66,200	578,249	717,070

Liabilities.

Year	Current	Capital Stock	Bonds due in 1927, etc.	Deferred Charges	Acc. Earn. C. & S., Excess Value of Stock	Total
1920..	$31,728	$877,020	$244,000	.....	$19,818*	$1,132,919
1919..	114,462	379,220	245,000	$277,905	46,613	508,390
1918..	25,079	.....	250,000	.....	.....	.....
1917..	11,202	.....	100,000	.....	.....	.....
1916..	39,500	500,000	100,000	.....	.....	.....

* Deficit.

Calumet & Sonora of Cananea Mining Co., S. A.

Subsidiary of Carnegie Lead & Zinc Co. of Arizona.

Offices: 701 Oliver Bldg., Pittsburg, Pa.; and Box 35, Cananea, Sonora, Mexico.

Officers: same as Carnegie L. & Z. Co. H. Sinclair McKay, mgr.

Inc. Jan. 7, 1905, in Mexico. **Cap.** 25,000 pesos. All the stock is owned by Carnegie L. & Z. Co.

Balance sheet of May 31, 1920, showed assets, $5,327,394, including property, $329,000; development $363,491; equipment, $489,055; supplies, $38,116; acc'ts rec., $24,932; value developed ore, $4,075,000; liabilities include, Carnegie L. & Z. Co., $694,875; acc'ts payable, $27,576; surplus $249,843.

Property: 658 acres, 2 miles N. and slightly W. of Cananea, Sonora, at elevation of 5,500'.

Geology: the group shows a variety of rocks, including Mariquita diabase, Mesa tuffs, San Pedro andesite, Henrietta diorite-porphyry, and Elisa quartz-porphyry. The two last named are the chief ore-forming rocks of the Cananea district.

Ore in the Chivera and Catalina No. 2 claims occurs in diorite-porphyry, which cuts through the tuffs. The ore is a mixture of galena, sphalerite, and chalcopyrite, with scanty tetrahedrite.

Development: by 900' Chivera incline shaft with levels at 200, 300, 400, 525, 600, 800 and 900'. The orebody is of oval cross section, about 50' by 200' on the 700 level and is continuous from 200 to 900 levels. At 700', the ore cut at 129' from shaft assayed 5.81% lead, with a little zinc and copper. A winze below 600' sampled 11% lead and 9 oz. of silver. Drifting on the 900' encountered the Chivera vein 45' from the shaft. A new vein about 2,000' from the shaft is being developed. It is a fissure vein 8' thick assaying 9% lead and 4-5 oz. silver. Reserves are estimated at 120,000 tons broken ore.

Equipment: includes two electric hoisting plants, crushers, 1,000' aerial tramway, one 1,500 cu. ft. and one 600 cu. ft. compressor, one 200 ft. oil-driven compressor, jack-hammers, stoping drills, and fully-equipped machine-shops.

A new 750-ton gravity and flotation mill was completed in 1919 and a power plant of 750 k. w. capacity constructed in 1920. The flow-sheet of treatment is Farrell jaw-crusher and Traylor rolls at Chivera shaft and aerial tram to 1,000-ton bin at mill. Then follow belt-conveyors, automatic weighers, samplers, Hancock jig, and Deister-Overstrom tables. Products are high-grade lead concentrate and zinc-copper concentrate. The latter passes through a Huff electrostatic plant, making a 17% copper concentrate and a 48 to 54% zinc concentrate. Tailings and middlings from the tables are re-ground in Allis-Chalmers ball-mills, the pulp going to a flotation plant. Final recoveries are 90% lead, 90% copper, and 90% zinc. The machinery described above cost $200,000. Electric power is purchased.

Production: from 1915-May 31, 1920.

Year	Lead, lb.	Zinc, lb.	Copper, lb.
1915	165,488	235,843	243,053
1916	4,347,470	3,702,389	235,843
1917	2,522,904	2,862,745	999,957
1918	1,317,456	2,244,619	888,300
1919	232,556	221,291	99,700
1920	1,073,767	717,596	568,698

CARWOOD MINING CO. CHIHUAHUA

Mine address: W. E. Brock, Parral, Hdgo., Chihuahua.

U. S. address: Philadelphia, Pa.

Property: 3 miles N. W. of Parral, said to contain a deposit of complex zinc-lead-copper ore containing gold and silver values.

CASCARRAJAS, MINA DE JALISCO

Address: F. Hernandez, mgr., Etzatlan, Jal., Mex.

CERRALVO LEAD SMELTER NUEVO LEON

Works address: Cerralvo, N. L., Mexico.

Owned and operated by **Cia Minera de Penoles,** which see.

CERRALVO MINING CO. NEUVO LEON

Office: 903 Hennen Bldg., New Orleans, La.

Mine address: Cerralvo, Nuevo Leon. J. T. Perry, mgr.

Officers: Julius C. Werner, pres.; Julius C. Mente, sec.-treas.

Inc. 1915, in Louisiana. **Cap.** $50,000; par $1.

Property: the Luz de Gracia silver-lead mine.

Employs 50-100 men normally.

CHARCAS UNITED; CIA METALURGICA NACIONAL SAN LUIS POTOSI

Address: S. H. Sherman, mgr., Charcas, S. L. P., Mex.

CHEROKE MINING CO. CHIHUAHUA

Property: near Guadaloupe y Calvo is to be reopened 1922.

CHICAGO EXPLORATION & DEVELOPMENT CO. SONORA

Described in Vol. XIV. Now called Compania Minera El Sacremento, S. A., which see.

CHIHUAHUA-ESPERANZA GOLD MINING CO. CHIHUAHUA

Subsidiary of the **Dolores Esperanza,** which see.

CHIHUAHUA LEAD SMELTER CHIHUAHUA

Owned by American Sm. & Rfg. Co., which see.

Office: 120 Broadway, New York.

Operating address: C. L. Baker, gen. mgr., El Paso, Texas.

Works address: J. R. Enlow, supt., Chihuahua, Mexico.

Custom lead smelter with annual capacity of 400,000 tons, 7 blast furnaces 500-ton cyanide plant.

Employs 500 men.

CHIHUAHUA MINING CO. CHIHUAHUA

Controlled through stock ownership by **El Potosi Mng. Co.,** a subsidiary of the Howe Sound Co.

Offices: 655 Fifth Ave., New York City, and Chihuahua, Mexico.

Officers: E. B. Schley, pres.; W. H. Gelshenen, v. p.; W. J. Quigley, v. p.; W. J. Walworth, sec.-treas.; E. Richter, asst. sec.-asst. treas.

Inc. Jan. 8, 1890, in New York. **Cap.** $600,000; $1 par; outstanding, 587,806 shares. Stock transferred at company's New York office. Annual meeting, second Monday in January. Stock is closely held.

Property: in the Santa Eulalia district, Chihuahua, Mexico.

Ore: lead, silver, and zinc occurring as replacement deposits in limestone.

Development: by vertical shafts to a depth of 1,800'. Operations have been hampered by the revolution, though shipments of zinc ore were made in 1915 and 1916. No work was done in 1919, but shipments were reported in 1920.

CHOIX CONSOLIDATED MINING CO., LTD. SINALOA

Office: 516 Grant Bldg., Los Angeles, Cal. **Mine office:** Choix, Sinaloa, Mexico.

Officers: C. J. Heyler, pres.; A. M. McDermott, v. p.; J. R. Thomas, sec.; with A. E. Pomeroy and Richard Lamson, directors.

Inc. May, 1902, in Arizona. **Cap.** $5,000,000; shares $1 par; non-assessable issued, $3,155,534. Is protocolized under laws of Mexico. Owns 45% of the stock issue of Los Platanos Development Co. Annual meeting, first Monday in October.

Property: 269 hectares, in El Fuerte district of Sinaloa and Urique district of Chihuahua. Orebodies are contact deposits between diorite and limestone and porphyry and limestone with fissure veins in granite and quartzite carrying gold and silver.

Shipments of 1,062 tons of ore, to the Aguascalientes smelter, gave re-

turns of 19.5 to 28% copper, with gross values of $127,915, and net value of $47,940.

Company sold its smelter machinery and 1,000,000 shares capital stock to the **El Fuerte M. & S. Co.**, which is operating the mine under a 10-year lease. The Choix company receives 10% of the net proceeds of all ore smelted, as royalty.

CHONTALPAN Y ANEXAS, S. A., MINERA **GUERRERO**

Address: Harold W. Fowler, mgr., Zacualpam, Mexico, Mex. J. Cleveland Jones, supt.

Officers: Jules Lacaud, pres.; Felipe Laso, v. p.; Fernando Guinchard, sec.-treas. F. Dosal, treas., with R. A. Lacaud, Augustin Legoretta and Ed. Weyl, directors.

Inc. 1907, in Mexico. **Cap.** 350,000 p.; 25 p. par; 14,000 shares outstanding.

Property: 8 patented claims, 500 acres, at Tetipac, Guerrero, Mex. Management estimates ore reserves at 2 years supply averaging 30 oz. per ton.

Development: by 218 meter shaft and tunnel 800 meters long.

Equipment: includes electric hoist, compressor, pump, 75-ton concentrating mill with 2 K. & K. flotation units.

The mine has been a regular shipper for several years.

CIENEGUITA CONSOLIDATED MINES **SONORA**

Office: 25 Broad St., New York. Is a reorganization of the Cieneguita Copper and Cieneguita Securities companies.

Officers: James F. Whitney, pres.; August Gauch, v. p.; R. C. Davenport, sec.; with Theodore Martin, Geo. D. Christy, and F. W. Hunt, directors.

Property: 1,100 hectares, about 40 miles S. W. of Sahuaripa, Sonora, is covered by rhyolitic rocks, mostly fragmental, cut by a diabase dike. The Chipiona and the Cargona groups lie close together and the Ostimuri-Tayapa group about 2 miles to the S. E. The rocks are cut by vertical veins, one reported to be from 3′ to 50′ wide, traceable 3 miles and to carry ore shoots averaging about 2½% copper and 40 oz. in silver.

Development: mainly by tunnels, one of 1,200′ with 2 shallow shafts and a total of about 3 miles of workings. These workings are not sufficient to block out any large amount of ore, but show that the property has merit.

Equipment: includes 100-h. p. steam plant, a 6-drill compressor and all necessary mine buildings and houses for employes.

A small smelter has crushers and rolls, a 75-ton calcining furnace and two 50-ton reverberatory furnaces, burning wood. Smelting plant inadequate and poorly adapted for the ore. Idle, pending restoration of peace in Mexico.

CINCO MINAS CO. **JALISCO**

Offices: 46 Cedar St., New York; 1026 Citizens National Bank, Los Angeles, California.

Mine address: Magdalena, Jalisco. Geo. F. Zoffman, mgr.; W. A. Grassie, gen. supt.

Officers: James W. Gerard, pres.; Marcus Daly, v. p.-treas., T. D. McCarthy, sec., with Mrs. J. W. Gerard, and H. E. Crawford, directors.

Inc. March, 1910. **Cap.** $500,000; $100 par; all issued. **Transfer office:** 61 Broadway, New York.

Property: in the Hostotipaquillo district of Jalisco. Examined by John B. Farish.

Geology: deposit is a fissure vein with andesite hanging and dacite footwall; it is 10 to 40′ wide, dips 65° S.-W., and has a N. 45° W. course. Ore shoots are 500 and 250′ long by 25 and 20′ wide. Ore is a sulphide assaying 12 oz. silver and $2 gold per ton.

Development: by 900′ vertical shaft and 1,000′ of tunnels. Workings aggregate 35,600′. Reserves are estimated as 500,000 tons. Mining is by overhand stoping and back filling.

Equipment: electric power, 500-h. p. hoist, compressor, pump, tram and 500-ton concentration and cyanide mill, containing 30-stamps, 5 tube mills and 2 ball mills, etc. Employs 500-600 men at mine and mill.

No production figures are obtainable, as mine is privately owned, but mine and mill were operated to full capacity in 1921.

COAHUILA MINING & SMELTING CO., LTD. COAHUILA

Office: 614 Penobscot Bldg., Detroit, Mich. **Operating office:** Apartado 72, Monterrey, N. L., Mexico. **Mine office:** Jimulco, Viesca, Coahuila.

Officers: H. T. Ambrose, pres.; Frank J. Llewellyn, v. p.; Walter E. Parker, sec. and gen. mgr.; Archibald Cattell, treas.; preceding, with J. Kirby, Jr., Sidney B. Cohn and C. F. Jennings, directors; J. C. Treadwell, supt.; Alex McCormick, mine supt.; Harry Reed, mill supt.

Inc. January, 1902, in Mexico. **Cap.** $500,000 gold; shares $1 par; non-assessable, fully issued.

Dividends: 10% in 1902; 6% in 1904; 29% in 1905; 30% in 1907; 10% in 1909 and 16% in 1910, a total of 101%, or $505,000. Annual meeting, first Wednesday in February.

Property: comprises holdings in the Mapimi, Viesca and San Juan de Guadaloupe districts, containing the (1) Santa Maria, Sultana, and other mines at Jimulco, carrying copper and lead ores, opened by a 700′ main shaft, and a 1,000′ main tunnel, with steam and electric power; (2) the Alberto mine, in the Mapimi, district was said to have made regular shipments of high grade ore to the Mapimi smelter, 1910; (3) a 250-ton smelter, with steam and electric power, connected with the mines by rail, idle since 1909. The revolution in Mexico practically stopped all mining in Coahuila.

COBRE MEXICANA, S. A., COMPANIA SONORA

Address: care Copper Exploration Co., 8 W. 40th St., New York City.

Inc. 1919, in Mexico as operating company of **Copper Exploration Co.**, which owns 80% of the authorized $10,000 capital stock.

No record of holdings or operations available.

CONCHO MINING CO. CHIHUAHUA

(Compania Minera de Concho, S. A.)

Succeeds Naica Mining Co.

Address: Jose Estrada Otamendi, pres., Naica, Chih., Mex., or Jose Bovro, cons. engr., Naica, Chih.

Property: the San Francisco, Dolores and Toledo mines, yielding silver-lead ores.

Equipment: includes gas and electric power, etc. Employs 250 men normally.

CONS. MINES OF EL ORO, LTD. MEXICO, D. F.

L. N. Billson, liquidator, 23 Broad St. House, London, E. C. England.

Reorganized 1920 as **Afric Corporation, Ltd.**, which see.

CONSOLIDATED SONORA MINES CO. SONORA

Address: C. P. Shaver, sec., care Bank of Thibodaux, Thibodaux, La., who says nothing has been done at the mine near Fronteras since 1914. See Vol. XIII.

CONSTANCIA, S. A., CIA. MINERA LA COAHUILA

Address: S. F. Shaw, gen. mgr., Apto. 2, Esmeralda, Coah., Mex.

Inc. 1879, in Coahuila. **Cap.** P. 32,000; par P. 32.

Property: the Esmeralda, Deonea, Guadaloupe, San Salvador and Blanca silver-lead mines.

Equipment: complete with steam power, hoists, compressors, etc. Employs 250 men.

CONTINENTAL MINING CO. COAHUILA

Mine office: San Antonio, Texas.

Officers: Otto Wahrmund, pres.; C. T. Priest, San Antonio, v. p.; S. G. Newton, sec.

Inc. April, 1905, as a reconstruction of Continental Copper Co. **Cap.**

$1,000,000; shares $10 par. Is closely allied in ownership and management with the Jimulco Mining Co.

Property: the Panuco mine with 65 hectares, opened in 1700 and worked at intervals since. Property was bought from the Panuco Copper Co.

Ore: deposit is a chimney of breccia, cemented by metallic sulphides, mainly chalcopyrite, but with a little chalcocite, in a quartz gangue, the country rock being granite. The ore is reported to average about 3½% copper.

Company owns a 40-mile railway, from Monclova to Panuco. Old company invested about $1,000,000 in the property and improvements. Largest production, under former ownership, was 1,466,059 lb. copper in 1902, and a small production was secured, July-November, 1907, by present company, estimated at 1,250,000 lb. copper. Mine considered promising, though low in grade, and management good. Closed down since 1913, on account of danger to life and property by revolutionary bands.

CON VIRGINIA MINE — **SONORA**

Address: Ygnacio Soto, Douglas, Ariz., owner. Was under option in 1919-20 to Shattuck Arizona Copper Co.; relinquished Jan. 1, 1921.

Property: 246 acres in Sierra Madre Mnts., E. of Moctezuma and within 4 miles of Chihuahua state line, show a vein 28′ wide. The ore carries silver and a little gold; silver value is 5 to 35 oz. at surface, but apparently does not continue with depth. Shattuck company did 700′ of work.

COPETE CONSOLIDATED COPPER CO. — **SONORA**

Office: 15 William St., New York.

Officers: Wm. T. Read, pres.; F. C. Hanford, v. p.; Myra B. Martin, sec.-treas., with Ralph Melczer and John C. Morrow, directors.

Inc. March, 1906, in West Virginia. **Cap.** $1,000,000; shares $1 par, non-assessable; issued 549,170½ shares. Annual meeting, first Wednesday in March.

The company was organized to develop the property owned by the Melczer Mining Co., legalized in Mexico, the entire stock issue of which is held by the Copete Consolidated Copper Co.

Property: 70 pertenencias, comprising the Last Chance, Copetito, Jalisco, Santiago, and El Copete claims, about 173 acres, at El Copete, Sonora, shows an immense gossan capping, apparently the remnant of a great blanket vein, the greater part of which has been eroded away.

Development: by several tunnels and a 615′ shaft with about 7,000′ of workings. Ores are mainly low-grade copper with considerable iron pyrite, gold and silver, giving average assay value of $6 per ton. The bottom of the ore zone seems to have been reached at about 300′.

It is believed that the officers now in control of the company will use every effort to bring the enterprise to a successful issue and the past may be considered a closed chapter. Those interested in the very interesting history of the company will find it given in Vols. X and XI, The Copper Handbook.

Idle on account of the revolution.

COPETE MINING CO. — **SONORA**

Office: 15 William St., New York. Myra B. Martin, sec.

Inc. 1900, in West Virginia. **Cap.** $5,000,000; shares $5 par. Owned stock of the **Melczer Mining Co.**, transferred, 1906, to **Copete Consolidated Copper Co.**, which see.

CORI GOLD MINES CO. — **NAYARIT**

Address: L. E. Whicher, 25 Broad St., New York City.

Officers: L. E. Whicher, pres.; Raymond Guyer, v. p.; R. M. Atwater, Jr., treas., with John Costin, H. G. McNair and E. G. Thomas, directors. S. L. Sherman, sec.

Inc. 1921, in Delaware. **Cap.** $2,000,000; $1 par; 500,000 outstanding. Organized as a holding company for the **Compania Minera de Cori**, incorporated in Mexico, **Cap.** 5,000 pesos.

Property: 4 groups, 300 acres, adjoining El Tigre mine, 6 miles from Huajicori in district of Acaponeta, Nayarit. Tract contains a quartz vein in andesite, 4-20′ wide, running N.-W. with dip 35°, and containing gold-silver-lead ore. The main vein has been opened at surface over a distance of 2,000′. Rich ore occurs in pockets. Mine is credited with past production of $2,000,000 in gold from shallow workings.

Development: by 50′ shaft and 200′ adit on vein.

Equipment: includes 10-ton mill, 50-ton crusher, 10-h. p. gas engine.

CORONA CONS. MINING & MILLING CO. — **CHIHUAHUA**

Address: Parral, Hidalgo, Chihuahua, Mex.

Is holding company for Mexican corporation, La Compania Min. Corona, S. A.

Officers: N. P. Wilson, pres., Denver. M. E. Peters, sec.

Cap. $1,750,000; par $5; $427,500 in treasury.

Property: Dudosa and other claims, 35 hectares, next to Palmilla mine, 3.5 miles from Parral, Chih.

Development: 1,500′ shaft with drifts on San Cristobal vein and 400′, 750′ and 300′ incline shafts opening 9′ of shipping silver ore on San Cristobal at 500′ with 22′ of $5 ore on 640′ level.

Equipment: steam power, hoists, compressor, etc.

CORTEZ ASSOCIATED MINES — **HIDALGO**

Office: 53 State St., Boston, Mass.

Mine office: Jacala, Hidalgo, Mex.

Officers: Joseph S. Fay, pres.; Olof Wenstrom, v. p.; Freeman Hinckley, sec.-treas.; preceding officers, B. Nason Hamlin, Robt. A. Manning and Philip W. Wrenn, directors.

Inc. Jan. 3, 1910, in West Virginia. **Cap.** $1,500,000; shares $3 par; non-assessable; $825,000 issued. Boston Safe Deposit & Trust Co., transfer agent. Stock traded in on the Boston Curb. Annual meeting first Tuesday in March. Company began business with $272,000 cash, and early in 1919 had about $1,500 cash, plus its holdings in the Antimony Corporation, (40,000 shares, or 80% of the issued common stock). Balance sheet of Dec. 31, 1920, showed $596 cash.

Late in 1921, the directors transfered the entire holdings of the company to the Antimony Corp'n., on a basis of 4 for 1, giving the Cortez 28,750 additional Antimony shares and thus avoiding the total loss of the mines through non-payment of taxes. See Antimony Corporation for description of property.

CUATRO SENORES, S. A. CIA MIN. — **CHIHUAHUA**

Reported to have a lease on the property of the **La Vigas Mining Co.**, at San Sostenas, Coyame, Chihuahua.

CUBANA CONSOLIDATED COPPER CO. — **SONORA**

Mine near Arizpe, Sonora, Mexico.

Inc. Jan. 6, 1903, in Arizona. **Cap.** $500,000; shares $1 par.

Lands: 244 hectares, bought for $20,000; show 6 orebodies of 4′ to 20′ width, of which 3 carry estimated values of 12% copper, 10 oz. silver and $2 gold per ton.

Development: 6 shafts, deepest 102′, and a number of tunnels, longest 250′ and 575′, with a total of 1,415′ of underground openings. Mine is about 30 miles from Cananea. Sample carload smelter shipments returned 23% copper, with fair gold and silver values. Property considered promising, but idle at last accounts.

CUCHARA MINING CO. — **NAYARIT**

Mine address: Acaponita, via Nayarit, Tepic, Mexico.

Address: Lacy Manufacturing Co., 601 Washington Bldg., Los Angeles, Calif. **Officers:** Wm. Lacy, pres.; Roscoe Kennedy, sec.

Inc. 1902 in Calif. **Cap.** $1000,000; $10 par.

Property: a large and well developed mine credited with a production of over $1,000,000 and reported to have as much more in sight in present reserves.

CUSI-MEXICANA MINING CO. CHIHUAHUA

Address: Wm. N. Fink, Chihuahua, Chih., Mex.

Property: the San Miguel silver-lead-copper mine, opened by shafts and drifts.

Equipment: includes steam plant.

Employs 50 to 100 men when operating.

CUSI MINING CO. CHIHUAHUA

Office: 144 South Wabash Ave., Chicago, Ill.

Officers: O. A. Wright, pres.-treas.; A. C. Honore, v. p.; E. J. McGowen, Jr., v. p.; R. E. Mauntz, sec.

Property: the Promontorio mine and other claims at Cusihuiriachic, Chihuahua, Mexico, showing veins of silver-lead ore.

Company is operated as a close corporation, with only 4 stockholders. no details available.

DEMOCRATA CANANEA SONORA COPPER CO. SONORA

Office: Fourth National Bank Bldg., Cincinnati, Ohio. Mine at Cananea, Sonora, Mexico.

Officers: H. H. Hoffman, pres.-treas.; C. E. Hoffman, v. p. and gen. mgr.; H. W. Santen, sec.

Inc. May 8, 1905, in Arizona. **Cap.** $3,000,000; shares $10 par; issued $2,869,970. Central Trust Co., registrar. Annual meeting, last Tuesday in May.

Property: 18 hectares, 44.5 acres, lying between the Copete and Veta Grande, in the heart of the Greene Cananea mines. Orebody is of contact metamorphic origin, consisting of a breccia of fragments of altered limestone, cemented by quartz, bornite and copper pyrite, in a fracture zone 50′ wide in limestone. The orebody lies about 300′ north of the Democrata shaft and also outcrops in 2 patches of garnet rock surrounded by diorite porphyry, good carbonates being mined at the surface.

Development: comprises a 700′ shaft and 1,600′ tunnel, with 5 miles of workings. On the 500′ level, the known orebody proved to be larger than previously estimated and the stopes yielded 5% ore. The East orebody near the Kirk mine, developed by tunnel workings, has also materially increased the proven ore reserves. Average assays at present are 3½% copper and 1.5 oz. silver per ton.

Equipment: includes electrically-operated hoists and air-compressor. Smelter contains 3 blast-furnaces of 250 and 300 tons daily capacity. A converter and electric power-plant were completed in November, 1917.

When in full operation company employs 600 men.

Production: in 1920, (7 months to Aug. 1), 3,462,155 lb. copper; 105,315 oz. silver; 461 oz. gold.

Operations have been intermittent due to the revolution. Work was resumed in 1915, and continued until March, 1919; there was a suspension until October, when one furnace was blown-in and 300 men employed. Worked at 50% capacity to August 1, 1920. Property is a valuable one.

DESCUBRIDORA MINING & DEVELOPMENT CO. CHIHUAHUA

Owned by **El Rayo Mines Co.** See **Dolores -Esperanza of America.**

DINAMITA MINING CO. CHIHUAHUA

Address: S. G. Burn, mgr., El Paso, Tex.

Mines leased 1922 to H. A. Morse of San Francisco, Calif.

Property: the Dinamita, Ontario Anexas, Kanamha, Anexas, El Disloque groups, 52 pertenencias, 125 acres in Santa Eulalia district, and southern part of La Sirena group.

DOLORES ESPERANZA CORPORATION CHIH. & SONORA

Succeeds **Mines Company of America.**

Office: Room 226, 111 Broadway, New York City.

Jas. S. Colbath, gen. mgr.; Geo. A. Schroter, cons. engr.

Officers: H. S. Black, pres.; W. E. Reis and A. T. Black, v. p.'s; with W. T. Graham, Frank H. Ray, E. N. Skinner, J. D. Tooker, W. Hinckle

Smith, Wm. H. Wheeler and E. L. Gruver, directors. J. D. Tooker, sec.-treas.

Inc. Jan. 18, 1919, in Maine. **Cap.** $2,000,000; shares $2 par; 864,817 outstanding. Bankers Trust Co., New York, transfer agent. Equitable Trust Co., New York, registrar. Listed on New York Curb. High 2½, low 1⅞ in 1921.

On February 11, 1919, directors of the Mines Company of America were authorized to sell all the company's property to the Dolores Esperanza Corporation for $600,000 cash, this money to be used to pay off all debts and to meet expenses. Old stockholders could buy new stock at $2 per share up to number of shares held.

Balance sheet: for year ending Dec. 31, 1921 showed current assets $2,424,700 including quick assets of $526,598 comprising $4,466 cash, $12,578 acct's receivable, $137,064 for bullion in transit, $190,000 Liberty bonds and $182,007 supplies on hand. Other assets: deferred charges $1,040, property and plant $945,431, construction expenditures $665,452, claims against Mexican government $138,104, concentrate stored at La Dura, $148,073.

Liabilities of $2,424,700 include capital stock outstanding, $1,728,175, current liabilities, $55,987, surplus $17,971 and equity of minority stockholders in subsidiary companies, $622,566.

The above compares with balance sheet of Dec. 31, 1920 which showed assets totaling $2,736,865, including property and investments, $977,811; Dolores plant, $378,536; claims against Mexican government, $127,853; machinery and supplies, $218,077; concentrates at mine, $207,889; Victory Bonds, $648,670; cash $27,519. Liabilities include capital stock, $1,729,634; reserves, $202,500; surplus, $115,567. Income for 1920 amounted to $49,551 and expenditures were $86,268.

Ownership in companies is as follows:

Per cent owned		Par.	Shares owned
99	Dolores Mines Co.	$5.00	396,220
100	Chihuahua Esperanza G. M. Co.	1.00	2,411,000
75	Consuelo M. M. & Power Co.	1.00	1,826,500
99	El Rayo Mines Co.	2.00	355,187
100	Creston Colorado Co.	100.00	1,000
33⅓	La Dura Mill & Mine Co.	10.00	33,333⅓
33⅓	Compania Minera Gloria Fortuna	1.00	8,000

Dolores Mines and El Rayo Mines each own ⅓ of La Dura and Fortuna capitalization.

Dividends: (by Mines Co. of America) total paid to Dec. 31, 1916, amounted to $4,958,600, including a dividend in 1906 in stock of the Dolores M. Co.

Chihuahua-Esperanza Gold Mining Co.

Property: adjoining that of the Dolores Mines Co., Chihuahua, on the west, consists of 3 claims, 304 acres. Company also owns 10,000 acres of timberland 5 miles north of Dolores.

Geology: formation is similar to that of the Dolores. Fissure veins occur in rhyolite dikes cutting andesite; 3 vein-systems exist. Development amounts to 502'. Ore reserves said to total 2,500 tons worth $15 per ton. La Esperanza mine has great possibilities.

Consuelo Mining, Milling & Power Co.

Property: adjoins that of the Dolores Mines Co., west of Madera, in Chihuahua, on the south and east, and consists of 77 pertenencias, 190 acres, and a half interest in 9 pertenencias, 22 acres, also a water-right on the Tu-

tuaca river. The formation is similar to that of Dolores. No systematic development has been done; the value of the ground is prospective.

Creston Colorada Co.

Mine office: Torres, Sonora, Mexico.

Inc. February, 1902, in Ohio. **Cap.** authorized and outstanding, $100,000; par $100. Annual meeting, first Saturday in November.

Property idle 1921-'22 and will not be operated until general economic conditions improve and high taxation is abated.

Property: 27 claims, 828 acres, commonly known as "Minas Prietas" (black mines), in Sonora, at La Colorada, a station on the narrow-gauge Mexico Union Ry., 12 miles east of Torres, on the Southern Pacific R. R. of Mexico, and 200 miles south of Nogales, Ariz. The mines have been worked for 100 years and have produced regularly during the last 33 years, but are now considered depleted. Gross production estimated at over $112,000,000.

The property is divided into 4 different mines; the Creston Colorada, Amarillas, Grand Central, and Verde. The claims contain a number of producing veins, and cover the latter for 8,000' along their strike. Company also owns surface rights to 7,000 acres land, including the mining claims. It also owns a water-right on the Matape river.

Ore: veins have a general E.-W. strike, dip N. 55° to 90°, and vary in width from 3' to 40'. Larger orebodies occur principally in diorite, metamorphic rocks and quartz porphyry. The Creston ore, or east end ore, is a highly fractured quartz. The Colorada is a harder quartz. Sulphides of silver, iron, lead and zinc occur from the surface down. Streaks of high-grade sulphide shipping ore are occasionally found. The Verde ore is a hard quartz, at times very refractory. The Amarillas-Grand Central ore is a highly oxidized quartz, containing free gold in places. Average values in ores, as milled, are said to be 60% gold and 40% silver.

Development: in 1916 totaled 2,075', compared with 2,578' in 1915. Work was divided as follows: Creston mine, 1,473'; Colorada mine, 226'; Amarilas-Grand Central mine, 376'.

Ore reserves: estimated Jan. 1, 1917, as 190,350 tons, average assay, $4.93 per ton, or a gross value of $937,591, as compared with 200,300 tons, average assay $4.89 per ton, the previous year; gold figured at $20 per oz., silver at 75c. per oz. The Amarillas-Grand Central mine has one dump of tailing, containing 280,000 tons which will be retreated.

Equipment: at the Creston mine includes steam hoist and compressor plant, foundry, etc. The Colorada cyanide plant receives Creston ore over a 3,200' aerial tramway, and the Colorada ore over an 800' incline tramway. The Amarillas-Grand Central mine has steam hoisting and compressor plants, electrically-driven crushing plant; also a 450-ton cyanide plant, which receives ore from the Creston, Amarillas and Colorada over aerial tramways. A pumping plant, 18 miles from the mines, on the Matape river, supplies water for all purposes through a 5" pipe.

Mill and cyanide plants: have been intermittently operated for the past six years owing to unsettled conditions in Mexico. The Amarillas-Grand Central unit has 303 tons per day with an extraction of 20.5% by concentration and 53.3% by cyanidation, a total of 73.8%.

Production:

Year	Creston Mine, tons	Colorada Mine, tons	Am.-G. C. Mine, tons	Old tailing, tons	Total tons	Value per ton
1916....	12,400	2,150	.....	.....	14,550	$5.65
1915....	98,662	18,854	10,365	3,469	131,350	4.80
1914....	94,655	18,090	10,887	3,243	126,875	4.67

The Creston-Colorada mines were badly damaged by Mexican bandits in 1919, who looted pillars of good ore, fired the shaft sets, burned buildings

and cyanide tanks, and stole the brass and babbit metal from all machinery. It will require a large amount of time and money to put the property in shape for operating.

Dolores Mines Co.

Inc. Nov., 1903, in Mexico. **Cap.** authorized and issued, $2,000,000; full paid and non-assessable; par $5. No bonded debt. U. S. Mortgage & Trust Co., New York, transfer agent, Guaranty Trust Co., New York, registrar. Annual meeting, first Tuesday in December. Listed on New York Curb.

Entire capital stock of this company was formerly owned by an English company called Dolores, Ltd.; dissolved February 25, 1908, by exchange of stock, share for share, of Dolores Mines, Ltd. The company owns 33⅓% of La Dura Mill & Milling Co.

222 shares sold for $1 each at public auction in New York on Dec. 22, 1920.

Property: 17 contiguous claims, 250 acres, in Chihuahua, west of Madera, on the Mexico Northwestern Ry., about 250 miles S. W. of El Paso, Texas, and 200 miles N. W. of the city of Chihuahua. Mines are reached over a 45-mile trail, requiring 7 days' time for pack trains. Company also owns 3 detached mineral claims, 126 acres, near Dolores, and all surface rights to 12,500 acres, also a water right on the Tutuaca river.

Geology: vein systems consist of rhyolite dikes in andesite; the veins are fissures in these rhyolite dikes, strike north and dip 55° to 90°. Orebodies occur at or near intersections of side fractures and within the boundaries of the dike. The group, as shown by developments to date, contains 4 main vein systems, known as the **Alma, San Franciso, West San Francisco, Washington and Arco Iris** dikes, covered for 8,000′ on the strike of the Alma vein system, 4,000′ on the San Francisco vein system, 3,800′ on the West San Francisco, 1,000′ on the Washington, and 2,600′ on the Arco Iris vein system. The adjoining El Continente mine was acquired in 1921. Dolores ore is a very hard quartz, containing about 2% sulphides of iron, silver and occasionally lead and traces of zinc. Values in ore approximately 40% gold and 60% silver.

Development: to depth of 700′ with levels 100′ apart. Early in 1921, the mine was entirely unwatered and crosscuts driven on the 200, 400, 500 and 700′ levels. The 700′ shows 3 orebodies in floor, with combined length of 577′. Face of 700′ north drift is in ore.

Ore reserves: were estimated Jan. 1, 1917, as follows:

	Tons	Value per ton	Gross value
Ore in place	135,628	$13.80	$1,873,335
Broken ore	13,595	14.10	191,668
Total	149,223	$13.83	$2,065,668

Compared with 125,663 tons of $14 ore with gross value of $1,768,693 on January 1, 1916. Value is based on $20 per oz. for gold and 50c. per oz. for silver.

Equipment: includes concentrating and cyaniding plants, also compressors and hoisting plants, machine shops, etc. Electrical equipment to supplant steam power is in place. A 33-mile transmission line connects Dolores with Madera; line is designed to carry 3-phase, 60-cycle current of 33,000 volts. Power is furnished by a generating plant near Madera to consist of two turbo-generators, with total capacity of 1,500 k. w., 2 jet condensers, two boilers, etc.

The new mill has 15x24″ Blake crushers, belt conveyors and steel ball mills, with 5,400 tons monthly capacity and was put into operation, 1921. Company has reduced power costs by erection of steam turbine plant at

Madera, 40 miles from the mine, generating 1,500 k. w. transmitted over new transmission line to mine. The new 200-ton cyanide plant is finished and in operation.

Company also constructed a saw mill and 4,500′ aerial tramway to the mine, 5 miles distant.

Production: 23,420 tons of ore treated in last half of 1921 at its reconstructed Dolores mill, yeilding $280,265 in bullion. In April, 1922 production was about 200 tons per day, or full capacity.

El Rayo Mines Co., Mexico.

Mine office: Santa Barbara Chihuahua, Mexico.

Inc. Feb. 13, 1906, in Maine. **Cap.** $1,000,000; outstanding $714,000; shares $2 par. No bonded debt. Annual meeting, second Tuesday in February. Listed on New York Curb. Company is the American holding company for the El Rayo Mining & Development Co., S. A., a Mexican corporation. Owns the Descubridora Mining & Development Co. and Buena Vista Gold Mining Co.

Property: 21 claims, 766 acres, in the State of Chihuahua, S. W. of Santa Barbara, the terminal of a branch line of the Mexican Central Reilway. Mines can be reached from Santa Barbara over an 8-mile trail. Company also has a 14-year lease on about 12 square miles of timberland, adjoining the mining property. El Rayo is at an elevation of 7,200′ above sea level. The mining claims cover the N.-S. strike of the producing veins for over 2 miles.

Ore: gold-silver in fissure veins in rhyolite, which dip from 50° to 90° The gangue varies from a friable and oxidized quartz at the north end to a harder sulphide-bearing quartz at the center and south end of the property. The north end contains about 4% sulphides, chiefly iron, with traces of lead and zinc. Copper sulphides are found occasionally. The metal content is about 74% gold and 26% silver. The ore shoots are irregularly shaped lenses which occur at vein junctions or intersections with main fracture.

Development: underground workings extend to depth of 1,400′ and total 79,000′. The Adela mine covers 4,700′ of the vein system at the north end. The El Rayo mine covers 2,300′ of the vein system and adjoins the Adela. The Descubridora mine covers 5,000′ of the vein system on the extreme south end of the property.

The mine was unwatered to depth of 1,200′, the main tunnel level, by January, 1921.

Ore reserves: were estimated Jan. 1, 1917, as:

	Tons	Value per ton	Gross value
Ore in place	65,210	$11.58	$755,283
Broken ore	13,328	10.77	143,542
Total	78,538	$11.44	$898,825

Compared with 75,038 tons of $10.48 ore with gross value of $786,825 on January 1, 1916. Value is based on $20 per oz. for gold and 50c per oz. for silver.

Equipment: includes a 1,950 cu. ft. steam operated compressor plant. A 2-mile aerial tram furnishes the necessary fuel, lumber and mining timbers.

Mill: includes 160-ton crushing, concentrating and cyaniding plants. From the storage bin at the portal of the 1,100′ level of the Adela mine the ore is trammed 1,300′ in 6-ton cars to the mill storage bin. Course of ore through plant is as follows: from bin through 9″x15″ Blake crusher, set at 1″ discharge; undersize by conveyor belt to bin, by Challenge feeder over conveyor belt to one set of 16″x36″ Traylor rolls, discharge to 2 sets of 14″x30″ Traylor rolls, to classifier; overflow to tables, oversize in closed

circuit returned to 7'x14' tube-mill; discharge to classifier, overflow to tables, oversize in closed circuit returned to tube-mill. Pulp treated by cyanide solution. Resulting bullion and concentrates are marketed in America.

Electrification of entire plant was finished in 1917. Electricity is furnished, under contract, by the Cia. Agricola y de Fuerza Electrica del Rio Conches, S. A. from its plant at La Boquilladam, about 70 miles from El Rayo.

Extraction has varied from 80% to 89%, from 12% to 20% being taken out by concentration and flotation, the balance by cyanidation.

Flotation by the Callow system is a success, and in later work recoveries were 42.7% by flotation, and 47.6% by cyanidation.

Development work was carried on during 1921, "without conclusive results". Property idle, 1922.

La Dura Mill & Mining Co.

Office: 111 Broadway, New York City. **Mine office:** La Dura, Sonora, Mexico. **Cap.** outstanding, $1,000,000; $10 par.

Property: 4 individual mines—Gloria-Fortuna and La Dura, on the east bank of the Yaqui river, Sonora, California and Prieta, 1½ miles N. E. of the former. The mines are near La Dura station on the Cananea, Yaqui River & Pacific Ry., which leaves the main line of the Southern Pacific of Mexico at Corral station, 325 miles south of Nogales, Ariz. Mines are connected with railroad by aerial tram.

Ore is a white quartz containing sulphides of silver, copper, lead, iron and zinc. Most of the ore requires milling.

There are 5 main veins known as the California, Prieta, Gloria-Fortuna, West Floria and La Dura. The Prieta and Gloria veins, from 6" to 4' wide, occur in andesite, strike N. W.-S. E. and dip 30° S. W.

Ore reserves: estimated Jan. 1, 1917, as 16,015 tons, average grade $54.80 per ton.

Only the Prieta and Gloria mines are operated by the company. The Prieta has a 3-compartment shaft, 1,040' deep. The Gloria is operated through a 1,600' incline shaft and a 700' vertical shaft, connected with the former, on the 500' and 700' levels. Stoping has proved persistence of veins in spite of faulting.

Equipment: in 3 units as follows: the Prieta-Gloria steam-operated compressor and hoisting plants; the Gloria-Fortuna-La Dura steam-operated compressor, hoisting, milling and generating plants; pumping plant, stores offices, and shops located half way between the two groups of mines. A transmission line from the Gloria-Fortuna plant furnishes power for pumping.

The mines employ under normal conditions, 8 Americans and about 225 Mexicans.

General Opinion: Dolores Esperanza Corporation had ore reserves in all its properties, estimated January 1, 1917, to have a gross vaule of $5,824,670. The company has several good properties, is well managed, and should make large profits with a peaceful Mexico and an improved metal market.

DOLORES MINES — SAN LUIS POTOSI

Address: E. E. Reyer, supt., American Smelters Securities Co., Matehuala, San Luis Potosi, Mexico. U. S. address: W. M. Drury, mgr., 1112 Mills Bldg., El Paso, Tex.

Geology: ore occurs as a contact metamorphic deposit between quartz monzonite and limestone. The shoots are large, some extending to a known depth of 1,000' and covering an area of 15,000 sq. ft. Oxidation extends to lowest levels but both oxide and sulphide ores occur on all levels. The ore averages from 2 to 3% copper, $1.25 gold and 2 oz. silver per metric ton.

Development: by two 1,000' shafts and numerous adits. Underground work is largely done on contract.

Equipment: includes 250 h. p. compressor, two 125-h. p. double drum

hoists, sample mill, hospital, dwellings, etc. The power plant is at Matehuala, 6 miles distant.

Production: averages 600 tons daily, when operating under normal conditions with 800-1,000 employees. Shipments made by Matehuala Ry. to company's smelter at Matehuala.

DOLORES MINES CO. **MEXICO**

Subsidiary of the **Dolores-Esperanza Corporation**, which see.

DOLORES MINING & DEVELOPMENT CO. **SONORA**

Dead. Described in Vol. XIII. See **Empire Mining Co.**

DOS ESTRELLAS, S. A.; CIA. MINERA LAS **MICHOACAN**

Main office: 212 Mutual Life Bldg., Ave. 5 de Mayo, Mexico City. **Paris address:** 18 Rue Chaneau-Lagarde, Paris.

Mine office: Las Dos Estrellas, Michoacan, Mex. H. E. Nyberg, mgr., T. Skewes Saunders, for many years gen. mgr., resigned in 1921.

Directors: in Paris—F. J. Fournier, E. Calvayrac, M. Ullmann, H. Duvergey, R. T. Sobey. In Mexico—Jose A. Signoret, Rosendo Esparga, F. Perrilliat, Lic. Jose R. Aspe and H. E. Bourchier.

Secretary-treasurer, Juan B. Argomedo.

Inc. Sept. 19, 1898 in Mexico. **Cap.** 300,000 pesos; 100 pesos par.

Balance Sheet:

Year	Cash & Bullion	Investments	Other Assets	Total Assets	Total Liabilities	Surplus
1918....	p526,388.50	p3,012,636.53	p4,086,273.29	p7,625,298.32	p3,683,142.90	p3,942,155.42
1919....	1,219,075.64	2,928,865.47	5,328,841.73	9,476,782.84	3,522,539.62	5,954,243.22
1920....	838,512.72	4,684,486.75	3,519,219.55	9,042,219.02	2,026,603.38	7,015,615.64

Financial Statement: (1920)

Realized by sale of bullion		p6,163,296.06
Interest		317,557.05
Income from other sources		35,282.89
		p6,516,136.00
Total operating expenses	p4,592,152.19	
Depre'n in "Investment" acct	200,585.90	5,152,738.09
Net profit in 1920		p1,363,397.91
Profit and Loss account brought forward from 1919		449,902.70
Total profit balance at December 31st, 1920		p1,813,300.61

Dividends

Coupon No. 35, 3,000,000 francs = 512,361.98 pesos		
" No. 36, 4,500,000 " = 649,350.65 "	1,161,712.63	
2½% distributed among directors upon 7,500,000 francs	72,393.82	
Amortization of Borda Antigua shares	575,000.00	1,809,106.45
Profit balance carried forward to 1921		p4,194.16

Dividends during 1919 were 763,145.08 pesos; during 1920, 1,161,712.63 pesos; total to end of 1920, 35,844,124.52 pesos. Additionally during 1919, the original capitalization (p300,000) was returned to the shareholders.

Property: 8 patented mining claims, having an area of 429 hectares, or practically 1,060 acres, situated on the western slope of the Somera mountain. Mine offices, mill and cyanide plants and practically all improvements are in the State of Michoacan, but a portion of the mining property is in the State of Mexico and adioins the mining claims of El Oro Mining and Railway Co., the Esperanza Mining Co. and the Mexico Mines of El Oro.

The main vein (Veta Verde) has an average strike of N. 18° W. and a dip of about 60° S. W. and has been proven for practically three kilometers along its strike and in places to 600 meters upon its dip.

The Dos Estrellas Company also holds 60% of the stock in the old Borda Antigua property in the Tlalpujahua district (about 3 kilometers from Estrellas mill) and during 1921, acquired controlling interest in other small silver properties in the same district. As development work has proven Veta Verde to lose its mineralization in depth, the company has actively engaged in searching for other properties and it is understood that they have options upon various properties including the Veta Grande near the City of Zacatecas and a copper-gold property at Las Vigas, State of Vera Cruz.

Geology: the property lies in an extensive belt of Cretaceous schists known as the "El Oro Shales" that extend from the northeastern part of the State of Michoacan to the southern part of the State of Mexico and northern part of Guerrero. These sedimentary rocks have been intruded by porphyritic igneous rocks of Tertiary age, accompanied by extensive faulting. Some of the northeast and southeast faults parallel or coincide with the veins and are highly mineralized, containing profitable orebodies, as for instance the San Rafael vein in the El Oro camp; other faults which have a general easterly and westerly strike, affect the vein system in several ways, but are void of mineralization:

The Dos Estrellas Company has extensively developed a system of veins, the principal one, known as Veta Verde, having ascending offshoots or branches, into the hanging wall, containing in general, payable ore. The main vein and its branches only occur in the shales. The shales and veins are covered by a caprock of andesitic lava, varying according to the topography of the original surface, from 80 to 320 metres in thickness.

The Veta Verde has a proven uniform width of about twelve metres down to a depth of approximately 600 metres from the cap rock.

The hanging wall branch veins vary from 70 cmts. to 3 meters in width, and are approximately parallel to each other and to Veta Verde. The westerly vein (Nueva) is about 65 meters from the main vein. In the upper part of the mine the shale is often mineralized to such an extent as to constitute ore, and the silver values in the shale are in places higher than those in the silicious ore of the branch veins. East of Veta Verde, in the footwall country, there are other veins, only one of which (Blanca) joins the Veta Verde in depth. The others have a width of from 0.8 to 2 meters, are irregularly mineralized and of little industrial importance.

The eruptive rocks include andestic and rhyolitic dikes and large intrusive masses. In the lowest workings, diabase is found.

The payable mineralization ceases very abruptly at a notably uniform level which is slightly lower than the point where the branch veins split from the main vein, or about 500' below the cap rock.

Development: by 6 tunnels from 200 to 1,800 meters in length and by 5 principal shafts from 150 to 450 meters in depth. Additionally there are six interior shafts of from 150 to 300 meters in depth. There are approximately 60 kilometers of levels of which about 38 kilometers are open at this time.

Ore reserves: the calculated ore reserves, December 31st. of each year, are shown in the following tables:

Year	Positive Metric Tons	Probable Metric Tons	Ore mined tons
1916	469,528	337,551	146,317
1917	213,218	84,166	277,876
1918	453,764	367,056	337,420
1919	542,920	461,292	366,440
1920	429,664	399,535	376,019

Equipment: Dos Estrellas has a complete electrically driven mining plant and machinery, including electric haulage (8 Baldwin Westinghouse locomotives),. The milling and cyaniding plant has a daily capacity of 1,250 metric tons and comprises two Hadfield gyratory crushers, Merrick automatic weigher, automatic sampler, 120 stamps of 1,250 lb., 108 drops per minute, 14 tube mills, 5'x24', 29 R. P. M., 14 classifiers, 9 Dorr thickeners, Butters filters and Merrill and Crowe vacuum precipitation.

The company owns its railway and rolling stock connecting its mine and mill with the El Oro camp, also owns lumber forests in the States of Mexico and Michoacan.

Production:

Years	Beneficiates Tons*	Total Value Bullion Rec.		Value Rec. per ton	Operat'g. Costs p. t.
1910.....	425,878	p11,185,443.78		p26.26	p9.9383
1911.....	479,889	11,178,086.76		23.29	9.9977
1912.....	507,018	11,237,311.57		22.16	9.1953
1913.....	521,799	10,309,630.86		19.76	9.2514
1914.....	141,824	2,632,526.40	(4 mos.)	18.56	9.3550
1915.....	24,542	173,783.38	(1mo. exp. work)	7.08	.....
1916.....	164,610	2,412,288.31		14.65	9.2330
1917.....	266,658	4,917,540.62		18.44	14.4847
1918.....	344,859	7,719,084.06		22.38	13.4167
1919.....	366,820	7,615,798.05		20.76	11.5499
1920.....	361,878	6,415,669.98		17.73	12.1700

*Dry metric tons.

Note: On account of political disturbances, milling was suspended from April, 1914 until May, 1916, with the exception of one month during 1915.

The total production from the mine from its inception to the end of 1920 was 4,869,878 dry metric tons.

DULUTH-MOCTEZUMA MINING CO. **SONORA**

Inactive. **Office:** Room 610 Lonsdale Bldg., Duluth, Minn.

Officers: Geo. H. Crosby, pres.; Cassius Bagley, v. p.; A. O. Rabideau, sec.; all of Duluth.

Inc. 1909, in Minnesota. **Cap.** $500,000; shares $10 par; $300,000 issued. Mexican holdings forfeited on account of excessive taxes. Minnesota iron lease sold for enough to clear up indebtedness on same.

DULUTH-SONORA COPPER CO. **SONORA**

Address: 602 Palladio Bldg., Duluth, Minn. Mine near Cananea, Sonora, Mexico.

Officers: B. Silberstein, vice-president, preceding with W. D. Underhill, sec., Theron H. Hawkes., treas., with Geo. M. Tallant and A. F. Norton, directors.

Property: about 3,621 acres, embracing a part of the former holdings of the Calumet & Sonora Co., and the South Cananea, or Mitchell property. The latter shows a strong vein with wide silicious outcrop and has been developed by a 400' shaft and some underground work, but an examination of dumps fails to show ore. Norton shaft, one-fourth mile distant, said to be 293' deep and to show good ore. Remainder of property considered of questionable value. Idle since 1910. Is a prospect only.

DURANGO MINING CONGRESS **DURANGO**

Address: Ernest Stein, sec., Durango Esdo Dgo., Mex.

Organized early in 1922 to assist the mining industry of the state.

DURANGO SILVER & COPPER CO. **DURANGO**

Organized to operate the properties of the **San Luis Mining Co.** (q. v.), under a lease with option to purchase. Owing to difficulties surrounding operations in Mexico and fall in price of silver, no work has been done.

EASTERN CANANEA DEVELOPMENT CO. **SONORA**

Mine about 18 miles N. E. of Cananea, Sonora, Mexico. John Martin, supt., at last accounts.

Property: said to show copper sulphide ore, is developed by shaft, held under lease and bond from M. L. Fay, of Duluth, Minn., who controls the **Fay Cananea Copper Co.**, the owner of the mine through the **Cananea Eastern Mining Co., S. A.**, a Mexican corporation. No returns secured, and idle for years.

EL CUBO MINING & MILLING CO. **GUANAJUATO**

Office: 1025 Peoples Gas Bldg., Chicago, Ill.

Mine address: Guanajuato, Gto, Mexico. Irving Herr, gen. supt., Cubo, Gto., Mex.

Officers: H. L. Hollis, pres.; Alfred Cowles, treas.; A. Hunter, sec.

Property: Villalpando and other mines in the towns of Cubo and Villalpando, 6 miles from Guanajuato, Mexico, with extensive workings on a typical fissure vein in andesite. The free milling silver ore occurs in oreshoots.

Equipped: with 250-ton flotation and cyanide mill, held under lease and option from the Providencia M. & M. Co.

Operations were resumed in October, 1919. Reported treating about 5,000 tons of ore monthly in 1921. Employs 150 men.

EL EDEU; COMPANIA MINERA Y BEUEFICIADORA **ZAC.**

Idle. Mine at El Eden, Zacatecas, Mex.

Officers: Francisco Llamosa, pres. and gen. mgr.; Enrique Gutierrez, sec.; Luis Colina, supt.

Inc. 1905, and reorganized 1907, in Mexico. **Cap.** 600,000 pesos; shares 100 pesos par.

Property: silver-gold mines, 102 hectares.

Development: by 210′ shaft and tunnels aggregating 1,120′, developing copper and lead zinc ores.

Equipment: includes 40-stamp mill with 2 Krupp tube mils, 6 Wilfley tables and 6 Johnson tables; company planned installing a cyanide plant, to treat a large amount of tailings accumulated, the dump being estimated to average 400 to 500 grams silver and 3 to 5 grams gold per metric ton.

ELENITA DEVELOPMENT CO. **SONORA**

Office: Room 3300, 120 Broadway, New York.

Officers: Henry B. Paull, pres.; Thomas H. Collins, v. p.; Frederic R. Kennedy, sec.-treas., with Thomas F. Cole, and John F. Bankerd, directors.

Inc. March 15, 1907, in Arizona. **Cap.** authorized 40,000 shares, par $10, $400,000; issued 6,000 shares at $10; 21,310 shares at $9 paid in; part paid stock subject to final call of $1 per share; in treasury 12,690 shares.

Property: Bonanza de Cobre mining claim, 182 pertenencias, approximately 450 acres at Cananea, Sonora, Mexico. Title to property held by the **Lomita Mining Company, S. A.**, a Mexican corporation.

EL FAVOR MINING CO. **JALISCO**

Officers: Makeever Bros., Journal Bldg., Boston, Mass., and 170 Broadway, New York.

Mine address: Hostotipaquillo, Jalisco, Mex.

Officers: Sanford Makeever, pres.; Dr. H. D. Meredith, v. p.; J. L. Makeever, treas.; M. M. Makeever, sec.

Staff: E. F. Beadle, gen. mgr.; J. H. Nelson, supt.; J. G. Murphy, cons. engr.

Inc. July, 1906, in Arizona; protócolized, 1906, in Mexico. **Cap.** $3,500,000; shares $1 par. Stock not listed. After 6 years of development work, mine paid total dividends of $210,000 in 1913-1914. Property said to represent investment of $1,000,000.

Property: the Favor silver-gold mine, 476 acres mineral land and extensive surface area at El Monte, 75 miles N. W. of Guadalajara, Jahsco, Mex. A branch line of the Southern Pacific R. R. runs to Quemada, near the mine, and the Chapala Hydro-Electric Co. furnishes power for $50 per

h. p. year. Vein reported as 10' to 14' thick with shoots of bonanza silver-gold ore workable to 1,300' by tunnels.

Development: by over 3 miles of workings above No. 7, the deepest, level.

An orebody assaying $140.80 in silver, free from manganese, was opened on No. 7, also on No. 3; while rich ore was found on No. 5. Reserves are said to be sufficient to supply mill for several years.

Equipment: includes 150-ton concentrator and cyanide plant; the mill has 35 stamps, crusher, tube-mills, Dorr classifiers and thickeners, Oliver filters, pachuca tanks, Wilfley tables. Extraction claimed to be nearly 90%. Total production to date reported as $1,500,000.

Mill buildings, burned by bandits in 1918, were rebuilt; and in September, 1919, daily output was 55 tons of $12 ore. In August, 1921, the mill was closed down because of low price of silver and high cost of supplies, but was reported reopened in November.

EL FUERTE MINING & SMELTING CO. **SINALOA**

Address: 516 Grant Bldg., Los Angeles, Calif. **Mine office:** Choix, Sinaloa, Mex. A. M. McDermott, gen. mgr.

Officers: Dr. L. C. Heller, pres.; J. A. Painter, v. p.; Arthur Gleason, sec.; J. R. Thomas, treas.; with A. M. McDermott, and E. B. Sprague, directors.

Inc. 1918 in California. **Cap.** $500,000; $1 par; 85,289 shares issued. Company owns 1,000,000 shares of the Choix Cons. M. Co.

Property: 11 claims, in El Fuerte district, held under 10-year lease from the Choix Cons. M. Co., and a 500 acre smelter site on the Fuerte river.

Equipment: 100-ton smelter purchased from the Choix company is now being installed. During 1920-'21, a 53-mile road to the railroad terminus was completed, a 150,000 gal. reservoir, lime kiln, blacksmith shop and necessary buildings constructed. Employs 50 men.

EL GLOBO MINING & MILLING CO. **SONORA**

Probably dead. Mine near Nacozari, Sonora Mexico. See Vol. XIII.

EL MAGISTRAL COPPER CO. **SINALOA**

Probably dead. See Vol. XIII.

EL ORITO MINING & MILLING CO. **DURANGO**

Address: care Robt. F. Fitz, gen. mgr., P. O. Box 275, Los Angeles, Calif. **Mine address:** Yerbanis, Durango.

Officers: A. W. Church, Port Chester, N. Y., pres.; R. F. Fitz, v. p.-sec.; J. A. Rovelstad, treas.

Inc. May 10, 1910, in Arizona. **Cap.** $500,000; shares $100 par; outstanding $432,500. Annual meeting, third Monday in May.

Properties: 93 pertenencias containing gold veins of free milling ore at Penon Blanco, and a copper property at Velardena, Durango, Mex.

Development: one vertical and one incline shaft, depth 375' with deepest workings at 475'. Total underground workings 1,500'.

Equipment: includes a 3-stamp mill. Mines were closed down 1912, owing to revolution, but operations resumed 1922, at mine and mill.

EL ORO MINING & RAILWAY CO., LTD. **MEXICO, D. F.**

Offices: H. F. Wreford, sec., 24 Lombard St., London, E. C. 3, England; 61 Broadway, New York.

Directors: R. T. Bayliss, chairman; A. M. Main, managing director in Mexico. H. V. Hart-Davis Nayor, L. Breitmeyer, P. L. Foster, J. H. M. Shaw, R. M. Raymond. H. C. Enos, asst. mgr., El Oro, D. F., Mexico.

Inc. July 27, 1899, in Great Britain, to acquire the capital stock of the American Mng. Co. and the American Railroad & Lumber Co., the former owning the El Oro Gold & Silver mine in the El Oro district of Mexico, and the latter owning the railroad connecting the mine with the Mexican National Ry. Purchase price was £886,072; paid £820,084 in cash and £65,988 in stock. The two American companies have since been dissolved. **Cap.** £1, 150,000; outstanding shares £1 par. £1,147,500 issued. Annual meeting in October. Listed on London Stock Exchange.

To comply with the Federal Statutes of Mexico, an operating company, The Investment Co., Ltd., **(La Compania de Inversiones del Oro, S. A.)** was organized under Mexican law in 1920, and is engaged in examing and developing new properties.

Report for year ended June 30, 1920, showed, total assets, £1,478,061, which includes, property and equipment, £936,562; investments £40,093; supplies, £65,003; bullion in transit, £60,862; bonds, £168,606; cash £173,-201; debit balances £33,731, liabilities include, capital issued, £1,147,500; credit balances, £156,707; profit and loss, £172,273. Income amounted to £773,705, of which £696,394 was from bullion sale; expenditures were £710,759, leaving an operating profit of £62,946.

Annual report for year ended June 30, 1921, showed: assets, £1,484,326, including stores and material, £118,270; bullion in transit, £55,665; war bonds and treasury bills, £214,562; cash, £62,873; investments, £81,778. Liabilities include: sundry credit balances, £202,520; profit and loss, £131,-906. Income amounted to £808,908, of which £678,508 was from bullion; £98,836 railway receipts; £31,124 interest and dividends; £438 sundry receipts.

Dividends: 148% from 1900 to 1913; 1913-14 to 1915-16, nil; 1916-17, 5% 1917-18, 5%; 1918-19, 5%; 1919-20, 5%; 1920-21, 5%. A stock dividend of 1 share of Investment Co. stock for each 25 shares El Oro stock held, was declared payable, June, 1921.

The El Oro Mng & Ry. Co., Ltd., owns 42,687 shares (par £1), of the **Suchi Timber Co., Ltd.**, 4,100 fully paid and 50,000 partly paid shares Invest. Co. stock; 25,000 shares and £6,000, 7-year 10% notes of Mexican Corporation, Ltd.

Property: the San Antonio, San Rafael Trianon, Diamante, Ofir, and Carmen No. 2 claims, 786 acres, at El Oro, 100 miles northwest of Mexico City. In 1912-1913, the adjoining Ofir claim, 11⅓ acres, was bought for £130,000 cash. This claim controls the rights of the San Rafael vein in depth. Ore occurs in fissure veins in a quartz-calcite gangue having a strike of N. 30° W. and dipping to the west. Commercial gold ore occurs in long horizontal ore shoots. Orebodies vary in width from 10′ to 60′.

Development: by shafts from 1,500′ to 1,600′ deep. Results on the 2,200′ level of the San Rafael have been disappointing, the vein having been cut off by a fault. Recent work on the Descubridora opened up an orebody 800′ long, 18″-5′ in width and averaging $13 in gold and 3 oz. silver and on the 1,350′ of the Ofir, a 6′ orebody averaging $20 gold and 1½ oz. silver was followed for 100′.

Total development for fiscal year, June 30, 1921, was 26,280′.

Equipment: includes a 200-stamp mill, 8 tube-mills and a cyanide plant. Mine and mill operations were resumed October, 1916, with 100 stamps and 70 were in operation at last accounts.

Production for years ending June 30:

Year	Tons milled	Value p. t.	Cost p. t.	Rec. %	Gross Value	Net Profit
1918-19....	$308,665	$8.07	$6.80	90.11	$2,491,279	$279,116
1919-20....	368,538	8.77	6.70	86.74	2,789,547	326,909
1920-21....	385,770	7.63	5.71	87.13	2,545,446	357,010

Ore reserves: June 30, 1921, estimated at 282,124 tons of $7.96 gold and 2.11 oz. silver, as compared with 293,779 tons in 1920 and 333,135 tons in 1919.

Mining costs for 1921 were $2.38 per ton exclusive of $0.79 per ton for development, $0.24 for milling, $1.06 for cyaniding, $0.01 for water $0.31 for general expense and $0.87 per ton for taxes, a total of $5.66 per ton, to which London expenses of 5¢ per ton must be added. For year ending June 30, 1921, 150,000 tons from San Rafael vein, averaged $4.45 gold and 2.01 oz. silver.

EL POTOSI MINING CO. **CHIHUAHUA**

Office: 665 Fifth Ave., New York, N. Y.

Mine office: Albert L. Eaton, gen. mgr., Santa Eulalia, Chih., Mex.

Officers: E. B. Schley, pres.; W. H. Gelshenen and C. G. Raynor, v. p's.; W. J. Walworth, sec.-treas.; W. J. Quigly, v. p. and gen., mgr. at El Paso, Texas.

Dividends: from 1903 to 1919, inclusive, $8,040,000.

A subsidiary of the Howe Sound Co., which purchased 53,800 shares out of a total outstanding capitalization of 60,000 shares in 1916.

Property: in Santa Eulalia district, Chihuahua, adjoins that of Chihuahua Mining Co., nearly all of whose stock is owned by El Potosi. Is one of the oldest producers of silver-lead ore in the district, said to have paid dividends for many years. The group consist of the Santa Domingo, Potosi, Santa Rita, Fortuna, Coronel, Leonidas, and Zubiate mines.

Large caverns encountered in mining are lined with a crystalline coating of cerussite, galena, calcite and gypsum. The ores contain native silver and silver bromides, and chlorides. The mines also contain contact deposits in limestone, and mantos or bedded deposits.

Development: to depth of 1,800' by vertical shafts. New work in 1920 amounted to 20,095' of diamond drilling followed by 4,687' of drifts and raises in the most promising sections.

Equipment: hoists, pumping plant, 19 kilometer pipe-line and a 400-cu. ft. compressor.

Production: in 1920 amounted to 173,810 tons of ore, classified as follows:

	Tons	Aver. oz. silver	Average % lead
Lead carbonates	120,158	13.95	4.22
Lead sulphide	42,211	19.34	6.98
Iron sulphide	11,441	23.28	....

Shipments were made to the smelter at Moise over the company's railroad. The railroad handled 218,751 tons in 1920, an increase of 24,988 tons over 1919. Thirty-two 15-ton steel cars were added to the equipment.

EL PROGRESO MEXICAN MINES, LTD. **SINALOA**

Address: A. Farmer, sec.-registrar, 13 Copthall Ave., London, E. C.

Directors: Walter L. Bennett, pres. Jas. P. Rickman and J. L. Duchene.

Inc. June 22, 1907 in Great Britain. **Cap.** £50,000; 5s par; £29,772 outstanding.

Balance sheet for year ended June 30, 1920, showed expenditures, £7,-114; cash £1,454; creditors, £1,674.

Property: 8 patented claims, 115 acres at Favor, Sinaloa, Mex. Ore contains gold and silver.

Idle several years owing to unsafe operating conditions.

EL PROGRESO SILVER CO. **SONORA**

Address: 406 Liberty Bldg., Philadelphia, Pa., and Box 744 Nogales, Arizona.

Officers: E. D. Dier, pres.; Andrew Macfarlane, v. p.-gen. mgr.; Maurice Brooke, sec.-treas., with E. W. Wilson, and T. M. Johnson, directors.

Inc. in Delaware. **Cap.** $2,000,000; $1 par; non-assessable; 1,000,000 outstanding.

Company owns entire capital of Compania de Plata El Progreso, a Mexican corporation.

Total expenditures for 1920 amounted to $106,429.

Compania de Plata El Progresso

Staff: Andrew MacFarlane, gen. mgr.; W. C. Laughlin, cons. met. eng.; H. C. Shotwell, cons. min. eng.; Jackson Elliott, mill supt.; E. E. Noon,

mine supt.; J. V. Macfarlane, engr.; John Logan, assayer; A. C. Burnett, accountant.

Property: the Progreso-Colorada mine of 28 acres, opened in 1895, and adjacent ground acquired in 1919, in the central part of Sonora, near junction of the Yaqui and Sonora rivers, and 160 miles S. of the international boundary. Nearest town is Suaqui de Batuc. Nearest rail is Verde, on the Mina Prietas line, a narrow-gauge road joining the Southern Pacific at Torres. In 1919 a 35-mile wagon-road was built to connect with the Moctezuma-Lampazos wagon-road, giving a direct route to Nacozari, 110 miles distant. Economic conditions in the district are generally favorable. Shallow workings on the vein have yielded silver worth $1,500,000. Mine examined by W. A. Farrish, James MacFarlane and W. C. Loughlin.

Geology: the district shows uptilted limestones and overlying tuff beds, cut by intrusive igneous rocks and by andesites; the fissure veins are in the intrusives. At Progreso-Colorada, the country rock is quartz diorite. The rock north of the Progreso vein is a porphyritic andesite, badly altered by vein-forming agencies, and impregnated with magnetite, pyrite and chalcopyrite. Numerous well-mineralized fissure veins, characterized by banded quartz, cut these two rocks, and carry shoots of rich silver-gold ore. Five nearly parallel veins that occur in a zone 500′ wide, are of the typical silver-gold type, run E. and W., and dip N. Only two, the Progreso and Colorada veins, 200′ apart and parallel, have been mined, but all five can be developed and mined from the new shaft now being sunk, and all five may be expected to show ore to depths of 500 to 1,000′.

Progreso vein is developed to depth of 300′ by 2 shafts developing the vein for a length of 500′ or more. The ore shoot is from 7.8 to 13′ wide in the old stopes, and is continuous for a length of 500′ on the 215′ level.

Reserves, above 215′ level total 21,800 tons, averaging 33 oz. silver and $6 gold per ton. There is also about 10,000 tons of indicated ore in the mine, and 5,100 tons of $26.25 ore on dumps.

The **Colorada** vein has been opened to a depth of 130′ and a length along its outcrop of 355′. On the 130′ level continuous ore is exposed for a length of 147′. Samples cut for a length of 100′ along this level averaged 6′ wide and assayed 24.5 oz. silver and $1.60 gold. Reserves in Colorada mine as of March, 1919, are 5,000 tons of $25.25 ore, plus 2,600 tons on dumps containing 46.17 oz. silver and $2.75 gold per ton.

Old Colorada and San Jose veins also show promising outcrops opened by shallow shafts.

The new 500′ shaft now being sunk will have levels at 100′ intervals, beginning at 200′. The San Fernando vein south of the main shaft, was opened in 1919 by a 30′ shaft in $22 ore.

Equipment: 80-h. p. hoist, 8-drill compressor, sinking pump, 10 machine-drills, and 100-ton mill consisting of stamps, tube-mill concentrates, and cyanide plant, to be enlarged to 300 tons.

Production: from Dec., 1919 to Dec., 1920, mill treated 3,670 tons that averaged 16 oz. gold and 22.5 oz. silver per ton. The recovery was 439 oz. gold and 58,720 oz. silver, from which the company netted $54,677.15. This was realized from the mill before it was equipped and does not of course represent results from the finished mill.

Is a promising property.

EL RAYO MINES CO. CHIHUAHUA

Subsidiary of the **Dolores Esperanza Corporation**, which see. (Mexico).

EL SACRAMENTO, S. A., CIA MINERA SONORA

Succeeded **Chicago Exploration & Development Co.**

Address: Mina Mexico, Son., Mexico. W. F. Jahn, supt.

Officers: H. L. Hollis, pres.; J. M. Gandara, sec

Property: 45 miles N. E. of Tonichi, the end of a branch line of the S. P. de M. R. R. Mine produces silver-copper ore.

EL TRIUNFO CONSOLIDATED MINING CO. SONORA

Mine office: Bacoachi, Arizpe, Sonora, Mexico.

Officers: at last accounts, A. C. Chalot, pres. and gen. mgr.; Dr. S. Newton Leo., v. p.; A. L. King, treas.; preceding, with T. B. Johnstone, Albert Reineman, Julius G. Miller, Henry Stern, Wm. H. Freystadt, I. Neuberger, A. H. Wand, D. Powdermaker, Dr. Moritz Gross, Adolph Oltmann and John H. Brown, directors; John Martin, supt.

Inc. in Arizona. **Cap.** $2,000,000; shares $1 par. Property is held through a Mexican corporation with capital of 10,000 pesos, shares 100 pesos par, entire stock issue of which is owned by El Trjunfo. Annual meeting, first Monday in October.

Property: 136 acres, in 12 different groups, principal property, about 4 miles from the Picacho mines, about 8 miles S. W. of Bacoachi, 2 miles from the Sonora river and about 75 miles by wagon road from Cananea. Lands carry 5 veins 2′ to 5′ wide, said to be traceable 2 miles, and to carry azurite, malachite, bornite, chalcopyrite and chrysocolla, all silcious, and occasional native silver, with a claimed average value of 5% copper, 25 to 600 oz. silver and $3 gold per ton.

Development: about 7,000′ of workings, main shaft 400′ deep, connecting with a tunnel for extraction.

Equipment: includes a 90-h. p. steam plant at the mine, small sawmill, 50-ton reverberatory furnace and 26 buildings. Wells provide water for boilers and potable use.

A 50-ton mill has a 25-h. p. steam engine and 4 Behrend tables, with a 3-mile pipe-line to the Sonora river, where there is a small pumping station.

Company paid a dividend of 1% in August, 1911. During 1912, company operated its smelter (reverberatory), shipping matte to El Paso, running $625 per ton.

Transportation facilities are poor, nearest railroad station being at Cos. 38 miles distant by mule trail.

Closed down since 1913 on account of unsettled political conditions and insecurity of property rights during revolution.

EL VAN COPPER CO., S. A. **SONORA**

Mine near Nacozari, Sonora, Mexico. Not operated for several years and several claims forfeited to government for non-payment of taxes.

EMPIRE MINING CO. **SONORA**

Was the Mexican holding company of the **Dolores Mining & Development. Co.**

Property: the Major Domo Copper mine, 85 hectares, a few miles from Cananea. A 200′ shaft shows a N. E.-S. W. vein, 2½′ to 3′ wide. Company also owns the Dolores, Empire, Bonanza, Spanish, Golden Cross and Providencia, silver-gold properties, 65 hectares, in the Magdalena district, Sonora, Mexico. Planned erecting a 3-unit Pittman mill at the Golden Cross property, 14 miles S. W. of Cananea. No recent reports received; presumably defunct.

ERUPCION MINING CO. **CHIHUAHUA**

Address: El Paso, Texas, or John C. Greenway, mgr., Warren, Ariz.

Holds control of **Cia. Minera Erupcion y Anexas, S. A.**, a Mexican corporation. Controlled by **Ahumada Lead Co.** and by Calumet & Arizona Mng. Co. interests.

Officers: E. F. Knotts, pres.; D. B. Smith, v. p.; J. H. Williamson, v. p.; C. A. Kinne, sec.-treas. Basil Prescott, geol.

Inc. in New Mexico. **Cap.** $1,000,000; increased to $1,500,000; $1 par.

Property: 85 miles S. of El Paso, in Lamentos Mtns., Chihuahua, adjoining holdings of the Ahumada. The main ledge has been developed for a distance of 1,700′. About 200 men employed, in 1922.

A 45-mile road (Ferrocaril de Chihuahua y Oriente) was constructed in 1922, by Erupcion and Ahumada companies, to connect with the Lucero station south of Juarez on the Mexican railroad.

ESMERALDA COPPER CO. **SONORA**

Has no representative at former mine office: Llano, Magdalena, Sonora, Mexico. F. C. Emery, pres.; W. D. Fredericks, mgr., at last accounts.

Property: 88 hectares, has about 300′ of workings, showing copper ore, with silver said to increase at depth. Presumably idle.

ESMERALDA COPPER MINING & SMELTING CO.

Idle. Mine near Santa Catarina del Norte, Baja California, Mex., known as La Esmeralda, is opened by shaft, with considerable development.

ESMERALDA MINING CO. **CHIHUAHUA**

Address Drexel Bldg., Philadelphia, Pa.

Mine address: Parral, Chihuahua, Mex., Adam Schaefer, supt.

Inc. 1907, in Delaware. **Cap.** $1,000,000; par $1.

Officers: W. P. Fairman, pres.; A. Urghuart, mgr.

Property: La Esmeralda gold-silver mine near Parral, Chih.

Development: 200′ shaft and 600′ tunnel with total of 1,500′ of workings. Employs 250 men when operating.

Equipment: includes electric power, compressor, etc.

ESMERALDA; NEGOCIACION MINERA **ZACATECAS**

Idle. **Property:** at Chalchihuites, Sombrerete, Zacatecas, Mexico, includes the Anaconda, Esmeralda and La Luz mines, developed by shafts and tunnels, opening up argentiferous lead and copper ores.

ESPERANZA, LTD. **MEXICO, D. F.**

Office: C. L. Johnson, sec., No. 1 London Wall Bldgs., London, E. C. 2, England. **Office of American company:** E. L. Gruver, pres., 25 Broad St., New York City.

Directors: R. J. Frecheville, chairman; F. W. Baker, Sir F. M. Crisp, A. A. Kelsey. Charles Hoyle, gen. mgr.; E. Ph. Harivel, asst. mgr.

Reg. Oct. 6, 1913, in Great Britain **Cap.** £455,000; shares £1 par; all issued and credited, except seven, as fully paid. Acquired by agreement with the Guggenheim Exploration Co., and the Venture Corporation, Ltd., 449,800 shares of $5 each, all the capital except 200 shares, in the Esperanza Mng. Co. of New York, inc. in New Jersey, and owning gold and silver mines covering 390 acres, adjoining the El Oro mine at El Oro, Mexico. Purchase price was £454,993 in fully paid shares.

Financial Statement, years ending December 31:

Assets.

Year	Invested in Esperanza M. Co., etc.	Other Hold.	Cash	Total
1920..	£454,993	£8,274	£3,568	£466,836
1919..	454,993	3,910	3,713	472,616
1918..	459,933	7,786	3,943	467,723

Liabilities.

Year	Capital	Creditors, etc.	Surplus	Total
1920..	£455,000	£10,433	£1,402	£466,836
1919..	455,000	12,765	4,851	472,616

Profit and Loss

Year	Dividends from Esperanza M. Co.	Total Income	Expenses, taxes	Balance
1920..	£ 4,613	£ 9,815	£ 8,412	£ 1,402
1919..	9,226	9,490	8,330	1,160
1918..	27,680	29,576	8,876	20,700
1917..	23,067	27,002	8,248	18,753
1916..	11,609	16,499	12,907	3,592

Dividends: 1903-04, 10%; 1904-05, 14 months, 82½%; 1906, 160%; 1907, 105%; 1908, 70%; 1909, 25%; 1910, 30%; 1911, 30%; 1912, 15%; 1913, 10%, 1914, 5%; 1915, 5%; 1916, nil; 1917, 5%; 1918, 5%. To June, 1918, 60 dividends totaled 557½%, equal to £2,536,625.

Esperanza Mining Co.

Controlled by Esperanza, Limited, which see.
E. L. Gruver, pres., 25 Broad St., New York City.
Inc. in New Jersey. **Cap.** $2,250,000; shares $5 par; all issued.
Dividends paid to Esperanza, Limited, amounted to $135,000 in 1918; $45,000 in 1919; $22,500 in 1920.

Financial Statement, years ending December 31:

Assets.

Year	Property	Absorptions, etc.	Deferred charges	Options etc.	Current	Total
1920...	$2,029,006	$ 55,893	$ 7,487	$243,064	$ 836,073	$3,171,525
1919...	2,009,378	56,208	7,760	105,438	1,159,350	3,338,136
1918...	2,006,687	64,447	8,459	.....	1,139,236	3,218,830
1917...	2,006,221	61,441	24,472	.....	1,074,458	3,166,592
1916...	2,003,835	104,887	269	.....	901,413	3,010,405

Liabilities.

Year	Capital	Reserve for Deplet., etc.	Esperanza Ltd.	Current	Surplus	Total
1920....	$2,250,000	$382,926	$11,812	$ 50,022	$476,763	$3,171,525
1919....	2,250,000	838,635	.....	78,282	216,218	3,338,136
1918....	2,250,000	742,888	13,585	37,307	175,051	3,218,830
1917....	2,250,000	505,176	.....	61,359	350,056	3,166,592
1916....	2,250,000	345,816	.....	112,857	301,732	3,010,405

Profit and Loss.

Year	Gold receipts, etc	Expenses	Reserves for dep. & deprec.	Profit or loss	Dividends paid	Surplus
1920..	$1,390,428	$1,518,091	278,828	—$406,491	$ 22,500	$476,763
1919..	1,524,432	1,387,516	95,747	+ 41,168	45,000	171,218
1918..	1,681,827	1,484,111	237,721	— 40,005	135,000	175,051
1917..	1,822,895	1,463,967	236,963	+ 121,965	112,500	350,056
1916..	892,085	702,234	.....	+ 189,851	56,250	301,732

Property: 6 patented claims, 390 acres, adjoining El Oro mine, at El Oro, shows fissure veins in shale, cut by andesite intrusions. The dip is 70° to the S. W., and course N. 45° W. The ore shoots are from 50 to 150′ long, and from 2 to 100′ thick.

The San Rafael vein is traceable for 10,000′ through El Oro district, but is cut by many transverse faults which displace the orebodies. The Esperanza vein fills a fault that has a displacement of 500′. The San Rafael vein fills a fault fissure whose displacement is approximately 1,000′ vertical. This vein narrows at depth of 2,000′ in the Esperanza mine and extends for 2,500′ through the property, with 7 payable branch veins.

Development: at El Oro, by vertical shafts, 1,600, 1,000, and 400′ deep, and a 1,000′ tunnel for tramming. Deep work on the San Rafael and San Carlos veins showed that the limit of pay ore had been reached. Work in 1920-21 has been concentrated on the 3, 4, 5 and 8th levels of the Descubridora vein. Winze No. 6 was sunk 42′ below 5th level, exposing the vein with an average width of 13-19″ and assaying 10-72 oz. silver and 0.2-1 oz. gold per ton.

Recent work shows the following results:

Year	Feet	Total, feet	Reserves tons	Profit in reserves
1920.....	2,565	188,177	117,684**	.....
1919.....	1,975	185,612	.....	.....
1918.....	4,817	183,637	35,131*	£19,322
1917.....	9,908	178,820	65,368	39,727
1916.....	8,900	168,912	111,723	.....

*Plus 50,000 to 100,000 tons of payable fills. ** Plus 750,000 tons possible low grade ore.

Equipment: electric power, 400-h. p. hoist, and cyanide mill, using 120 stamps and 14 tube-mills of 1,000 tons daily capacity. The stamps are being replaced by ball-mills.

Production:

Year	Tons Milled	Year	Tons Milled
1920.....	273,120	1918	200,589
1919.....	267,258	1917	200,548

During most of the years, 1914 and 1915, revolutionary disturbances prevented work. Operations were suspended from February 25, 1915, until April 23, 1916.

To end of 1918, the total output was $78,003,993 (Mexican gold currency) from 2,826,041 tons ore.

Company has under option and is developing the Union en Cuale mines, near Banderos bay, 25 miles from Las Pinas, Jalisco. The property shows very large and persistent veins of zinc ore carrying silver and gold, as well as lead ore. These veins were worked until 1893 for the silver only, two of the mines yielding about 6,000,000 ounces up to that date. To Dec. 30, 1920, $243,000 had been expended on the Cuale holdings. The purchase price is $250,000.

ESPERANZA MINING CO. **BAJA CALIFORNIA**

Secretary and office: E. W. Nicholson, 801 Land Title Bldg., Philadelphia, Pa. **Operating office:** P. O. Box CCC, San Diego, Cal. Mine near Ensenada, Baja California, Mex. Geo. P. Brown, gen. mgr.

Property: 83 hectares, and 40 acres miscellaneous lands, on Cedros island, on the Pacific coast, shows diorite cut by veins having 3 lenticular ore shoots, carrying carbonate and sulphide ores, estimated by company to average 40′ width, 300′ depth and 1,100′ length, and to contain an average of 2.5% copper, 3% zinc, 2 oz. silver and $3.50 gold per ton.

Development: about 8,500′ of workings, showing 150,000 tons of low-grade ore, with about 100,000 tons blocked out for stoping. Has received about $450,000 from shipments to the Denver, Pueblo, San Francisco and Tacoma smelters.

Unsettled conditions in Mexico since 1914 have prevented reopening the property.

ESPERANZA MINING CO., LA, **COAHUILA**

Address: Saltillo, Coah., Mex.

Stock made assessable and 50,000 new shares issued in January, 1921.

ESPERANZAS MINING CO. **DURANGO**

Idle for several years. Mine at Estacion Symon, San Juan de Guadalupe, Durango, Mexico. Joseph Steel, gen. mgr., at last accounts. **Cap.** $200,000.

Property: includes the Montana de Cobre, Esperanza and other claims.

ESQUER y CIA; ALEXANDER **SONORA**

Mine at Baroyeca, Alamos, Sonora, Mexico. J. J. Esquer, mgr., at last accounts.

Property: the Mexicana, Esperanza and other mines, developed by shafts and tunnels, carries auriferous and argentiferous copper ores. Idle for years.

ESTACA MINING CO. **SINALOA**
(Mexican Candelaria Co.)
Office: Col. Daniel M. Burns, pres., Call Bldg., San Francisco, Calif.
Mine address: Contra Estaca, Sinaloa, Mex.
Staff: H. D. Hickie, gen supt.; D. M. Munro, mine supt., B. A. Newman, mill supt.
Property: the Rosario and Contra Estaca silver-lead mine in Concepcion de Oro district, Sinaloa, Mex., reported forfeited for non-payment of taxes and re-located in 1921 by Manuel Hoche.
Equipped with 16-stamp mill, 2 tube mills and 100-ton cyanide plant.

EXPLORADORA de SANTA MARTA S. A., CIA **CHIHUAHUA**
Address: T. W. Foster, gen. mgr., Caples Bldg., El Paso, Tex.
Officers: Dr. C. S. Bungart, pres.; Dr. I. J. Bush, v. p.; H. W. Foster, sec.-treas., with W. B. Watts and Elliott Ryer, directors.
Inc. 1921. **Cap.** 5,000 shares.
Property: 60 hectares on Eureka river, Baranca del Cobre district, southwestern Chihuahua.

EXPLORATION CO., LTD. **MEXICO**
Office: H. F. Wreford, sec., 24 Lombard St., E. C., London; P. L. Foster, 61 Broadway, New York.
Directors: R. T. Bayliss, chairman and mng. director; J. H. M. Shaw, mng. director; J. R. Maguire, J. E. D. Ryder, G. D. Smith, and O. E. Warburg.
Inc. March 21, 1904, in Great Britain, to acquire the assets and undertakings of a company of same name, registered June, 1896, except certain assets and liabilities which had been acquired by the Exploration Assets Co., Ltd. The company carries on a general financial business and holds interests in the Tomboy, El Oro, Santa Rosa, Buena Tierra, Greene-Cananea Copper, Chile Copper, Natomas Co., South African Real Estate Trust Ltd., and other concerns, and floated the Mexico Mines of El Oro, Ltd.
Cap. £750,000; shares £1 par; reduced Nov., 1916, to £375,000; shares 10s. par, all issued. For every 5 old shares, holders received 3 fully paid shares and £2 of the Assets Company's debenture stock.
Dividends: declared by former company: 1896, 2s; 1897, 2s 6d; 1898, 2s. 6d.; 1899, 3s.; 1902, 1s. Dividends paid by present company; 1905, 1s.; 1906, 1s.; 1907, nil; 1908, 1s.; 1909, 1s. 6d.; 1910, 1s.; 1911, 1s. 6d.; nil in 1913, 1914 and 1915; 1s. in 1916; 6d. in 1917; 9d. in 1918; 1s. 6d. in 1919; 1s. in 1920.
For year ending Dec. 31, 1920, income was £74,715; there was a net profit of £57,162, which added to balance of £87,384 from previous year, left a total balance of £124,546, after deducting £20,000 for depreciation. Total assets of £532,240, include cash, £20,772; shares in other companies, £266,521; Natl. War Bonds, £78,163; treasury bills, £69,832; exchequer bonds, £70,211; debtors and debit balances, £26,738. Liabilities include capital stock, £375,000; creditors, £31,701; unclaimed dividends, £991; profit and loss, £124,546.

EXPLORATTION CO. OF ENGLAND & MEXICO, LTD. **MEXICO**
In liquidation, 1917.

FAY-CANANEA COPPER CO. **SONORA**
Probably dead. Last address: 2105 East Superior St., Duluth, Minn. Mine near Cananea, Sonora, Mexico. Described in Vol. XII.

FENOMENO MINING CO. **BAJA CALIFORNIA**
Address: Tecata, Baja Calif., Mex.

FORTUNA MINES CO. OF MEXICO, LTD. **CHIHUAHUA**
Subsidiary of **Santa Eulalia Mng. Trust, Ltd.**, a British Corporation.
Address H. A. Searle, sec., 65 London Wall, London, E. C. England.

Directors: T. Davidson, H. A. Searle, H. Limebeer, A. S. Northcote and W. Pocock. W. J. Deavitt, supt.

Inc: January 1920. **Cap.** £200,000; 5s par. Company acquired holdings of Manta Mng. Co., Ltd., 1921.

Property: Carmen silver-lead group, 47 acres, at Santa Eulalia, 15 miles S. E. of Chihuahua, Mex., reported shipping high-grade silver ore.

FORTUNA, S. A.; COMPANIA MINERA LA. AGUASCALIENTES

Address: Aguascalientes, Mex. **Mine office:** Tepezala, Ocampo, Aguascalientes, Mexico.

Officers: Geo. B. Wardman, pres.-gen. mgr.; O. F. Westlund, v. p.; DeWitt Crevelling, sec.-treas. Alberto Pez, supt., at last accounts.

Inc. 1902. **Cap.** 200,000 pesos; shares 100 pesos par.

Property: 20 hectares, including La Fortuna and adjoining mines.

Development: by tunnels and a 100-meter blind shaft to a vertical depth of 200 meters, and length of 600 meters, showing oxidized argentiferous copper ores of commercial grade.

FRESNILLO CO. **ZACATECAS**

Address 82 Beaver St., New York.

Inc. 1910, in New York. **Cap.** $2,000,000 com. and $500,000 7% cum. pfd.; $100 par; $1,500,000 com. and $500,000 pfd. outstanding.

Property: bonded on a 60-40% profit basis, to **The Mexican Corporation, Limited,** which see.

GARRETSON-SAHUARIPA CO. **SONORA**

Probably dead. Mine at Calera, Sahuaripa, Sonora, Mexico. W. H. Farnsworth, pres.; Laurens Enos, v. p.; W. H. Davenport, sec.; D. B. Sherman, treas.; John A. Moore, supt, at last accounts

Inc. 1903, in Arizona. **Cap.** $600,000; shares $100 par; non-assessable; issued, $450,000.

Property: 96 hectares, and 14,000 acres of surface rights, about 30 miles S. E. of Sahuaripa, includes La Calera mine, having 6 orebodies, 2 under development, of 3′ to 6′ width, estimated by company to average 2% copper, 45 oz. silver and $14 gold per ton, which is interesting, if true. Mine has about 1,200′ of workings.

The smelter, 1 mile from the mine, has a 50-ton 29″x48″ Garretson pyritic blast furnace. Idle for years awaiting construction of the Sonora Central railway from Tonichi, which has been surveyed to pass through this property.

GRANADENA MINING CO. **HIDALGO**

Closed down by revolution. Mine at Santa Barbara, Hidalgo, Mex., produces silver-lead ore with a small amount of copper. Fully described Vol. X.

GREENE CANANEA COPPER CO. **SONORA**

Office: 25 Broadway, New York.

Officers: W. D. Thornton, pres.; Cornelius F. Kelley, v. p.; Jos. W. Allen, sec.-treas.; W. S. Harper, asst. sec.-asst. treas.; H. B. Paull, aud.; Philip L. Foster, Cornelius F. Kelley, Walter Douglas, W. D. Thornton, Wm. E. Corey, John D. Ryan, Jos. B. Cotton, Jos. W. Harriman and L. D. Ricketts, directors.

Inc. Dec. 26, 1906, in Minnesota. **Cap.** $60,000,000; shares $100 par; issued $50,000,000. The New York Trust Co. and Old Colony Trust Co., Boston, transfer agents; Bankers Trust Co., New York, and State Street Trust Co., Boston, registrars.

Shares listed on the New York and Boston Stock Exchanges. Range of shares during 1920 was 28¼ in January and 15 in December. Total sales in New York were 71,663 shares.

In Feb. 1921, company took a 4.63% interest, $1,852,000 total amount, in the Copper Export Association's $40,000,000 8% bond issue.

The Greene Cananea owns the entire stock issue of Cananea Cons. Copper Co., the operating company which holds title to the Mexican properties.

The history of this company and of the other companies, merged with it, is given in Vol. XIII.

Balance Sheet, years ending December 31 for Greene Cananea and subsidiaries:

Assets

Year	Mines, railways, buildings, equipment	Current	Total
1920.....	$51,527,811	$8,928,836	$60,456,647
1919.....	51,355,754	9,740,814	61,096,569
1918.....	50,992,008	8,032,608	59,024,625
1917.....	50,787,446	8,405,579	59,193,025

Liabilities

Year	Capital	Reserves	Current	Surplus	Total
1920	$50,000,000	$532,734	$2,026,526	$7,897,387	$60,456,647
1919	50,000,000	532,734	2,726,526	7,837,309	61,096,569
1918	50,000,000	636,352	905,001	7,483,272	59,024,625
1917	50,000,000	251,990	892,384	8,048,652	59,193,025

Income Account.

Year	Sales of Metals etc.	Net Charges	Depreciation	Net Balance	Final Surplus
1920....	$7,299,919	$6,380,344	$311,081	$560,078	$7,897,387
1919....	8,939,090	7,456,743	361,981	1,104,037	7,837,309
1918....	10,801,766	6,916,251	528,734	3,434,620	7,483,272
1917....	9,392,639	6,623,137	350,455	2,497,888	8,048,652

Dividends:

	Rate	Par Value Shares	Amount
1920.....	$1.00	$100	$500,000
1919.....	8.00	100	750,000
1918.....	8.00	100	4,000,000
1917.....	8.00	100	3,954,215
1916.....	8.00	100	3,907,284
1915.....	....	100	.....
1914.....	2.00	100	972,645
1913.....	1.25	100	1,093,143
1912.....	0.75	20	1,819,877

Earnings: as the company's average profit per pound for the past 10 years was 5.65c., earnings on an average annual copper production, equivalent to 78.8 lb. copper per share, are equal to $4.45. The silver production alone could probably take care of a dividend requirement of $2 a share.

The Cananea Consolidated Copper Co., S. A.

Mines and works: Cananea, Sonora, Mexico. C. E. Mills, pres.; T. Evans, v. p. and gen. supt.; Geo. Young, sec.-treas.; Casey Stites and W. S. Harper, asst. sec'ys; T. Evans, traffic mgr. and purch. agt.; G. W. Prince, smelter supt.; F. J. Strachan, mill supt.

Inc. Sept. 30, 1899, in Mexico. **Cap.** 20,000 pesos, shares $1 gold par. Entire stock owned by Greene Cananea Copper Co., the C. C. C. Co. being merely the operating company, holding direct title and right to operate the property, as is necessary under the laws of Mexico.

Property: 14,062 hectares, or approximately 34,738 acres mineral lands held by mining patent from the Mexican government. The surface lands also owned by the company comprise 130,414 hectares, or approximately 322,123 acres. All of the mines, works, offices, warehouses, stores, etc., of

the company, and valuable residence properties, occupied by local officials and employees in Cananea, are located on its own land.

Cananea is a community of 16,000 inhabitants, located 40 miles south of the International boundary line, on a branch railway of the Southern Pacific lines of Mexico.

Geology: the mines are situated in the Cananea mountains, in northern Sonora, within sight of and 40 miles south of Bisbee, Arizona. The mines are in a mineral belt, about 6 miles long, in a N. W.-S. E. direction, and about 2 miles wide. The oldest rock is pre-Cambrian granite, which is overlaid by Cambrian quartzite, in turn overlaid by Cambrian limestone. Breaking through these rocks, and covering much of the mineral belt, is a series of igneous rocks of Tertiary age, which include many varieties of massive intrusive volcanic rocks, largely as bedded tuffs.

Three main classes of ore deposits are recognized: (1) Deposits containing secondary chalcocite together with iron pyrite either massive or disseminated along shear zones in diorite porphyry; (2) Contact deposits containing chalcopyrite associated with iron pyrites and some zinc blende in a matrix of altered limestone; (3) Disseminated chalcopyrite associated with zinc blende in a diorite porphyry breccia.

The 3 great mines of Cananea are the **Veta Grande, Oversight** and **Capote**, which have large bodies of direct smelting ore and also contain great deposits of concentrating bodies. This ore contains copper as chalcocite, disseminated through diorite porphyry in broad shear zones.

The Capote mine differs from the Veta Grande and Oversight in that the ore occurs not only disseminated in diorite porphyry but also in the underlying granite. There are 3 principal ore shoots connected by continuous ore on the various levels. The ore in the upper levels is chiefly chalcocite, but the new shoot consists of massive pyrite with primary chalcopyrite and bornite in granite.

The **Cobre Grande** mine, the original mine of the Cananea Consolidated Copper Co., has been idle for some years, save to supply converter lining. The ore occurred in a wide vein traversing both altered limestones and igneous rocks.

The **Kirk** mine is situated in an extensive area of highly-altered limestone capped with diorite porphyry and cut by small, irregular dikes and intrusions of the same material. The ore is not adapted to concentration and it is necessary to hand-pick it as mined. The sorted ore carries a desirable high percentage of lime and iron.

The **Chivatera** has a large body of oxidized ore containing about 2% copper, but averages 12 to 15 oz. silver and some gold. As the orebody now stands it contains several years' reserves on the basis of 150 to 200 tons daily production, and there is a considerable territory lying ahead of present exploration that gives promise of important development.

The **Sierra de Cobre** property was acquired by purchase from the Phelps-Dodge interests several years ago, and since its acquisition has proved to be a large and profitable mine. The ore occurs in fissures in limestone, the fractures running out from the Eureka fault. The ore occurs as a replacement of the limestone, both in the veins and as irregular deposits of pyrite and chalcopyrite that follow the bedding planes of the limestone on each side of the veins. The Sierra de Cobre property also has an extensive area of undeveloped ground lying in the limestone areas, along which smelting ore has been found in the Kirk mine and elsewhere.

The **Elisa** mine contains a number of lenses of ore lying approximately parallel to a nearly vertical fault between limestone and the diorite porphyry. The lenses occur in the limestone at the fault and back of it for a distance of 150', along a zone some 1,500' in length. The ore consists of a garnet matrix containing chalcopyrite and iron pyrite. It is a desirable basic ore for the smelter, containing about 20% of lime in addition to the iron.

The **Henrietta** is a small mine whose ore occurs on a contact between diorite porphyry and quartz porphyry. The orebodies are not large and the ore is silicious. New development work in the vicinity of Henrietta has not yet shown workable orebodies.

The **Puertecitos** mine and the town of that name are located at the N. W. end of the mineral belt and at the terminus of the narrow-gauge railroad of the company. The Puertecitos ore deposit has a great outcrop of limestone altered by igneous contact metamorphic action to lime-iron-Garnet rock and containing carbonates of copper and some chalcopyrite and bornite. Large areas of this outcrop contain enough copper to warrant mining, which is carried on by means of large quarries. The ore as mined is not sufficiently rich to be sent direct to the smelter, but has to be broken and hand-sorted, yielding about 4 tons of waste material to each ton of ore.

The **Elenita** mine, one of the earliest producers of the camp, located southwest of Puertecitos, has been reopened with a view to again putting it in the producing class. The ore from the mine is similar to that of Puertecitos.

The **Cananea Duluth** mine has an orebody that is a neck of diorite about 1,200′ long and 200′ wide, intrusive in bedded tuffs. The diorite is shattered, altered and for 200′ to 300′ below the surface is impregnated throughout with pyrite and copper minerals. On the 600′, lowest level, the central portion is not commercial, the values being concentrated around the border of this long canoe-shaped orebody. The ore carries good silver and gold values, with about 2% copper.

Development: in 1920 totaled 76,431′ including drifts on 7th and 8th levels of the Cananea Duluth, 6th and 7th level of the Kirk and 11th and 12th of the Capote mines. Total development work, 200 miles. Development work done in 1918 amounted to 13⅓ miles, compared with 5 miles in 1917, 11 in 1916 and 1½ in 1915.

Ore reserves: kept pace with extraction in 1918 and 1919, but in 1920, there was a decrease in visible ore reserves at the Capote, Oversight and Sierra de Cobre mines, but an increase in the Cananea Duluth. Definite tonnages are not given.

Equipment: Greene-Cananea is one of the best equipped of the North American copper producers, as is necessary by reasen of its isolated location. Its equipment includes practically everything from the producing end of the copper business, to the maintenance of a community. The electrical equipment consists of turbines and engines having a capacity of 5,850 K. W. alternating and 500 K. W. direct current, transmitting up to 11,500 volts. From this power plant, current is supplied for every phase of the enterprise, with the exception of the pumping plants at Oja de Aqua. These pumping plants bring the water a distance of 9 miles, using a crude oil burning equipment for the generation of the necessary steam, for the operation of the condensing engines.

The concentrating plants have a daily capacity of 2,800 tons and consist of a crushing plant, sampling mill, two concentrating mills, a settling system and slime plant. The concentrators have been remodeled recently and the oil flotation system installed.

All ores, concentrates, fluxes, etc., for the blast furnace treatment, are weighed and delivered to the main receiving bin over a narrow gauge railroad. The ore after passing the sampling mill is conveyed to the bedding plant where it is distributed evenly over the entire length of the bed by an over-head belt which is automatically tripped. The mixed ore is reclaimed by a machine which has a capacity of 175 tons per hour, the charge being dropped by gravity above the furnace into measuring hoppers holding 2,000 lbs. each. There are 5 such hoppers at each furnace, and these are discharged either directly into the furnace, or into the feed floor. At the smelter, in addition to the blast furnace, the company has its own roasting

plant, reverberatory furnaces for smelting fine ore and Great Falls type Bessemer converters 12′ in diameter.

The company owns and operates 36 miles of standard and narrow gauge railroad, including branches, spurs and sidings connecting with the Nogales and Naco branches of the Southern Pacific lines of Mexico and by this line with the El Paso and Southwestern Railroad at Naco, Ariz.

The following table summarizes operations:

Year	Ore Concentrated tons	Cost of Milling	Products Smelter, tons	Cost of Smelting
1920.....	288,176	.....	782,989	.....
1919.....	220,821	$1,87	715,621	$3.51
1918.....	289,098	1.25	902,520	3.38
1917.....	171,202	...	481,632	2.61

Production: output and earnings since beginning of operations—

Year	Tons Mined	Mng. Cost per Ton	% Cu.	Copper, Lb.	Silver Oz.	Gold, Oz.	Cost per Lb. Cu. Cents	Earnings
1920....	1,053,806	.....	.....	43,672,939	1,778,617	10,089	16.304	$560,078
1919....	929,193	$3.643	.....	41,404,810	1,739,789	9,167	14.750	1,104,037
1918....	1,169,998	$3.240	2.430	52,694,731	1,666,993	9,846	15.082	$3,434,620
1917....	574,582	2.900	2.273	24,711,204	655,656	3,804	17.951	2,497,888
1916....	1,143,508	2.612	2.258	48,663,381	1,464,808	8,710	11.395	6,908,513
1915....	285,701	2.493	2.700	16,335,081	635,997	3,773	11.086	1,410,543
1914....	413,766	3.146	2.201	21,858,920	907,310	6,055	10.724	638,955
1913....	765,063	2.854	2.363	44,480,513	1,497,938	8,021	9.631	2,344,592
1912....	1,121,346	2.902	2.146	48,157,847	1,559,996	7,232	10.310	2,580,749
1911....	945,160	2.355	2.414	44,897,466	1,339,839	5,892	9,483	1,318,473
1910....	.....	.....	.....	45,771,925	1,187,820	5,483	11.437	459,202
1909....	.....	.....	.....	44,547,689	933,549	5,887	11.612	544,107
1908....	.....	.....	.....	18,619,609	447,663	2,879	.....	214,141
(b).....	.....	.....	.....	58,180,856	766,422	6,100	.....	3,220,247
(a).....	.....	.....	.....	247,144,706	2,006,679	13,795	.....	9,870,762

Employs 3,247 men, 211 of whom are not Mexicans. Improvements in 1922 will cost $1,000,000.

GUADALUPE DE LOS REYES; NEG. MINERA — **SINALOA**

Address: Aptdo. 80, Mazatlan, Sin., Mex.

Mine address: Guadalupe de los Reyes, Sin., Mex.

Officers: Marcial Yribarnegaray, pres.; Leopoldo Guerrero, mgr.

Property: the Estaca and Descubridora silver mines.

Equipment: 100-ton concentrator, with flotation and cyanide plants. Employs 250 men.

GUADALUPE LEAD SMELTER — **NUEVO LEON**

Works address: Guadalupe, N. L., Mexico.

Is a custom plant owned and operated by the Cia. Minera de **Penoles**, which see for details.

GUANACEVI TUNNEL CO. — **DURANGO**

Mine at Guanacevi Santiago Papasquiaro, Durango, Mexico.

Inc. 1904, in Arizona. **Cap.** $5,000,000; shares $5 par. Debts amounted to $150,000 in 1912 and have since increased.

Property: is in hands of trustees until conditions in Mexico permit of financing company sufficiently to carry on the extensive development planned. There are 22 properties, including timber rights and original concessions, said to possess large bodies of gold and copper ore. The mine has 3 shafts of 100′ depth each, with tunnels of 1,250′ and 1,400′, the main tunnel, 7x9′, planned to be driven about 3 kilometers, management estimating that in this distance a large number of veins carrying lead and copper ores should be cut, the tunnel being estimated as likely to cost about $250,000.

The L. Diamond Co., of Boston, was never a representative of this corporation, but a number of brokers bought stock and combined to unload on the public at unduly high prices.

Idle for several years.

GUANAJUATO CONS. MNG. & MILLING CO. **GUANAJUATO**

Subsidiary of **Exploration Company of New York.**

Office: 35 Wall St., New York

Mine address: Jos. Mac Donald, gen. mgr., Guanajuato, Gto., Mexico.

Officers: Fred G. Corning, pres.; Robt, Mulford, v. p.; C. Van Rensselaer Cogswell, sec-treas.; with Walter D. Clark, Walter W. Storer, R. A. Walker, W. Lawrence Green, Chas. G. Molin, Sidney Green, all of New York, and Geo. A. McGlone, Charleston, W. Va., directors.

Inc. 1899, in West Virginia. **Cap.** $3,000,000; shares $5 par; 566,184 issued. $169,080 of the unissued stock has been set aside to retire the outstanding 7% bonds. State St. Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting in January, at Charlestown, W. Va. Listed on Boston Stock Exchange and dealt in on New York Curb.

Bonds: authorized $300,000; outstanding $128,000 convertible debenture 7's, dated January 2, 1904, due January 2, 1924. Interest January 2 and July 2, at New York office of company. Coupon and registered bonds, $100, $500 and $1,000; convertible at 120 into stock at par; 10% of net earnings is set aside for redemption of this bond issue. Coupon No. 22, due January 2, 1915, on the debenture bonds, was payable on May 15, but No. 23, due July 2, 1915, was deferred until further notice. Trustee, Columbia Trust Co., New York.

Sold $15,000 of 7% bonds for $150 the lot at public auction in New York on Dec. 16, 1920.

Dividends 1¼%, 6¼c per share, paid July 31, 1906; 1½%, 7½c per share, October 31, 1906; none since.

Balance sheet December 31, 1913, the last one published, showed assets of $3,495,586, which included mines, plants, etc., $3,136,890; supplies, $78,896; cash, $96,996. Liabilities included: 6% bonds, $5,000; refunding notes, $53,800; surplus, $200,000; sinking fund, $28,409; undistributed profits, $45,019; notes payable, $10,466.

Income account for 1913, last reported, showed: Receipts—bullion and concentrates, $670,142; expenditures, mining, etc., $302,452; ore bought, $176,585; treatment charges, $39,186; bullion expense, $23,413; taxes, etc., $26,674; total $568,312. Gross profit, $101,830. Deduct: bond interest, $13,412; depreciation, $33,427; bond redemption reserve, $5,494; total, $52,333. Net profit, $49,498; undistributed profit forward, $45,522; total $95,019. Forward to surplus accounts, $50,000. Undistributed profit, December 31, 1913, $45,019.

The company owns a large interest in the Carmen-Guanajuato gold Mining Co.

Property: the Sirena, San Bartolo and San Vicente mines in the Guanajuato district. Of these the Sirena is the oldest, having been worked for 100 years. Under normal conditions it has a monthly output of 7,500 tons of milling ore, with value mainly in silver. Vein varies in width from 3′ to a maximum of 200′. Ore reserves of the Sirena mine were estimated 1913 as 800,000 to 1,400,000 tons blocked out, pillars and fill; Penafil lease, 180,000 tons. Only development work being done since May, 1920. Employs 500 men when active.

Development: by shafts to depth of about 1,000′.

Equipment: includes 80-stamp, 250-ton concentrator, 250-ton cyanide plant, electric power, etc.

GUANAJUATO DEVELOPMENT CO. **GUANAJUATO**

Office: 50 Broad St., New York. **Corporate office:** Jersey City, N. J. Mine office at Guanajuato, Gto., Mexico.

Officers: Geo. W. McElhiney, pres.; Wright Johnson, v. p.-sec.; P. E. Sharpless, v. p.; W. H. Porter, treas.; with C. G. Fowler, H. C. Field, H. O. Marcy, John A. Martin, and F. G. Peck, directors. John Pritzel, asst. treas.; Geo. W. Bryant, attorney in fact, in Mexico.

H. C. Field, gen. mgr.

Inc. Feb. 24, 1906, in New Jersey. **Cap.** $300,000 com. and $600,000 pfd., decreased June 24, 1916, from $1,000,000 6% cum. pfd.; $3,000,000 common; pfd. $60 par; com. $10 par. Preferred stock has preference as to assets and is subject to call at par and accrued dividends on any semi-annual dividend date. Stock transferred at company's office. Annual meeting, first Wednesday after second Tuesday in June, at Jersey City, N. J.

Dividends: preferred, paid semi-annually Jan. and July 1, from 1906 to 1910, inclusive, none since.

Property: company controls the **Pinguico Mines Co., Mexican Milling & Transportation Co.** and **Peregrina Mining & Milling Co.** and the **Esperanza Mine.** Properties are located at Guanajuato, Gto., and are held under Government titles, options, etc.

The mines have strong fissure veins cutting bedded volcanic tuffs and intrusive rocks. The ore-shoots contain rich silver ore with gold values, in a quartz gangue. Lead and copper are practically absent.

Esperanza Mine.

Address: P. R. Hudson, gen. supt., Guanajuato, Gto., Mex.

Mine yields free silver ore with low gold values, treated in San Mathias mill of Mex. Mlg. & T. Co.

Development: by shafts and extensive levels to depth of 600'.

Employs 250 men.

Mexican Milling & Transportation Co.

Subsidiary of Guanajuato Div. Co.

Address: O. W. Johnson, supt., Guanajuato, Mex.

Property: the San Mathias concentration mill with crushers, 40 stamp battery, tube mills and cyanide plant, treating 300 tons of silver ore a day.

Employs 250 men under normal conditions.

Peregrina Mining & Milling Co.

Mine address: W. T. Kendall, gen. supt., J. G. Reilly, supt., Guanajuato, Gto., Mex. Same officers, as Guanajuato Dev. Co., with H. C. Field, A. G. Lund, John A. Martin, Frank G. Peck, and James Tracy Potter, directors.

Inc. Feb. 21, 1905, in New York. **Cap.** authorized and issued, $1,000,000, 7% cum. pfd., and $2,000,000 common. **Shares:** preferred, $100; common, $10. Annual meeting in June in New York.

Dividends: preferred paid 3½% in 1905; 1906 to Sept. 1, 1910, inclusive, 7% per annum; none thereafter until April 15, 1915, when 3½% was paid. Common none. Preferred dividends, payable March 1 and Sept. 1, at 50 Broad St., New York. Last one, of 5% paid April 15, 1916.

Financial report for year ending Dec. 31, 1918, the last issued, shows a total deficit of $547,090, compared with a deficit of $379,397 in 1917.

Property: about 175 acres, which include a group of old producing silver-gold mines near Guanajuato, Mexico. Output under normal conditions, 13,000 tons per month. Ore reserves estimated January 1, 1919, at 70,000 tons.

Equipment: includes milling and cyanide plants. Ore milled in 1918 was 55,146 dry metric tons.

Operations continuous for 15 years, until suspended September, 1921, owing to increased taxation and general depletion of reserves. Total amount milled about 1,250,000 tons.

Pinguico Mines Co.

Controlled by the Guanajuato Dev. Co.; same officers; with W. B. Field, H. O. Marcy, Jr., A. G. Lund, J. A. Martin, H. C. Field and Frank G. Peck, directors.

Inc. Sept. 13, 1906, in New Jersey. **Cap.** authorized and outstanding, $1,000,000 6% cum. pfd. and $500,000 common, reduced from $2,000,000 and $5,000,000 respectively June 24, 1916. Shares: preferred $50; common, $1 par. Preferred stock has preference as to assets and is subject to call at par, and accrued dividends on any dividend date. Stock transferred at company's office. Annual meeting, first Friday after second Tuesday in June at 15 Exchange Place, Jersey City, N. J. Fiscal year ends December 31.

Dividends: preferred, 1907, to Oct., 1913, inclusive, 6% per annum; none reported since. Common, none. Preferred payable April and October 1 at 50 Broad St., New York.

Property: the Pinguico mine, 5 claims, 300 acres, covering 3,200' on the main Pinguico vein, near Guanajuato, Gto. **Ore:** silver-gold. **Development:** Pinguico shaft, 800' deep, and the Fortuna, 670' deep, with several miles of underground workings. **Equipment:** includes a 40-stamp mill and 250-ton cyanide plant.

Company has been developing the Esperanza mine at Santa Ana, held under lease and bond. The group consists of 197 acres on the mother lode, 2½ miles N. W. of Guanajuato. H. C. Field in charge.

Employs 250 men, normally.

GUANAJUATO REDUCTION & MINES CO., THE GUANAJUATO

Address: Columbus, Ohio. Mines and mills at Guanajuato, Gto., Mex.

Officers: C. L. Kurtz, pres., Columbus, Ohio; Wm. G. Moore, v. p.; Geo .D. Bounton, v. p., Philadelphia; C. J. Kurtz, sec.-treas.; with C. J. Schlachter, Wm. D. Sherrerd, Robt. T. Moore, Geo. W. Chase and L. O. Bailey, directors. W. G. Wheaton, auditor; H. P. Smith, gen. mgr. at Guanajuato; Louis S. Noble, cons. engr., August McDonald, mill supt.

Inc. 1904, in Colorado, as a consolidation of several silver and gold mines in the Guanajuato district. **Cap.** $75,000; $1 par. Stock transferred at company's office, Columbus. Empire Trust Co., New York, registrar. Annual meeting, first Tuesday in February, at Colorado Springs, Colo. Listed on New York Curb.

Bonds: authorized $3,000,000; outstanding, $2,800,000, first mortgage 6%, 20-year, $100, $500, and $1,000 gold bonds, dated July 1, 1904, due July 1, 1924; interest January 1 and July 1, at office of the trustee, Empire Trust Co., New York.

Bond interest was deferred January 1, 1915, and operations temporarily suspended in August, 1916, due to the revolution in Mexico and also to the inability to secure cyanide and other supplies.

The company was unable to convert its product into cash on account of the Mexican revolution and defaulted, July 1, 1914, interest on its first mortgage 20-year 6% bonds; this interest was paid in January, 1915. On February 1, 1919, interest was paid for the period July 1, 1914 to January 1, 1915.

Comparative Income Account, years ended December 31:

Year	Gross Earnings	Operating Expenses	Net Earnings	Bond Interest	Balance for year
1920.....	$1,285,048	$1,166,228	$118,820	$168,000	$49,180(b)
1919.....	1,618,567	1,227,157	391,410	168,000	223,410
1918.....	1,213,872	1,044,673	169,199	168,000	1,199
1917.....	1,214,145	1,043,940	170,205	168,000	2,205
1916.....	353,357	339,314	14,043	168,000	153,957(b)
1915.....	489,724	366,434	123,290	168,000	44,710(b)
1914.....	1,523,668(a)	1,361,720	161,948	168,000	6,052(b)
1913.....	1,149,176	839,674	309,502	168,000	141,502
1912.....	1,004,290	693,477	310,813	168,000	142,813
1911.....	930,280	648,247	282,033	168,000	114,033
1910.....	931,562	618,414	313,148	168,000	145,148

(a) Includes deduction of $64,191 for conversion of accounts from 2 to 1 ratio to U. S. currency. (b) Deficit.

Property: a group of famous bonanza silver mines in the Guanajuato district in which much of the ore is in the form of old stope-fills. Since 1918, La Luz group, embracing the San Pedro, Purisima, Rosario and Pili mines, has been acquired. Also, in late 1919, the Promontorio mine was leased on a 50c. royalty basis.

Development: consists quite largely of opening old workings, extensions in solid ground averaging about 10% of the total, which in 1920 was 6,674 meters. Work on the Promontorio which shows the extensions of the Garrapata orebody has not proved encouraging. On La Luz, a new 3-compartment shaft had reached 115 meters in April, 1921, and at the Pili mine a 4 meter vein of good ore grade was uncovered.

Operating results for 1918:

	Prod. tons	Silver, grams	Gold grams	Cost	Reserves Met. tons
Tepeyac—Valenciana	8,338	270.0	2.00	$3.59	19,950
Maravillas—Cata	18,842	225.0	1.64	2.76	38,700
Melado—San Miguel	27,363	244.0	2.20	2.79	30,580
Mellado—Kurtz	20,899	220.7	2.02	2.08	50,880
Mellado—Rayas	13,484	202.0	7.69	3.65	15,520
Mellado—Garrapata	35,137	199.3	3.33	2.06	77,515
Promontorio	4,754	194.7	3.90	2.67	.....
Dumps	87,473	153.9	1.36	0.41	483,143
Total	216,290				716,288

The reserves average 219 grams of silver and 2.55 of gold; there is also a probable tonnage of 234,225 with an average of 229 grams of silver and 2.27 of gold. La Luz group has no reserves as yet but its dumps will afford 249,000 metric tons averaging 177 grams of silver and 1.78 grams of gold.

Equipment: includes the Bustos 160-ton stamp and concentrating mill and Flores cyanide plant. Crushed ore is sent from the mill to the treatment works through 6,000′ of 8″ pipe.

In December, 1920, the San Pedro 20-stamp all sliming mill on the La Luz property was completed and was operating shortly thereafter; the capacity is 200 tons.

Production, year ending December 31:

Year	Tonnage	Silver grams	Gold, grams	Extraction, Silver, %	Extraction, Gold, %	Cost Mining per ton	Cost Milling per ton
1920	217,074	194.7	2.36	84.25	84.23	$2.74	$1.97
1919	217,965	198.6	2.55	84.08	83.13	2.75	1.96
1918	187,760	209.7	2.29	78.08	80.39	2.91	2.10
1917	.....	.....	....	.....	.....	.....	.....
1916	64,030	245.7	2.49	80.18	85.35	1.44	1.93

Beginning with April 1918, the Bustos mill has operated full capacity, and in spite of low silver prices, it is believed that it and the San Pedro should continue to run "under a modified operation as to ore sources."

GUERRERO MINING CO. **SONORA**

Was the Mexican incorporation of the **Victor Mining & Smelting Co.,** which owned 2 properties in Magdalena district, Sonora, Mexico, 10 miles S. W. of Cananea. Properties about one-half mile apart, contain 15 and 32 pertenencias, respectively.

GULF COPPER CO. **BAJA CALIFORNIA**

Former office: Phoenix, Ariz. Mine at Angeles Bay, Gulf of California, Mexico.

Cap. $1,000,000; shares $1 par. J. H. Baker, pres. and gen. mgr.; G. E. Anthony, mgr engr.; J. H. Louden, directors.

Property: 40 hectares, about 100 acres, at north end of Angeles bay, 140 miles N. W. from Guaymas and about 90 miles S. W. from Port Lobos. Claims show silicious schists cut by porphyry dikes and a vein running N. W., dipping at 45° and varying from 5 to 42' in width.

Ore: black oxide and sulphide of copper said to average 4.7% with trace of gold and silver.

Development: by tunnels with 1,363' workings, including winze sunk on vein 175'. Has shipped 300 tons, 25% picked ore, and has several thousand tons of low-grade ore on dump. Property considered promising if properly financed and handled. Presumably idle; no recent returns received.

HARRIS COPPER CO. SONORA

Sold its property, El Caridad group, to the Moctezuma Copper Co., of Phelps-Dodge Corp'n, February, 1916. Company has no assets.

HARTFORD MINING & MILLING CO. SONORA

Address at last accounts: Mark Wondess, Hermosillo, Sonora.

Property: a silver mine, 34 miles N. W. of Hermosillo.

Development: by over 3,000' of workings, opening milling and shipping ore.

Equipment: 20-ton plant using Hardinge mill and cyanide installation. No recent returns.

HELENA MINING CO. CHIHUAHUA

Address: A. M. Tenny, mgr., Villa Gonzalez, Chih.

Property: Las Cuevas mines, 25 hectares, in Bracha mountains, near Villa Gonzalez and near the Ruth and La Corona zinc-lead mines.

HERMOSA MINING CO. SINALOA

Address: 1102 Trust & Savings Bldg., Los Angeles, Calif. J. E. Minney, pres.; M. E. Alderman, sec.

Inc. 1906, in Calif. **Cap.** $1,000,000; $1 par; all issued.

Property: at Cosala, Sinaloa, contains free milling gold-silver ore. Reported developing.

HERMOSILLO COPPER CO. SONORA

Office: 914 Columbus Savings & Trust Bldg., Columbus, Ohio. **Operating office:** Aptdo. 98 Hermosillo, Sonora, Mexico.

Officers: J. L. Zimmerman, pres.; C. P. West, v. p.; F. E. Resler, sec.; H. W. Whitaker, treas., with A. J. Rushing, R. D. Wood, L. A. Clark, A. W. Pence, and E. C. Plyley, directors R. D. Wood, gen. mgr., and James Penman, supt.

Inc. Feb. 13, 1909, in Mexico. **Cap.** $1,500,000; shares $1 par; non-assessable; issued $1,047,267. Authorized bond issue, $200,000 of 7% convertible gold bonds, amount outstanding $85,860.

Property: about 1,300 acres, with 200 acres of mill and smelter sites, in the Hermosillo district, about 28 miles N. W. of Hermosillo, consists of 9 claims, reported to carry porphyry and lime cut by granite. The Picacho and Verde Grande have contact deposits in limestone, near igneous intrusives carrying oxidized ore giving assays of 6% copper, 8 oz. silver and $1 gold per ton. La Cobriza group and La Verde have contact deposits between granite and quartzite of 30' to 60' claimed width, traceable 7,000', carrying, auriferous and argentiferous copper ore said to assay 5.5 to 20% copper, with gangue of talcose limestone. Company reports 7 orebodies under development of 10 to 100' width, averaging 5.44% copper, 8.66 oz. silver, and 75c gold per ton.

Development: by 20 shafts and tunnels with over 7,000' of workings, reported to show over 200,000 tons of ore. Some shipments made carrying 20% copper, 30 oz. silver, and $1.25 gold per ton.

Equipment: includes a 100-ton Allis-Chalmers blast-furnace and several hunderd horse-power of boilers, 40-h. p. hoist, 6-drill air-compressor, a large churn-drill, 22-h. p. traction engine, boilers, oil engine, rock drills, etc. Smelter is 1½ miles from principal workings, consisting of large buildings, assay office, large machine and blacksmith shop, 3 large boilers in engine

room, coal and ore-bins and reservoirs holding thousands of barrels of water, and with an inexhaustible supply of good water.

A ranch of 25,000 acres lying between the mines and Hermosillo has been acquired for the timber and agricultural land, and the new road through this tract should shorten the haul to Hermosillo several miles.

No record of recent developments.

HIDALGO COPPER MINING & SMELTING CO. **HIDALGO**

Office: Avenida Juarez 15, City of Mexico D. F.

Mine office: Zimapan, Hidalgo, Mexico.

Officers: Sydney Ludlow, pres.; Ricardo T. Sobey, v. p.; R. A. Mills, sec.; Hedley Ludlow, treas.; preceding, with George A. Camphuis and W. H. Armstrong, directors. **Staff:** Hedley Ludlow, gen. mgr.; Jas. H. Armstrong, supt.; Plenio Lopez, engr.; Halarion Diaz, chemist.

Inc. Aug. 14, 1907, in Arizona. **Cap.** $2,000,000; shares $10 par, in $1,000,000 preferred and $1,000,000 common stock. Annual meeting, third Monday in August.

Property: the Concordia and Purissima mines, 500 acres, with a 500-acre millsite, said to carry copper ores, with small amounts of lead ore. Lands show monzonite-porphyry and limestone, with contact ore deposits. Copper ores are estimated by the company to average 2.8% copper and 800 grams silver per ton. The mines yield a great variety of ores, including oxides and carbonates, and sulphides of lead and copper.

Development: by shafts and tunnels, with a total of 3,000 meters of workings, estimated to show 50,000 tons of ore, with 20,000 tons blocked out for stoping.

Equipment: includes a small steam plant and 16 buildings. Company employed about 800 men at the mines and works when operating.

The Equitiva Smelter: the 50-ton smelter, at Zimapan, 5 miles from the mine, contains 2 duplicate 20-ton water jacketted blast furnaces, operated for copper matte and occasionally for lead. (See description by R. B. Brinsmade, M. & Sci. Press, Sept. 24, 1921). The smelter received ore by pack-train. Copper is smelted to a 20% matte that is sent to the Aguascalientes smelter. The lead ore from Nevada group of mines averaged 25% lead and 900 grams silver. Employs 250 men.

HIDALGO MINING CO. **CHIHUAHUA**

See Volume VIII.

HIGUERRAS, S. A.; LAS **NUEVO LEON**

Address: Thoe. Dupoyet, Cuauhtemoc 88, Monterrey, N. L., Mex.

IGNACIO RODRIQUEZ RAMOS, S. A.; COMPANIA MINERA CHI.

U. S. Office: Enrique F. Vasquez, mgr., Mills Bldg., El Paso, Tex. **Mexican address:** Hidalgo North 20, Saltillo, Coahuila, Mex.

Mine address: Almoloya, Chihuahua, Mex.; Salvador Narro, supt.

Officers: Jose Garcia Rodriquez, pres., Saltillo; Robt. H. Jeffrey, v. p.-gen. mgr., Saltillo.

Inc. 1903, in Mexico. **Cap.** P10,000,000; par P100. Listed on Mexico City Stock Exchange.

Property: the Cigarrero mine, 129 hectares, covering the mineral zone of the Sierra Almoloya. The geological conditions greatly resemble those at Santa Eulalia. Ore occurs in limestone, in lenses, one having a width of 70′ and length of 140′, ore said to average 5% copper, 25% lead, 6% zinc, 15 oz. silver and $8 gold per ton. Values are mainly in silver-lead ores, though chalcopyrite occurs as a by-product.

The mine is extensively developed to a depth of 300 meters, by an 800′ shaft and 2 main tunnels.

Equipment: includes 600-h. p. gas and electric power, with hoist and air compressor. A 3-stamp experimental mill is connected with the mine by a 4,000′ incline tram. A standard gauge railroad connects the mine with the N. P. R. at Baca. Employs 500 men.

INGUARAN COMPAGNIE D'. **MICHOACAN**

Address: Wm. d'Eichthal, pres., 56 Rue de Provence, Paris, France. Mine office: Inguaran, Ario, Michoacan, Mex.
office: Inguaran, Ario, Michoacan, Mex.
Louis Magar, Mexico City, agent.

Inc. Jan. 15, 1898, in France. **Cap.** 12,000,000 francs, shares 500 francs par. Is controlled by the French houses of Rothschild.

A considerable portion of the company's stock is owned by the Compagnie du Boleo. Property is said to have cost 1,500,000 pesos, and company reported to have expended about $8,000,000 thereon, which is undoubtedly an overestimate.

Property: 185 hectares, and a mineral zone of 5,000 additional hectares, in the Tacambaro district 70 miles north of the Balsas river, Michoacan, lying on the plateau of the volcano Jorullo, 1,500' above the plains.

Geology: the Inguaran mountain is traversed by a dike 2,000 to 3,000' wide, of fine-grained pink granite, traceable several miles across country. The granite rock is sprinkled with specks of chalcocite and chalcopyrite forming a disseminated, or so-called porphyry deposit whose payable ores occur in belts or bands, in the dike. Proved depth of the ore is about 300 meters, at which point it apparently cuts off.

Development: by a 2,500' tunnel and 2 main shafts, deepest 350', with levels opened at 80' intervals. Both ore and country rock are exceedingly firm, little timbering being required. Estimates of size and value of the ore-bodies vary greatly, but the best authorities estimate an average of 3.25% copper, with 2,000,000 to 3,000,000 metric tons of ore blocked out. The ore is not well adapted to wet concentration as the metallic sulphides are firmly interlocked with the granite minerals, but it is admirably adapted to treatment by froth flotation, and apparently could be put about 8 or 10 into 1.

The property has been idle several years and cannot become an important producer until rail connection is secured.

INTERNATIONAL CO-OPERATIVE HOLDING CO. **MEXICO**

Dead. Former offiec was at Las Cruces, New Mexico. See Vol. XIII.

INTERNATIONAL COPPER ORE CORPORATION **SONORA**

Office: 424 Scarrit Bldg., Kansas City, Mo. A. M. Conard, Nogales, Ariz., was president at last accounts. **Mine office:** Noria, Sonora, Mexico. Is the Mexican operating corporation of the **Sonora Copper Smelting Co.**

INTERNATIONAL COPPER ORE CORPORATION **SONORA**

Address: 1210 Washington Bldg., Los Angeles, Calif.
Leslie J. Webb, v. p.; E. C. Dicey, sec.

Inc. 1909 in Calif. **Cap.** $100,000; $100 par; 1,000 shares issued.

Property: an iron mine in Baja California.

INTERNATIONAL GOLD & COPPER MINING CO. **CHIHUAHUA**

J. C. Peterson, president at last account. Company took over lands formerly held by **International Cons. Smelting & Mining Co.**, known as the Utah mine, in Guaynopa canyon, near Guaynopa, Chih., Mex. Claimed by former owners to have a 90' vein, with an 8 to 12" pay-streak carrying high-grade chalcopyrite, assaving 5 to 8% copper, with good silver value. Mine has several short tunnels. Idle on account of revolution, but regarded unfavorably for other reasons. No recent returns secured and mine idle for several years.

INTERNATIONAL MINES DEVELOPMENT CO. **SONORA**

Eastern office: Room 1606, 20 Broad St., New York.

Officers: Max Muller, pres.; P. Schabarium, v. p.; N. S. Haughwout, sec.-treas.; above with Augustin Freese, H. J. Wendler, S. A. Josephi and C. F. O'Brien, directors. A. C. Barke, mgr.

Cap. $3,000,000; shares $1 par; $2,400,000 issued. Stock listed on New York Curb.

Property: the Santa Rita, Santa Gertrudis, Santa Ana and El Carmen mines, 160 acres in Sonora, Mexico, about 200 miles from Bisbee, Ariz. Company also reported to have a 5-year option on the Ash Peak mine near

Clifton, Arizona. The Mexican properties have been silver-gold producers in the past, but are undeveloped. The Santa Rita is an "antiqua," or old Spanish mine. It was worked by a 1,500' open-cut and numerous narrow drifts, etc. Seventeen adobe furnaces were kept in blast in the early times. The future of all the Mexican mines of this company, which are close together, lies in the treatment of large bodies of milling ore amenable to cyanidation.

INTERNATIONAL ORE & SMELTING CO., S. A. **COAHUILA**

Main office: 67 Rue Royale, Bruxelles, Belgium. **Mexican office:** Calle Cuauhtemoc 3, Saltillo, Mex.

Mine office: P. O. Box 136, Saltillo, Coahuila, Mexico. F. E. Salas, gen. mgr. and director general.

Cap. 6,000,000 f. Revenue about $1,500,000 annually.

Property: includes several zinc and lead-silver mines in different states of Mexico, principally in Coahuila.

Equipment: includes a zinc smelting plant at Saltillo. There are 2 oil-fired Belgian distillation furnaces of 300 retorts each.

ITALICA Y ANEXAS; CIA. MINERA **COAHUILA**

Address: Angelo Afostini a Hijos, Saltillo, Coahuila, Mex.

JALISCO; CIA MINERA DE **JALISCO**

Address: Amado Aguirre, mgr., Mexico City, Mex.

JESUS MARIA, S. A. NEGOCIACION MINERA DE **COAHUILA**

Property under lease to American Smelting & Refining Co., and operated through Sierra Majada Unit.

Office: 120 Broadway, New York.

Operating address: W. M. Drury, mgr. Mexican Dept., El Paso, Texas. **Works address:** W. B. Gates, supt., Sierra Majada, Coah., Mexico.

Ernesto Madero & Bro., of Saltillo, are heavily interested in company.

Property: the San Jose and Jesus Maria mines.

JESUS MARIA Y ANEXAS, CIA MIN. **SINALOA**

Address: Balboa Bldg., San Francisco. **Mine address:** San Jose de Gracia Sin., Mex.

Property: Jesus Maria and adjoining gold-silver mines in Sinaloa district.

Equipment: includes 20-stamp mill and K. & K. flotation unit. Gold and silver concentrates shipped to Selby, Calif., smelter.

JIMULCO MINING CO. **COAHUILA**

Address: care San Antonio Brewing Ass'n., San Antonio, Tex. **Mine address:** Otto, Coahuila, Mex.

Otto Wahrmund, pres.; Sidney B. Tyler, supt.

Inc. 1901 in Texas. **Cap.** $500,000; $50 par; increased March, 1906 to $1,000,000; $100 par. Dividends total $1,005,000. Last distribution in 1912.

Property: Reforma, San Juan, Esperanza and Defensa copper-silver mines, 56 pertenencias, carrying argentiferous azurite, malachite cuprite, chalcocite, bornite and chalcopyrite, oxidized ores predominating, as replacement deposits in limestone.

Development: by 500' main shaft and about 10 miles of workings. Has 5-mile narrow gauge railway line using steam equipment.

Former production figures given in the Copper Handbook, Volume XI. Presumably reopened in 1921. Employs 250 men when operating to capacity.

JUANITA MINING CO., S. A. **SONORA**

Office: Sellwood Bldg., Duluth, Minn. **Operating address:** Bisbee, Ariz.

Officers: Byron M. Pattison, v. p. and mgr.; Lemuel E. Shattuck, sec.-treas.

Property: about 1,000 hectares, known as the Juanita group, adjoining the Carnegie L. & Z. Co. property, 3 miles N. W. of Cananea, is traversed by several narrow fissure veins in volcanic tuff beds. These veins carry

small oreshoots with chalcopyrite, galena and sphalerite. No. 1 shaft is 220' deep and there also is a 75' shaft. Is an undeveloped prospect.

KEYSTONE MINING CO. **JALISCO**

Office: at last report at Shamokin, Penn. Is a reorganization of **Keystone Copper Smelter Co.**, of Philadelphia, and is the holding company for the **Mexicana Co.** Tapalpa district, Jalisco, Mexico. W. H. Childs, gen. mgr.

Property: about 100 hectares, in 5 groups, in Tapalpa, including the Mexicana, America and Palma groups; also timber rights to 50,000 acres of adjoining lands. Principal development is on La Mexicana group, 82 hectares, 15 miles west of Tapalpa, mine having a 200-metre crosscut tunnel, cutting 4 veins, with about 1 mile of workings. Veins are fissures in porphyry, averaging 5' width, carrying auriferous and argentiferous chalcopyrite, sphalerite and pyrite.

Equipment: includes steam and electric power and 30-ton mill. The entire plant was enlarged and remodeled and resumed operations in January, 1912. Presumably idle since 1915, owing to unsettled conditions in Mexico.

LA COBRIZA DE COBRE **SONORA**

Address: Rafael Elias, Cananea, Sonora, Mexico.

Property: 14 claims, adjoining Carnegie L. & Z. property on S. E. shows several veins in bedded volcanic tuffs with complex, silicious lead-copper-silver ore. Developed by 200' shaft with short drifts in ore.

LA COBRIZA MINING CO. **SONORA**

Described in Volume XIII. Property acquired by **Aztec Consolidated Mining Co.**, which see.

LA CRUZ UNITED QUICKSILVER MINE **GUERRERO**

Address: Estate of Manuel Romero-Rubio, Ciudad, Mexico, D. F.

Mine address: Jose Lewis, gen. mgr., Huitzuco, Guerrero, Mex.

Property: La Cruz quicksilver mine, at Huitzuco.

Equipment: includes steam power, compressors, etc. and a retorting plant. Employs 200 men.

LA EXPLOSICION MINING CO. **SONORA**

No information about this company has been obtained since 1917. See Vol. XIII.

LA FE MINING CO., LTD. **ZACATECAS**

Offices: Pinner's Hall, Austin Friars, London, E. C. 2, England; and Guadalupe, Zacatecas, Mexico.

Directors: H. Strakosch, chairman; J. P. Farrar, J. Kitchin, and C. T. Pott.

E. A. Strout, mgr.; Burral H. Ireland, engr., Guadalupe, Zac., Mex.

Inc. Dec. 12, 1911, in Great Britain. **Cap.** £600,000; shares £1 par; 525,000 issued. Company is controlled by the Union Corporation, Ltd. of South Africa. Statement for 1919 showed expenses in Mexico, £50 103 and £75,896 to date, in London; creditors and loans amounted to £265,029; cash £565; debtors £2,019.

Property: 95 hectares, at Guadalupe, covering 3,500' along strike of Le Centera vein, which carries silver, lead and gold.

Development: by 2 vertical and 1 inclined shaft blocking out 192,410 tons of ore averaging 14 oz. silver, 1.86% lead, and 60 cents gold per ton.

Equipment: complete with 30 heavy stamps, 6 tube-mills, and cyanide plant.

Mine closed down in 1914, but kept unwatered, was reopened in 1921.

LA FORTUNA MINING CO. **OAXACA**

Idle. **Mine office:** Apartado 21, Ocotlan, Oaxaca, Mexico.

Officers: C. E. Miller, pres.; Wm. H. Brown, 1st v. p.; E. D. Stimson, 2nd v. p.; Amos Tyree, sec.; W. H. Brown, treas., at last accounts.

Inc. 1906, in South Dakota. **Cap.** $250,000; shares $10 par; outstanding, $230,000.

Property: 30 hectares, the Treadwell group, 3 miles from Ocotlan,

shows a vertical fissure vein of 2 to 12′ width, cutting bedded andesite tuffs, leached and oxidized to depth of 300′.

Development: by a 400′ vertical shaft, with 700′ of workings, showing chalcopyrite, with quartz gangue, estimated by company to average 4.5% copper and 200 grams silver per metric ton. Some ore was shipped returning 14% copper and 600 grams, silver per metric ton.

Equipment: includes a 30-h. p. boiler, hoist and a small air-compressor for hammer drills.

Idle since 1912 owing to conditions in Mexico.

LA JARA GOLD MINES CO. — **TEPIC**

Idle and probably dead.

Office: W. P. Dunham, pres.; E. G. Thomas, v. p.; J. W. Dunham, sec.-treas.

Inc. in Maine. **Cap.** $3,000,000; shares $1 par; 2,500,000 issued.

Property: the old Natividad group of claims, 298 acres, at La Jara, Tepic, said to show large quartz veins in andesite carrying gold-silver ore. Mine was under development by tunnels until July, 1916, when conditions in Tepic became dangerous to Americans.

In 1917, company acquired an option on the Jim Crow-Imperial group of patented claims about 123 acres, in the Steeple Rock district, New Mexico, about 7 miles E. of Duncan, Ariz. Said to have made ore shipments in the past running from $22 to $500 a ton in gold and silver.

LA LEONA SILVER MINING CO. — **OAXACA**

Address: Mirabeau C. Towns, 3 Maiden Lane, New York; or Rickards Hermanos, Mexico City.

Property: 11 claims, 80 miles from City of Oaxaca. According to the "New York Curb" of August 24, 1918, Louis Roumagnac and associates, of the Tuxpam Star Oil Corporation scandal, advertised that they owned the claims and incorporated a company under the above title, and stated that whoever put money into it would get a fortune. The promoters simply held an option. Fairly large blocks of the $1,200,000 outstanding shares, $5 par, were sold at prices up to $1 a share. The bubble burst when a judgment was obtained by the real owners of mines—Rickards Hermanos of Mexico City.

LAMPAZOS SILVER MINES CO. — **SONORA**

The only data obtainable about this corporation was from George Graham Rice's "Industrial and Mining Age."

Office: formerly at 40 Exchange Place, New York; or the Registrar & Transfer Co., 900 Market St., Wilmington, Del.

Officers: at last accounts, H. J. Wendler, v. p.-gen. mgr.; I. H. Weinberg, sec.; with C. S. Herzig and J. J. Harper, directors. Judge H. D. Rummel, Charleston. W. Va., attorney.

Inc. Jan. 15, 1918, in Delaware. **Cap.** $3,000,000; $1 par; 2,000,000 issued.

Company has no property, having lost its option on the Lampazos mine, now owned by Max Muller, Epes Randolph estate and the Bank of Sonora. 443 acres, containing 17 mines, 4 of which have been developed. The mine is reported to have 200,000 tons of 30-oz. silver ore blocked out, with continuous bands of ore for 1,500 to 2,000′ that extend down to bottom of mine 750′ below surface. A 12-mile wagon road was constructed.

The Lampazos appears to be a good mine whose name has been clouded by scandalous promotion methods.

LANE-RINCON MINES, INC. — **MEXICO, D. F.**

Address: 20 Nassau St., New York City.

Officers: H. G. H. Tarr, pres.; D. D. Walton, v. p.; E. W. Stitt, Jr., sec.-treas.; Blamey Stevens, managing engineer.

Inc. 1911, in New Jersey. **Cap.** $3,000,000; all issued. Bonds authorized $500,000; all outstanding. Annual meeting, 2nd Wednesday in January.

Total profits to date given as $868.911, of which $415,000 was invested

in equipment. Last balance sheet shows assets of $1,498,000, not including a $600,000 claim against the Mexican government.

Property: the Rincon silver mines in district of Temascaltepec, Mexico, Mex., worked since 1790.

Development: by shafts to depth of 600'. Ore averages 50 oz. silver per ton and the bottom levels show same grade and width of ore as mined in upper levels. Reserves estimated by management, July, 1921, at 72,000 tons.

Equipment: partially destroyed by revolutionists in 1917, since when the mine has been idle. Bondholders plan refinancing.

LA REGINA MINING CO. **JALISCO**

Office: 2120 W. Tioga St., Philadelphia, Pa. **Mine office:** San Martin Hidalgo, Jalisco, Mexico.

Officers: Chester P. Ray, pres.; F. W. Schmidt, v. p.; A. W. Brackmeyer, sec.-treas.; M. J. Slattery, gen. mgr.; John P. Delaney, supt.

Inc. Nov. 1, 1909. **Cap.** $1,000,000; shares $1 par, as successor of Philadelphia Copper & Gold M. M. & Smelter Co. Debentures, $200,000 authorized; issued, $62,000.

Property: 73 hectares, including the San Vicente, La Perla, La Fe, La Concha, Ajax and other mines, shows veins of 3 to 25' width, carrying auriferous and slightly argentiferous chalcopyrite. The Ajax mine shows a 12' vein, estimated to average 4% copper, 2 oz. silver and $1.33 gold per ton.

Development: property as a whole has 8 shafts, of 100' average depth with a total of about 1,000' of workings, claimed to put in sight 125,000 tons of auriferous copper ore. Development in recent years has been confined to the gold-silver vein, said to show at depth of 115', ore averaging 2 oz. silver and 15 grams gold per ton.

Equipment: includes a steam hoist and air compressor, at the San Vicente group. The mill has a 25-ton Elspass mill, 25-ton experimental cyanide plant, Huntington mill and 3 Pachuca tanks. Idle on account of political disturbances in Mexico.

LA REINA DE PLATA, LTD. **CHIHUAHUA**

Address: G. H. Johnson, sec., Capel House, 62 New Broad St., London, E. C.

Cap. £30,000, in 6,000 pfd. and 24,000 ord. shares; £1 par.

Property: Santa Fe group, 16 hectares, in La Eulalia camp, Chihuahua, Mex., developed by 900' shaft.

Shipments to smelter at Avalas in September, 1921, said to run 30% lead and 406 oz. silver per ton.

LA REINA UNION MINING & REDUCTION CO. **SONORA**

Address: San Javier, Hermosillo, Sonora, Mexico.

Property: includes the Mimbres mine, said to show a fissure vein carrying lenses of complex lead-copper-sulphide ore with gold and silver.

Development: by shaft, cut a vein that assayed from 15 to 30 grams gold and 400 grams silver per ton.

Equipment: includes steam and electric power, and an air compressor. Idle for several years.

LAS CHISPAS EXTENSION MINING CO. **SONORA**

Address: Louis Burgonia, supt., Arizpe, Son., Mex.

Property: in Arizpe mining district, about 40 miles from Nacozari, Sonora.

Development: by shafts to 800' depth, where recent work has developed a 6½' vein of high grade ore.

Operations have been seriously handicapped since 1911 by revolutionary disturbances. In 1917, the mine was confiscated by the local government, and all developed ore extracted, before the mine was returned to the company. Shipments on company account were resumed in 1920.

LAS VIGAS MINING CO. **CHIHUAHUA**

Address: care Geo. E. Voorhees, Jr., Santa Barbara, Calif.

Mine at San Sostenes, Coyame, Iturbide, Chihuahua, Mex., consists

of 74 hectares, said to show upturned Cretaceous sandstones and shales with interbedded copper lodes, occuring as impregnations and replacements in sandstone. Four veins last under development are reported to average 7 to 12′ in width, and to give average returns of 7.5% copper and 3 oz. silver per ton, mainly from disseminated bornite and chalcopyrite, with occasional oxidized ores and native copper.

Development: by shafts of 61′, 98′, 125′ and 212′ with various levels; also 3 short tunnels. Workings estimated to develop 160,000 tons of ore.

Equipment: includes steam power, a hoist, and air compressor, and a 100-ton concentrator. Buildings include an office, store and 19 dwellings. Ore was hauled, 43 miles, to Las Trancas stations, by traction engine.

Reported under lease to **Cia. Minera Cuatro Senores, S. A.**

LAUGHLIN MINING CO. — **SONORA**

Address: W. C. Laughlin, or George Schroter, San Javier, Sonora, Mexico.

Property: Las Animas silver mine at San Javier, leased from the Wyman Mining Co., of Cleveland, Ohio. A leaching plant to handle 50 to 100 tons of ore a day was put in operation early in 1918.

No recent information.

LA UNION CONSOLIDATED COPPER CO. — **SONORA**

Address: C. B. Bell, Douglas, Ariz., owner.

Property: 660 acres, in Cerro Tordillo section of the Ajo mountains, W. of Fronteras, Sonora, Mexico, shows a 3′ to 20′ vein traceable a mile, that carries high-grade copper, gold, silver, zinc ore in a contact deposit in lime near an intrusion of porphyry.

Development: by 5,000′ of tunnels and shafts to depth of 500′. Shipments of 1,500 tons made 1914 returned 15% copper, 15 oz. silver and 0.1 oz. gold. The property was worked in 1882-86, acquired by present owner in 1906, and considerable work done in 1912-13-14. C. B. Bell plans resuming operations, 1922.

LLUVIA DEL ORO MINING CO. — **CHIHUAHUA**

Address: Rialto Bldg., St. Louis, Mo.

Is a close corporation, owned and controlled by B. F. Yoakum, John Scullin of St. Louis, Mo. and the estate of Jas. Campbell, A. J. Underwood, mgr.

Property: in the Andres del Rio Mtns., Chihuahua, Mexico, consists of the Lluvia del Oro gold mine, a mill, cyanide plant and hydro-electric plant. No data available.

LOMITA MINING CO., S. A. — **SONORA**

Is the Mexican operating company for Elenita Development Co., which holds the entire capital stock of the Lomita Co.

LOS HILOS MINE — **CHIHUAHUA**

Address: Felizardo Rodriguez, owner, M. de Ocampo, Rayon, Chih., Mexico.

Property: Los Hilos mine, at Ocampo, in Rayon district, Chihuahua, said to carry a vein 2½′ wide, assaying 60-80 grms. gold and 5 oz. silver. The adjoining San Timoteo mine shows a 10′ vein, averaging 6-8 oz. silver and 5 grms. gold.

Equipment: includes concentrator, 5-stamp mill, Wilfley table, etc., run by 30″ Pelton wheel.

LOS PLATANOS MINING CO. — **SINALOA**

Address: A. M. McDermott, president, 516 Grant Bldg., Los Angeles, Calif.

Mine has been idle several years, but company still intact and taxes paid. See Vol. XIII for description.

LOUISE MINING CO. — **SONORA**

Address: H. J. Wendler, mgr.; Buena Vista, Montezuma district, Sonora: and Charleston, W. Va.

Property: the Buena Vista mine. Development has proven a large

quantity of silver ore at a depth of 300'. **Equipment:** includes a one furnace smelter and 50-ton flotation plant.

LUCIA MINING CO. DURANGO

Office: 15 William St., New York. **Mine office:** Panuco de Coronado, San Juan del Rio, Durango, Mexico.

Officers: Wm. T. Read, pres H. M. Hubbard, v. p.; Myra B. Martin, sec.-treas. with De Witte M. Harms, directors.

Inc. 1900, in West Virginia. **Cap.** $25,000; shares $5 par. This company is controlled by the San Luis Mining Co. and its property is described under that title.

LUCKY TIGER COMBINATION GOLD MINING CO. SONORA

Office: O. E. McMullen, sec., 1012 Baltimore Ave., Kansas City, Mo. **Mine office:** Esqueda, Sonora, Mexico.

Officers: E. D. Fischer, pres.; L. R. Budrow, v. p.-gen. mgr.; W. A. Moses, v. p.; A. E. Mosier, v. p.; H. Vanderslice, treas.; G. M. Smith, asst. treas.; H. B. Duke, v. p.; John M. Kelley, v. p., with E. J. Street, J. T. McCormick, W. G. Catron, J. B. Kasselbaum and O. V. Dodge, directors.

Inc. March 16, 1903, in Arizona. **Cap.** 800,000 shares; $10 par; 715,337 shares issued. Annual meeting, third Monday in March. Company owns the entire capital stock of Tigre Mining Co., S. A., the Mexico operating company.

Financial Statement, years ending December 31:

Year	Revenue	Operating Charges	Operating Profit	Dividends	Current Assets	Current Liabilities
1920	$3,405,489	$1,870,011	$1,535,478	$1,323,373	$1,255,186	$139,705
1919	3,672,640	1,854,854	1,817,785	1,158,845	1,311,206	197,643
1918	2,636,810	1,351,539	1,251,583	786,871	768,363	205,746
1917	.....	.....	.....	422,049	.....	.....
1916	1,624,817	979,697	645,120	515,042	423,268	161,694

Dividends, paid since organization of the company:

	p. share	No.	Amount
*1921	$ .74	129-136	$ 529,349
1920	1.85	117-128	1,323,373
1919	1,62	105-116	1,158,845
1918	1.10	93-104	786,871
1917	.59	86- 92	422,049
1916	.72	77- 85	515,042
1915	.69	69- 76	493,582
1914	1.00	58- 68	715,337
1913	.63	46- 57	450,662
1912	.47	40- 45	336,208
1911	.50	30- 39	357,601
1910	.60	18- 29	429,000
1909	.10	6- 17	409,500
1908	..	1- 5	71,500
Total	.....	.....	$7,998,922

* To Oct. 1, 1921.

Tigre Mining Co., S. A.

L. R. Budrow, gen. mgr., Douglas, Ariz.

R. T. Nishler, mgr., El Tigre, Son., Mex.; Ernest J. Stanley, mine supt., W. A. Wasley, mill supt.

Property: El Tigre mine, 13 claims, 936 acres, at El Tigre, Montezuma district, Sonora, Mexico, contains veins of gold-silver-lead-copper ore cutting through rhyolite. Vein is from 3½-25' wide, proved for 4,000' in length,

and runs N.-S. with average dip of 65°. Geology fully described in M. & S. Press, Oct. 23, 1920.

Development: by 1,300′ incline shaft and 5,000′ tunnel, with over 15 miles of workings. Ore is mined mostly by overhand shrinkage, and electric haulage is employed underground. During 1920, work amounted to 11,217′; the main vein was opened for 1,000′ on the 9′ level, and averaged 50 oz. silver per ton. Good ore was also opened in the Kelley vein on the 5th level.

Equipment: includes electric power, 25-h. p. electric hoist, pump and 200-ton concentrating mill making an average extraction in 1920 of 96%. The mill treated 76,212 tons of ore and produced 6,748 tons concentrate averaging 2.78 oz. gold; 433.31 oz. silver; 3.9% copper; 14.05% lead. Costs were $4.48 for mining and $3.75 for milling.

Production: in 1920 was 77,454 tons, averaging .25 oz. gold; 40.1 oz. silver; 37% copper; 1.38% lead.

Company has been able to continue operations and shipments more or less regularly, notwithstanding disturbed conditions in Mexico during the past years.

MAGISTRAL, S. A.; NEGOCIACION MINERA DEL. ZACATECAS

Office and mine: Aptdo. 22, Zacatecas, Zacatecas, Mexico.

Company, a close corporation, is said to have paid for improvements from net earnings. Owns the Refugio de Magistral and San Roberto mines. See Vol. XIII.

No recent returns secured. Property idle owning to Mexican conditions.

MAGISTRAL AMECA, S. A., CIA. DE COBRE **JALISCO**

Mine office: Ameca, Jalisco, Mexico.

Officers: H. L. Percy, pres.-gen. mgr.; Fred M. Lyon, v. p.; Geo. C. B. Robinson, sec.-treas.; and H. N. Manington, directors.; Percy A. Babb, cons. engr.; G. E. McCormick, mine mgr.

Inc. 1908, in Mex. **Cap.** P 1,000,000; par P 100. Is the operating company, whose entire stock is held by the **Magistral Ameca Copper Co.**, incorporated. Annual meeting, second Wednesday in November.

Property: bought of **Las Moras Copper Co.**, for $100,000 by Patrick Clark, Jas. P. Harvey, H. L. Percy and Fred M. Lyon, the first named selling his quarter interest to his associates for $55,000.

Property: the Mina Magistral 74 pertenencias, 185 acres, on the Hacienda Hegira, 8 miles S. W. of Ameca, has veins in diorite that are cut by porphyry dikes. The veins occur on dike contacts and show outcrops of silicified rock with quartz stringers and hematite. The vein varies from 4 to 25′ in thickness and carries lenticular orebodies connected by mere films of quartz or fissures with wall rock impregnated with chalcopyrite. The Magistral ore shoot occurs where 3 veins intersect. The ore carries copper sulphides (chalcopyrite), and averages from 4 to 7% in copper with about $2 in combined gold and silver value.

Development: by 321′ shaft, and by tunnels with about 1 mile of openings, developing copper ground for width of 5 to 50′, said to assay 4 to 8% copper. The Magistral was worked many years ago for bluestone, used by neighboring mines in the process of treating silver-lead ores.

Equipment: includes two 80-h. p. high-pressure boilers and a 150-h. p. tandem compound engine, with hoist good for 500′, at the Magistral. The mines are connected with Ameca by a good wagon-road, 8 miles long, with a 1½% grade, built with the idea of using it for railway tracks in the future. The 125-ton concentrator includes a ball-mill and flotation plant.

Owing to disturbed conditions in Mexico, operations have been greatly interfered with. No recent returns securable. Employs 100 to 150 men normally.

MANHATTAN DEVELOPMENT CO. **SONORA**

Owns **Arnold Mining Co.** property near Santa Cruz, Sonora, Mexico.

MANHATTAN EXPLORATION CO. SONORA

Office: 52 Broadway, New York. **Mine:** at Hermosillo, Sonora, Mex. **Officers:** Grosvenor B. Clarkson, pres., A. H. McCarthy, v. p.; T. Addison Bell, sec.-treas.; with Wm. Tierney, directors.

Inc. Feb. 6, 1909, in Maine. **Cap.** $2,000,000; shares $100 par; $1,800,000 outstanding. Company is a close corporation.

Property: several valuable properties, near La Dura in the Yaqui River district, Central Sonora. Two of the properties, the Promontorios, silver-lead and the Mesita, copper-silver-lead ore, had just reached the shipping stage when the Mexican revolution stopped all operations, May, 1912. Company expects to resume operations as soon as country is once more safe.

MANTA MINING CO., LTD. CHIHUAHUA

Address: W. Pocock, 18 St. Swithin's Lane, London, E. C., England. **Mine address:** W. J. Deavitt, supt., Sta. Eulalia, Chih., Mex.

Inc. 1909. **Cap.** £1,000,000; £1 par; all issued.

Property: the Manta silver-lead mine at Santa Eulalia, Chihuahua, reported sold 1921 to **Fortuna Mines Co. of Mexico, Ltd.**, which see.

MAPIMI LEAD SMELTER DURANGO

Works address: Mapimi, Durango, Mexico.

Owned and operated as a custom smelter by **Cia. Minera de Penoles**, which see for details. Plant will eventually be consolidated with that at Torreon.

MARIA MINING CO. SONORA

Office: 516 Providence Bldg., Duluth, Minn.

Officers: Joseph Backus, pres., Virginia, Minn.; Jas. A. Butchart, sec.-treas.; with Thos. F. Brady, Martin Trewhella and Thos. A Armstrong, directors.

Cap. $500,000; shares $1 par.

Property: the Carmen mine, in Arizpe mining district, Sonora.

Ore: silver, gold, in veins in andesite and rhyolite.

Development: by shaft; greatest depth 350', with 3,000' of underground workings. Had been idle 4 years, owing to the revolution, but resumed work in February, 1917 and rich silver ore was extracted. On account of bandits work was again suspended.

MASCOTA COPPER CO. JALISCO

Supposedly dead. Mail returned from former address, Ameca, Jalisco, Mexico.

Officers: Chris. D. O'Brien, Sr., pres.; J. M. Bowler, v. p.; Byron J. Mosier, sec.-treas.; Chris D. O'Brien, Jr., gen. mgr., at last accounts.

Inc. June, 1908, in Arizona, as successor of Independence Mining & Smelting Co. **Cap.** $1,500,000; shares $1 par.

Lands: 46 hectares, said to include an antigua mine, in the Guachinango division of the Mascota district, 24 miles from the Mexican Central line. The claims show an 8' fissure vein in porphyry, said to be traceable about 2,000' and proved to depth of 486'. The ore is reported to average 5% copper, 7 oz. silver and 6 grams gold per ton.

Development: includes 300' shaft and 375' tunnel, with 4,825' of workings, estimated to show 40,000 tons of ore, with 28,000 tons blocked out for stoping.

Equipment: included 50-h. p. steam plant, with 3-drill air-compressor, a 25-ton wooden stamp-mill with 10 Allis-Chalmers gravity stamps, and a small concentrator, equipped with 2 Overstrom tables, vanner, 4 slime tables and a sizer. Operations suspended on account of revolution.

MATEHUALA SMELTER SAN LUIS POTOSI

Owned by National Metallurgical Co., a subsidiary of A. S. & R. Co.

Office: 120 Broadway, New York. **Operating address:** C. L. Baker, gen. mgr., El Paso Texas. **Works address:** Matehuala, San Luis Potosi, Mexico.

Is a copper smelter drawing ores from the nearby mines of Le Paz and Catorce. It is on the Mexican Central railway, has a complete plant including jaw-crusher, sampler, ore-bedding plant, 4 hand-fed blast-furnaces, total capacity of 400,000 tons annually, 3 cycloidal blowers giving 24-oz. blast pressure driven by 180 and 200-h. p. steam engines, 5 boilers, forehearths, slag-cars, electric locos for slag dump, generators, machine- shops. The plant turns out a matte averaging 45% copper which is sent to the Aguascalientes smelter for conversion. The smelter was idle in 1916, but was blown-in early in 1917, and operated nearly continuously since then.

MAZAPIL COPPER CO., LTD. ZACATECAS

Office: C. R. Darlington ,47 Peter St., Manchester, England. **Mine address:** Apartado 64, Saltillo, Coahuila, Mexico.

Directors: Alfred Crewdson, chairman; R. R. Crewdson, Col. Arthur Dugdale, W. A. R. Heaven, A. B. Mallinson, J. Ramsden, and J. W. Purcell. R. H. Jeffrey, mgr.; J. F. Allen, cons. engr:

Inc. February, 1891, and re-incorporated April 21, 1896, in Great Britain. **Cap.** £1,000,000; par £1; was originally £200,000 in £10 shares, but increased 1903 to £300,000 and in July, 1912 to £500,000, shares subdivided, and £140,830 transferred from reserve fund and 5 shares given as bonus for every old £10 share held. In Feb., 1920, changed to £1,000,000 and 100,000 given to shareholders as bonus. **Debentures:** £120,000 at 7%; £114,500 issued.

Dividends: 20% in 1910; 20% and a 5% bonus in 1914; 30% cash and 50% bonus in 1912; nothing 1913 to 1916; 5% in 1917; 7½% in 1918; 22½% in 1919; 20% bonus in shares, in 1920.

Company owns and operates the Coahuila and Zacatecas railway, running from Saltillo to Concepcion del Oro, 2 smelters and various mines, employing over 4,000 men normally. Operations were suspended June, 1913, by the Mexican revolution, but were partly resumed in March, 1917. Also owns a half interest in the New Sabinas Ltd., owning coal lands in Coahuila, Mexico.

Property: the Mazapil copper mines at Concepcion del Oro, Mazapil, Zac., including about 850 hectares of mineral land in State of Zacatecas. The Aranzazu and Cabrestante mines, carrying copper ores, are the most important; the San Elijio, Naranjera, Cajon, San Francisco and Protero mines, carrying silver-lead ores, and the Promontorio group, producing mainly fluxing ores. Copper ores occur in irregular masses, in limestone, near granite-porphyry contacts, and are opened by over 25 miles of workings.

Equipment: includes a 150-ton concentrating plant. The smelters are at Concepcion del Oro and Saltillo. The first named, of about 800 tons daily capacity, has 4 copper furnaces.

The Saltillo smelter, built 1906, has a lead plant of 300 tons daily capacity, and does a general custom business, as well as treating ores of the company. There are 3 blast-furnaces and 1 reverberatory furnace. Transportation is by 4 aerial trams. Two furnaces were blown in at the Saltillo plant in December, 1921.

Production: in 1918 was 5,320 metric tons copper, 4,250 metric tons lead, 1,005,000 oz. silver and 11,580 oz. gold; 1919 output estimated at 7,500,000 lb. copper. No later figures available.

Operations resumed, March, 1922, at mine and at the Saltillo smelter. Employs normally 3,000 men at mine and smelter.

MELCZER MINING CO. SONORA

See **Copete Consolidated Copper Co.**

MESA RICA GOLD CO. SONORA

Address: A. G. Frick, sec., Freeport, Ill.

Inc. 1905, in South Dakota. **Cap.** $3,000,000; $3 par; 700,000 issued to J. J. Smith, A. F. Tanner, and others of Chicago, the organizers.

Property: 415 acres, 40 miles E. from Sahuaripa, Sonora. About 3,000'

of development has been done, mainly on the surface. No work is being done, but taxes are paid and a caretaker is in charge.

MESQUITAL DE ORO MINE **JALISCO**

Address: J. E. Hunter & Co., El Paso, Texas.

Property: the Mesquital mine, was a famous bonanza producer, under bond to the Hunter Co. early 1922, and work resumed on vein parallel to bonanza lode.

METATES MINING CO. **SINALOA**

Address: 425 Grosse Bldg., Los Angeles, Calif.

Officers at last account: W. T. Bell, pres.; Ira D. McCoy, sec.

Inc. 1910 in Calif. **Cap.** $200,000; $1 par; 141,394 shares issued.

Property: 3,000 acres at Metates, (Mazatlan) Sinaloa, Mex., worked for silver ore.

MEXICANA; COMPANIA METALURGICA **MEXICO**

Offices: 82 Beaver St., New York, and 26, Ave. 15th de Septiembre, Mexico City, D. F.

Officers: Geo. Foster Peabody, pres.; D. C. Brown, 1st v. p.; C. J. Peabody, 2nd v. p.; R. E. Safford, sec., asst. treas., with H. H. Dean, G. F. Peabody, Wm. Mason Smith and Isaac Jackson, directors.

Donald O. Brown was appointed receiver for the company, March, 1921, in an equity suit brought by stockholders in the Montezuma Lead Co. Bondholders Committee: Rm. 1404, 52 William St., New York City.

Inc. 1890, in New Jersey. **Cap.** $4,000,000; shares $100 par; fully issued; in $1,000,000 cumulative 8% preferred stock, $1,250,000 guaranteed 6% second preferred stock, and $1,750,000 common stock.

Bonded debt $2,774,700 first gold 5s. dated July 1, 1901, due July 1, 1931; interest payable at the company's New York office. Coupon (principal may be registered) $1,000, and registered in multiples of $100, Guaranty Trust Co., New York, trustee. Authorized $3,000,000, of which $732,700 held alive in sinking fund. Subject to call at 110 and interest. Sinking fund, 2% per annum of amount outstanding; bonds so purchased being kept alive and the interest thereon added to the fund. Interest paid without deduction for normal income-tax. Guaranty Trust Co., New York, registrar.

Property: interests are extensive, including control of numerous subsidiary mining, transportation, and land companies, among the more important being the **Sombrerete Mining Co.**, and the **Mexican Lead Co.**, at Sombrerete, Zacatecas, Mex., the **Montezuma Lead Co., Alvarez Lead & Timber Co., Mexican Mineral Railway Co.**, and **Potosi & Rio Verde Railway Co.**

The **Veta Rica** mine, owned outright, is at Sierra Mojada, and is an important silver-lead producer. Development is by a 600' shaft.

Other important producers are the silver-copper mines at **Concepcion del Oro,** State of Zacatecas. The **San Pedro** and **San Pablo** mines at Diente in Coahuila, 12 miles from Monterrey, are also important producers of lead, and the mines of the San Pedro district at San Luis Potosi are heavy producers of silver, gold and lead ores, constituting the main supply of ore for the company's custom smelter at San Luis Potosi. Smelter has been operating since February, 1918.

At the Diente group, including the San Pedro, San Pablo, and Zaragosa mines, J. S. Carnaham, mgr., silver ore was originally discovered in caves in cliffs of hard blue limestone. It is found in so-called chimneys or pipes, the largest one being beneath a cave 150 meters wide and of same height. The orebodies extend from near the crest of the cliffs or 3,266' above the valleys, down to the deepest workings. The ore chimneys are connected by thin seams and stringers which are a guide in exploration work. The silver occurs in cerussite, changing to galena in depth. Mining is by panel slicing under mats of timber. (See Brinsmade, "Min. & Sci. Press," November 22, 1919.) Monthly production averaged 1,000 tons, but in December, 1919, ore extraction was suspended, though development continued.

Equipment at Diente: steam boilers, Frazer and Chalmers engine-driven Bullock generators, motor-driven compressor, Lidgerwood hoist, ventilating fans, machine-drills, 3-rail gravity surface tram 1,000 meters long, Hallidie single-rope aerial tram, and 2,200-meter aerial tram to loading-bins at rail.

The **San Luis Potosi smelter,** blown in February, 1918, treating 1,000 tons daily, includes 12 furnaces for the reduction of gold, silver and lead ores, and a special copper department of 100 tons daily capacity. The works have steam and electric power, and employ about 1,000 men. In addition, there has lately been completed the Carmen 250-ton cyanide plant for cyanidation of lower grade ores from the San Pedro mines.

The company is a large producer of lead and silver, with copper and gold, secured mainly as by-products, and is active and enterprising in the rejuvenation of old properties and the development of new mines. The low price of silver has seriously affected recent output and profits.

MEXICANA DESSARALLADORA DE MINAS **SONORA**

Address: C. N. Knutsen, mgr., Cumpas, Sonora, Mexico.

In May, 1919, it was reported that this company, headed by L. G. Cloud, had leased the San Nicholas silver mines from the Transvaal Co. The property is 15 miles west of Cumpas, in the Moctezuma district, and has been examined by W. H. Weed for the Transvaal Co.

Equipment: includes a 50-ton flotation plant yielding 2 tons of concentrate daily assaying 800 oz. silver, 80% lead, and 6% copper. Concentrate is sent to El Paso. Fifty men employed, at last account.

MEXICANA MINING CO. **JALISCO**

Was the operating subsidiary company of the **Keystone Mng. Co.,** of Shamokin, Pa., which see.

MEXICAN CORPORATION, LIMITED (THE) **ZACATECAS**

Offices: A. A. Kelsey, sec., 1 London Wall Bldgs, London, E. C. 2, England: 61 Broadway, New York; and Edificio La Mutua, 522, Mexico City.

Directors: F. W. Baker, R. T. Bayliss, Walter McDermott, F. A Govett, A. S. Elmore, Herbert Guedalla, J. A. Agnew, and Lord Brabourne. Consulting Engineer-gen. mgr., Hugh Rose.

Inc. July, 1919, in Great Britain. **Cap.** £1,000,000; increased to £1,400,000; £1 par; all allotted, of which £850,000 is held by Consolidated Gold Fields of South Africa, Consolidated Mines Selection Co., Central Mining Corporation, Imperial & Foreign Corporation, Lena Goldfields Co., Lake View Invest. Trust. and the Exploration Co., Limited, etc.

When the company was formed 25% of the capital stock was underwritten by the Camp Bird Co., 25% by Santa Gertrudis, and 15% of the capital, or 150,000 shares reserved for subscription by Santa Gertrudis shareholders. Additional shares accrued to Camp Bird, through the share holding in Santa Gertrudis.

Financial statement for year ending June 30, 1920, showed: total assets £700,555, which includes, advances to Mexican Corporation, S. A., £571,236; investments, £42,920; Union en Cuale option, £17,311; cash, £58,857; profit and loss, £5,691. The 1921 report showed: total assets £1,326,935, which includes investments. £95,130; Union en Cuale option, £28,792; advances to Mexican Corporation, £1,132,813; profit and loss, £38,427.

Debentures: £380,000 of 10%, 7-year notes, redeemable at 120% offered in Nov., 1920.

Company was organized to acquire an interest in the **Teziutlan Copper Co.,** the **Fresnillo Co.,** and a 22½% interest in the option of the Esperanza Co. on **La Union en Cuale** mine. A Mexican company, the **Mexican Corporation, S. A.,** was incorporated to operate these holdings. In Dec., 1921, company acquired the **Silla mines,** 60 miles E. of Mazatlan, Sin., Mex. The mine has 600,000 tons of sulphide ore blocked out that will assay 2.4% copper, $1.75 gold and silver, and 5.5% zinc, and diamond-drilling has revealed

additional ore. This ore needs concentration by flotation, followed by smelting.

Teziutlan Unit

Address: D. R. Thomas, mgr., Aurora, Puebla, Mex.

Property: a 25-year lease from Nov. 1919, on 2,500 acres at La Aurora, Puebla, Mex. Development in 1920-21, totaled 1,229′ in Cometa orebody. Also 10′ of ore opened in Volcan, or bottom level for 185′, averaging 3.3 oz. silver, 4.5% copper, 24% zinc.

Equipment: includes 300-ton flotation mill, hydro-electric plant, smelter, with two blast furnaces each of 400 tons daily capacity. The cost of operations from Nov. 1, 1919 to June 30, 1920, amounted to $140,360. The Mexican operating company gets 37½%, and the Teziutlan Copper Co., 62½% of the operating profit.

Production: the smelter treated 35,256 tons, valued at $547,326, or $15.52 per ton and containing 82.9 oz. gold, 58,451 oz. silver, and 2,199,692 lb. copper. The silver output was sold at an average of 22c. per ounce and copper at 18.4c. per lb.

See **Teziutlan Copper** in Volume XIII of this Handbook.

Fresnillo Unit.

S. N. Cook, mgr.; J. S. Butler, supt., Fresnillo, Zac., Mex.

Company acquired a 40% interest in the Fresnillo Co., at Fresnillo, Zacatecas, comprising the Proano or Fresnillo mine and a total of 733 acres mineral land. The Proano produced 150,000,000 ounces of silver from 1550 to 1873, when pumping expenses and low silver prices caused its shutdown. In 1919, there was 600,000 tons of tailing left, assaying 0.05 oz. gold and 3.2 oz. silver per ton, besides 3.5 oz. of mercury. Management estimates ore in the Cerro Proano, a small hill 300′ high and ¾ mile across, at 4,000,000 tons of 5.25 oz. silver ore that can be mined by the "glory hole" system, and 2,000,000 tons probable ore.

Development: to depth of 1,500′ with workings on 50 veins. Work in 1921 totaled 5,457′ mostly in preparation for glory hole workings of surface orebody.

Equipment: includes oil-fired Stirling boilers, steam turbines direct connected to 60-cycle, 2,300-volt alternating current generators, having a total normal capacity of 6,000 k. w., with 50% continuous overload rating; a 2,000-ton treatment plant is being constructed, consisting of 10-ton ore cars electric locomotives, one 30″ gyratory crusher, two 48″ horizontal and two 48″ vertical Symons disc-crushers; wet fine grinding to 75% through 200 mesh, will be done in six Marcy type rod mills, space being left for the addition of auxiliary tube mills and for concentration equipment, if found desirable latter on, especially in the treatment of sulphide ores: the finely ground pulp will flow to six Dorr type thickners, 60 ft. diameter, by 10 ft. deep, and thence to 13 agitators of a modified Dorr type, 40′ diameter by 25′ deep, after agitation, the pulp will pass to a Butter's type vacuum filter plant, the tailings therefrom being pumped to the impounding dams. Precipitation of metals will be by the Merrill zinc dust method, with the Crowe vacuum system. -Expenditures to June 30, 1921, total $559,856. Half of the new plant began operations in Aug., 1921, the balance in September.

Production: from Nov. 1, 1919 to June 30, 1920, 100,901 dry tons were treated, valued at $693,033 or $6.87 per ton and containing 531 oz. gold, and 390,744 oz. silver. Tailings treated amounted to $96,225 dry tons valued at $507,139, or $5.27 per ton, containing 428 oz. gold, 180,141 oz. silver, and $23,992 in mercury and copper.

MEXICAN CORPORATION, S. A. — **MEXICO**

The Mexican operating company of the Mexican Corporation, Ltd., which see.

MEXICAN EXPLORATION & MINING CO. — **SONORA**

Controlled by **Pacific Smelting & Mining Co.**

MEXICAN METALS CO. **SONORA**

Officers: Geo. E. Keith, pres.; Geo. H. Woodman, v. p.; Sumner M. Teele, sec.; Harold C. Keith, treas.; with Eldon B. Keith, directors.

Inc. Aug., 1916, in Arizona. **Cap.** $5,000,000; shares $5 par; assessable; 538,824 issued; $2.55 paid.

Company succeeded the **Arizpe Mines Co.** and holds title to property through the Moctezuma-Arizpe Development Co., legalized in Mexico. Fully described in Vol. XI, Copper Handbook.

Old Colony Trust Co., registrar; Federal Trust Co., transfer agt. Annual meeting, second Monday in September. Listed on Boston Curb.

Mexican property near Cananea, Sonora, Mexico, closed down in autumn of 1914. After geological survey of property made by J. M. Little, checked by A. H. Rogers of Boston, and Franklin W. Smith, of Bisbee, it was decided to sell or abandon such property as directors considered unworthy and to purchase new properties.

Company took a 5-year lease in 1917 on the Ajax property of the Colburn-Ajax Gold Mng. Co. at Cripple Creek, Colo. No record of recent work obtainable.

MEXICAN MINES CO. **SINALOA**

Address: Lewis Bradbury, pres., 545 Bradbury Bldg., Los Angeles, Cal.

Inc. 1910 in Calif. **Cap.** $500,000; $1 par.

Property: a silver mine at Rosario, Sinaloa, Mex.

MEXICAN NATIONAL RESOURCES CO. **MEXICO**

Address: E. B. Bunte, 1277 Downing St., Denver, Colo.

Inc. May, 1921, in San Antonio, Texas.

Property: company reported to have acquired several properties in Mexico, but details not obtainable.

MEXICO MINES OF EL ORO, LTD. **MEXICO, D. F.**

Offices: 2 St. Helen's Place, London, E. C. 3, England; 18 Rue Chaveau-Lagarde, Paris, France; and El Oro, Mexico.

Directors: Sir E. M. Clarke, Don Guillermo de Landa y Escandon, F. J. Fournier, H. Higgins, and Sir R. J. Price. F. L. Allan, resident manager, El Oro, Mexico; J. Vincent, asst. mgr.; C. R. Pinder, cons. engr.

Reg. Oct. 14, 1904, in England. **Cap.** £210,000; £1 par; increased from £180,000 in July, 1914; 29,942 shares were issued in Dec., 1920, to acquire 93,500 shares of the Compania Exploradora de Minas de Mexico. Also, 60,058 new £1 shares were offered at £5 10s. each.

Financial statement for year ended June 30, 1919 showed an operating profit of £196,223; dividends, absorbed £189,000, leaving balance £186,688. Report for 1920 showed income from ore sales, £533,808; profit, £196,579; dividends, £189,000; and in 1921, income was £455,999; net profit £91,747; dividends amounted to £126,000; balance forward, £160,015.

Dividends, including bonuses:

Year	Year	Year
1907-'08.....5s.	1912-'13.....18s.	1917-'18.....19s.
1908-'09.....12s. 6d	1913-'14.....18s.	1918-'19.....18s.
1909-'10.....14s.	1914-'15..... nil	1919-'20.....18s.
1910-'11.....16s.	1915-'16..... nil	1920-'21..... 4s.
1911-'12.....16s.	1916-'17.....11s.	

Property: company was formed to acquire by agreement with the Exploration Co., Ltd. 26.63 hectares (65.79 acres), total with surface rights, 75 acres, adjoining the Esperanza mine, near El Oro, Mexico. The land, formerly held by the Mexico Venture Syndicate, Ltd., includes the Mexico gold and silver mine. The properties of the Compania Minera de Oro Nalon were acquired in January, 1915, for 30,000 fully paid shares. The ore is gold and silver bearing occurring in fissure veins.

Development: by the North shaft 1,574' deep, and the South shaft, 1,687.

Ore reserves: on June 30, 1917, were estimated at 457,100 tons, $11.89 gold, and 8 oz. silver; in 1918 there were 416,200 tons; 379,000 tons in 1919, and 350,100 tons in 1920, averaging $10.92 gold and 8.82 oz. silver; in 1921, 311,430 tons averaging $11.23 gold and 9.83 oz. silver per ton.

Equipment: includes a 40-stamp mill, 7 tube mills, and a cyanide plant.

Production:

Year	Tons Milled	Total Yield	Gold	Silver, oz.
1920-21.....	125,185	£455,999	$1,426,291	973,162
1919-20.....	138,710	533,808	1,435,381	972,934

This famous and efficiently managed property appears to have passed the zenith of its career.

Exploradora De Minas De Mexico, S. A., Cia.

Subsidiary of Mexico Mines of El Oro, Ltd.

Inc. 1920, in Mexico. **Cap.** 2,000,000 pesos; 10 pesos par; 1,065,000 shares owned by Mex. Mines. Organized to examine and develop promising properties in Mexico. Two mines were under development at last account.

MEXICO MINING, REFINING & EXPLORATION CO. SONORA

Address: W. T. Calderwood, pres., 840½ S. Berendo St. or F. C. Lamb, sec.-treas., 1432 W. 28th St., Los Angeles, Calif.

Officers: Wm. T. Calderwood, pres. and gen. mgr.; Dr. Chas. B. Nichols, v. p.; F. C. Lamb, sec.-treas.; preceding with E. B. Lovie, C. A. Neil, L. A. Davis and A. A. Snodgrass, directors. B. A. Ogden, supt.; A. Wainwright, engineer.

Inc. 1905, in Arizona. **Cap.** $5,000,000; $1 par. Annual meeting, second Monday in April, at Nogales, Ariz.

Property: El Creston de Cobre mine, 35 miles west of Hermosillo, an antigua dating from the eighteenth century. The property carries orebodies, 2 of which are said to be 30′ wide, and traceable 1,400′, with ores averaging 4% copper, 8 oz. silver and $1 gold per ton.

Development: by 8 shafts, deepest 300′, and 4 tunnels with 1,000′ of workings estimated by the company to show 100,000 tons of ore.

Le Cobriza mine ,at Sayopa, is said to show a 16′ vein with a 7′ paystreak, carrying copper-silver ore.

Equipment: includes 235-h. p. steam plant, 2 hoists, 6-drill air compressor, and 20-ton mill. Company was planning to erect a 100-ton smelter, but revolution interfered. No recent information secured.

MICHOACAN RAILWAY & MINING CO., LTD. MICHOACAN

Address: G. A. Mitchell & Co., secretaries, 17 Ironmonger Lane, London, E. C. 2, England. **Mine office:** Angangueo, Michoacan, Mexico. **Works office:** Ocampo, Zitacuaro, Michoacan, Mexico.

Directors: G. A. Mitchell, chairman; C. H. Potter, W. J. H. Moll, and T. B. R. Scott.

Inc. Jan. 29, 1889, in Great Britain. **Cap.** £105,364; £1 par; in £21,015 A non-cumulative 7% preference shares, £12,190 B non-cumulative 7% preference shares, £70,745 ordinary shares, and £1,414 founders' shares; all issued save 6,094 ordinary shares. Total capital issued is £99,370. Debentures; the prior lien debentures were paid off. There are outstanding £51,500 (the balance of £103,000) 4% mortgage debentures due July 1, 1930, repayable at a preminum of 50% at any time before that date. All arrears of interest up to July 1, 1920 were cancelled by the debenture holders. The railway rights originally held have been disposed of to the Michoacan & Pacific Railway Co., in which the company has a £60,000 share interest in addition to £18,600 bonds held.

Income during 1917 was £7,820, of which £807 was profit, after paying £5,475 for interest. Assets, consisting of investments, securities stores, advances, rental accrued, etc., totaled £145,960 at end of 1917. Against this were debentures, interest, and creditors of £218,574.

Property: 537 hectares known as the Anganueo silver mines, opened by

tunnels and variously reported to have 14 to 30 kilometers of workings. Mine was leased, 1909, for 10 years, to the American Smelting & Refining Co., and this lease has been extended until July, 1936, at a minimum annual rent of $50,000 (Mexican) plus half the net profits.

Conditions in Mexico have improved and the mines are now being operated by the A. S. & R. Co. The government operates the railway in a limited way, but pays nothing to the owners.

MINA MEXICO MINING CO. SONORA

Out of business. Succeeded by **Compania de Minas de Mexico, S. A.**

MINAS DE MEXICO, COMPANIA DE SONORA

Office: Mina Mexico, Sonora, Mexico.

Officers: E. F. Bryant, pres.-treas.; E. P. Ryan, v. p.; J. M. Gandara, sec.

Property: the copper mine formerly worked by the Mina Mexico Mining Co. at Mina Mexico, Sahuaripa district, Sonora, Mex.

Equipment: includes a power plant, small mill and smelting plant. Property has been in charge of caretaker for several years, but will be operated when Yaqui River branch of the Southern Pacific has been rebuilt.

MINERA CONSOLIDA LOS AZTECAS, S. A., COMPANIA SONORA

Controlled by **Aztec Consolidated Mining Co.**, which see.

Inc. in Mexico. **Cap.** 10,000 pesos; 1 pesos; par; 9,997 held by Aztec Cons. M. Co. Company holds title to Mina Verde and La Polka mines.

MINERALES Y METALES, COMPANIA DE MEXICO

Subsidiary of American Metal Co., Ltd.

Office: 61 Broadway, New York. Heath M. Steele, gen. mgr., Monterey, N. L.

Cap. $2,500,000; increased from $125,000 in 1917; par $100 (Mex currency). A. M. Co. owns entire share capital.

Company is practically a holding company for its subsidiary, **Cia. Minera de Penoles, S. A.**, to which (in 1920) it sold all mines, reduction works and railroads, for 180,000 Penoles shares, Minerales retains only certain real estate holdings and leases. The latter includes 6,710 acres of oil-land in the State of Vera Cruz, adjacent to producing areas.

MINES CO. OF AMERICA CHIHUAHUA

Fully described in Vol. XIII. Succeeded by **Dolores Esperanza Corporation**, which see.

MINNEAPOLIS COPPER CO. SONORA

Mine address: Cumpas, via Nacozari, Sonora, Mexico.

Officers: J. W. Christy, pres.; James Thompson, sec.; F. A. Guice, gen. mgr.

Inc. June, 1906, in South Dakota. **Cap.** $1,000,000; shares, $10 par; also inc. in Mexico as Minneapolis Copper Co., S. A., the South Dakota corporation being a holding company. Is operated in the United States under the title of Minneapolis Copper Development Co., the reason for which has not been explained.

Property: 277 hectares, about 30 miles S. E. of Cumpas. Property carries several fissure veins, in andesite, with N. E. strike, of which 4, under development, are of 5' to 8' estimated average width, carrying tetrahedrite, estimated by company to average 10% copper, with traces of lead and zinc, 5 to 40 oz. silver, and $1 and upwards in gold, with occasional very high assays.

Development: the Archipelago mine, the principal property, has a 250' incline shaft, and the mine as a whole has about 8,000' of workings, mostly in ore.

Equipment: includes a 35-h. p. gasoline hoist and 5 buildings. There is also a 75-ton smelter, built in 1912. Transportation is by wagon-road to Cumpas, freight being carried in two 90-h. p. gaso-electric trucks.

Operated under lease, 1917, by Samuel E. Greenidge, of Douglas, Arizona. No later returns received.

MIRASOL; COMPANIA MINERA DEL **CHIHUAHUA**

Address: E. P. Ryan, gen. mgr., El Paso, Tex. **Mine address:** Eduardo W. Enriquez, gen. supt., Cusihuiriachic, Chihuahua. E. F. Russell, mill supt. **Officers:** H. L. Hollis, pres., 1025 Peoples Gas Bldg., Chicago, Ill.; J. M. Gandara, sec.

Operated as a close corporation. **Inc.** in Mexico, 1918. **Cap.** P 50,000; par P 1.

Property: the Promontorio mine at Cusihuiriachic, contains siliceous lead-silver-copper ore. Developed by 3 shafts.

Equipment: 600-h. p. steam-electric power, compressor. **Mill:** 200-ton concentration plant with crushers, rolls, 2 tube mills, ball mill and flotation plant. Employs 550 men.

MOCTEZUMA COPPER CO. **SONORA**

Fully described under title of **Phelps Dodge Corporation, U. S.**

H. T. Hamilton, mgr.; Frank Ayer, supt., Nacozari, Son., Mex.

MOCTEZUMA Y ANEXAS; CIA. MIN. **TAMAULIPAS**

Address: M. Barreda, mgr., San Nicolas, Tamaulipas, Mex.

MOLOLOA MINING CO., LTD. **JALISCO**

Controlled by Makeever Bros. Rm. 1210, 170 Broadway, New York City.

Address: Hostotipaquillo, Jalisco, Mexico.

Officers: Sanford Makeever, pres.; M. M. Makeever, sec.; W. M. Mathews, treas. and gen. mgr.; Edward Fenley, supt., at last accounts.

Inc. 1908, in Canada. **Cap.** $250,000.

Property: the Mololoa gold-silver mine, 130 hectares, includes antiguas opened by the Spaniards in the 16th century, reopened in 1904. Several fissure veins in andesite carrying gold-silver ore were worked in 1914, and shipments made to the El Favor mill.

Development: by Mololoa tunnel to depth of 800′. In 1919 the Soledad shoot of the Mololoa mine was said to show silver ore which, on No. 6 level, beyond the fault, was 12′ wide and assayed $38.50 per ton. The ore carries so little manganese that cyanidation will extract 85% of the silver.

MONJARAS MINING CO. **NAYARIT**

Office: H. Chester Johnson, sec. 1535 Chestnut St., Philadelphia, Pa. **Officers:** Judge Wescott, pres., Trenton, N. J.

Inc. in 1919. **Cap.** $2,500,000.

Property: nearly 100 acres; 10 kilometers south of Ixtlan del Rio, Nayarit, the new State of Mexico. **Geology:** fissure veins traverse granitoid rocks, porphyry and limestone.

Development: by adits or tunnels. High-grade shipping ore has been opened. Equipment: mine cars, tracks, houses for officers and miners.

Property taken over by **Humboldt Mining Co.**

MONTANA de MANGANESO; MINAS **SONORA**

Address: Aurelio de Leon, mgr., Apto. 4618, Mexico City, Mex.

MONTERREY LEAD SMELTER **NUEVO LEON**

Owned by **American Smelting & Refining Co.**, which see.

Office: 120 Broadway, New York. **Operating address:** C. L. Baker, gen. mgr., 1112 Mills Bldg., El Paso, Texas. **Works address:** L. B. Harrison, supt., Monterey, Nuevo Leon, Mexico.

Has an annual capacity of 410,000 tons, or 1,500 tons a day.

MONTEREY MINING, SMELTING & REFINING CO., S. A. **N. L.**

(Compania Minera, Fundidora y Afinadora, S. A.) Address: Monterey, Nuevo Leon, Mex. Earl F. Salisbury, gen. mgr.

Cap. $8,000,000; $100 par. Capital stock is to be reduced to $3,000,000 (Mex.) upon final payment for smelter.

Property: includes the **Ocampo** mine at Cuatro Cienegas and **Santa Elena** mine, at Mineral de la Mula, Coahuila, carrying gold, copper and lead ores; **Lepanto** silver-lead mine at Naica, Chih.; **Arzate** silver-gold mine at Panuco, Dgo.; **El Caballo** silver-lead mine at Sta. Barbara, Chih.; **San Juan** silver-lead mine at Villa Garcia, N. L., and **La Puerta** silver mine at Pueblo Nuevo, Dgo.

The smelter and refining plant formerly operated by the company has been sold to the Cia. de Minerales y Metales, S. A., a subsidiary of the ?American Metal Co., Ltd.; later turned over to Cia. Minera de Penoles (q. v.), a subsidiary of Minerales y Metales.

MONTERREY, S. A.; CIA. FUND. FIERRO Y ACESO DE **N. L.**

Monterey Iron & Steel Co.; **New York address:** Wm. G. Moler, agt., 5 Beekman St.

Works address: F. F. de Sachico, Monterey, N. L., Mexico. **Main office:** Apartado 243, Ciudad Mexico, D. F., Mex.

Officers: Adolfo Prieto, pres.; Manuel Garza Guerra, v. p. **Staff:** Roberts Gayol, gen. mgr., Monterey; Ramon Yarza, works mgr., Monterey; A. G. Hartenstein, gen. supt., Monterey.

Inc. in Mexico, 1900. **Cap.** P. 10,000,000.

Property: in addition to having large iron and steel works, company owns the property known as **Iron Mountain** near Durango, about 1⅓ miles long by ⅓ mile wide and 200 to 400′ high. Conservative estimates place reserves at 360,000,000 tons of specular hematite and magnetite, carrying 60% iron. The ore is generally hard or massive.

Also the Cinco de Mayo iron mines in Coahuila, containing magnetite and hematite ore.

Smelter: 300-ton blast furnace, with full equipment for steel making; also bolt and nut factory, wire mill and wrought iron pipe works, etc. Employs 2,000 men.

MONTEZUMA LEAD C.O **CHIHUAHUA**

(Subsidiary of **Mexican Metallugical Co.**, which see)

Address: 82 Beaver St., New York.

Mine address: Santa Barbara, Chih.; R. G. Dufourcq, supt.

Property: the Alejandria mine and 500-ton concentration plant. Employs 250 men.

MORELOS DE ORO MINING CO. **GUANAJUATO**

Address: 28, Avenida Republic del Salvador, Mexico, D. F., Mex.

Mine address: Francisco Antunez, mgr., Guanajuato, Gto., Mex.

Property: the Morelos silver mine, developed by tunnels, but not productive. Employs 50-75 men.

NACOZARI CONSOLIDATED COPPER CO. **SONORA**

Controls the Tharsis-York Co., which see.

Office: First National Bank Bldg., or P. O. Box 1074, Douglas, Ariz. **Mine office:** Pilares de Nacozari, Sonora, Mexico.

Officers: John G. Alexander, pres.-gen. mgr.; L. M. Williams, v. p.; B. R. Russell, sec.; Roy Hiatt, treas.; with L. E. Hoover and R. C. Heath, directors. Fred Alexander, mill supt.; George Motz, mine supt. and purch. agt.

Inc. July, 1907, in Arizona. **Cap.** $6,000,000; $5 par; increased Feb., 1919, from $3,000,000; 1,048,729 issued; 151,271 shares in treasury, November 1, 1920. Annual meeting, second Monday in November.

Property: 17 claims, 502 acres, in 3 contiguous groups, adjoining the Pilares mine of the Moctezuma Copper Co. on the E. and S. The Galera tract shows andesite and brecciated rhyolite cut by several large quartz veins containing copper lead and zinc sulphides, with gold-silver values. The Tharsis-York or Central group was acquired by the company in December, 1918, by purchase of a majority of the Tharsis-York stock. This land, with that of the Copper King group, to the east, contains a big outcrop or red "reef" 600′ wide, of brecciated silicious vein-matter, which is

regarded by the Nacozari Cons. management as an extension of the Pilares deposit. In 1920, company acquired an additional 231 acres, including the Sinaloa and Jumbo groups in the same district.

Development: by a main crosscut tunnel to cut the Pilares reef at a depth of 600'. This tunnel at 4,000' from portal cut a diabase dike forming south wall of Pilares lode. At this point diverging drifts were driven; one to the N. W., a total of 702', and the other to the N. E., a total distance of 634'. The N. W. drift has exposed a partially brecciated formation with steadily increasing pyrites of copper and iron, with some tetrahedrite, for a distance of 300 or 400', and indications are that an additional 100' will develop commercial, copper-silver milling ore in large quantities. Total development to date amounts to approximately 12,000'. Total development for past year ending Nov. 1, 1920, amounts to 2,184'.

The San Pedro claims of the Moctezuma Copper Company, have been leased to this company and a drainage-tunnel is being driven to connect with the San Pablo shaft.

Ore reserves: reported to be 15,000 tons of $35 ore; 60,000 tons of $20 ore; and about 500,000 tons of $10 to $12 ore.

Equipment: includes compressor, air drills, 400-h. p. steam engine, boilers, a 200-ton concentrator with flotation unit, mine cars, blacksmith shop and necessary buildings. Company plans erection of a 200-ton smelter.

Production: 28 carload shipments of high grade silver, lead and copper ore have been made to the smelter, netting the company as high as $191 per ton after deducting freight and smelting charges. One shipment contained 325 oz. per ton in silver.

Reported on by H. C. Beauchamp.

NAICAS S. A.; CIA MINERA DE **CHINUAHUA**

Reported reorganized, Sept. 1921, as **Compania Minera de Concha, S. A.**, which see.

A 40% interest in the Naica company is owned by the Cia. Minera de Penoles, a subsidiary of the American Metal, Ltd. Lic Jose Estrada Otamendi, pres.; Jose Bovro, cons. engr.

Property: a large group of properties that includes the Maravillas mine at Naica, Chihuahua, E, of Jimenez, discovered in 1896 by Don Santiago Stoppelli and returned to his heirs by a decision of the Supreme Court of Mexico in 1921. Is a well known producer of lead carbonate ore carrying 500-600 grams of silver per ton.

Equipment: includes 250-h. p. gas engine, compressor, 30 k. m. narrow gauge railroad connecting mine with Concho station, 27 cars and 5 engines.

Reserves: 200,000 tons of high grade and 100,000 tons of low grade ore

Production: total to 1921, 276,129 tons. In 1922, about 4,000 tons monthly.

Employs 500 to 600 men.

NATIONAL METALLURGICAL CO. **SAN LUIS POTOSI**

The Mexican title of which is Cia. Metalurgica Nacional, is a subsidiary of the American Smelting and Refining Co.

Office: 120 Broadway, New York. **Operating addresses:** W. M. Drury, mgr., Mexican mng. dept.; C. L. Baker, gen. mgr., Mexican smelter dept.; both El Paso, Texas. **Mine address:** S. H. Sherman, Charcas, S. L. P., Mexico. Smelter address: R. T. Wilder, supt., Matehuala, S. L. P., Mexico.

Company owns and operates the Tiro General and Dolores mines and Matehuala smelter, which see.

NATIONAL MINES & SMELTER CO. **DURANGO**

Office: Magee Bldg., Pittsburgh, Pa. **Mine office:** Magistral, Durango, Mexico.

Officers: S. H. McKee, pres.; Wm. L. Curry, v. p.; John S. Eberman, sec.-treas.; Renald Ailes, financial agt.; E. A. Kennedy, supt.; R. W. Stiler, mgr.

Inc. 1911. **Cap.** $2,500,000; issued, 1,700,000 shares. Authorized $400,-

000 collateral income bond issue; issued, $375,000. Company owns all the stock of the Santa Maria del Oro Mines Co., which company purchased property of the Lustre Mining & Smelting Co. from old stockholders, paying for same in stock and bonds of the National Mines & Smelters Co.

Property: the Magistral and Cocinera mines, 32 claims, 441 hectares, 1,089 acres of mineral lands, 397 hectares of mill and smelter sites, besides miscellaneous lands and leasehold timber lands. The Magistral mine is developed by 3 tunnels and 9 shafts and has a large body of slightly cupriferous pyrite with quartz and limestone gangue carrying 0.5 to 5% copper, probably averaging under 1% copper, 1oz. silver and 15 to 20 grams gold per metric ton.

The Cocinera mine developed an ore-shoot, 1,000' long, 15' wide and said to average $10 gold and copper with a little silver. Depth over 600'.

Ore reserves: in this and the Azurite mines are estimated by the management at 190,000 tons, developed in new ground since 1911. The old company claimed reserves of 185,000 tons in other and entirely distinct orebodies, in 1910.

Equipment: is complete including a central power plant having two 360-h. p. and two 350-h. p. gas engines, one 200-h. p. and three 400-h. p. gas producers, 2,300-volt 3-phase generator, two 6-drill air-compressors and 10 hoists of 100 to 300-h. p. The 40-stamp mill, 750-lb. heads, has Huntington mills, 1 ball-mill and 10 Frue vanners.

The smelter has 6 blast-furnaces, including two 150-ton hot-blast furnaces and three 200-ton furnaces, air for blast being heated by waste gases in a specially-designed heater. Produced 8,000 tons matte sent to the A. S. & R. Co. at Aguascalientes, averaging 15 to 17% copper, $155 gold and $4 silver per ton.

The old company apparently spent a million dollars or so for installation before the mines were sufficiently developed to provide the ores necessary to keep the various plants running and in 1907-'08 became financially embarrassed. The mines are not yet on a profitable basis, but with the new concentration plant, built in 1915, it is expected that the property will yield a satisfactory return on the investment, as soon as operations become normal in Mexico.

The plant is reported to have been badly damaged by bandits.

NATIONAL SMELTING CO. **ZACATECAS**

Address: L. H .Taylor, Jr., 2030 Land Title Bldg., Philadelphia, Pa.

Properties said to be lost to company through the revolution in Mexico and a claim for indemnity has been filed with Department of State. Practically dead. See Vol. XI for description.

NAZARENO y ALICANTE, S. A.; COMPANIA MINERA **ZAC.**

Address: P. O. Box 183, Saltillo, Coahuila, Mexico.

Officers. Leo M. Cardenas, pres.; F. M. Cardenas, v. p.-mgr.; Lic. L. Davila, sec.; J. C. Siller, treas., with R. J. Rodriguez, directors. F. C. Mortimer, supt.

Inc. 1912, in Coahuila, Mexico. **Cap.** 1,000,000 pesos; 100 pesos par.

Property: 57 claims, 142 acres, in Mazapil district, Zacatecas, Mexico, containing contact and chamber deposits of gold and silver bearing lead and copper ores, in part oxidized. The sulphide ore assays 19 oz. silver, 16% lead, 22% zinc and 14% iron, while the oxide ore averages 9 oz. silver and 14% lead.

Development: is to a depth of 600' with about 1,000' of underground workings, blocking out 100,000 tons of ore.

Equipment: includes electric hoist, pump and a 40-ton concentrator. Mine is connected with railroad by a 5-mile cable line and an 8-mile tramway, the cable handling 100 tons in 8 hours.

Company is apparently connected with the Compania Minera del Saltillo, which see.

NAZARENO Y CATASILLAS, S. A., CIA. MIN. ZACATECAS

Address: Roman J. Rodriguez, sec., Apt. 19, Saltillo, Coah., Mex.

Officers: Santiago Purcell, pres.; Mario Blasquez, treas.

Inc. 1920. **Cap.** $2,000,000; $100 par.

Property: in Concepcion del Oro and Mazapil, in Zacatecas, connected with Saltillo by the Coahuila and Zacatecas R. R. Mines yield lead-zinc ore, and can produce 4,000 to 5,000 tons of metallic lead per month.

The mill and flotation plant are at Saltillo.

NOCHE BUENA; MINA SINALOA

Address: C. D. Medberry, Mocorito, Sinaloa, Mex.

NORIAS DE BAYAN; CIA. MINERA COAHUILA

Address: C. A. Villareal, Apto. 110, Monterey, N. L. Mex.

NORTHERN SIERRA MADRE MINING CO. SONORA

Address: D. E. Alexander, Humboldt Savings Bank Bldg., San Francisco, Cal. Mine near Soyopa, Sonora, Mex.

Officers: Chas. K. Blender, pres.; Carlo Giovannetti, v. p.; John O'Donnell, sec.; Fred Townsend, treas.; preceding, with D. E. Alexander, Fred Trevarrow and E. C. Curtis, directors, at last report.

Inc. Aug. 2, 1901, in California. **Cap.** $300,000; shares $1 par.

Property: La Reina de Cobre and Providencia copper mines and El Colosus silver-lead mine, 25 miles west of Suaqui de Batuc. La Reina shows diabase, shale and limestone carrying orebodies of sulphide ores, with quartz gangue.

Development: by 633′ of workings. Management estimates 4,854 tons of ore in sight, with 3,214 tons blocked out for stoping. Idle many years.

NORTH TIGRE MINING CO. SONORA

Address: R. D. Brown, pres., and F. J. Holmes, mgr., Douglas, Ariz.

Property: La Protectora, La Protectora No. 2, and the Esperanza groups, leased to North Tigre Leasing Co. of Bisbee and Douglas, for 2½ years. The mine is said to be located on the Lucky Tigre lode, which on this group is 4 to 20′ wide and carries ore said to assay over 100 oz. silver, 6 to 7% copper and 25% lead.

Development: is by tunnels, the lowest, No. 8 tunnel, having a vertical depth of 800′, with total of 5,000′ of underground workings. Ore in sight is said to total 30,000 tons, worth $1,250,000. A 5′ vein of ore carrying up to 2,000 ounces native silver per ton, was cut early in 1920.

Equipment: includes a 50-ton mill with flotation unit, completed in February, 1920. Power is purchased from the Copper Queen plant at Douglas over a branch line run from El Tigre mine.

NUESTRA SENORA; NEG. MINERA SINALOA

Address: E. H. Hoag, mgr., Cosala, Sin., Mex.

ONAVAS MINING & MILLING CO., S. A. SONORA

Mine address: Onavas, Ures, Sonora, Mex.

Property: 3 groups, 70 pertenencias, 175 acres, about 3½ miles from the village of Onavas and equal distance from the Southern Pacific R. R. and the Yoquin river.

The claims show 3 quartz veins, traceable for 5,000′ across the tract and containing complex silver-lead-copper ore that is of milling but not shipping grade.

Development: by 2 short tunnels, 2,200′ apart. Examined 1917 by John Christy.

PACIFIC COPPER CO., LTD. GUERRERO

Address: F. C. Stephens, P. O. Box 1656, Mexico, D. F. **Mine office:** Petatlan, Galena, Guerrero, Mexico.

Officers: Dr. W. S. Cockrell, pres.; Thos. Milan, v. p.; J. P. Taylor, sec.; H. J. Morden, treas.; F. C. Stephens, gen. mgr.; preceding, with J. N. Gilbraith and Carlos Eisenmann, directors.

Inc. May 16, 1906, in Mexico. **Cap.** 10,000,000 pesos; shares 100 pesos par; non-assessable; fully issued. Company holds direct title to its property

through the Compania de Cobre del Pacifico, and is in turn controlled through stock ownership by the **Pacific Copper & Pyrites Co.**

Property: 1,000 pertenencias, 2,471 acres, known as El Rey del Cobre group, near the Rio Murga in Las Union district, 10 miles north of Petatlan and about 28 miles N. E. of Zihuatanejo, the nearest port. The property shows contact deposits in metamorphic schist, the main lode having a N. E. strike, traceable 3 miles. No. 3 orebody, reported to have a maximum width of 197', carrying lenses of cupriferous pyrite, is developed by crosscut tunnels, drifts and raises to depth of 234' below the outcrop. No. 5 orebody, about 1 mile to the S. E., has only been slightly developed: the nature of the ore in both is said to be identical. Ore is estimated to average 1.5% copper and 40c in silver and gold per ton, with 48% sulphur and 42% iron.

Property lies in a very rugged country and is reached only by trails.

Development: by "A" shaft of 109', "B" shaft of 70', El Socavon drift tunnel of 400', No. 3 crosscut tunnel of 404', No. 4 crosscut tunnel of 486', No. 5 tunnel of 243', and No. 1 tunnel of 407', with a total of 3,050' of workings.

Ore reserves were estimated at 3,000,000 tons of ore blocked out, January, 1916.

Equipment: includes a hoist, not installed, good for 1,000' depth, and a small air-compressor. There are about 35 buildings.

Development: was continued without interruption until 1915. Company was planning to build a railway to Zihuatanejo and to add equipment at the mines. The mine, though low-grade, apparently contains large orebodies and is considered promising.

PACIFIC SMELTING & MINING CO. **SONORA**

Mine and smelter office: Fundicion, Sonora, Mex.

Officers: Melbert B. Cary, pres.; Geo. M. Ryall, v. p., 390 Pacific Electric Bldg., Los Angeles.; Nelson S. Haughwout, sec.-treas.; preceding, with Ronald E. Curtis, Howard Mc Williams and Charles E. Wetmore, directors. Thornton C. Kirkland, asst. gen. mgr.

Inc. Oct. 6, 1909, in Maine. **Cap.** $8,000,000; shares, $5 par, issued in $1,737,850 convertible cumulative 7% preferred stock and $6,262,150 common stock; all issued. United States Corporation Co., New York, registrar. Annual meeting, third Monday in January, at Augusta, Maine. Stricken from listing on New York Curb.

Shares sold at public auction in New York on Dec. 31, 1920; 3,000 pfd., $40 the lot; 1,000 com, $10 the lot.

Holdings: company controls the Mexican Exploration & Mining Co. by ownership of 98% of the capital stock and practically the whole of the capital of 5 subsidiary Mexican corporations, viz.; the Anita Mines Co., Yaqui Mining Co. and the following smelting companies: Compania Metalurgica y Refinadora del Pacifico, S. A., owning the Fundicion smelter; the Mexican American Smelting & Refining Co., S. A., owning the Guaymas smelter and the Sinaloa Smelting Co., holding the Mazatlan, or Sinaloa smelter concession.

Anita Copper Mines Co., S. A., owns the Anita mine with 330 acres, 25 miles north of the Fundicion smelter and station of that name on the Southern Pacific Railroad of Mexico. Mine has been developed to a depth of 900' on the dip of the vein and ore reserves above the 7th level were estimated by Courtney de Kalb at 55,000 tons, that average $2.58 gold, $1.17 in silver and 3.99% copper.

Geology: the Anita (or El Cobre mine), has a shear zone 115' wide with a diorite foot and rhyolite hanging wall. This zone traceable for several thousand feet, with N.-S. strike and dip of about 45° W., carries ore in 5 lenses, or chimneys, the principal one being opened from the surface down to the 8th level, branching at the 6th level. Faulting, cross-faulting and brecciation occur with displacements up to 200'. Ore is said to be a metasomatic replacement of diorite accompanied by a contact metamorphic

deposit. It contains the usual oxide minerals succeeded in depth by chalcopyrite.

Development: comprises a 900' inclined main shaft with 9 levels opened and about 7,415' of workings. There are also 4 other shafts.

The surface equipment consists of 2 cross-compound 2-stage Rand compressors of 3,000-cu. ft. combined capacity; a Risdon second-motion duplex hoist, 14x21"; three 150-h. p. boilers; generator for light and power, rock-crushers, picking tables, shops assay office, office buildings, warehouses, dwellings, supplies, etc.

The Pirita mine, 81 acres, 5 to 7 miles from Victoria station contains pyritic ore having small values in gold, silver and copper. The deposit will eventually become of value to the company for fluxing purposes.

Yaqui Mining Co. S. A., owns several slightly developed mining properties including the Rosamond and Aurora mines with about 1,600' of development work, exposing commercial copper-silver ore.

Compania Metalurgica y Refinadora del Pacifico, S. A., owns the Fundicion smelter, built originally to treat the ores of the Anita mine and to do custom business. The plant has a capacity of 350 tons a day, but was designed and in part equipped for 3 times that amount. It has one 42x160" blast furnace, sampling mill, power house, shops, administration buildings, and an electric plant for lighting and power purposes, all machinery excepting yard locomotives being motor driven. The plant is of modern design and in excellant condition. Plant idle for many years.

The L'Aime lime quarry, has 75 acres of limestone averaging 1.2% silica, with about $1 in gold.

Mexican-American Smelting & Refining Co., S. A., owns the Guamas smelter with 250 acres, at Batuecas, a suburb of Guaymas on tide water, lying between the Bay of Guaymas and the S. P. R. R. of Mexico. The plant was erected by William C. Greene, founder of the Greene-Canan a Copper Co.

The **Sinaloa Smelting & Refining Co., S. A.,** owns a concession from the Government for a smelter at Mazatlan, or elsewhere in the State, for a period of 20 years from the 27th day of April, 1906, and is particularly exclusive in its terms.

PALMAREJO & MEXICAN GOLD FIELDS, LTD. **CHIHUAHUA**

Office: E. B. Brown, sec., 10 Austin Friars, London, E. C. 2, England.

Directors: Sir W. B. Perceval, chairman; G. Hallett, H. G. Tollemache, and E. Turk. W. D. Hole, gen. mgr., in Mexico; E. T. McCarthy, cons. eng.

Inc. June 25, 1898, in Great Britain. **Cap.** £565,000, in 200,000 A shares of 6 pence each, 21,000 pfce. shares of £1, and 1,400,000 of 5s., of which 120,000 pfce. and 835,978 ord. issued.

Bonds: £25,000 of prior lien, due April, 1921; £28,330 of 5% first, £18,797 of 7% second, and £93,500 or 6½% third mortgage debentures.

Accrued debenture interest on March 31, 1920 was £45,107. Property was in hands of Receiver from December, 1914, to August, 1918.

Financial report for year ending March 31, 1920 showed, expenditures to date, £144,514; cash £3,219; accrued debenture interest, £45,181; creditors, £1,727; debtors, £1,350.

Property: 127½ sq. miles of mineral and timber lands in the Huruapa district of western Chihuahua. Reserves estimated as 331,560 tons proven ore, averaging 45s. ($10.80), and 1,600,000 tons of possible ore of similar value.

Equipment: an old 60-stamp mill and treatment plant, which will be remodelled.

Operations were suspended from 1912 until late in 1918, owing to revolution.

PALMARITO LEASING CO. **SINALOA**

Miles S. Milward, gen. mgr., Mocorito, Sinaloa, Mex.

Property: Palmarito mine in Mocorito district, developed by 3-compartment shaft to 200′ depth, said to open a 90′ vein of silver ore.

Equipment: 20-stamp mill and cyanide unit, treating 80 tons of 12 oz. ore daily at last account.

PANUCO; CIA. MINERA de **SINALOA**

Address: R. Robles, mgr., Panuco, Sin., Mex.

PARCIONERA CONSOLIDATED MINING CO. **CHIHUAHUA**

Address: Jos. S. Qualey, pres., 25 Pine St., New York City. **Mine office:** Santa Eulalia Chihuahua, Mex. Ernest Henderson, sec. Is a close corporation; shares $100 par.

Property: a silver-lead mine, with some copper. Idle on account of Mexican revolution.

PEDRAZZINI GOLD & SILVER MNG. CO., S. A. MINAS **SONORA**

Succeeded Arizona company of same name in 1921.

Address: 50 bis, Rue Pierre-Charron, Paris VIII, France, or care John Pedrazzini, Locarno, Switzerland.

Officers and directors: John Pedrazzini, pres., and Paul Pedrazzini, sec., Locarno, Suisse. In San Francisce, Calif.; Fernando Montijo, v. p.; Adolfo Bley and Fred'k A. Denicke. At Paris; Chas. Berrogain. At Douglas Ariz.; Wm. D. King, attorney for company in Arizona and Sonora, Mex.

Mine staff: Antonio Pedrazzini, gen. mgr., Arizpe; Fernando Montijo, Jr., mng. engr.

Inc. 1921, in France. **Cap.** 15.000,000 francs; par 100 francs; 105,555 shares (f. 10,555,555 par value) given in exchange for shares held by stockholders of American companies in ratio of 30 shares of $1 par of Ped. G. & S. M. Co. for 2 shares (f. 100 par) of new company and 90 shares of Minas Mercedes for 2 shares of new company, making a total issue of 10,-555,555 francs in new stock, when all the old stock is exchanged. The new company thus starts out with f. 4,444,445 treasury stock.

In 1920, total receipts were $262,872, of which income from sale of concentrate was $257,788; expenditures were $210,051; profit and loss, $52,-820. Total assets, $1,513,318; current liabilities, $160,391.

Report of old (American) company for year ended Dec. 31, 1919, showed receipts from ores and concentrates, $96,628; ore in transit and on dump, $52,000; expenditures include, operating $73,349; taxes and general, $54,057; interest $11,266; depreciation, $25,653.

Balance sheet for 1921 shows assets total, $1,513,318, including mines buildings and 50% interest in The Minas Mercedes Co., Ltd., $1,172,000: equipment, $230,881; cash and supplies, $18,286; Minas Mercedes Co., $22,-735.

Liabilities include capital stock $1,250,000; creditors, $160,391; reserve fund, $50,106; profit & loss, $52,820.

Property: the Chispas mine with about 650 acres at Las Chispas, Arizpe district, Sonora, Mex,. about 15 miles from Arizpe and 60 miles from Nacozari. This mine famous for its high grade silver ore, has been worked since 1890, though only since 1908 by this company. The claims show rhyolite cut by a series of 14 parallel fissure veins including the Chispas and the Wm. Tell veins. The vein-filling is rhyolite-breccia and quartz. In the upper workings of the Chispas mine the silver occurs as cerargyrite but below water level it forms argentite, polybasite, stephanite and ruby silver. The ore as milled averages 40 oz. silver and 0.5 oz. gold, while the rich ore that is sacked for export averages 500 oz. silver and 40 oz. gold per ton.

The irregularity of the pockets of rich ore prevents an accurate estimate of ore developed, but discoveries of new ore more than balanced extractions in 1920-21, the 900′ level being practically virgin ground with excellent ore faces.

Development: the mine is opened by a 900′ shaft; a tunnel connecting with it on the 600′ level, a half mile from the portal extends several thousand feet further on the vein. Ore is hoisted to this tunnel level. Daily out-

put 300 tons of ore and shipments of very high grade ore average 70 tons of 700 ounce ore a month.

Equipment: includes 60-ton mill with concentration plant, compressor, ice plant, and 150-h. p. Hamilton Corliss engine. Water is pumped from the river through 13,000′ of line. Mill recovery is about 85%. Employs 200 men of whom 150 are Mexicans

Production: in 1920 was 607,708 tons of ore, containing 1,773 oz. gold and 281,403 oz. silver. The 64,385 tons concentrate contained 204 oz. gold and 27,618 oz. silver, the combined output yielding a net smelter return of $286,463. Expenditures for operating and developing were $82,600 and for transportation, taxes and general, $93,012.

Mine has been a producer of bonanza ores for many years and is likely to be for some time to come.

PENINSULAR MINING CO. **CHIHUAHUA**

Office: 519 Story Bldg., Los Angeles, Calif.

Mine address: Parral, Chih., Mex.; W. T. Houser, mine mgr.; H. C. Schmidt, supt.

Officers: H. A. Houser, pres.; M. Hottenstein, sec.

Inc. 1917, in Mex. **Cap.** $5,000; $50 par; all issued.

Property: the Revalacion silver-lead mine, at Parral, in Chihuahua, Mexico.

Development: by shafts and tunnels, with 3,000′ of workings. Employs 50 men.

PENOLES S. A., CIA MINERA DE **MEXICO**

Subsidiary of Cia. de Minerales Y Metales (q. v.), which in turn is a subsidiary of The American Metal Co., Ltd. (q. v.), which owns entire Minerales share capital.

Office: Calle de Matamoros No. 130, Monterey, N. L., Mexico. **New York office:** 61 Broadway.

Officers: Heath M. Steele, pres.-gen. mgr.; E. M. Villareal, v. p.; S. M. Zambrano, sec., with Aleiandro G. Sauter, Luis Bermejillo, Andres Bermejillo, Luis G. Flores, Gil E. Montero, directors.

Inc. in Mexico. **Cap.** P. 9,000,000. increased September, 1920, from P. 3,600,000; par P. 30. The Cia. de Minerales Y Metales (q. v.) in 1920 sold all its mines, smelteries and railroads to the Penoles company for 180,000 shares of Penoles stock.

In 1921, Penoles absorbed by stock exchange the Cia. Minera Paloma y Cabrillas, S. A.

Mapimi Unit.

Address: Heath M. Steele, gen. mgr., Mapimi, Durango, Mex. Philip Nolan mine supt., Ojuela Durango, Mex.

Penoles Mines—This property near Mapimi, Durango, includes the Ojuela mines, one of the best and longest known producers of Mexico. The property covers 7123 acres, and has an average monthly production of 15,000 tons of lead-silver ore, containing 14% lead, 13 oz. silver and 1 oz. gold.

The **Mapimi smelter** has five blast-furnaces and a roasting-plant for the treatment of 400,000 tons of charge per annum, and there is also an arsenic plant which produces arsenic as a by-product from smelting operations. One power-plant supplies mine and smelter, as well as the town. A 25-mile narrow-gauge railway connects both mine and smelter with the National Railway lines at Bermejillo. The normal yearly production of the plant is 25,000 tons of silver-lead bullion and 5,000 tons of white arsenic.

Was closed down in mid-1921; smelting plant is being combined with that at Torreon.

Golondrinas Unit.

Address: W. E. Thomas, supt., Guadalupe, Nuevo Leon, Mex.

Property: the Viejas and soledad zinc-lead mines, in the Villaldama district, Nuevo Leon; claims cover 2,270 acres, and yield lead and zinc ores shipped over an 18-mile narrow gauge railway to the plant at Guadalupe.

This plant has a 250-ton concentrator and a 200-ton lead smelter. There is also a calcining plant for zinc-carbonate ores, capable of handling 7,000 tons per month from the mines near Guadalupe, and the company's other mines and custom ore. At Guadalupe there is also a modern power-plant, officers workmen's houses, schools, hospitals and other miscellaneous equipment.

Cia. Minera Cerralvo.

Address: Cerralvo, N. L. Mex. E. A. Manderfield, supt

This unit of 750 acres, in Nuevo Leon includes the El Refugio silver-lead mines, whose product is handled in a 100-ton concentrator and 100-ton lead smelter. The mine produces 1,200, tons of 40% lead ore and can furnish 300 tons of zinc carbonate ores monthly.

Zacatecas Property.

Providencia Mines situated in Saltillo district, Zacatecas, these mines are capable of producing 4,500 tons of lead-silver ores per month, averaging 18% lead and 13 oz. of silver; also 1,500 tons of oxidized zinc ores running about 25% zinc. The ore goes by aerial tramway and narrow gauge railway to the National Railway at Saltillo. The zinc ores are sold in the United States and the lead-silver ores treated at the various smelting-plants controlled by the company.

Guanacevi Mines

In Guanacevi, Durango, the company owns valuable silver properties covering 415 acres. As they are remote from a railway and in an unsettled district, the company has not yet begun operations there. Work already done on the properties is said to show that they are worth more than the amounts invested.

Monterey Unit.

Monterey smelter and refinery—The lead smelter and silver-lead refinery plant of the Cia. Minera, Fundidora Y Afinadora Monterey, S. A., at Monterey, N. L., orginally under lease, was acquired by purchase. This plant has 9 blast furnaces which can reduce 90 tons of charge daily, and has an annual refining capacity of 50,000 tons of lead bullion. It also has an electric silver parting plant for the separation of gold and silver, equivalent to a production of 10,000,000 oz. of silver. This plant treats primarily Penoles ores and bullion, but also handles custom business.

Paloma and Cabrillas Mines—Comprise 278 acres of mining properties near Higueras, in the State of Coahuila, and is connected with the National Railway lines at that point by an aerial tramway. The mines are equipped with adequate power-plant facilities as well as offices, workmen's houses, hospitals, schools, etc., and are capable of producing 5,000 tons monthly of iron-lead ores containing 15% lead and 3 oz. of silver, and 800 tons of zinc carbonate ores containing 32% zinc.

Company also controls the following properties:

Cia Minera la Parrena—The capital stock of this company is P500,000 of which the Penoles Co. owns 50%. Its mining properties are in the Sierra Mojada district, Coahuila, covering 475 acres, from which are produced lead-silver, copper, and zinc ores. The Parrena Co. also owns a 50% interest in the San Salvador mine in the same district, which has been producnig for over 30 years. The Parrena Co.'s own properties are still in the development stage, although the value of the production up to date covers all development expenses. The San Salvador and Encantada mines were closed in mid-1921.

Santa Eulalia Property.

Address: Santa Eulalia, Chih. J. M. Brook, Jr., supt.

These properties covering 2,935 acres in Santa Eulalia district, Chihuahua, are held under a 10 year lease (from 1917) and bond from **San Toy Mng. Co.**, which see. Ores are transported by aerial tram from Santa Eulalia to the main line of the National Railway. Other properties in this district, including San Antonio Chico, Inglaterra and Cosineras mines, are under lease.

After a shutdown, shipments were resumed in May, 1921; ore averages 17 oz. silver and 20% lead.

Cia. Metalurgica De Torreon, S. A.

(Managed by Cia. Minera de Penoles)

Office: Torreon, Viesca, Coahuila, Mexico.

Officers: Heath M. Steele, pres.; E. M. Villareal, v. p.; Lic S. M. Zambrano, sec.; with H. Himes, F. T. Anderson, G. H. Harbordt, directors.

Inc. June, 1901, in Mexico. **Cap.** 4,000,000 pesos; shares 80 pesos par; of which the Penoles company owns 83%.

Dividends: 20% in 1902; 18% in 1903; 14% in 1904; 12% in 1905 and 1906; 6% in 1909.

Property: the Torreon smelter and a number of lead mines and several partly developed copper mines in northern Mexico, covering 503 acres. The San Diego mine at Santa Barbara, Chihuahua, has a 150-ton concentrator treating zinc ore.

Smelter: is a modern plant of 1,250 tons daily capacity at Torreon, an important railway junction point. The plant handles the company's own output, but also does an extensive custom business in gold, silver, lead and copper ores.

The plant has 10 blast-furnaces, including eight 100-ton silver-lead stacks, and two 250-ton copper stacks, all using mechanical charges. There are two Dwight-Lloyd sintering machines, and a converter plant of 30 tons daily capacity to treat copper matte. Water is furnished by three large wells. The company has an extensive townsite, with dwellings for laborers and officials, officers, hospitals, schools, etc. The plant has been operated as a custom smelter for the past 15 years.

Production: The normal production is 20,000 tons of silver-lead bullion and 2,500 tons of blister copper per annum. Prior to the revolution, the plant treated over 200,000 tons of ore annually at a profit of $700,000. Regular, but much curtailed, operations were continued to August, 1921, when smelter was closed down pending the alterations required for an increased capacity.

The Mapimi smelter is being dismantled, Penoles Co. planning to make the Torreon plant its principal smelter.

Subsidiaries: the Penoles company controls also through stock ownership, the Cia. de Combustibles Aguijita, S. A. and the Cia. de Combustible Nacional Y. Transporteo, S. A. The former owns coal-lands aggregating 4,225 acres at Agujita and Lampacitos, with a developed tonnage of 18,000,000 and a possible production of 45,000 tons of coal per month. Coking plants have a total capacity of 12,500 tons. Penoles Co. consumes most of both coal and coke, any excess production being sold through the C. N. & T. Co., which has its own transportation equipment, consisting of three 90-ton locomotives and 60 cars.

The Penoles company owns 30 locomotives and 900 cars, which it operates over the National railroads to transport its products. It also has valuable real estate holdings in Monterey, Laredo and Saltillo. In addition to the above the Penoles Co. has minoriy interests in several other companies, including a 40% interest in Cia. Minera de Naica, S. A., which Penoles does not operate, and maintains a trading department for the marketing of its own products as well as for the purchase and sale of the products of independent companies operating in Mexico.

PERLA MINING CO., LA **DURANGO**

General office: 40 Wall St., New York.

Mine address: David R. Thomas, mgr., Topia, Mex.

Officers: Bernard MacDonald, pres.; M. E. MacDonald, sec.-treas.

Inc. in Maine. **Cap.** $1,500,000; par $5.

Property: includes 358 acres of mineral land and 3,198 acres of timber land in the Topia mining camp, N. W. corner of Durango.

PERLITA Y ANEXAS MINING CO., LA COAHUILA

Address: Saltillo, Coah., Mex.

Capital stock duplicated, (Feb. 1921) and new assessable stock distributed among stockholders, to be paid for by monthly assessments of one pesos per share.

PHELPS DODGE CORPORATION SONORA

Owns Moctezuma Copper Co., or Nacozari branch of the P. D. Corp'n. See same title in United States section of this book.

PICACHO MINING CO. (CIA. MINERA DE PICACHO) SONORA

Address: J. S. Williams, Jr., pres., Douglas, Ariz.

Property: 35 miles S. E. of Cananea, has a deposit of auriferous ore. Shipments formerly made to the Copper Queen smelter at Douglas. Idle several years.

PIEDRAS NEGRAS MINING CO. ZACATECAS

A new company reported developing various groups near Zacatecas, Zac.

PIEDRAS VERDES Y ANEXAS: COMPANIA MINERA SONORA

Alamos, Sonora, Mex. Angel Almado, pres., at last accounts.

Property: the Piedras Verdes, Union and Sonora mines, covering a mineralized zone about a mile wide, and 4 miles long. Claims show red schists and veins 10 to 40′ wide carrying oxidized ore, with occasional native copper.

Development: by a 350′ shaft and a 375′ tunnel. Two churn drills in operation and 15 men employed in 1921.

Equipment: includes steam power, and a small matting furnace.

PINOS ALTOS MINES CO. CHIHUAHUA

Address: 41 E. 42nd St., New York City.

Officers: F. H. Minard, pres.; E. B. Reeser, v. p.; J. T. Furlong, treas.; Jas. A. Dunn, sec., with Robt. Law, Jr., directors.

Inc. 1904, in New Jersey. **Cap.** $200,000; $100 par; Barnsdall Corp. owns $165,000 of the stock.

Property: several silver-gold mines, near Concheno, in Chihuahua, Mex., about 80 miles from railroad at Tamosochic; developed by tunnels to depth of 2,500′.

Equipment: includes 50-stamp mill. Idle several years owing to revolutionary disturbances.

PITIQUITO MINING CO. SONORA

Address: E. W. McKay, fiscal agent, Fifth Ave. Arcade, Pittsburg, Pa.

Officers: Marshall M. Hickey, pres.-mgr.; Jas. R. Ellis, sec.- treas., Canon, Ariz.

Inc. 1920, in Arizona. **Cap.** $1,000,000; par $1; $600,000 issued for property to M. M. Hickey, who is under contract to finance development and put up a 200-ton concentrating mill from sale of 200,000 shares of his own stock, leaving 400,000 treasury shares intact.

Property: about 60 acres, 40 patented, in Altar district, Sonora, covering an isolated hill several hundred feet high, consisting of sheared porphyry seamed with copper glance, oxides, etc., said to average at least 5% copper with $12 per ton in gold and silver. J. R. Ellis, sec., reports entire mountain mass to consist of rich concentrating ore.

Development: slight, consisting of pits, deepest 50′, and short tunnels. A back of 300′ can, it is said, be obtained by tunnel work.

The place is about six hours ride from Tucson, about 75 miles north of Santa Ana on Nogales line of the S. P. R. R., and 60 miles south of the border.

PLACEROS MINING CO., LOS COAHUILA

Address: Saltillo, Coah., Mex.

An assessment of 50¢ per share on the entire issue of 1,000 assessable shares, was levied, April, 1921.

PLACERS DE ORO DE BACUBIRITO SINALOA

Jose Zakany, mgr., Sinaloa, Mex.

A steam power plant and 7 cu. ft. gold dredge (the old Oroville Ltd. No. 3), installed in 1921.

PLATA-FINA MINING & DEVELOPMENT CO. SONORA

Office: Baldwin, Kan. **Mine office:** Alamos, Sonora, Mexico

Officers: E. G. Swayze, pres.; Dr. L. R. King, v. p.; C. N. Emery, sec.; E. A. May, treas.; T. P. Brinegar, mgr.; with J. M. Nolan, A. P. Elder, and J. W. Churchill, directors.

Inc. March, 1911, in Arizona. **Cap.** $500,000; $2 par; 150,000 shares issued.

For the year ended, September 1, 1918, company expended $7,000 on the property, leaving a cash balance of about $23,000. No debts.

Property: includes the Plata-Fina group, 9¼ hectares, Cacharamba group, 8 hectares; Otilla group, 10 hectares, about 100 acres in all, 3½ miles from a railway and 8 miles west of city of Alamos. Ground shows copper-bearing veins in a zone 40′ wide between granite and porphyry.

Development: by 8,000′ of underground work, with 8 shafts, deepest 115′, blocking out 10,000 tons of silver-copper ore said to assay over $25 per ton. In 1919, development work only was done. Company plans to sink 2 shafts to the 200′ level during 1920.

Equipment: includes 2 hoists and a pump. Compressor and mill are to be installed when conditions permit.

POTRERO MINING CO. SINALOA

Address: 417 Kerckhoff Bldg., Los Angeles, Calif.

Lyttleton Price, pres.; M. D. Andrews, sec.; Arthur Cortelyou, mgr., Mocorito, Sin., Mex.

Inc. 1912 in Calif. **Cap.** $160,000; par $1; 160,000 shares issued.

Property: 250 acres in Mocorito district, Sinaloa, contains gold-silver bearing ore. Sinking a 1,000′ shaft.

Equipment: includes 10-stamp mill and cyanide plant, treating 50 tons of $12 gold ore daily.

PROMONTORIO, S. A.; NEG. MIN. DEL DURANGO

Address: Apt. 60, Durango, Mex.

Staff: Maximiliano Damm, mgr., Andres Herrera, supt.

Officers: M. Damm, pres.-mgr.; Fred. C. Damm, v. p.; Francisco Clark, sec.; Pedro Herrera, treas., with Andres Herrera, G. Sanchez, Carlos F. Damm, Serafin Herrera, Victor H. Damm and Enrique Fernandez, directors.

Inc. in Durango, Mex. **Cap.** $5,000,000 (Mex); $1 par; all issued.

Property: Promontorio group, 250 patented claims, at Sierra de San Francisco, Chinacates, Durango. Tract contains a true fissure vein in porphyritic rhyolite, the ore averaging 20 gm. gold and 1,500 kgs. silver per ton.

Development: by two shafts to depth of 300 meters and 14 levels.

Equipment: includes 150-h. p. steam hoist, compressor, pump, 100-ton concentration mill and cyanide plant.

Reserves estimated by management at 250,000 tons.

The mine was idle for eight years owing to revolutionary disturbances, but work was resumed in 1921 and shipments of 3 cars per month made to the Aguascalientes smelter.

PROPRIETARY MINES COMPANY OF AMERICA GUANAJUATO

Succeeded 1922 by **Valenciana Extension Co.**, (q. v.)

Office: 25 Broad St., New York; or D. C. Catlin, 15 Broad St., New York.

Officers: D. C. Catlin, pres.; E. J. Page, v. p.; Chas. E. Pope, 2nd v. p.; C. W. Pope, sec.-treas.; above with Horace E. Parker, Wm. A. Robinson, Jr., Theodore Dwight and W. B. Cogswell, directors.

Inc. 1907, in Nevada. **Cap.** $3,000,000; shares $5 par; $2,250,500 issued. **Bonds:** authorized, $750,000, 6% convertible; outstanding, $703,400. New York Trust Company, registrar. Stock transferred at company's office. Annual meeting, second Monday in June. Is a holding company, controlling through stock ownership the Mineral Development Co. and the Providencia M. & M. Co. of Guanajuato, Mexico.

Latest financial report available, year ending May 31, 1914, showed assets; property, $2,249,000; stock, bonds and notes of subsidiary and other companies, $560,542; accounts receivable, $31,076; cash $5,427; furniture, $313; accounts since organization of company, $132,632; loss and gain $8,700. Liabilities, amounting to $3,737,193, include outstanding stock, $2,250,500; outstanding bonds, $703,400; stock exchanged for Min. Dev. Co. shares, $6,380, accounts payable, $5,996; contingent, $21,417.

The 1915 annual report contains a reference to necessary "additional financing" when the orebodies of the Nueva Luz mine have been more thoroughly developed and when political conditions in Mexico permit the reopening of the Tajo de Dolores mine.

Mineral Development Co.

Address: Donald Catlin, sec., 15 Broad St., New York City., Smith K. Hayes, in charge, Guanajuato, Mexico. **Cap.** $1,000,000; shares $1 par; $800,000 issued.

Property: the Nueva Luz mine, the La Planta and Torre mines. La Nueva Luz mine, adjoining the world famous Valenciana mine is developed by a 2,035′ shaft and a 1,130′ crosscut, driven to the Veta Madre, below the Valenciana workings. This work exposes 3 veins, the third or footwall vein 51′ wide, averaging 130 grams of silver for the entire width, including a 5′ streak that assayed 530 grams silver with small amounts of gold, copper pyrite and some zinc blende and galena. This vein was cut at 1,069′ from the shaft, at a point several hundred feet S. E. of the place where the downward extension of the old Valenciana ore shoot should be found. Drifting to be done, 1922, will open up this ground. The mine was closed from 1914 to 1920, as company's model hoisting and compressor plant, supply house etc., were burned down. Mine kept unwatered, but no work done. A new company, the Valenciana Extension, was organized by Proprietary Mines Co. in 1921 to purchase and develop the Nueva Luz group. See under that title.

Providencia Mining & Milling Co.

Cap. $1,250,000, of which $250,000 is 7% preferred, convertible at 110. and $1,000,000 common stock, 250,000 shares common in treasury.

Property: the Tajo de Dolores mine at Guanajuato, Mexico. The mine was closed down in April, 1914 and the outlook for an early resumption of operations is not bright. The 200-ton mill and cyanide plant has been leased for 3 years to El Cubo Mining & Milling Co. for a monthly rental of $1,000 U. S. currency and an option to purchase at $100,000. The option has been exercised and final payment will be made in 1922. The Cubo Co. agreed to mill Tajo de Dolores ore for a period of 7 years at cost plus 20% thereafter. The lease became operative when work was resumed.

PROTECTORA y ANEXAS; COMPANIA MINERA LA ZACATECAS

Address: San Salvador, Mazapil, Zacatecas, Mexico. Percy A. Babb, pres. and gen. mgr.; J. L. Miranda, sec.

Inc. 1907, in Mexico. **Cap.** 100,000 pesos; fully paid.

Property: 68 hectares, including La Protectora y Anexas and San Francisco mines carrying copper, lead and zinc ore occurring as replacements in limestone. Low-grade ores average 2.5 to 5% and high-grade ores 12 to 19% copper. Mine has a depth of 100 meters with about 1,500 meters of workings.

Equipment: includes a 15-h. p. gasoline hoist. Working about 200 men and shipping around 250 tons of high-grade ore monthly before closing down. No recent reports received and mine presumably idle.

PROVIDENCIA SAN JUAN DE LA LUZ y ANEXAS, LA GUANAJUATO

Address: Emilio Mendez Bancel, Ave. Brazil 6, Mexico City, Mex.

PUEBLA SMELTING & REFINING CO. PUEBLA

Office: 2 Rector St., New York.

Officers: C. H. Bassford, pres.-treas.; J. L. Lawrence, v. p.; L. F. Reed, sec., with J. A. Osborne, and L. S. Rogers, directors.

Inc. Oct., 1912, in Delaware. **Cap.** $5,000,000; shares $5 par; non-assessable. Debentures, $1,000,000 at 6%. Owned a 72% stock interest in the **Cia Minera Explotadora El Magistral y Anexas,** and also sundry lands acquired from the **Bankers Mining & Development Co.**

Due to the revolution the property has not been operated since 1913.

PURISIMA; NEG. MINERA Y FUNDICION HIDALGO

Address: Jorge Hernandez Yanez, owner, Zimapan, Hgo., Mexico.

Office: P. V. Hernandez, mgr., 4 a del Fresno 142, Mexico City.

Property: the Todas Santos and Santo Tomas groups, 100 claims, at Zimapan, Hgo., containing lead-silver-gold bearing ore.

Development: by 89 meter shaft and 40 meter tunnel.

The operations of the Purisima Silver Lead smelter, owned by this company, are an excellent example of smelting without water jackets.

Production: 800 to 1,600 tons yearly.

Examined by Olaf Wenstrom. Is a promising property needing development and modern equipment.

PURISIMA Y GUADALUPE FRESNILLO Y ANEXAS; CIA MINERA HACIENDA GRANDE, HIDALGO

Address: Manuel A. Teja, Uruguay 44, Mexico City, Mex.

QUINTERA MINING CO., LTD. SONORA

London secretary and office: J. G. Mills, 8 Crosby Square, London, E. C., England. **Paris office:** 1 Rue des Mathurins, Paris IX, France. **Mexican agent:** T. Robinson Boursy, Hermanos, Alamos, Sonora, Mexico.

In consequence of the former unsettled state of affairs in Mexico, the mine was closed down in 1909; in 1921, company placed its entire holdings in the states of Sonora and Sinaloa on the market for immediate realization. Property fully described in Vol. XIV.

RAFAEL POZAS, S. A., CIA. MIN. NUEVO LEON

Address: Monterey, N. L., Mex.

REAL DEL MONTE Y PACHUCA, CIA DE HIDALGO

Fully described under own title in Volume XIV.

Subsidiary of **U. S. Smelting, Refining & Mining Co.,** which see.

REFORMA MINING & MILLING CO. GUERRERO

Address: c/o Hamilton H. Durand, New York Counsel, 68 William Street, New York City.

Mine address: Campo Morado, Guerrero, Mexico.

Property: group of mines at Campo Morado containing copper, lead and silver ores and develcped by 2,700' of tunnel work.

Equipment: includes electric power, compressor and 100-ton smelter. Employs 175-200 men when operating.

REPUBLICAN MINING & MILLING CO. QUERETARO

(Subsidiary of Cookson & Co., Ltd., Newcastle on Tyne, England).

Address: Mutual Life Bldg., Mexico City, D. F., Mex.

Staff: H. E. Bourchier, gen. mgr.; A. J. Lewis, mgr. mining department; W. J. Graveling, asst. mgr. and metallurgist.

Property: the Penamiller antimony mines.

RHODES (MEXICAN) MINING & GENERAL, LTD. MEXICO

Address: C. A. Sack, sec., Portland House, 73 Basinghall St., London, E. C.

Inc. June, 1920, to acquire the capital stock of the Rhodes (Mexican) Mng. Synd., Ltd. **Cap.** £20,000, in 10,000 pfd. and 10,000 ord. shares; £1 par; 2,945 pfd. and 7,883 ord. shares issued.

Rhodes (Mexican) Mines Syd., Ltd.

Address: C. A Sack, sec, Portland House, 73 Basinghall St., London, E. C., England.

Inc. 1919. **Cap.** £5,000 in 3,000 pfd. and 2,000 ord. shares; £1 par; all issued.

Property: option on holdings of F. J. M. Rhodes in Mexico, including Pachuca-Capula Silver & Gold Mines, Pachuca-San Carlos silver mine and oil concessions in the Tuxpam fields.

RICHFIELD COPPER CO. **SONORA**

Office: 812 Mears Blg., Scranton, Pa.

Officers: Dr. J. K. Bentley, pres.; Dalbys L. Fickes, sec.; Otto Robinson, treas.; preceding, with Harry Witter, R. H. Gay, Geo. Stark, John Hershberger, Philip Robinson, J. A. Schadt, R. E. Mikesell, W. O. Smith, J. H. Wood and Jacob Huffer, directors.

Inc. 1902, in Arizona, as successor of Richfield Mining Co. **Cap.** $5,000,000; shares $1 par; issued, 4,000,000. Bonds, $250,000, authorized, at 6%; issued, $230,000. Scranton Trust Co., registrar. Annual meeting, 2nd Saturday in October.

Property: 1.300 acres of mineral property, with timber and ranch lands, totaling 26,512 acres in the Ures district. The Dos Naciones group, 12 miles east of Tuape and 35 miles from a railway, is said to have 7 contact deposits between granite and limestone, of 10′ to 60′ estimated average width.

Development: includes about 10,000′ of underground work, showing oxidized ores and chalcopyrite, reported by present management to assay 4 to 15% copper, 7 to 40 oz. silver and $2 to $5 gold per ton.

Equipment: includes two 25-h. p. hoists and a 5-drill air compressor, several mine buildings and an 80-ton water-jacket smelter.

Idle owing to revolutionary disturbances in Mexico.

RIO GRANDE & DOLORES SILVER MINING CO., LTD.

Address: M. Jenks, liquidator, 6 Old Jewry, London, E. C. England. Company was wound up voluntarily in 1919. Fully described in Volume XIV.

RIO PLATA MINING CO. **CHIHUAHUA**

Office: 410-11th Ave., New York.

Officers: H. W. Miller, pres.; Archibald Nesbitt, v. p.; J. J. Bonneau, sec.; Lincoln Bonneau, treas., with Geo. F. Parker, John C. Hanson, W. E. Green, Jos. Coult, R. N. Brundage, A. P. Roth, D. J. Dwyer, and J. H. Lee, directors.

Inc. April 7, 1906, in Arizona. **Cap.** $2,000,000; shares $5 par; outstanding $1,872,590. Stock transferred at company's office. New York Trust Co., New York, registrar. Annual meeting in January, at Phoenix, Ariz. Protocolization of the company completed October 15, 1910.

Company controls the Trinity Cons. Hydraulic Mining Co. in California.

Dividends: initial dividend, 1½%, paid Dec 1909; quarterly dividends, 2% from March, 1910, to December, 1911, inclusive; none in 1912; February 1, 1913, 1%; none since.

Property: the mines and reduction works of the Cia Minera de Rio de Plata, S. A., of Mexico; 187 acres mining land, 2,700 acres ranch and timber lands and water rights, located 6 miles S. of Guazapares, Chihuahua, and 350 miles from El Paso. Holdings include the Santo Nino, David, Santa Teresa, Santa Barbara, Cleopatra, La Ultima and Enrique, silver mines. The ore occurs in the Santa Barbara fissure vein dipping 17°, with average width of 4 to 6′.

Development: by tunnels, with about 3,000′ of workings.

Equipment: includes hydro-electric plant and an auxiliary steam plant, 25-stamp mill, 60-ton concentrator and an 80-ton cyanide plant.

Operations have been greatly interfered with on account of the revolution, but property not molested. A new staff was sent to the mine in 1919, but withdrew shortly after; operations presumably resumed in 1922.

RIO TINTO COPPER CO. CHIHUAHUA

Mine and works office. Terrazas, Chihuahua, Mexico.

Inc. in Ohio. Is a holding company for Mexican subsidiaries. Operated as a close corporation under the control of Corrigan, McKinney & Co., Cleveland, Ohio.

Property: the Rio Tinto Mexicano mine and works bought 1908 for $187,500, and the property formerly held by the **San Rafael Copper Mining Co.** The first named is about 25 miles north of Chihuahua City and comprises a main tract of 153 hectares, and a smaller tract of 6 hectares, including nearly all the developed mineral property of the Terrazas camp, except a few lead mines. The tract includes the Rio Tinto mine, and properties formerly worked by the **Rio Tinto Mexicano Mining Co., Boston & Mexican Mining Co., Dragoon Mining Co.** and **San Rafael Copper Mining Co.** The principal properties are the Rio Tinto Mexicano, San Rafael, Promontorio, Verde and Colombia mines, all connected underground. The company also owns the Savanarola group, at Savanarola, about 50 miles south of Chihuahua and 35 miles west of Ortiz carrying silver-copper and lead ores.

The Rio Tinto Mexicano mine opened 1860, closed 1902, reopened 1905, has been owned and operated by a number of different mining companies until purchased by this company from Messrs. Enrique and Juan A. Creel.

Geology: the claims cover contact deposits between limestone and altered andesite, there being 5 known orebodies in a metamorphic zone traced 1,500 metres. The orebody has a minimum width of 2′, maximum of 100′, and averages 20′ across. Ore also occurs between the limestone bedding planes, near a large quartz ledge, and the orebodies, while erratic in size and occurrence, are connected and practically continuous. The limestone has an average dip of 45° N.-W., and the property has also some silver-lead ore. The gangue is mainly limestone, somewhat garnetiferous. Extensive diamond-drill borings prove large orebodies of workable copper ore.

Development: by a number of shafts to a depth of 400′; has about 3 miles of workings. The ground is firm, requiring no timbering, pillars having been removed to give chambers up to 100′ square.

The San Rafael mine has a 440′ two-compartment shaft. The Promontorio mine has 2 shafts, 1,000′ apart, the main shaft being 350′ deep. The Colombia mine has a 275′ shaft, with about one-half mile of workings.

Equipment: includes steam and gas power, air compressors, etc.

Ore is carried from mines to smelter by a mile long narrow-gauge railway, equipped with a 6-ton Porter locomotive and 5-ton iron ore cars.

Smelter at Terrazas, one mile from the mine, connected by ¼ mile spur with the main line of the Mexican Central railroad, has two 300-ton 42x192″ blast-furnaces. The converter department has 1 stand and 3 shells, with a 40-ton electric traveling crane and a relining plant. The power plant has a 250-h. p. compound engine, direct-connected to a No. 8 Connersville blower, and a 100-k. w. generator supplies current for the other machinery.

Production: for recent years not known, but for the four years 1906-1910 was 9,150,000 lb. copper; 27,000 metric tons smelted averaged 2.5% copper, mining cost being $3.50 per ton, and smelting cost $3.50 per ton, or a cost for finished copper of 12.5c. per lb.. The ore, though low grade, exists in large quantities, and the mine promises to become a producer, capable of making 1,000,000 lb. fine copper monthly.

The mine and smelter were operated intermittently throughout the earlier years of the Mexican revolution.

ROSARIO MINING & SMELTING CO. CHIHUAHUA

Address: Geo. Stinson, agent, Guadalupe y Calvo. E. Chihuahua, Mex.

Property: a group of gold-silver claims in Victoria district, W. of Santiago Papasquiro.

Plans erection of mill and completion of highway connecting with Guadalupe y Calvo.

ROY MINE SONORA

Address: W. R. Moycumber, supt., Pilares de Teras, Sonora, Mexico. Has 50-ton flotation plant.

SALTILLO, S. A., COMPANIA MINERA DEL. ZACATECAS

Office: Primera de Galeana No. 2 Saltillo, Coahuila. Mine near Mazapil, Zacatecas, Mexico. Lic. Miguel Cardenas, pres.

Inc. June 15, 1899, in Mexico. **Cap.** 100,000 pesos; shares 100 pesos par; fully paid.

Dividends: were 10,000 pesos in 1907; 15,000 pesos in 1908. Annual meeting, January 31, each year.

Property: the Jesus Nazareno mine, in the Nazareno mining district of Mazapil, 10 miles from a railway. The mine produces 1,000 metric tons of silver-lead ore monthly, when conditions are normal.

Equipment: includes 5-mile private tram line, and 135-h. p. gas and electric plant. Apparently connected with Compania Minera Nazareno y Alicante, S. A., which see.

SAN ANTONIO COPPER CO. SONORA

Address: Geo. J. Eisele, sec.-treas., Iron Mountain, Mich. **Mine office:** San Antonio de la Huerta, Sonora, Mex.

Officers: Otto C. Davidson, pres.; Dr. J. A. Crowell, v. p; preceding, with John Uno Sebenius, D. M. Clemson, Hon. Richard C. Flanagan, E. G. Kingsford and W. H. Johnston, directors; John E. McIntyre, supt.

Inc. Sept. 23, 1908, in Arizona. **Cap.** $2,500,000; shares $10 par; issued, $1,000,000 full paid and $1,000,000 with $3.50 paid. Title is through the San Antonio Copper Co., S. A., inc. April 12, 1908, in Mexico, all stock being owned by this company. Annual meeting, 2nd Monday in April.

Property: 9 groups, about 7,500 acres, with 2,000 acres about 3 miles from San Antonio de la Huerta, near the Yaqui river. The property was worked 1862 in a small way.

Lands show a mineralized zone 200′ to 500′ wide, with veins containing copper oxides and carbonates, with a considerable quantity of chalcocite, giving assays up to 11% copper.

Development: consists of tunnels with 15,000′ total workings, opening 7 separate orebodies, with 4,000′ of workings in ore. Dwight E. Woodbridge estimated that the San Antonio had 300,000 tons of ore, averaging 7% copper. The railway line extends to within 2.2 miles of the main tunnels. Operations suspended on account of revolutionary disturbances since August, 1917.

SAN AUGUSTIN Y ANEXAS DURANGO

Address: E. Capillas Rueda, 7a Altamirano 133, Mexico, D. F.

SAN CAYETANO MINES, LTD. GUANAJUATO

Controlled by General Development Co., 61 Broadway, New York.

Officers: J. H. Susmann, pres.; J. A. Lewisohn, v. p.; Herman Cook, sec.; S. A. Lewisohn, treas.; with J. P. Channing, J. G. Greenburgs, and W. H. Osborne, directors.

Inc. Jan. 24, 1907, in New York. **Cap.** $1,500,000; $5 par; 51,390 issued. Stock transferred at company office; Columbia Trust Co., registrar.

Property: 341 hectares in La Luz section of Guanajuato district, cut by numerous silver veins.

Development work consists in a main haulage and development tunnel a mile long, undercutting many quartz veins. Owing to former low price of silver and the low grade of the ore found in the tunnel, operations were suspended in 1911. The mine has recently been worked on a royalty basis by leasers.

SAN FELIPE MINING CO. **JALISCO**

Address: Hostotipaquillo, Jalisco, Mexico. Col. N. Z. Seitz, pres. and gen. mgr.

Inc. 1902, in Arizona. **Cap.** $1,000,000; shares $1 par.

Property: includes a 50-ton mill. The company is said to have paid dividends from stock sales and was considered by the late Horace J. Stevens as a rank bit of stockjobbery. Probably defunct.

SAN FRANCISCO MINES OF MEXICO, LTD. **CHIHUAHUA**

Officers: H. A. Searle, sec., 2 Broad St., Place, London, E. C. 2, England and The London Syndicate of Mexico, 20 Avenida del 5 de Mayo, Mexico City.

Mine officials: Wm. S. Harrison, gen. mgr., Parral, Chih., Mex. A. C. Munro, mill supt.; A. K. Macfarlane, met. engr.

Directors: Earl of Denbigh, chairman; T. Ford, J. Hatfield, J. Kitchin, W. Maclachlan, A. S. Northcote, Sir Henry Strakosch, and A. J. H. Smith. Knox & Allen, 160 Broadway, New York, cons. engrs.

Inc. March 27, 1913, in England. **Cap.** £800,000; increased from £650,000, in 1921; outstanding £349,018; shares £1 par. **Bonds:** £200,000 convertible first mortgage 6% debentures, in denomination of £100 and £20 each; int. payable April and October 1, was paid to October 1, 1914; payment of the next 10 half-yearly installments has been postponed for a period of 5 years, so that in each of the 10 half-years ending October 1, 1923, a year's interest will become due, and on the postponed interest 6% interest will be allowed. Company is controlled by the **Union Corporation of South Africa.**

Report for year ending Sept. 30, 1920, shows total revenue, 1,657,075 p., operating expenses, 1,268,449 p.; net profit 388,625 p. Assets total £643,237, including property £387,411; cash and investments, £31,333; debentures interest charges, £100,326; liabilities include capital stock, £349,018; creditors, £10,239; debentures and interest, £283,880.

Property: the San Francisco del Oro group of silver-lead-zinc mines, 253 acres, 14 miles from Parral, formerly worked by the **San Francisco del Oro Mining Co., Ltd.,** covers nearly 1½ miles on the strike of the San Francisco vein, a fissure lode in limestone. The ore shoot has a length of 2,600′ with minimum width of 5½′, 4th level is in primary ore; ore minerals are galena, blende, pyrite and chalcopyrite.

Development: to depth of 484′ by 3 shafts and 5 levels. Ore reserves are estimated at 70,000 tons blocked out, Dec., 1920.

Equipment: includes an aerial tram, a 100-ton concentration mill, with flotation equipment, remodled in 1919; also a complete mining plant.

Operations have been intermittent as a result of the Mexican revolution, but milling was resumed in September, 1918.

During year ended Sept. 30, 1920, 25,087 tons were milled in 9 mos., that averaged 688 grams silver, 4.6 grams gold, 30.4% lead, 21.4% zinc and 0.8% copper. Recovery was 47% silver and 77% of the lead.

Production: during the year ending Sept. 30, 1920, 33,795 tons of ore mined; yielded 15,878 kilo. silver; 52.3 kilo. gold; 2,542 tons lead; 2,752 tons zinc; 89.6 tons copper.

Employs 500 men.

SAN FRANCISCO Y MARAVILLAS; CIA. MIN. **HIDALGO**

Address: G. Hernandez, mgr., Apto. 431 Mexico City, Mex.

SAN GERONIMO CO. **JALISCO**

Address: B. J. Cotna, Worcester, Mass., who organized this company in 1922 to take over and operate mines in the Mascota district of Jalisco.

Machinery and supplies were said to be on hand early in 1922.

SAN GERONIMO MINES & METALS CORP'N. **SONORA**

Office: 149 Broadway, New York City.

Officers: M. P. Dallon, pres.; M. P. Hall, treas. and G. F. Powell, engr. Is a close corporation.

Empire Trust Co., N. Y., transfer agent; Columbia Trust Co., registrar.

Property: a group of claims that cover the "San Geronimo mining district", including a highly mineralized tract of 1,800 acres near the San Miguel river, about 18 miles N. E. of Poza, in which there are five mines.

Development: by numerous prospect shafts and tunnels.

Equipment: includes a 100-ton concentrating plant.

SAN JUAN MINING CO. **CHIHUAHUA**

Address: A. H. Kraft, pres.-mgr., Box 994, El Paso, Texas.

Property: the San Juan copper mine, 40 acres, in Chihuahua, 9 miles S. of the border, opposite Fort Hancock, Texas. Office and loading stations are on the Southern Pacific, 2 miles N. of border.

Geology: limestone and sandstone are cut by dykes and sheets of porphyry with contact deposits along the igneous mass. Ore is an impregnation and replacement of limestone and sandstone with chalcopyrite and chalcocite.

Development: by 1,200′ tunnel and 3,000′ of work on 3 levels, opening ore 3 to 10′ thick, for a length of 200′. Reserves in 1919 were 10,000 tons broken in the mine, 8,000 tons on dumps, and 25,000 tons ready for stoping. This ore carries from 3 to 4% copper and 3 to 4 oz. silver per ton.

Equipment: includes a complete mining plant, and 75-ton concentrator.

Production: from Feb., 1916, to Dec., 1918, inclusive, 22,500 tons sent to El Paso smelter yielded $336,563. Expenses were $226,336, leaving a profit of $110,227. Mining, milling, and freight is estimated to total $7.80 per ton.

Employs 100 men, when active.

SAN JUAN REDUCTION CO. **BAJA CALIFORNIA**

Address: P. A. Guappe, mgr., San Antonio, Baja California, Mexico. J. C. Puttner, mine mgr.; David Lawrence, mill supt. Operates a mine yielding gold-bearing arsenopyrite ore, 5 miles E. of Triunfo.

The reduction plant has dry rolls, Hardinge mills, roasting furnaces, and cyanide department. No recent information is available.

SAN JUAN Y ANEXAS; MINA **CHIHUAHUA**

Office: M. F. Crossette, mgr., First Natl. Bank Bldg., Denver, Colo.

Mine address: G. S. McKay, supt., Cusihuiriachic, Chih., Mex.

Inc. in Illinois. **Cap.** $300,000; $10 par; 20,000 issued.

Property: a group of silver-lead-copper-bearing claims in the Cusihuiriachic district of Chihuahua.

Development: to 500′ depth by shaft and levels opening veins of silver ore. The mine was closed in 1916 after the Santa Ysabel murders.

Employed 150 men.

SAN JULIAN MINING CO. **SONORA**

Address: La Trinidad, Dto. de Sahuaripa, Sonora, Mex.

SAN LUCAS COPPER CO. **SINALOA**

See El Magistral Copper Co., described in Vol. XIII.

SAN LUIS; CIA BENEFICIADORA **GUANAJUATO**

San Luis de la Paz, Gto., Mexico. Owns the Ojo de Agua smelters. Idle.

SAN LUIS MINING CO. **DURANGO**

Office American Natl. Bank Bldg., San Francisco, Calif., or Myra B. Martin, sec., 15 William St., New York. **Mine office:** San Dimas, Durango, Mexico.

Officers: David F. Beggs, pres. and treas.; C. P. Jacobs, F. C. Hanford, W. B. Raymond, Wm. T. Read and Walter S. Logan, directors.

Inc. 1900, in West Virginia, and cap. increased, 1905, to $3,000,000; shares $1 par: First dividend, 1%, was paid January ,1906, and a second dividend was paid July, 1916. Direct title to this property is held in the name of Lucia Mining Co. Annual meeting, last Tuesday in February.

Property: the San Luis, Cinco Senores and Arana silver-gold mines, 225 pertenencias, and a 25-acre millsite, in the San Luis and Panuco de Coronado districts of Durango. The property shows limestone and porphyry, carrying fissure veins and contact deposits, whose ores are estimated by the management to average 3% copper, 12% lead, 1% zinc, 35 oz. silver and $4 gold per ton, mainly from sulphide ores.

Property and equipment fully described in Vol. XIV, which see.

Lease to Durago Silver & Copper Co., was cancelled, 1921.

SAN MANUEL Y ANEXAS; CIA MIN. **ZACATECAS**

Address: Henry Barnhof, pres., Mexico City, Mex., or Zacatecas, Mex.

An assessment of 1 pesos per share levied, July, 1921.

SAN MARTIN Y ANEXAS S. A.; COMPANIA MINERA **OAXACA**

Office: Aptdo 145, Oaxaca, Mexico. **Mine office:** San Martin de los Cansecos, Oaxaca, Mexico.

Officers: Frank M. Leonard, pres. and gen. mgr., 3543 Third St., San Diego, Calif. Lic. Jesus Acevedo, v. p.; Ranulfo Bravo, sec.-treas. and supt. with Frank J. Woods and Alfredo Castillo, directors, at last accounts.

Inc. Jan. 15, 1907, in Mexico. **Cap.** 400,000 pesos; shares 10 pesos par, in 35,000 fully paid shares and 5,000 assessable shares, issued 37,995 shares.

Property: 53 pertenencias, including El Billete de Banco, King Dodo, La Liga, Las Virginias, La Maria and La Roseta mines about 10 miles from Ocotlan. Property shows diorite cut by a 6′ vein carrying silver ore assaying 5 kgs. silver and 50 grams gold per ton.

Development: a 160′ shaft, on the Maria, an 80′ shaft on the Billete de Banco and a 350′ tunnel on La Liga claims.

The unsettled conditions in Mexico stopped operations and mine is filled with water, but company keeps up tax payments and keeps watchmen at the mine.

SAN MATEO, S. A.; CIA MINERA **DURANGO**

Office: Velardena, Durango, Mexico. Company controlled in San Antonio, Texas.

Inc. 1911, as successor of the Hileta Gold & Silver Mining Co.

Property: 72 acres, including the Santo Tomas, Bolsa and other mines, and a 60-acre mill site. Claims are reported to show 5 E.-W. fissure veins cutting through limestone and porphyry.

Development: one vein of 12″ to 3′ width, is developed by a 1,600′ tunnel with 6,000′ of workings, exposing ore said to average 1% copper, 6% lead, 36 oz. silver and $10 to $50 gold per ton.

Equipment: includes steam and gasoline hoists, good for 1,000′ each, engine and air compressor.. There are 9 buildings. Shut down several years on account of political conditions. Operations reported resumed in 1921 and shipments made to Chihuahua smelter.

SAN MIGUEL LOS PALACIOS, SAN MIGUEL DEL MONTE, GUADALUPE & MARAVILLAS; MINAS DE HIDALGO

Address: Aloys Preissner, mgr., Zimapan, Hgo., Mex.

SAN MIGUEL TLAXPAMPA MNG. CO. MEXICO

Address: Zacaulpan, Mexico, Mex. S. J. Lewis, pres.

SAN NICHOLAS, CIA. MINERA COAHUILA

Address: J. C. Rodriguez, mgr., Apto. 87, Saltillo, Coah., Mex. **Mine address:** Ignacio V. Sanchez, supt., Saltillo, Coah.

Officers: J. C. Rodriguez, pres., Hipolito, Arizpe, sec.

Inc. 1907, in Mex. **Cap.** P10,000; par P5.

Property: the San Nicholas lead-zinc mine, developed by a shaft and levels. The hoist and compressor are operated by steam power. Employs 20 to 60 men.

SAN PASCUAL DE LAS ADARGAS, S. A.; CIA. MINERA CHIHUAHUA

See **Adargas Mining Co.**

SAN PATRICIO, S. A.; CIA. MINERA CHIHUAHUA

Subsidiary of Mexican Northern Light & Power Co.

Mine address: A. W. Morris, mgr., Parral, Chihuahua, Mex.

Office: Mills Bldg., El Paso, Texas, T. G. MacKenzie, gen. mgr.; A. W. Morris, mine supt.

Officers: Strahan Johnston, Toronto, pres.; I. N. Thacker, sec.

Inc. in 1918, in Mexico. **Cap.** P100,000; par P1.

Property: the San Patricio silver mine in Parral-Minas Nuevas section, Chihuahua, under development since 1912. About 250 men employed.

Equipment: includes 300-ton mill and cyanide plant, completed in 1921.

SAN PEDRO COPPER CO., S. A. SONORA

Company absorbed by Cananea Consolidated Copper Co.

SAN RAFAEL ANEXAS, S.A.; NEG. MIN. DE HIDALGO

Address: Fred MacCoy, mgr., Ave 5 de Mayo 7, Mexico City, Mex.

Officers: Emilio Berthier, pres.; Alfonso Septien, Jr., sec., with Aug. Genio and Fred MacCoy, directors. F. D. Wheatley, treas.

Operating staff: Fred. MacCoy, gen. mgr.; J. L. Salinas, Pachuca, mine mgr., Simon Anduaga, Pachuca, mine supt., P. S. Stockdale, Pachuca, mill supt.

Inc. 1874, in Mexico. **Cap.** 220,000 shares; 10s par; all issued.

Property: includes mines at Pachuca, Hidalgo; Parral, Chihuahua; and Analco, Jalisco, Mexico.

The **San Rafael** mine at Pachuca was a producer in 1878 and to end of 1910 is credited with a production of 47,000,000 oz. silver. The ore contains argentite and occurs in quartz veins in andesite, the orebody being 500 meters long, 300 meters deep and up to 75′ wide, the ore averaging 450′ gm. silver per ton. Gold occurs in ratio of one gold to 250 silver.

Development: by 3 shafts, deepest 1,955′, with 21 miles of workings.

Reserves: at end of 1920 were 167,535 tons, averaging 3.67 grams silver per ton.

Equipment: electrically equipped throughout, includes 1,500 k. (wt power, 3 hoists, compressor, pumps, 3 electric locomotives, etc.

Mill: with 500 ton cyanide plant was burned down in 1921; rebuilding, 1922.

Production: 131,969 metric tons in 1918; 138,228 tons in 1919 and 131,589 tons in 1920. Average value in 1920 of ore milled was 453 grams silver per ton with an extraction of 88.958% of the silver and 81.2% of the gold.

SAN RAFAEL Y BAJAN, S. A. COAHUILA

Address: A. Rodriguez, Apto., 13, Monterey, N. L., Mexico.

SAN ROBERTO MINING CO. ZACATECAS

Address: Zacatecas, Zac., Mexico. C. A. Bently, gen. mgr.

Property: the Roberto mine, opened to depth of 400', yields copper-lead-zinc ores, occasionally assaying up to 30% copper with good value in gold and silver. The mine has given a creditable production of excellent ore and is now being developed at depth.

SANTA AGUEDA DE CANANEA, S. A., COMPANIA MINERA SONORA

Address: George Young, sec.-treas., Cananea, Sonora, Mexico.

Officers: J. H. English, pres.; C. E. Hoffman, v. p. **Cap.** 7,500 pesos.

Property: 10 pertenencias, 15 miles S. E. of Cananea, developed to a depth of 250' by workings that show high-grade stringers of argentiferous bornite. Mine has been operated on a small scale, making ore shipments that returned about $20,000 annually.

SANTA ANA Y ANEXAS, S. A., CIA DE MINAS HIDALGO

A 90% interest of this company was acquired in 1919 by the **Real del Monte y Pachuca Cia. de,** a subsidiary of the U. S. Smelting, Refining and Mining Co., which see.

SANTA BARBARA MILL CHIHUAHUA

Address: Fred M. Heidelberg, supt., Santa Barbara, Chih., Mex.

SANTA CECILIA MINING CO. DURANGO

Address: Luis C. Ratto, Torreon, Dgo., Mex.

Property: in Ramirez mountains, San Juan de Guadalupe district, Dgo.

SANTA CRUZ MINING CO. DURANGO

Address: S. W. Loring, gen. mgr., Zapotes, Durango, Mex. Lawrence Elder, mgr.

Property: the Santa Cruz and Sta. Maria silver mines in Ortez district. A 50-ton mill is to be erected to work ore now on the dump, that assays 1 to 5 kilos silver per ton.

SANTA DOMINGO SILVER MINING CO. CHIHUAHUA

Address: F. E. Brodye, Batopilas, Chihuahua, Mex.

SANTA EULALIA MINES CHIHUAHUA

Owned by **Am. Sm. & Ref. Co.,** which see.

Address: W. J. Deavitt, supt., Santa Eulalia, Chih., Mexico.

Employs nearly 1,000 men, when operating full time.

SANTA EULALIA MINING CO. CHIHUAHUA

Address: 410 Hearst Bldg., San Francisco, Calif.

Officers: R. A. Clark, pres.; I. J. Egan, sec.

Inc. 1895, in Calif. **Cap.** $300,000; $1.50 par; 200,000 shares issued.

Property: at Santa Eulalia, Chihuahua, has been closed down several years.

SANTA GERTRUDIS CO., LTD. HIDALGO

Controlled by Camp Bird, Ltd.

Office: 1 London Wall Bldgs., London, E. C., Eng. A. A. Kelsey, sec.; C. L. Johnson, asst. sec.

Directors: F. W. Baker, chairman; Hugh Rose, managing, J. A. Agnew, L. Clerc, F. A. Govett, F. H. Hamilton, O. deRivaud, and A. S. Elmore.

Mine staff: C. A. Lantz, gen. mgr.; F. H. Walsh, gen supt., J. F. Berry, mine supt.

Inc. Dec. 31, 1909, in England. **Cap.** £1,500,000; increased Jan., 1911, from £1,275,000; shares £1 par; all issued and fully paid. (Camp Bird, Ltd., owns 841,685 shares.) An issue of £300,000 of 8% five year notes dated Sept. 30, 1925, was made in Dec., 1920.

Company organized to acquire from Camp Bird, Ltd., a controlling interest in the Compania Minera de Santa Gertrudis y Guadalupe, owning the

Santa Gertrudis gold and silver mines, for $9,000,000 Mexican currency, approximately £922,130. Consideration for the option was £222,869, payable £20,000 cash and £202,869 in fully paid shares; the vendors also agreed to provide subscribers for 1,072,131 shares at par, and to provide £150,000 working capital, and also the purchase price of £922,130, the preliminary expenses to be repaid to vendors out of the first profits.

The name of the operating company is **Compania de Santa Gertrudis, S. A.**

The subsidiary company formed to operated the mill in which the ores are treated, is known as Compania Beneficiadora de Pachuca, S. A., inc. in Mexico. All shares in both these companies are owned by Santa Gertrudis Co., Ltd.

Company owns 137,745 fully paid £1 shares of Mexican Corp., Ltd. and 108,510 ¾ paid shares. Also £60,000 notes, 10 year 10% 49,996 shares of Mexican Chemical & Metallurgical Corp., Ltd.

Balance Sheet, years ending June 30:

Assets.

Year	Property & Equip.	Ivest-ments	Cash	Miscel.	Total
1921	£1,019,343	£948,616	£ 9,858	£77,468	£2,055,286
1920	1,019,343	887,759	19,152	1,954	1,928,209
1919	1,019,343	609,646	61,028	2,370	1,691,287
1918	1,019,343	541,464	15,732	24,414	1,600,953
1917	1,019,343	405,003	38,668	92,494	1,555,509
1916	1,019,343	431,739	100,982	17,253	1,569,317
1915	1,019,601	503,507	99,459	17,722	1,640,289

Includes cost of shares in Cia. Ben. de Pachuca, Cia. de Santa Gertrudis, Amistad y Concordia Aviado and Recuperadora, and Messina Transvaal Dev. Co., Ltd., Messina, Transvaal.

Liabilities.

Year	Capital	P. & L. Acct.	Miscel.	Total
1921.....	£1,500,000	£ 453	£554,833	£2,055,286
1920.....	1,500,000	28,982	399,227	1,928,209
1919.....	1,500,000	8,322	182,935	1,691,287
1918.....	1,500,000	1,498	99,456	1,600,953
1917.....	1,500,000	21,329	34,180	1,555,509
1916.....	1,500,000	22,030	47,287	1,569,317
1915.....	1,500,000	130,394	9,895	1,640,289

Profit and Loss Account:

Year	Balance from previous year	Profit for year	Total available	Dividends paid	Balance forward
1921.....	£28,982	£ 453	£ 29,435	.....	£29,435
1920.....	8,322	170,660	178,983	£150,000	28,982
1919.....	1,498	158,409	159,906	151,584	8,322
1918.....	21,329	112,544	133,873	132,375	1,498
1917.....	22,030	1,798	21,329	.....	21,329
1916.....	55,394	42,057	97,451	75,421	22,030

Dividends: 15% in 1911-12; 15% in 1912-13; nil in 1913-14, owing to unsettled conditions in Mexico and Europe; 5% in 1914-15; 5% in 1915-16; nil in 1916-17; 8¾% in 1917-18; 10% in 1918-19; 5% in 1920, to Jan. The total is £881,250.

Income account showed total receipts, £251,699, of which £250,000 represented dividend disbursements of the Com. Ben. de Pachuca; expenditures were $14,315, leaving balanc £237,384.

Santa Gertrudis Mines

Property: 626 acres in the Pachuca mining district, State of Hidalgo, about 62 miles from Mexico City. The tract carries silver and gold ore in large fissure veins or crush zones, 50′ to 100′ wide in andesite. A great oreshoot 3,000′ long, 18′ thick and 600′ high has prongs that extend upward from the 800′ or 900′ level, but do not reach the surface. Down to No. 18 level the ore maintained its value. On the 19th level the ore was low grade and the values practically ceased on the No. 20 level, though the country rock did not change, nor were the structural conditions different.

Development: at Santa Gertrudis—new openings and reserves may be tabulated thus:

		Reserves		
Year	New Work, feet	Ore, tons	Silver recoverable, oz.	Gold recoverable, oz.
1921.....	1,297	309,911	2,687,877	15,430
1920.....	5,714	476,678	4,309,556	24,382
1919.....	8,162	718,579	7,128,996	40,108
1918.....	7,014	880,433	9,595,800	53,987
1917.....	8,856	1,125,000	12,381,080	61,904
1916.....	14,865	1,214,000	13,392,981	66,964
1915.....	15,838	1,287,000	14,595,567	72,977
1914.....	.....	1,194,000	.....	.....
1913.....	.....	1,047,000	.....	.....
1910 (when purchased)....		1,150,000	(containing profit of £1,650,000)	

Equipment: Santa Gertrudis has a complete electrically-driven mining plant.

The Mill: the milling plant which can handle 2,000 tons of ore daily, has sixty 1,550-lb. stamps, two 8′ by 48″ Hardinge ball-mills, 11 tube-mills, elevators, thickeners, Dorr agitators, 8 filter presses, 300 leaf vacuum-filter plant, aluminum dust precipitation plant (zinc dust superseded), and Crowe vacuum precipitation apparatus. Flotation experiments show that process cannot compete commercially with cyanidation for the treatment of the company's ore.

The mill was enlarged to treat 2,000 tons daily in 1921.

Production, years ending June 30:

Year	Tons*	Value	Extraction, %	Gold, Oz.	Silver, Oz.	Price Silver, per oz.
1921.	201,094	£ 502,109	86.4	12,170	2,119,409	75.45¢
1920.	356,988	1,178,971	93.00	20,322	3,479,326	120.12
1919.	362,122	1,037,606	....	24,359	4,304,812	102.52
1918.	324,762	951,605	87.95	21,856	3,775,745	96.77
1917.	223,736	395,374	89.84	11,154	1,989,761	81.42
1916.	277,616	379,651	....	12,550	2,286,450	49.68
1915.	211,669	249,728	....	10,727	2,000,856	65.66
1914.	293,836	498,754	....	.....	.....	54.81
1913.	263,554	631,718	....	.....	.....	57.79

* 52.7% of capacity in 1915; 56.6% in 1916; 53.2% in 1917; 80.7% in 1918; 90.2% in 1919; and 98.3% by July, 1919. The low capacity was due to the revolution in Mexico.

Production during 1921 was 201,094 tons of ore that averaged 49s. 11d per ton, 86.4% of value being silver and 13.6% gold.

Since its purchase in January, 1910 up to June 30, 1921, the mine has produced 2,773,696 tons of ore containing 196,817 oz. gold and 36,378,926 oz. silver.

During 1918, Santa Gertrudis, through its subsidiary, made a 20-year con-

tract with **Compania Explotadora de Minas** to operate the latter's El Bordo, Malinche, El Cristo and La Zorra properties, 431 acres of developed and virgin ground in the most highly mineralized and productive part of the Pachuca district.

The Bordo Property.

El Bordo mine is on the Vizcaina vein, one of the largest in the district, and from which a great production has been and is being obtained in the neighboring Santa Ana (see Real del Monte), San Rafael, and Camelia mines for a distance along the strike over 8,000', from ore-shoots recurring with great regularity. El Bordo is a well-developed mine, with a large tonnage of profitable ore blocked out, in addition to having excellent future prospects; it covers 2,500' on the strike of the Vizcaina, Sacramento and Tapona veins. Some of the shoots vary from 5½' of 43 oz. ore up to 36' of 50 oz. ore, with 44' of 12½ oz. ore.

Development: at Bordo for 1921 was 4,396' in payable ore, 5,060' in vein, not payable, and 4,842 in rock.

		Reserves		
Year	New work, ft.	Ore, tons	Silver, oz. per ton	Gold, oz per ton
1921....	14,298	1,064,059	11,944,552	48,810
1920....	14,798	1,064,180	11,000,444	48,400

During 1921 new work amounted to 14,298'.

In March, 1920, the main shaft of El Bordo was burned for a depth of 500', with great loss of life and delay in ore extraction. Shaft was sunk to 625 meters in 1921, with extensive development on 6 levels the deepest 525 meters.

Equipment: at El Bordo is a steel head-frame, 300-h. p. electric hoist, 1,400 cu. ft. compressor, machine-shops and 4-mile aerial tram, with branch to Malinche to new mill.

Production: was 131,836 tons in 1920 and 257,050 tons in 1921.

The Malinche Mine

Malinche covers a large, undeveloped area east of the Camelia and Paraiso mines which have worked in ore to its boundary line, and it covers 5,000' on the strike of the Vizcaina vein, It also has the eastern extension of the Maravillas vein which has been productive in nearby mines, with frequent ore-shoots for over a length on the strike of 8,000'. During 1920, a total of 2,504' was done.

Development: includes the 846' Ensenaza shaft used for ventilation, and the 1,410' Santo Tomas shaft. The 330-meter (1,082') level passed through broken vein matter for 325'. Beyond this the vein became normal, with 14 oz. ore. At 390' W. of the main crosscut, a local crosscut exposed 19' of 14.5 oz. ore, plus 6' of 19.5 oz. ore, in the Maravillas vein.

Reserves on June 30, 1921, were 133,761 tons of ore, containing 1,386,490 oz. of recoverable silver and 5,170 oz. of gold, compared with 102,810 tons in 1920, containing but 832,190 oz. silver and 3.670 oz. gold.

El Cristo is a partly developed mine from which a considerable tonnage of ore has been extracted. Other veins in this ground are the Calderona and Maravillas, in which further development should disclose important tonnages of lower grade ore.

Development: at El Cristo; previous work was by the 2,575' Calderona tunnel and the Esperanza shaft. The adit has since been driven 350', and a raise 592' above the end is to connect with the shaft. Mine is now fully equipped and has aerial tramway to El Bordo terminal.

Reserves at June 30, 1921, were 121,797 tons of ore containing 1,049,726 oz.recoverable silver and 5,170 oz. gold, a reduction of 10% below 1920 figures.

La Zorra covers a small vein upon which little development has been done and is a prospect of undetermined value.

El Bordo and Malinche mines are connected with the new mill by an aerial tram 4 miles long, and a short branch line installed to deliver ore from El Cristo mine to the main line at El Bordo.

By the terms of the working arrangement Santa Gertrudis makes an advance to the Cia Explotadora de Minas of $500,000, to be repaid out of the first profits. It also provides $600,000 for the development of the mines, and the equipment and enlargement of its present milling and treatment plant and receives 40% of the profits for 20 years.

Compania Beneficiadora de Pachuca, S. A. (Milling Co.)

Address: Pachuca, Hidalgo, Mex.

During year ending June 30, 1920, the mill treated 477,075 tons having a gross value of £1,652,584, or £3 9s. 6d. per ton and containing 23,070 oz. gold and 4,430,433 oz. silver. In year ending June 30, 1921, the mill treated 475,361 tons from the Gertrudis and El Bordo mines, with an estimated profit of £232,361.

Teziutlan Copper Property.

The Santa Gertrudis management anticipated the depletion of its mine by buying another to take its place. In November, 1919, through The Mexican Corporation, Ltd., which see, company acquired a 25-year lease on property of the Teziutlan Copper Co. The mines, 500-ton mill, power-plants and smelter, are in the State of Oaxaca. Development, in 1921, exposed an ore body 7-11′ wide, opened for 185′, and proven for 400′ long by diamond drill work. This ore averages 3.3 oz. silver p. t., $5.80 gold, 4.5% copper, 24.2% zinc, 14.3% iron and 21.3% insoluble. Prior to 1913, when the revolution prevented operation, the annual output was 7,000,000 lb. of copper, with a fair quantity of silver and gold. There were 2,500 men employed.

Control was also obtained on the Fresnillo Co., which has a mine in Zacatecas.

SANTA MARIA DE LA PAZ Y ANEXAS: NEGOC. MIN. DE S. L. P.

Office: Avenida Uruguay 70, Mexico City, Mexico. **Mine address:** W. Puente, mgr., Apto, 16, Matahuala, S. L. P.

Officers: Jose de Caso, pres.; Vincente Etchegaray, Deogracias Alonso, Adolfo Prieto, Baltoasar Marquez, Jose Sainz, and Eusebio Gomez Allende, assistant presidents; Geoffrey M. Wasteneys, managing director.

Inc. in Mexico, in 1864. Reincorporated March 29, 1917, and capitalization changed from 240,000 pesos to 625,000 pesos; 25 pesos par. Listed on Mexico City Exchange.

Net profit in 1918 was 947,377 pesos. Monthly expenses are 125,000 pesos.

Dividends: from 1895 to 1904, inclusive, 5,778,270 pesos. A distribution of 2 pesos per share is paid monthly besides extras, the total being from 30 to 35 pesos per annum.

Property: the Santa Maria de la Paz silver-lead-copper mines, 282 hectares in the Matehuala district of San Luis Potosi. The mines are opened to depth of 1,500′. The ore, which is a hard quartz with calcite, occurs in fissures along porphyry dikes, averaging 32 oz. silver per ton.

Equipment: steam, air, and electric power, with total capacity of 2,500 h. p. The 300-ton concentrating mill and 80-ton smelter are idle as ore is sent to smelters at Matehuala and Monterey.

Production: in 1918, 54,267 kg. (1,728,000 oz.) of silver. Monthly output is 6,000 kg., to be increased in 1920 to 8,000 kg. There are 1,600 men employed.

Mines reported closed down in 1921 owing to fuel shortage and low price of silver and copper. Employs over 1,000 men when in active operation.

SANTA MARIA MEXICO MINING ASSOCIATION CHIHUAHUA

Address: Parral, Chihuahua, Mex. Wm. G. Gruber, pres. and gen. mgr.; Arthur H. Gruber, sec. and treas.

Inc. in Wisconsin. **Cap.** $250,000; shares $1 par.

Property: 50 claims, La Lolita, La Viola and Santa Clara groups, in the Galena district of the San Blas mountains,

Development: is on La Lolita group, in which shafts of 75′ and 150′. deep are said to show oxidized ores, shipments from which are reported to have averaged 15% copper. Idle for several years.

SANTA ROSA MINING CO. ,LTD. **ZACATECAS**

Subsidiary of the Exploration Co., Ltd.

Office: H. F. Wreford, 24 Lombard St., London, E. C. England.

Directors: R. T. Bayliss, chairman; S. A. Cloman, J. E. D. Ryder, J. H. M. Shaw and the Earl of Hardwicke.

Inc. Nov. 24, 1910, in England. **Cap.** £150,000; shares £1 par; 100.007 issued. **Debentures:** £35,500.

Property: in the Mazapil district, Zacatecas, Mexico. The mill has not been operated, since 1914, owing to the revolution.

SANTA TERESA, S. A.; CIA MINERA DE **CHIHUAHUA**

Address: Felizardo Rodriquez, owner, Ocampo, districto Rayon, Chihuahua, Mex.

Property: the Santa Teresa mine 19 patented claims, on the Sahuayacan ranch, Municipalidad de Moris, Rayon district, said to show a 5′ quartz vein averaging $20 in gold and silver. Reserves estimated at 15,000 tons blocked out. Also owns 1.755 hectares of forest land, and valuable water power, etc.

Developed: to depth of 300′ by shaft and adit.

Equipment: includes two 50-h. p. boilers, one 70-h. p. engine, 20-h. p. steam hoist, 10-stamp mill, with 2. rock crushers, 2 Wilfley tables, 4 amalgamation pans. 2 settlers, etc.

Production: to 1922, 20,000 tons ore assaying $12-$40 per ton.

SAN TOY MINING CO. **CHIHUAHUA**

Office: L. A. McKee, sec., 34th St. & A. V. R. R., Pittsburgh, Pa.

Officers: G. McCargo, pres.; W. Saul Lynne, v. p.; H. T. Frauenheim, treas., with Jos. H. Bialas, C. A. Blanchard, directors. A. R. Hunt, J. S. McFadyen, Geo .Mortimer and J. H. Richardson. W. V. Paterson, asst. sec.

Inc. 1901, in Maine. **Cap.** $7,000,000; $1 par; outstanding $5,746,750. Colonial Trust Co., Pittsburgh, transfer agent. Commonwealth Trust Co., Pittsburgh, registrar. Annual meeting, third Monday in February at Augusta, Me. Stock listed on Pittsburgh Stock Exchange and New York Curb. Shortly after flotation of the company stock sold up to $1.25 per share. In 1918, it sold 7c. low, 18c. high; in 1919, 5c. low, 13c. high; 1920, .08 high, .03 low; in 1921, .05 high, .03½ low.

Dividends: 6% in 1911; 1% in 1912; 2% in 1913; none since.

Financial statement for year ending Dec. 31, 1920, showed, total assets, $5,847,482, which includes; mines, $5,518,627; buildings and equipment, $251,668; accounts receivable $4,000; cash, $73,185. Liabilities include, capital stock, $5,746,750; surplus, $98,517; reserve, $1,780; unpaid dividends, $434.

Comparative Statement of Earnings, years ending December 31:

Year	Gross Value	Expenditures	Net Earn. & Misc. Inc.	Dividends	Surplus Year	Balance Surplus
1920..	$ 32,453	$ 40,760	$ 8,307*	.....	$ 8,307*	$ 98,517
1919..	30,672	8,157	22,515	.....	22,515	107,009
1918..	.....	.....	.....	.....	.....	79,985
1917..	26,715	33,292	6,577*	.....	6,577*	316,062
1916..	13,098	42,733	29,635*	.....	29,635*	332,639
1915..	19.552	100.956	68.575*	.....	68,575*	352.273
1914..	64,950	172.139	92,379*	.....	92,379*	420.850
1913..	334.728	184,905	132,428	$115,000	34,928	513,229
1912..	314,884	229.539	106.458	60,000	46,458	478,301
1911..	793,319	321.314	496.493	360,000	136,493	431,844
1910..	529,470	376,762	157,566	.....	157,566	295,350

*Deficit.

Property: 5 claims, the Bustillos, La Fortuna, Independencia, Juarez and La Central, in the Santa Eulalia district, 12 miles S. E. of Chihuahua, adjoining the Potosi mine, controlled by the Howe Sound Co.

Ore: lead-silver, occurring in chimneys and "mantas" (beds or blankets) in limestone. For detailed description of geology of the district, see Trans. A. I. M. E. Vol. LI, (pp. 57-99).

Comparative Statement of Operations:

Year	Ore, Tons	Silver Oz.	Silver Oz. p. t.	Lead Lb.	Lead %	Average Net Value Silver Oz.	Lead Lb.
1914	2,918	110,824	31.5	.....	..	51.48c	....
1913	7,129	554,181	78.5	.....	..	57.45c	....
1912	7,851	485,712	66.3	260,989	1.8	60.07c	2.89c
1911	12,173	1,433.071	117.7	1,275,778	5.9	51.87c	1.79c
1910	20,181	879,492	43.6	1,584,528	3.9	52.10c	1.65c
1909	25,509	1,410,630	47.8	1,810,397	3.1	50.77c	1.66c

Company was a large producer of silver-lead ore prior to the Madero revolution. In 1917, the Santa Eulalia property was leased to Compania de Minerales y Metales for 10 years, on a royalty of 15% on net smelter returns, the minimum to be $30,000, payable monthly in advance in installments of $2,500.

SAN VICENTE MINING CO. **SINALOA**

Address: 58 Second St., San Francisco, Calif.

Officers: A. G. Folger, pres.; F. C. Ruppel, sec.

Inc. 1893, in California. **Cap.** $100,000; $1 par; 100,000 shares issued. Dividends to date amount to 820%; last distribution, 5%, Nov. 16, 1916.

Property: 250 acres, patented, at San Ignacio, Sinaloa, Mex. Credited with past production of $5,000,000 in gold and silver.

SAN XAVIER COPPER CO. **SONORA**

Probably dead. Formerly operated mine near San Xavier, Sonora, Mex. See Vol. XIII.

SIERRA CONSOLIDATED MINES **CHIHUAHUA**

Office: 120 Broadway, New York, N. Y.

Officers: J. B. Cotton, pres.; Robert Linton, v. p.; F. R. Kennedy, sec.-treas.; H. B. Paull, auditor.

Directors: Robert Linton, E. R. Grochau, J. F. Bangerd, T. F. Cole, J. B. Cotton, L. D. Ricketts, F. R. Kennedy, and H. B. Paull.

Inc. Aug. 18, 1909, in Arizona. **Cap.** $5,000,000; $10 par; 76,500 shares issued, fully paid 223,500 shares part paid at $7 each, $1,564,500; total outstanding $2,329,500. Last assessment, $1 per share, was payable Aug., 1, 1918. Stock transferred and registered at the company's office. Annual meeting, first Tuesday after first Monday in May at Warren, Arizona. Stock traded in on Boston Curb.

Property: embraces mines, mineral and timber lands, water-rights, etc. The mineral properties consist of 1,235 acres, in Ocampo, Pinos Altos, Socorro and Yepachic, in the district of Rayon, State of Chihuahua, Mexico. The timber lands comprise 80,000 acres all in Chihuahua. The company has water-power rights at Jesus Maria arroyo, a stream that flows through Ocampo, and to the Basaseachic falls 18 miles from Ocampo.

Development: from 1909 to 1912 in Matulera, Belen, Santa Eduviges, Guadalupe, San. Ramon, El Conico, San Estanislao, and La Cumbre mines totalled about 13,000′ when operations were suspended on account of the revolution.

The underground work has developed six ore-shoots blocking out approximately 100,000 tons of ore averaging $12 per ton in gold and silver, basing the value of silver at 50c per ounce. The silver occurs as argentite, with some associated gold, in a silicious gangue. The ledge matter is an andesite breccia cemented with quartz.

Equipment: the mill equipment consists of a 20 by 10" Blake crusher, ten 1,500-lb. stamps, two 4 by 20' tube-mills, three 15 by 45' Pachuca agitators, two Dorr thickeners, Esperanza classifier, 135-ton Oliver filter, Gwynne centrifugal pumps, solution tanks, steel zinc-boxes, Johnson precipitate press, tilting furnace for refining precipitates and other necessary accessories. The electric generating station, 6 miles from Ocampo, on one of the company's timber tracts consists of 66" by 16' Brownell tubular boilers, with feed waterheaters, pumps, etc.; three 100-h. p. Russell high-speed automatic engines belted to 75-k. w. generators; three 75-k. w. oil-cooled transformers; and all necessary lightning arrestors, switch-board apparatus, Tyrell regulators, etc. The current is generated at 2,300 volts and raised to 22,000 volts for transmission to Ocampo.

Sierra Mining Company, S. A.

Principal office: Juarez, Chihuahua. Mines and works at Ocampo, district of Rayon, Chihuahua, Mexico. This company is the Mexican operating corporation for the Sierra Consolidated Mines Co.

Officers: J. B. Cotton, pres.; Robert Linton, v. p. and gen. mgr.; H. O. Flipper, sec.; F. R. Kennedy, treas.; H. B. Paull, auditor and Enrique N. Seyffert, commisario.

Inc. Dec. 11, 1908, in Mexico. **Cap.** 25,000 shares at $20 each (Mexican Currency).

Combined balance sheet Sierra Consolidated Mines Co. and Sierra Mining Co., S. A., December 31, 1920.

Assets.

Property	$1,452,602
Cash	3,417
Accounts receivable	24,320
Assessments No. 2	165,496
Investments	45,000
Supplies at mines	31,321
Suspense items	1,891
Construction and equipment	170,283
Development, taxes and miscellaneous expenses	483,863
Total	$2,378,193

Liabilities.

Capital stock	2,329,500
Collateral trust notes	45,600
Accounts payable	3,093
Total	$2,378,193

SIERRA MADRE MINING CO. **CHIHUAHUA**

Address: W. J. Kelly, pres., 4601 Lincoln Ave., Chicago, Ill.

Officers: W. J. Kelly, pres.; J. R. Kelly, v. p.; M. P. Geiselman, sec.-treas., with M. V. Kelly, directors.

Inc. in Mexico. **Cap.** $250,000; $1 par; 5,000 shares in treasury.

Property: 7 claims, 165¼ acres, in State of Chihuahua. Ore said to contain lead, silver, copper and gold.

Development: by shafts and drifts to depth of 1,000'. Reported to have 50,000 tons milling ore on dump.

Idle since Mexican revolution.

SIGLO NUEVO; MINA EL **NUEVO LEON**

Address: Pablo Hinojosa, mgr., Cerralvo, N. L., Mexico.

SILVER SEAL MINING CO. **SONORA**

Mine at Pilares de Teras, Sonora, Mex. Fred O. Colsen, lessee at last accounts.

Property: El Aguaje mine, 12 miles east of Nacozari, showing a fissure vein in andesite rock, carrying narrow paystreaks of gray copper, chalcopy-

rite and galena ore. The mine yielded ore which assayed up to 15% copper and 20 oz. silver per metric ton.

Probably idle.

SINALOA SMELTING & REFINING CO., S. A. SINALOA

Subsidiary of the Pacific Smelting & Mining Co., which see

SINDICATO MINERO FUNDIDOR NUEVO LEON

Address: Joaquin Maiz, mgr., Apto. 102, Monterey, N. L., Mex.

SOCORRO y ANEXAS; CIA. MINERA AGUASCALIENTES

Address: Gabriel Chavez, mgr., Bajos del Hotel Paris, Aguascalientes, Ags., Mexico.

SOMBRERETILLO MINING CO., S. A. SONORA

Dead. Was controlled by Sonora Central Mines Co., also defunct.

SONORA CENTRAL MINES CO. SONORA

Dead. See Vol. XI of Copper Handbook.

SONORA CHIEF MINING CO. SONORA

Probably dead. Mail returned from former address, 219 Argyle Bldg., Kansas City, Mo. Mine near Suaqui de Batuc Sonora, Mex.

Officers: Jas. E. Crosby, pres.; Dr. Moses T. Runnels, v. p. and treas.; R. A. Bruns, sec.; preceding with C. D. Stoll and I. D. Waggener, directors

Inc. July 18, 1904, in Arizona. **Cap.** $1,500,000; $1 par.

Property: the Phoenix and Lakeside groups, 464 acres. This flotation was, it is believed, a crooked one. The property had no such showing as reported and described. Such veins as existed were tiny streaks, a few inches wide, which in places contained very high-grade ore, chalcocite and perhaps whitneyite. Its location, on the far side of the Yaqui river, is such that even a remarkably good showing would not have been worth development at the time the company was active. The property is said to be totally devoid of merit.

SONORA COPPER MINING CO. SONORA

Idle and probably dead. Mail unclaimed, at last office 895 So. Clarkson Ave., Denver, Colo.

Officers: Edward J. Wilcox, pres.; H. L. Peebles, v. p.; Fred W. Webber, sec.; C. A. Parker, treas., and L. J. Stark, directors, at last accounts.

Inc. May 17, 1910, in Colorado. **Cap.** $10.000; shares $1 par.

Property: 10 claims. 4 miles from San Felipe, in the Arizpe district, Sonora, developed by 820' of underground workings, showing a 12' vein, with some complex silver-lead-zinc ore.

Is unfavorably regarded.

SONORA COPPER SMELTING CO. SONORA

Last address: 424 Scarritt Bldg., Kansas City. Mo. **Mine office:** Noria Sonora, Mex.

Officers: A. M. Conard, pres. and gen. mgr., at last accounts; J. M. Lowe, v. p.; C. E. Kroh, sec.; W. R. Moore, treas.

Inc. June 25, 1908 in Arizona. **Cap.** $3,000,000; shares $10 par.

Company supposed to have been organized as successor of the Sonora Copper Co., but apparently owns only a 50% stock interest in that company, and title to the Mexican property is held in the name of the International Copper Ore Corporation, which is controlled, in some manner, by this company, the corporate relations being neither clear nor satisfactory.

Property: about 500 acres, including the Cobre Grande, 123 acres, 5 miles east of Noria.

The principal mine, is not considered worthy of the money spent upon it and the past history of the president is such that the company is regarded with much suspicion.

SONORA DEVELOPMENT CO. SONORA

Office: 500 New Ridge Bldg., Kansas City, Mo. R. W. Brown mgr.

Officers: H. P. Wright, pres.; J. A. Nuttman, 1st v. p.; D. J. Haff, v. p.; W. A. Rule, treas.; J. W. Amermen, sec.; with William Huttig, Thos.

Mackie and Henry C. Page, directors. International Commission Co., Y. Soto, agent, Douglas, Ariz.

Inc. in Arizona. Cap. $2,500,000. Reorganization completed in 1919, and outstanding shares reduced to 500,000. Company absorbed the Goodlander Mining & Milling Co. in 1902.

Property: 335 acres, includes Don Genario, 50 acres; Nacozari Copper Queen, 65 acres; La Madrugada, 40 acres; El Nocturno, 40 acres; La Gran Republica, 25 acres; Lady Goodlander, 65 acres; Tres Avril, 15 acres, and Wostenholm, 35 acres. Properties show silver, copper, lead, and zinc ore.

Company resumed development work in 1921.

SONORA EXPLORATION CO. SONORA

Controlled by **Aztec Consolidated Mining Co.** which see.

Inc. in Arizona and legalized in Mexico. Cap. $10,000; shares $1 par; 9,997 held by Aztec Cons. Mining Co.

SONORA EXPLORATION CO. SONORA

Address: Estacion Yzabal, via Agua Prieta, Mexico.

Property: once owned by the **Florida Copper Co.**, includes El Temblor Last Chance, Texas, and other properties, carrying copper ore, developed by shaft.

Equipment: includes steam power and an air compressor. Idle and probably dead.

SONORA MEXICAN SILVER MINES, LTD. SONORA

Office: G. W. Vinson, sec., 9 Kings Bench Walk, Temple, London, E. C. 4.

Directors: Sir E. W. Birch, chrm.; M. Epstein, T. W. Brown, J. C. Craigie.

Inc. Sept. 1919. Cap. £85,000; £1 par; 45,000 shares issued.

Property: 125 acres, in Alamos district, near Minas Nuevas, Sonora, includes the Quintera, Zambora Purisima, San Antonio, Zambora No. 3, Fortuna and La Purisima Conception mines worked before the 1914-21 revolution by Amos Yaeger.

Equipment: includes 20-stamp mill and cyanide plant.

SONORA MINING & DEVELOPMENT CO. SONORA

Idle since 1910. Office: 207 Spitzer Bldg., Toledo, Ohio. Works office: Toledo, Sonora, Mex.

Officers: A. E. Klauser, pres.; H. R. Klauser, v. p. and gen. mgr.; J. G. Meilink, sec.-treas.; and A. V. Baumann, directors, at last report.

Inc. 1904, in Arizona. Cap. $5,000,000; shares $1 par. Company operated in Mexico under the name of the **Yaqui Smelting & Refining Co., S. A.**, inc. in Mexico; cap., 100,000 pesos. Company is exempt from the payment of property tax for 20 years and also enjoys a 50% reduction on the state tax for 20 years. International Trust Co., Boston, registrar; Frederick R. Tibbetts, Boston, transfer agent.

Property: about 154 hectares, about 80 miles east of Torres and 60 miles below Campo Santo Nino. The principal property is the Veta Grande mine, about 10 miles from the smelter, said to show a gossan 40′ wide, outcropping for a quarter mile.

Equipment: the reduction works include a sampler, smelter and power plant, with necessary adjuncts. The 150-ton smelter has a 36″ circular Allis-Chalmers blast furnace, for use interchangeably on lead and copper ores, and a small furnace for copper only. The power plant includes two 80-h. p. water-tube boilers, 2 engines, an Erie high-speed engine and a No. 7 Connersville blower, for furnace blast. The lead refinery building has a softening furnace, refining furnace and 2 desilverizing kettles, operating on the Park process. The silver refining plant includes 2 cupel furnaces, with blast attachments, 1 bullion furnace, 1 muffle furnace and necessary pots and moulds, with a bullion vault.

SONORA-PACIFIC MINING CO. SONORA

Idle. **Address:** Noria, Sonora, Mexico. Ira E. Bowers, gen. mgr., at last account.

Inc. 1911, as the successor of the **Llano Copper Co.**

Property: 10 groups, 526 hectares on Caracahui mountain, 3 miles east of Noria, the nearest rail point. Lands show limestone cut by intrusions of diorite and porphyry, with a quartz vein of 3' to 50' estimated width, traceable 6,000' on the company's claims, which is reported to show bunches of ore carrying chalcocite, bornite and chalcopyrite, with a little native copper, 6 to 10 oz. silver and $2 to $5 gold per ton, as developed.

Development: consists of the 105' No. 1 shaft, No. 4 shaft of 800', and No. 7 shaft of 600' with tunnels of 50', 200', 577, and 750'. Orebodies developed so far are too small and too few for commercial production.

Equipment: includes a 125-h. p. steam plant, with 2 hoists, and a 6-drill compressor.

SOYOPA SILVER MINING CO., S. A. SONORA

J. E. Crocker, mgr., Nogales, Son., Mex.

Inc. 1921.

Property: Hidalgo gold-silver mine, in Soyopa district, Sonora.

SULTANA, S. A., LA CIA. MINERA COAHUILA

Address: J. C. Rodriguez, Apto. 87, Saltillo, Coah., Mex.

SUPERIOR BONANZA MINING CO. SONORA

Controlled through stock ownership of 60,000 shares by Cananea Cons. Copper Co., S. A.

Office: Cheyenne, Wyo. **Head office:** 25 Broadway, New York City.

Officers: Jos. B. Cotton, pres.; John D. Cuddihy, v. p.; Walter S. Harper, v. p.; Jos. W. Allen, sec.-treas.; Paul J. Geisler, asst. treas., with Evan J. Dudley and A. E. Peterman, directors.

Inc. in Wyoming, Aug. 31, 1907. **Cap.**. $1,250,000; shares $10 par; 74,923 issued. Owns the entire capital stock of Bonanza Mining Co., S. A.

TAJO; MINAS DEL. SINALOA

Mine address: G. C. Jones, mgr., Rosario, Sinaloa, Mexico.

Office: Bradbury Estate, owners, Bradbury Bldg., Los Angeles, Calif.

Is one of the large gold-silver mines of Mexico, showing a big fissure vein in andesite, developed to 1,000' in depth. Working $8 ore from old fills and pillars, above 600' level, at last reports. Has a complete equipment with 1,000-k. w. gas-producer electric plant.

The mill has a capacity of 250 tons per day and treats custom ore.

TAMAULIPAS; CIA. MINERA DE TAMAULIPAS

Address: Sabino Zuniga, mgr., El Palmar, Jurisdiccion de San Nicolas, Tamo.

TECOLOTES MINES CHIHUAHUA

Owned by **Am. Sm. & Ref. Co.**, which see.

Address: W. P. Schumacher, supt., Chihuahua City, Chih., Mex.

About 1,000 men are reported employed at mines and at the 750-ton mill.

TEZIUTLAN COPPER MNG. & SM. CO. PUEBLA

Office: 82 Beaver St., New York. R. E. Safford, sec.

Property leased for 25 years to **The Mexican Corporation, Ltd.** (which see), the operating company receiving 37½ per cent. of the net profit. See Vol. XIII for details of organization.

The Teziutlan Copper Co., a N. J. Corp'n, is a subsidiary of this company

THARSIS-YORK CO. SONORA

Fully described in Vol. XIV. Property purchased by the Nacozari Consolidated Copper Co., which see.

TIGRE MINING CO., S. A. SONORA

See **Lucky Tiger Combination Gold Mining Co.**

TIRO GENERAL; CIA. MINERA DEL **SAN LUIS POTOSI**

Sold property to the **Cia Metalurgica** Nacional, of Matehuala, San Luis Potosi, Mex., which is controlled by the American Smelting & Refining Co.

TIRO GENERAL MINES **SAN LUIS POTOSI**

Owned by Cia. Metalurgica Nacional (or National Metallurgical Co.), a subsidiary of the American Smelting & Refining Co. Mine was formerly owned by the Cia. Minera del Tiro General, S. A.

Office: 120 Broadway, New York. **Operating address:** W. M. Drury, gen. mgr., 1112 Mills Bldg., El Paso, Texas. **Mine address:** S. H. Sherman, Charcas, S. L. P., Mexico.

Property: 72 pertenencias, 178 acres, with 46-acre millsite, and 50-acre farm, in the Venado district. The mine was worked on a small scale for 3 centuries, and in a larger way since 1859. It shows 2 main ore zones, carrying fissure veins in porphyry, near a limestone contact, with a generally E.-W. strike and dip of about 70°. The N. vein, of 3 to 8 meters width, with known length of 500 meters, is opened to depth of 1,361′, showing chalcopyrite and sphalerite estimated by the management to average 2% zinc, 430 grams silver and 8 grams gold per metric ton. There are 9 tunnels with 13,123′ of workings.

Equipment: includes a 700-h. p. steam plant, with hoists of 100-h. p. and 175-h. p. and a 10-drill air compressor. There is a 10-stamp mill and a 150-ton concentrator, having crushers and 5 sets of rolls, with trommels and other necessary equipment. The mill has 10 pneumatic dry concentrators, which treat sulphide ores and give a preliminary lead concentrate cut out from the final zinc concentrate, the latter being a 45% zinc product, secured largely from rosin jack.

The mine was flooded from 1913-1919; was unwatered in 1920, but operations again suspended, 1921.

TOMMIL-ESPANOLA PROPRIETARY CO., LTD. **SINALOA**

Office: Capel House, 54 New Broad St., London, E. C.

Mexican office: Donald Gosset, resident engr., Mazatlan, Mex.

Directors: Henry Herbert Pain, chairman; John L. Richardson and Arthur Edwin Rigden.

Inc. August, 1920 as a reconstruction of the Tommil (Mexican) Mng. Co., (1910) Ltd. **Cap.** £250,000; 10s par; 258,734 issued and fully paid; 169,467 issued, 6s 8d paid.

Property: San Felix, Eliza and San Augustin claims in Tamazula district, Durango, equipped with 50-ton cyanide mill. The mine has been closed down since 1912 owing to revolutionary disturbances.

Company has since acquired a one-half interest in the Habal gold quarries and the Espanola group, about 7 miles from Rosario, in the State of Sinaloa and about 50 miles from Mazatlan.

Development: by 100′ shaft, crosscuts and drifts. Trial shipment to Tajo mill said to have averaged 30 oz. silver and 2 oz. gold.

It is planned to form a syndicate to develop the Habal property and erect a 1,000-ton mill.

TOMMIL (MEXICAN) MINING CO., (1910) LTD. **SINALOA**

Liquidator: A. E. Rigden, Capel House, 54 New Broad St., London, E. C. 2, England.

Succeeded August, 1920 by Tommil-Espanola Proprietary Co., Ltd., which see.

TORREON, S. A., CIA. METALURGICA DE **COAHULIA**

Controlled and managed by Cia. Minera de Penoles, which see for detailed description.

Office: Torreon, Viesca, Coahuila, Mexico.

Operates both silver-lead and copper custom smelters.

TRANSVAAL COPPER MINES CO. OF UTAH **SONORA**

Mine address: Cumpas, Sonora, Mexico.

Officers: Louis J. Hauck, 433 Dayton St., Cincinnati, Ohio, pres.; Theo.

M. Foucar, 1st v. p.; Percy Andreae, 2nd v. p.; Alfred Vogeler, sec.-treas., with Louis Hehman, W. C. Geis, Leo. G. Cloud, Bernhard Freiberg and I. J. Haas, directors.

Inc. Aug. 4, 1917, in Utah, as a reorganization of the Transvaal Mining Co of Utah, which was a reconstruction of the Transvaal Copper Co. **Cap.** $4,000,000 shares $5 par. Annual meeting 1st Tuesday after 1st Monday in May.

Property: the La Verde, Cobre Rico, Buckeye, Ultima Chanza, and San Nicolas mines, a total of 3,500 acres of mineral land, including a 50-acre smelter site with 75-acre townsite adjoining; La Piedra Verde ranch of 15,000 acres and an interest in the San Nicolas Tolentino ranch, 26,000 acres, including timber and grazing lands.

Geology: company's holdings cover the heart of a mountainous district showing widespread rock alteration with acid stream waters, bleached and iron-stained areas, and "chimneys" or "pipes" of silicified breccia. The tract shows granite exposures, part of an underlying batholith, cutting recrystalized volcanic breccias, baked by contact action. In the Transvaal mines, both granite and volcanic rock are cut by irregular mineralized fractures along which orthoclase, carrying chalcopyrite, fluorite, chlorite, and calcite have been deposited by pneumalytic action. The "pipe" or "chimneys" of brecciated material cemented by quartz, are sometimes barren, but in other cases, as at La Verde and Cobre Rico, contain workable copper ores. It is a peculiar type of deposit and resembles the Calumet-Copper Creek deposits of Arizona, the Kamloops mine in British Columbia and the Washington mine, 4 miles W. of the Cobre Rico property.

The **Verde mine** has two 80-h. p. boilers, a steam hoist and air compressor. The water supply at this mine is bad, owing to its acidity.

Extensive diamond drilling at La Verde, the Transvaal mine proper, has developed a large tonnage of low-grade primary ore, averaging 1½% copper and estimated by the management at 3,000,000 or more tons, which will doubtless be treated some day by flotation methods. The drills have shown the ore to extend to a depth of 1,100'.

The **Cobre Rico mine** has 2 shafts, No. 1 of 100' and No. 2 about 140' deep, with several tunnels and about 16,400' of workings, (including diamond drilling) developing several orebodies in a mass of brecciated rock, locally called trachite. Ore is estimated to average about 2% copper, 1 to 2 oz. silver and a trace of gold. Management estimates 2,500,000 tons available in this mine.

The **Buckeye mine** has about 10,000' of tunnel work, on a blanket vein of 6" to 4' thickness, showing ore reported to have given average returns of 12% copper and 8 to 10 oz. silver, with a trace of gold. There are about 5,000 tons of high grade ore left in the mine and a considerable amount of low-grade ore of no present commercial value. The mine, however, has been thoroughly explored in the bottom, or lower tunnel level and the ore shoot found to have played out.

The **San Nicolas mine** is a silver property about 8 or 10 miles from the Transvaal. It shows a vein varying from 1 to 4' in width, carrying silver-lead ore said to change to copper in the lower workings. The mine is reported to have yielded 6,000 tons of 60 oz. silver ore and still has between 2,000 and 3,000 tons of 50-oz. silver ore. It is regarded as a promising prospect especially for lateral development. In May 1919, it was reported that the San Nicolas Leasing Co. operating as the Mexicana Dessaralladora de Minas, had secured a lease on this mine. A 50-ton flotation plant was erected.

The **Ultima Chanza mine** has a 300' incline shaft and a 100' winze, with about 5,000' of workings, developing a fissure vein of 10" to 42" width. The management estimates 50,000 tons of ore in sight, averaging 10% copper, 5 oz. silver and a trace of gold. This property is a good, but small mine, needing further development. Equipment includes a steam plant and hoist.

The nearest rail station is at Nacozari, 30 miles north, but the Cananea, Rio Yaqui y Pacifico railway has surveyed a line to within 9 miles of the smelter. The company has built about 35 miles of wagon roads and 25 miles of trails at a cost of $50,000, with a maintenance charge of about $5,000 yearly.

The main camp is at La Verde, 25 miles S. W. of Cumpas, where mining operations are centered. There are 20 buildings, including 3 power plants, machine shop, carpenter shop. smithies at the principal mines, 2 laboratories, a boarding house, general store, with a branch store at the smelter, a hospital and several dwellings.

Smelter: at Cumpas, about 25 miles from the mines, was located at that point because of a good site and ample water supply. Equipment includes a 125-ton 42"x120" El Paso Foundry & Machine Works water-jacket blast furnace, with room for 2 additional furnaces of the same size. There is a reverberatory furnace, of 50 tons daily capacity, and a sampling mill, capable of sampling ore to feed 3 furnaces. The smelter power plant includes, three 80-h. p. Babcock & Wilcox boilers and Allis-Chalmers tandem compound engine and a Connersville blower. This smelter was blown in May 1, 1906, treating ores from the Buckeye and San Nicolas mines and doing a little custom business, producing matte shipped to the Laurel Hill works of the Nicholas Copper Co., and from May 1, 1906 to November 3, 1907, a period of 18 months, the smelter, in operation about two-thirds of the time owning to scarcity of freighting outfits, smelted 18,550 tons of ore having an average assay tenor of about 10% copper and 8 oz. silver for copper ore, and 2% copper and 60 oz. silver for silver ore,, making 3,089 tons of matte yielding 2,178,855 lbs. fine copper, 407,607 oz. silver and 240 oz. gold.

The extensive development work done on the property since 1909, shows the existence of small veins of rich ore and large deposits of low-grade ore. The property can be worked on a large scale when given the rail connections absolutely essential to the profitable exploitation of the ores.

TRENTON-SONORA MINING CO. **SONORA**

Mine office: Tarachi, Sonora, Mex.

Property: the San Jose, Santa Eduviges, El Porvenir and other mines, 4 miles S. of La Calera carrying copper ores, with values mainly in silver. The San Jose mine is reported to show an 18" paystreak of highly auriferous chalcopyrite.

Development: by a 200' shaft sunk on the vein, equipped with a hoist. There is a mill and a smelter. No recent returns.

TRES ESTADOS MINING CO. **COAHUILA**

Address: Saltillo, Coah., Mex. Ramon M. Garcia, treas.

The 15th assessment of 50 centavos per share levied, August, 1921.

Property: in Coahuila, Mex.

TRES SENORES MINING CO. **ZACATECAS**

Mine: at San Pedro Ocampo, Zacatecas, Mexico.

Property: includes La Providencia and La Poderosa mines, near San Pedro Ocampo yielding ores that have given smelter returns of 10% copper, 3,234 grams silver and 120 grams gold per metric ton. No recent reports received. Property closed down.

UNION EN CUALE MINING CO. **JALISCO**

Property being operated by **The Mexican Corporation, S. A.**, a subsidiary of the Mexican Corporation, Ltd., (Mex.), which see.

UNITED MEXICAN MINES **SONORA**

Idle. **Address:** O. L. Neer, mgr., Douglas, Ariz.

Property: 40 miles S. of Nacozari, near La Verde, via Cumpas, Sonora, Mexico, includes the Veta Grande and Cerro Gordo groups, near the Transvaal mine.

Mines show rhyolite, granite and porphyry, with several orebodies occurring in fissure veins, and as breccia deposits between trachite and granite. Ores contain copper sulphides.

UNITED MINES CO. **GUANAJUATO**

Office: 15 Broad St., New York City.

Officers: Fred G. Corning, N. Y. pres.-gen. mgr.; Jos. McDonald, mgr., Guanajuato, Mex.

Inc. 1917, in So. Dakota. **Cap.** $2,500,000; par $5; 2,000 shares sold for $100 the lot at public auction in New York on Dec. 16, 1920; 19,000 for $100 the lot on Dec. 31.

Property: the Melladito, La Lula, San Ramon silver mines in the Guanajuato district. Work was resumed on the Melladito group, 1920-21, and a new body of milling ore reported opened up.

Equipment: includes 15-stamp mill, tube mills, 100-ton cyanide plant, etc., operated intermittently.

Employs 150 men.

VALENCIANA EXTENSION CO. **GUANAJUATO**

A reorganization of the Mineral Development Co. and Proprietary Mines Co. Sponsored by C. W. Pope & Co. Reported that Cameron, Michel & Co., 8 W. 40th St., New York City, will handle stock sales and have control.

Inc. 1921. **Cap.** $6,000,000; par $10; 300,000 shares put in voting trust, and go to stockholders of the Mineral Dev. Co. and stockholders and bondholders of the Proprietary M. Co.

Cameron, Michel & Co., are to have option on 200,000 shares at $5, proceeds to be used to continue development of Nueva Luz mine, and a further option on 80,000 shares at par.

Company organized to take over the Nueva Luz mine, and other holdings hitherto owned by the Mineral Development Co., a corporation controlled by the Proprietary Mines Co. The property, fully described under the latter title, is a development proposition which is expected to open up the downward extension of the great Valenciana orebody, probably the greatest silver bonanza ever known. From geologic evidence, it is thought that this orebody will pass downward into the Nueva Luz ground. See **Proprietary Mines Co.**, in this book.

Company will it is said start out clean, with no bonus, promotion or ownership stock available for sale, and former owners are to accept voting trust shares and wait for their profits from the mine. The new interests will finance property from sale of treasury stock. Last work in Nueva Luz mine cut the Veta Madre at a point 200' or so from the place where the Valenciana ore shoot is supposed to be. It will take 1,800' of drifting to explore and open up the ore shoot.

VETA GRANDE; CIA. MIN. de la **ZACATECAS**

Address: Jose de Casco, Isabel la Catolica 72, Mexico City, Mex.

Property: an old silver-lead mine, shipping to smelter at Aguascalientes in 1920.

VETA GRANDE; CIA RESTAURADORA del MINERAL de **ZAC.**

Address: Jose de Caso, Isabel la Catolica 72, Mexico City, Mex.

VETA GRANDE MINES **CHIHUAHUA**

See Am. Sm. & Ref. Co.

Address: Parral, Chih., Mex.

VICTOR MINING AND SMELTING CO. **SONORA**

Probably defunct. **Former office** 315 Schulz Bldg., Columbus, Ohio. **Former address:** Cananea Sonora, Mexico.

Officers: at last accounts, S. D. L. Jackson, pres.; M. F. Cole, v. p.; F. P. Jackson, sec.-treas., with J. S. MacLean, W. H. Sartain, C. Thornton, Chas. Schindler and C. A. Stillwagen, directors. W. A. Woodlief, fiscal agent.

Inc. May 9, 1905, in Arizona. **Cap.** $1,500,000, increased 1907, from $1,000,000; shares $10 par; issued, 90,000 shares. Title to property was held through the **Guerrero Mining Co.**, legalized in Mexico.

Property: 47 pertenencias, in 2 groups in the Magdalena district, about

12 miles S. W. of Cananea, shows fissure veins in granite-porphyry intruding sedimentary rocks.

Development: by 5 short tunnels, about 1,500′ of workings, showing high-grade copper ore with small gold and silver values, in 2 veins of about 4′ and 70′ width, latter without ore.

Mine was ordered sold at receiver's sale, September 11, 1916, at Nogales, Arizona.

WASHINGTON MINES DEVELOPMENT CO. SONORA

Office: Douglas, Ariz. **Mine office:** Washington Mine, via Huepac, Sonora, Mexico.

Officers: F. O. Bostwick, pres.; Geo. Cass, v. p.; Albert Sames, sec.-treas.

Inc. 1911, in Arizona. **Cap.** $1,500,000; shares $10 par; issued 130,000 shares.

Property: 27 hectares in the Arizpe district, 60 miles from Nacozari, the nearest rail point. Claims show several "pipe" deposits composed of brecciated rhyolite in dacite. Ore is reported to average 3.2% copper, 0.35% tungstic acid, 1.5 oz. silver and some gold.

Development: by a total of about 6,000′ of workings said to show 600,000 tons of ore blocked out for stoping.

WEST COAST MINING & SMELTING CO. SINALOA

Idle many years. **Office:** Mocorito, Sinaloa, Mexico. Howard L. Haines, pres.; Chas. M. Hicks, sec., at last accounts.

Inc. 1906, in Maine. **Cap.** $2,500,000; shares $1 par; in $500,000 of 7% cumulative preferred stock and $2,000,000 of common stock.

Property: 6 groups, 387 acres, 5 to 20 miles from Mocorito, and 12 to 40 miles from Carbo. Principal property is Los Tajos group, 357 acres, showing andesite, cut by narrow fissure veins of 4′ average width that are said to carry chalcopyrite ore. The River mine, has a 150′ shaft, on a vein of 5 to 8′ reported width, carrying ore said to average about 5% copper and $3 per ton in gold and silver.

Equipment: a 70-h. p. steam plant, a small compressor and 6 drills. The 30-ton experimental concentrator has a crusher, 2 rolls, 2 Bartlett tables and 3 screens. The smelter, at the mine, has a 50-ton water-jacket blast furnace.

WEST MEXICAN MINES, LTD. CHIHUAHUA

Address: W. Marshall, sec., 2 Norfolk St., London, W. C. 2, England. **Mine address:** Guadalupe y Calvo, Chihuahua, Mex.

Directors: R. K. Higginsbotham, J. C. McKellar and Hon. J. A. Peacock, at last accounts.

Inc. Jan. 22, 1910, in Great Britain. **Cap.** £550,000; £1 par; 470,007 shares issued. **Debentures:** £190,040, authorized in 1912.

Property: 105 acres, 1½ miles N. W. of Guadalupe y Calvo, includes the Rosario mine, formerly owned by the Rosario M. & M. Co., and 10,000 acres of ranch and timber lands with water rights of the Guadalupe river.

Development: the Rosario is opened up on seven levels and is said to contain substantial reserves of milling ore.

WEST MEXICO MINES CO. BAJA CALIFORNIA

Office: Krape Inv. Co., Gas & Electric Bldg., Denver, Colorado. **Mine office:** San Antonio, Baja California, Mexico.

Officers: A. A. McCall, pres.; A. R. Whitely, v. p.; W. G. Krape, sec.-treas.

Inc. January, 1912, in Arizona. **Cap.** $3,000,000; shares $1 par; non-assessable; outstanding 1,985,000 shares. Annual meeting, first Wednesday in January.

Property: 7 claims, about 60 acres, in the San Antonio district, 38 miles S. of La Paz, Lower California, Mexico. Veins are both fissure and contact, containing gold and silver. Pay ore occurs in shoots and streaks, the main

orebody varying from 3' to 14' wide. Sulphides appear at 275' depth

Development: by inclined shaft, greatest depth being 340' and extent of lateral workings 5,000'.

Equipment: includes a 3-stamp concentrating mill.

Production: total production said to be $20,000 from 6 shipments of ore assaying $192 to $326 per ton.

In 1914 the Wm. G. Krape Inv. Co. was selling this stock at "12½c. per share fully paid and forever non-assessable" on the installment plan. See Vol. XIV.

The equipment was destroyed in 1916 and company is inactive.

YAQUI CANYON COPPER CO. **SONORA**

Probably dead. Described Vol. XIII. Formerly at Suaqui de Batuc, Ures, Sonora, Mexico.

YAQUI COPPER CO. **SONORA**

A dead fraud. See Vol. XIII.

YAQUI MINING CO., S. A. **SONORA**

Mine address: Fundicion, Sonora, Mexico. **Company address:** Geo. M. Ryall pres., Pacific Electric Bldg., Los Angeles, Cal. **Inc.** in Mexico.

Owned by **Mexican Exploration & Mining Co.**, controlled by Pacific Smelting Co. Property is described under latter title.

YAQUI SMELTING & REFINING CO., S. A. **SONORA**

Dead. Formerly operated at San Antonio de la Huerta, Sonora, Mexico. Fully described Vol. VIII of the Copper Handbook.

ZAMBONA DEVELOPMENT CO. **SONORA**

Property: dead. Formerly at Minas Nuevas, Alamos, Sonora, Mexico. See Vol. XIII.

ZIMAPAN, CIA. MIN. Y FUNDIDORA DE **HIDALGO**

Address: S. Dominguez, mgr., Mexico City, Mex.

Property: a lead-silver mine, developed by shafts and tunnels, and a smelter, with roasters, 3-blast furnaces, etc. Employs about 250 men normally.

CENTRAL AMERICA

ABANGAREZ GOLD FIELDS OF COSTA RICA **COSTA RICA**

Office: 17 Battery Place, New York City. Mine office: Abangarez, Costa Rica.

Officers: Minor C. Keith, pres.; A. W. Preston, v. p., E. W. Ong, sec.; with B. W. Palmer, directors. H. H. Hanson, auditor; H. M. Keith, treas.

Inc. Sept. 8, 1899, in Delaware. **Cap.** $4,000,000 com. and $1,000,000 6% cumulative pfd.; outstanding, $3,880,000 com. and $1,000,000 pfd; par $25. Transfer agent; Old Colony Trust Co., Boston; registrar, American Trust Co., Boston. No dividends on pfd. since May, 1911, when semi-annual of 3% was paid. Annual meeting, third Monday in December. Listed on Boston Stock Exchange.

Notes payable may be shown as under:

Term	Interest %	Amount	Dated	Due	Amount at end of 1918
Demand....		$.....	.....	.....	$502,784
1-year....	6	374,000	May 1, 1915	May 1, 1916..	281,825
2-year....	6	476,000	May 1, 1914	May 1, 1916..	357,000
3-year....	6	.....	.....	May 1, 1914..	1,975
3-year....	6	.....	.....	May 1, 1915..	3,750
Total payable.....					$1,147,271

Financial Statement, years ending December 31:

Assets.

Year	Property	Equipment	Current	Supplies	Cap. stock held	Income account	Total
1920....	$3,437,447	$963,571	$121,942	$310,256	$80,150	$1,539,302	$6,452,670
1919....	3 460.034	1.084.188	186.709	191.081	80,150	1,290,491	6,292.653
1918....	3.458.897	1.214.048	246.663	203.223	80.150	1,057.853	6,260.835
1917....	3.488.018	1.346.719	179,937	170.873	80,150	945.059	6,235.757
1916....	3.519.834	1.506.309	282,519	165,879	150	977,474	6,452,165

Liabilities.

Year	Capital	Notes payable	Current	Sundry	Total
1920.....	$4,880,000	$1,147,271	$418.867	$6,531	$6,452,670
1919.....	4.880.000	1,142.242	263,879	6,532	6,292,653
1918.....	4 880.000	1,162,367	211,936	6,532	6,260.835
1917.....	4.880.000	1,143,248	205,978	6,532	6,235,757
1916.....	4.880.000	1,333,426	158,063	80,675	6,452,165

Profit and Loss.

Year	Bullion Sales	Operating Cost	Profit	Interest	Previous deficit	Depreciat'n & amortization	Total deficit
1920.....	$451,739	$458,326	$6.586*	$77.796	$1,374,873	$164,428	$1,539,302
1919.....	500.421	496.485	3,936	73.702	1,127.619	162,871	1,290.490
1918.....	582.425	458.121	124,304	70.127	945,059	166,971	1,057.853
1917.....	636.298	457.565	178,733	68.153	977,474	78,165	945,059
1916.....	67.0.574	425.623	244.951	79 $62	1.006.369	136,494	977.474
1915.....	197.619	206,863	9,243*	78,546	809,063	109,517	1,006.369

* Loss.

Property: company acquired the properties of the Guanacaste Syn. and the Guacimal Expl. Co. After obtaining possession of three-fifths of the capital stock of the Costa Rica Esperanza Mng. Co. in exchange for land, the Abangarez Co., December 31, 1909, acquired the balance of the stock, by giving one share of Abangarez and $1.87 in cash for each share of Costa Rica Esperanza. Owns mining properties covering 118 sq. miles in the province of Guanacaste, Costa Rica, C. A. The ore from the Tres Hermanos lode at Majica creek is transported by 4,000′ aerial tram to the Abangarez mill.

Equipment: includes a power plant on the Guacimal river, 12 miles from the mill; cyanide plant, saw mill, tramway, buildings, etc., and a 5-mile narrow gauge railway.

Production:

Year	Ore Milled, Tons	Cost Per Ton Mng.	Mlg.	Cyanide	Total*	Prod.**	Earn.**	Int. Chgs.**
1920.....	62,012	$ 4.04	$ .59	$1.16	$ 7.39	$ 7.28	$ .11†	$1.25
1919.....	53,134	4.56	1.01	1.65	9.34	9.42	.08	1.39
1918.....	66,204	3.10	0.55	1.32	6.92	8.80	1.88	1.06
1917.....	62,934	3.50	0.58	1.23	7.26	10.12	2.86	1.08
1916.....	50,221	4.08	0.71	1.36	8.48	13.35	4.87	1.58
1915.....	25,262	4.33	0.84	1.60	8.18	7.82	0.36†	3.11
1914.....	37,742	4.47	0.58	1.39	7.89	5.27	2.62†	2.00
1913.....	69,346	4.92	0.64	1.70	8.68	8.36	0.32†	1.00
1912.....	50,011	9.11	1.07	2.28	14.71	12.14	2.57†	0.94
1911.....	42,514	10.06	1.61	2.38	16.98	21.84	4.86†	0.42

*Includes cost of production, administration and marketing.
**Per ton. †Deficit.

The depletion of the La Luz vein, leaves the company dependent upon the Tres Hermanos property for its ore supply. Development at this mine has been neglected for 5 years and present reserves are small and low grade.

AGUACATE MINES, INC. **COSTA RICA**

Office: 126 Liberty St., New York City. **Mine office:** San Mateo, Costa Rica. H. H. Juchem, gen. supt.

Officers: W. F. White, pres.; Edgar H. Woodward, treas.; W. Foster White, asst. treas

Inc. 1907, in Maine. **Cap.** $4,000,000; $3,754,630 outstanding and $245,370 in hands of trustees for benefit of company.

Balance sheet of Dec. 31, 1920, shows assets of $4,194,119; covering property and equipment, $3,892,323; exploration, $163,556; current, $70,922. Liabilities include current, $483 and depreciation reserve, $193,636. The deficit was $61,020. Operating expense was $60,551, with a loss of $15,285 for the year.

Property. the Quebrada Honda mine, which carries gold ore in fissure veins that average $8 per ton value recovered. Also, Los Castros mine and the Oreamunos group, and an option on the Little Johnny mine, about 2 miles to the east.

Development: by tunnel and a shaft below the 700′ level, or the main haulage tunnel connecting with the mill. On the Black vein, the deepest workings are on the 1,000′ level, opened 1918, for 840′ in length and stoping started, ore being hoisted to the 700′ level. Recent work on the 850′, 930′ and 1,000′ levels has opened the ore shoot for about 1,000′ in length. A new orebody was discovered on the 850′ level in 1920. Total extensions for that year were 1,779′.

Ore reserves: on Dec. 31, 1920, were 28,677 tons. plus 4,500 tons of probable ore.

The amalgamation and cyanide mill with a capacity of 2,000 tons per month, made an extraction of 89.7% in 1919 and 84.9% in 1920.

Production: in 1918 was 17,159 tons of $7.87 ore yielding $130,342 in bullion, in 1919, 10,609 tons of $9.26 ore yielding $91,995; in 1920, 6,260 tons yielded $45,266.

AMERICAN MANGANESE MFG. CO. **COSTA RICA**

See same title under Minnesota.

Office: 352 Bullitt Bldg., Philadelphia, Pa.; and Duluth, Minn.

Officers: R. A. Crespi, Jr., gen. supt.; William Norris, geologist.

Property: 5 developed mines acquired in 1917 from the **Costa Rica Manganese & Mining Co.**, at Playa Real, on the Pacific Coast, 2 miles N. E. of Norris Hermosa on the Nicoya peninsula, province of Guanacaste, Costa Rica, in a region difficult of access and with bad climate. (Described in the Eng. & Mng. Journal of October 27, 1917; and in Bull. 710-C of U. S. G. S.)

Equipment: steam tramway, loading pier on the coast, 5,000-ton orebins, docks, 9 lighters, and 5 ore steamers aggregating 6,000 tons, delivering at Baltimore or Philadelphia.

Production: from 1914 to Oct. 1918, inclusive, a total of 14,000 long tons.

The Playa Real property, formerly the main source of ore supply, is exhausted and company is now developing the Curiol mine, 15 miles inland from Santa Rosa, which is credited with a production of 20,000 tons of ore that averaged 52% manganese and 8% silica. Present owners have extracted 500 tons high-grade ore and estimate 20,000 blocked out.

The future profits of the company depend almost entirely on the market for these desirable manganese ores.

BABILONIA GOLD MINES, LTD. **NICARAGUA**

In liquidation, G. G. Hay, liquidator, No. 1 London Wall Bldgs., London, E. C. 2, England.

Described in Volume XIV. Registered June 9, 1911, as Sierra Guaranty Syndicate, Ltd., named changed Dec., 1911. Went into voluntary liquidation, Dec. 17, 1920.

BUTTERS DIVISADERO CO. **SALVADOR**

Succeeded by **El Salvador Silver Mines Co.**, which see.

BUTTERS POTOSI CONSOLIDATED MINES, INC. **SALVADOR**

Succeeded by **El Salvador Silver Mines Co.**, which see.

BUTTERS SALVADOR MINES, LTD. SALVADOR

Address: La Union, Department of La Union, Salvador, Central America.

Property: San Sebastian mine, 30 miles N. of La Union, San Salvador. Company controls the **Grecia Mng. Co.** of Nicaragua.

Geology: fully described by C. Erb Wuensch in Mining and Scientific Press of September 8, 1917.

Development: by 800′ shaft, with 1,800′ drainage tunnel 30′ below, and 30 miles of workings.

Production: 3,500 tons milled each month. Total output is approximately $15,000,000.

Early in 1921 company discontinued operations.

CENTRAL AMERICAN EXPLORATION CO. NICARAGUA

Address: Jas. M. Hall, mgr., 602 Postal Telegraph Bldg., Chicago, Ill. John A. Willey, supt., Matagalpa, Nicaragua, C. A.

Officers: Frank K. Bull, pres.; Jas. M. Hall, v. p.; Horace L. Wing, sec.; E. T. Meredith, treas., with Ashton Clemmens, T. A. Harding and N. E. Coffin, directors.

Inc. November, 1918, in Delaware. **Cap.** $200,000; $100 par; $186,000 outstanding.

Property: company is opening up a gold gravel mine (ancient channel) in a concession covering the Coco, or Wanks river, and its tributaries 400 miles up the river. The concession extends from Bocay to Guilili, and covers about 4 million acres, including dredging and hydraulic gravels and all mineral rights.

Development: company spent some two years drilling an ancient gravel channel reported to be 100 to 300 yards wide, traceable 40 miles and 30′ to 100′ deep. Values vary from 9¢ to $10 per cu. yd., but company expects an average of 30¢ a yard.

Equipment: a straight hydraulic plant to treat 2,500 cu. yds. daily. Dredging ground along the bars of the Coco river are said to average 20¢ per yard.

CHONTALES MINES, LTD. NICARAGUA

Address: care Mechanics & Metals Natl. Bank, registrar, 20 Nassau St., New York City. Headquarters Montreal, Que. D. J. Pullinger and Wm. Wallace Mein are interested. J. F. Thorn, gen. mgr., Santo Domingo, La Libertad, Nicaragua.

Property: includes Escandola, Javali, Cedro and Pabon mines, near Santo Domingo, in the department of Chontales, said to cover 12,000′ of vein, 3,300′ of which has been opened up, showing average widths of 12 to 14′. Developed by tunnels, the lowest crosscut tunnel driven in 1921, having an average back of 300′.

An ancient gravel channel has been traced by drilling for 40 miles, the width varying from 30-100 yards and the depth of gravel from 30-100′. Average values given as 30¢ per cu. yd. in coarse nuggets.

Equipment: includes power plant and 200-ton mill. A 1,000-h. p. hydro-electric plant is being erected and a mill is to be enlarged to 600 t. p. d. An hydraulic plant with capacity of 2,500 yd. daily, was installed in 1921.

Production: about 210 tons daily; 50,000 tons milled to date, valued at $1,000,000.

COCO RIVER MINING CO. NICARAGUA

Office: was at 50 Broadway, New York.

Officers: J. G. Turrif, Ottawa, Can., pres.; H. A. Currie, v. p. A. A. Holland, managing director. J. A. Calder, J. T. Brown and J. H. Lamont, directors, at last accounts.

Inc. in Delaware. **Cap.** $1,000,000; $1 par ; 500,000 issued. U. S. Corporation Co., 28 Cedar St., New York City, registrar and transfer agent.

Property: 175 acres in Cabo Gracias district, Nic., C. A., 60 miles inland and 3 miles from navigable river, via Cabo Gracias.

Ore: free milling gold quartz said to average $5 per ton.

Equipment: costing $125,000, includes 200-ton mill "of ironwood and mahogany," electric motors, etc. A report by A. A. Holland, is said to give 2,000,000 tons blocked out and 4,000,000 partly blocked out.

Former officers know nothing about the present status of the company. Presumably and deservedly defunct.

COMACARAN GOLD MINING CO. **SALVADOR**

Main office: San Salvador, and mine office, Mineral Hormiguero, Rep. del Salvador, C. A.

Officers and directors: Benjamin Gonzales, pres.; Gustavo Vides, v. p.; Lucio Quinones, sec.-treas.; and Emilio Gonzales, res. director. G. A. Swanquist, local manager.

Inc. 1909, in Salvador. **Cap.** $500,000; shares $100 par. Semi-annual meetings in January and June.

Gross earnings in 1915 were $377,142; in 1916, $245,920; in 1917, $473,420; and in 1918, $382,342. Two dividends have been paid to date.

Property: 3 mines—Gallardo, Hormiguero, and Guadalupe—and a number of partly developed and undeveloped prospects, about 550 acres of mineral land and 12,000 to 14,000 acres of timber and agricultural land. Ore occurs in fissure veins, averaging $7 to $9 in gold and silver. The vein-filling is quartz, sometimes very hard and sometimes soft and friable, and carries silver, sulphur, calcite, iron and manganese. The ore from all three mines is conveyed to the mill by aerial trams.

Development: the Gallardo mine has been opened for a distance of 2,200′ and to a depth of 410′, the Hormiguero mine for 1,200′, and to a depth of 464′; and the Guadalupe for a distance of 1,700′ and a depth of 200′. A new main working shaft is now being sunk on the Guadalupe vein. Other veins are also being developed.

Equipment: includes a 25-stamp mill and cyanide plant with a capacity of 5,000 tons per month. Average extraction is about 90%. Power is steam, using wood as fuel.

Production: 1914, 30,483 tons; 1915, 49,430; 1916, 40,976; 1917, 61,891; and 1918, 55,799 tons.

No information received since 1919.

CONSTANCIA CONSOLIDATED MINING CO. **NICARAGUA**

Address: 700 Tchoupitoulas St., New Orleans, La. H. T. Cottam, principal owner.

Inc. 1916. **Cap.** $400,000.

Property: Siempre Viva and Constancia mines in the Pis Pis district. Ore averages $8 to $10 in gold per ton.

Equipment: includes 100-ton mill and cyanide plant, in operation 1917 to mid-1920, when oxidized copper content of the ore gave trouble in treatment. No later information.

COSTA RICA MANGANESE & MINING CO. **COSTA RICA**

Property sold in 1917 to **American Manganese Mfg. Co.**, which see

COSTA RICA UNION MINING CO. **COSTA RICA**

Address: H. M. Keith, Rm. 1803, 17 Battery Place, New York.

Inc. in West Virginia. Empire Trust Co., New York City, registrar

Property: La Union mine, a regular producer, presumably controlled by the Abangarez interests.

No report furnished.

CUJE GOLD MINES **NICARAGUA**

Controlled by **Banner Cons. Mines, Inc.**, Calif., which see.

EDEN MINING CO. **NICARAGUA**

Controlled through ownership of 55% of capital stock, by Tonopah Mining Co. of Nevada.

Office: 572 Bullitt Bldg., Philadelphia, Pa., and Bluefields, Nicaragua, C. A.

Officers: J. H. Whiteman, pres.; C. R. Miller, v. p.; Walter L. Haehn-

len, J. C. Stevens, Barton Hoopes, Jr., H. D. Moore, Samuel Bell, Jr., G. S. Munson, and W. I. Forbes, directors. P. S. Bickmore, sec.-treas.; W. H. Blackburn, con. engr.; M. B. Huston, gen. mgr.

Inc. Nov. 24, 1914, in Delaware. **Cap.** $1,000,000, all oustanding; shares $1 par, non-assessable. Company office, transfer office; Fourth St. National Bank, Philadelphia, registrar. Annual meeting, first Wednesday in May.

Comparative Balance Sheet, for years ending Dec. 31:

Assets

Year	Prop. & Plant	Devel.	Invest	Current	Total
1920.....	$1,662,544	$828,909	$484,029	$464,989	$3,441,471
1919.....	1,660,028	680,528	486,352	484,456	3,311,364
1918.....	1,644,953	663,061	453,309	454,305	3,215,628

Investment covers outlay for Tunkey T. & P. Co.

Liabilities

	Capital	Loans	Current	Depl. Reserve	Total
1920.....	$1,000,000	$2,189,100	$86,192	$166,179	$3,441,471
1919.....	1,000,000	2,189,100	39,263	83,001	3,311,364
1918.....	1,000,000	2,159,100	56,528	.....	3,215,628

Accrued interest, amounting to $413,280 in 1919, and $544,626 in 1920, due on loans from Tonopah Mng. Co. not included.

Comparative Income Account, for years, ending Dec. 31:

	Metal Value	Total Income	Oper. Expense	Other Charges	Net Income	Depl. & Depr.	P. & L. Surplus
1920...	$363,957	$380,679	$418,804	$25,423	$63,548*	$83,177	$146,725
1919...	443,400	451,947	360,382	29,573	61,992	83,001	21,009

*Loss.

Property: 9 square miles in the Pis Pis mining district, which is 100 miles in direct line from the town of Prinzapolca on the east coast of Nicaragua. Transportation of supplies from the United States involves 1,200 miles by ocean steamer, 90 miles by coast schooner, by barges up to Tunky, transfer into "pitpans" to Miranda on the Tunky river, and finally 7 miles by narrow-gauge railway to the mine. The full distance from Prinzapolca is 187 miles. It costs from $90.78 to $131.28 per ton to carry freight from New Orleans to the mine. The rainy season lasts for 8 months, when wheel vehicles cannot be used. The Tunky Transportation & Power Co. which operates the railway and power-plant, is controlled by the Eden company.

Development: as the property is mountainous, the veins are all opened by tunneling, there being 6 main adits at an elevation of 652 to 1,307 ft. above sea-level. The main tunnel has an electric haulage system, the locomotive handling 20 tons a trip. The two veins so far developed—the Culebra and Eden, strike E. and W. and N. and S., respectively and dip steeply, so that shrinkage stoping is used. The oxide ore near the surface breaks easily, but the deeper ore is difficult to blast. The Culebra vein is rather more uniform in value than the Eden, in which the values are bunchy.

The main tunnel had reached 3,850′ in March, 1921, and search was being made for a known ore shoot in the Hidden Treasure vein; two vein systems were cut, but their value has not been determined. During 1919 and 1920, practically all ore of commercial grade in the Eden vein was mined. Development in 1920 largely confined to the Culebra vein in which the main ore shoot is 160′x4.4′ for a height of 390′. Ore reserves at end of 1919 were 115,161 tons of $11.41 ore and for 1920, 88,574 tons averaging $12.29, representing a 2 years supply. Extensions for 1919 and 1920 were

2,247' and 1,401', respectively; total workings about 5 miles; costs $15.66 and $14.54 per foot. Mining costs including development, were $4.46 in 1919 and $4.65 in 1920.

Equipment: includes fully equipped machine-shops, sawmill, ice plant, wireless station for distant communication, hydro-electric plant of 700-h. p. turbine and 500 k. w. generator, since increased to 1,200-h. p., sub-station electric locomotive, two 600-cu. ft. air-compressors, drills, and 150-ton cyanide mill including ball and tube-mills.

Production: the mill started in November, 1918, and produced $45,947 to the end of the year. In 1919 the mill treated 36,159 tons of $12.94 ore, yielding $443,400 with an extraction of 94.7%; in 1920, 42,169 tons of $9.13 ore yielded $363,957, or a 94.5% extraction, as compared with 92% in 1918. Milling cost for 1919 was $3.62 and in 1920, $3.74.

EL SALVADOR SILVER MINES CO., INC. **SALVADOR**

Office: 11 Pine St., New York. Receiver: A. Parker Nevin, 30 Church St., New York.

Frank M. Estes, gen. mgr.; Gus Scogland, mgr., Divisadero, Department of Morazan, El Salvador, C. A.

Officers: Edward D. Dowling, pres.; A. J. McAllister, sec.; with F. B. Adams, Thomas Howell, F. D. Lackey, T. H. Frothingham and F. W. Allen, directors. H. M. Case, treas.; John Cabot, Jr., asst. sec.-asst. treas.

Inc. Feb., 1918, in Delaware. **Cap.** $3,000,000; $1 par; all issued. Company's office, transfer agent; Bank of America, registrar, both in New York. Listed on New York Curb.

Balance sheet of Oct. 31, 1921, shows assets, $4,207,155, of which $161,295 are current. Current liabilities were $281,771. Deficit for the fiscal year was $560,950.

Company was organized to acquire, consolidate and operate a group of producing mines in Salvador, including those of Butters Salvador Mines, Ltd., Butters Divisadero Co., and Butters Potosi Consolidated Mines Co., also controls 95% of the issued capital of the Monte Mayor Mines Inc.

Property: an estate of 3,000 acres, 4½ miles from San Sebastian, Department of La Union, comprising the Monte Mayor, Santa Gertrudis, Banadero, El Carao, and Los Tunos, Tempisque and Jimerito mines; the first named being the most important. Also owns rights on estates nearby covering 2,500 acres.

Monte Mayor Mines, Inc.

Address: 11 Pine St., New York, or G. A. Swanquist, Divisadero, El Salvador, C. A.

Officers: E. D. Dowling, pres.; J. H. Warner, v. p.; G. W. Griffin, sec.; with G. E. Farish and G. A. Swanquist, directors. H. M. Case, treas.

Inc. Jan., 1918, in Delaware, succeeding Monte Mayor G. & S. Mng. Co., Ltd., (of London). **Cap.** $500,000; $1 par; all issued.

Equipment: includes 10-stamp, 60-ton cyanide mill, water power, steam power plants, offices, dwelling, etc.

The Monte Mayor mine has an oreshoot 500 feet long opened to a vertical depth of 120'; the Santa Gertrudis orebody is 200' long and opened to depth of 150'; the Carao oreshoot is 200' long and developed to a depth of 70', the veins persisting at depth in all mines. Surface work on Banadero and Los Tunos shows a strong vein, and indications of good oreshoots. The Temisque and Jimerito claims cover a well-defined, vein parallel with the Monte Mayor. In the former, the shoot is 220' long and opened to depth of 80'.

Butters Potosi: the Potosi mine, 25 miles west of the Divisadero. Extensive development has proven considerable ore, with every indication of a continuation of the ore shoots downward.

Butters Divisadero: 7,000 acres, 14 miles west of Monte Mayor, and 24 miles north of San Miguel, the nearest rail point connecting with La Union on the Pacific Coast, Department of Morazan. The important mines of this

group are the Divisadero, La Matilde, San Francisco, Carolina, Portectora, and Gigante; also leases on the Encuentros and Loma Larga mines. The Divisadero is the most extensively developed mine, including the Matilde and Carolina which belong to it.

Workings extend to depth of 700′ on the incline and for a length of over 2,000′.

Gigante: this mine, situated about six miles east of Divisadero, is opened to depth of 100′, with promising indications, and estimated to contain a total of 26,960 tons valued at $301,716.

Equipment: Monte Mayor—present plant cost $161,983; and includes hydro-electric and steam power-plants, mine machinery, 10-stamp mill, cyanide plant, store and quarters.

Divisadero—oil-storage tanks, 14-mile oil pipe-line, steam and Diesel oil engine plant generating 1,100-h. p., transmission-line, hoists, pumps, compressors, aerial tram, 400-ton cyanide mill, foundry, machine-shops, stores, dwellings, etc.

Potosi—power-plant, hoists, machine shop, etc.

Production:

Mine	Years	Ore, Tons	Gross Value
Monte Mayor	3	23,382	$233,818
Divisadero	13	.....	5,194,967

The Divisadero yield represents 93,971 oz. of gold and 5,657,128 oz. of silver.

Operations were suspended July 1921.

A report by F. M. Estes, gen. mgr., was apparently distinctly unfavorable, and as company is without funds or income, the directors on Oct. 31, 1921, recommended that company's assets should be liquidated. On Jan. 30, 1922, a receiver was appointed on application of Alex. J. McAllister with a claim of $37,550. Bankruptcy proceedings against Thos. H. Frothingham had already begun on Dec. 12 preceding, but at the request of El Salvador stockholders, the trustees were restrained from immediately disposing of his property, alleging fraudulent representations.

ESMERALDA MINE — **NICARAGUA**

Address: Alfonso Hurtado, Granada, Nicaragua.

Property: at La Libertad, Chontales district, adjoins that of Babilonia Gold Mines on the W. Ore is gold-bearing, averaging $10 per ton. Has been worked for many years.

ESPARTA GOLD FIELDS, LTD. — **COSTA RICA**

Property: Santa Clara mine near Esparta, said to show several veins of high grade ore.

GRECIA MINING CO. — **NICARAGUA**

Controlled by Butters Salvador Mines, Ltd.

Address: care Chas. Butters, 6272 Chabot Rd., Piedmont, Calif. Mine at San Juan de Limay, Nicaragua.

HONDURAS AMERICAN SYNDICATE, INC. — **HONDURAS**

Controlled by **U. S. Continental Mines Co., of Arizona.**

Address: Irving K. Farrington, 30 Broad St., New York; Robt. B. Cross, sec.

Mine address: Manuel Argenal, res. mgr., Yuscaran, El Paraiso, Honduras.

Inc. 1920 in Delaware, as a holding company. **Cap.** 20,000 shares of no par value; 10,973 shares outstanding Dec. 1, 1921. Registrar & Transfer Co., transfer agent. Listed on N. Y. Curb, 19½ high—6 low in 1920; 6¼ high—6 low in 1921. Indebtedness of $5,000 as of Dec. 1, 1920.

Property: its only assets are its stock holdings in the **American & Honduras Mines Corporation.**

In Dec., 1921, the shareholders were advised by R. B. Cross, secretary of the company that inasmuch as the Honduras American stockholders had

agreed to exchange their shares for those of the U. S. Continental Mines Co., receiving 20 shares for one, that the corporation should be dissolved. See U. S. Continental, Yuscaran Mines, etc.

LA LUZ & LOS ANGELES MINING CO. **NICARAGUA**

Offices: 511 Fifth Ave., New York; and Frick Bldg., Pittsburgh, Pa.

Officers: J. Gilmore Fletcher, pres.; Jesse C. Seobey, mgr., at Pittsburgh.

H. A. Watson, gen. mgr., Prinzapolca, Nicaragua; H. G. Smith, mill supt.; Dr. Benjamin Cuadra, attorney at Prinzapolca.

Inc. Feb. 8, 1916 in Delaware.

Property: near the Eden mine, but on a different branch of the Prinzapolca river, in the Pis Pis district, Nicaragua, formerly owned by the **Compania Minera La Luz y Los Angeles,** incorporated 1896 in Nicaragua.

Ore is a soft altered shale, a considerable portion locally known as "manta", being no more than a stiff clay, and occurs covering an area of 400'x750', to a depth of 100', and averaging $9.20 gold per ton. Below this clay the ore occurs in a much fractured limestone highly metamorphosed by porphyry intrusions; although generally pyritic, higher gold values are said to prevail when pyrite is absent.

Development: for surface ore, by open cut 1,000' long and 300' wide, with floor entirely in ore. In 1913, water prevented exploration by shafts, and in 1916, 6,000' of drilling showed continuity of average grade ore to depth of 500'.

Equipment: includes a mill of 10 stamps followed by pebble mills delivering to amalgamation plates. Average extraction is 66%.

Production: from 1901 to 1920 totals 540,145 tons, or $4,399,334, an average of $8.15 per ton gross.

Company has been a regular producer for 19 years, but operations have been hampered by lack of adequate power. A cyanide plant is planned.

MATAQUESCUINTLA MINING CO. **GUATEMALA**

Property: El Rosario, Los Ocotes, Magdalena, and San Francisco silver mines in Mataquescuintla county, under development in August, 1918. A careful sampling of El Rosario mine showed the ore to assay from 0.01 oz. gold and 7.4 oz. silver per ton to 0.01 oz. gold and 54.20 oz. silver. The San Francisco is to be reopened. A native company worked it in 1888, and erected a 20-stamp mill. Some chloride of silver ore yielded 300 oz. per ton. Reserves were reported to be 600,000 tons worth $34 per ton, with silver valued at $1 per ounce.

MONTE MAYOR MINES, INC. **SALVADOR**

Controlled by **El Salvador Silver Mines Co.,** which see.

NACIONAL DE MANGANESE, COMPANIA **COSTA RICA**

Address: San Jose, Costa Rica, Central America.

Property: the Lagarto group of manganese mines, with a shipping port at Lagarto on the Pacific Coast, 20 miles S. of Morra Hermosa. Transportation is by ox-cart, 10 miles over hilly country. The general geology is similar to that of the American Manganese Mfg. Co.'s deposits. Failure to recognize faulting, etc., led to over-estimates of tonnage. Houses, ore-bins, track cars, and a 550' pier were erected, but the future of company is not bright, owing to serious decline in metal prices, and competition of other countries.

NEW YORK & HONDURAS ROSARIO MINING CO. **HONDURAS**

Office: 17 Battery Place, New York. **Mine office:** San Juancito, Honduras, C. A.

Officers: Lewis L. Clarke, pres.; H. A. Guess, v. p.; A. R. Gordon, v. p. and gen. mgr.; W. C. Langley, treas.; J. Perlman, sec., L. F. Pierce, mine supt.; F. C. Devereux, mill supt.

Executive committee: Wm. A. Prendergast, chm., Lewis L. Clarke, H. A. Guess, W. C. Langley, W. L. Saunders, Sidney Abbey, P. R. Weiler and A. G. Todd.

Directors: same as Exec. comm., plus Alfred V. Guidet, Irving Heidell, J. C. F. Jacoby and M. F. Soto.

Inc. Nov., 1880, in New York. **Cap.** $2,000,000; $10 par; all issued. Stock is listed on the New York Curb. American Exchange Nat'l. Bank, New York, registrar. U. S. Mortgage & Trust Co., New York, transfer agents. Company holds a 63% stock interest in the Sobana Grande-Honduras Mng. Co.

Dividends: to Jan. 1, 1921 total $5,270,000, plus $580,000 for amortization. Last dividend of 3% in Jan., 1921.

Financial Statement, years ending December 31:

Assets.

Year	Property	Equipment	Current	Investments Etc.	Sundry	Total
1920.....	$3,000,000	$634,275	$1,406,339	$136,464	$7,709	$5,184,787
1919.....	3,000,000	1,175,934	1,706,441	202,436	69,838	6,154,649
1918.....	3,000,000	1,135,859	1,630,866	151,372	39,504	5,958,602
1917.....	2,800,812	1,257,869	1,505,209	.....	.....	5,563,890
1916.....	1,516,515	781,952	1,095,341	103,521	17,355	3,514,674

Liabilities.

Year	Capital	Current	Reserves	Surplus, Including Deplet., Valuation	Total
1920..	$2,000,000	$149,069	$1,632,514	$1,403,204	$5,184,787
1919..	2,000,000	412,062	1,085,131	2,657,456	6,154,640
1918..	2,000,000	688,789	845,747	2,434,066	5,958,602
1917..	2,000,000	567,784	458,937	2,537,168	5,563,890
1916..	2,000,000	257,499	206,555	1,050,674	3,514,674

Profit and Loss.

Year	Income	Expenses, Etc.	Net Oper. Income	Reserve Fund	Year's Surplus	Dividends Paid
1920..	$1,518,612	$1,249,572	$319,040	$ 35,036	$211,668	$320,000*
1919..	2,115,158	1,271,239	843,919	174,947	758,140	200,000*
1918..	803,751	223,459	504,513	80,113	376,992	200,000*
1917..	1,676,846	1,075,966	600,879	94,005	506,874	300,000*
1916..	1,566,173	970,080	596,093	135,983	460,110	400,000
1915..	1,200,743	847,276	353,466	117,324	236,142	240,000

*Plus $100,000 from amortization in 1917; $200,000 each in 1918 and 1919; $80,000 in 1920.

Property: a 20-year concession from the Government upon 25 sq. miles of mineral-bearing land, located about 20 miles from Tegucigalpa, including the Rosario mine, at San Juancito, Honduras, C. A. The altitude is 5,000'. The first work was done in 1882. Also the San Marcos mine of the Sabana Grande company, 40 miles W. of Rosario. Concession to the Rosario was renewed for a second 20 years' period on Dec. 31, 1920.

Geology: the veins lie in slate, andesite, and altered granite. The ores are mainly silver-bearing, the principal mineral being stephanite. There is a little native silver.

The Rosario contains about 20 mineral bearing veins, which have been or are now being worked. The south San Miguel was the main producer in 1918-19-20.

Geological investigations of the entire zone, as well as surrounding country, were concluded in 1916. Exploration of other properties is part of the regular work of this company. It resulted in finding the San Marcos, which has been under development by the company since 1919, and on January 1, 1920, contained 19,202 tons of ore averaging $38.77 per ton in silver and gold. Is developed to 375' depth. Extensions in 1920 were 1,415', and output was 11,671 dry tons, compared with 7,120 in 1919.

Development: results may be shown as follows:

Year	Footage	*Ore Mined Tons	Reserves Tons	Value per Ton	Cost per ft.	Cost per Ton
1920.....	16,838	91,690	211,783	....	....	...
1919.....	15,901	92,167	283,422	$13.45	....	...
1918.....	11,266	74,816	282,559	15.15	....	...
1917.....	9,381	83,052	303,296	9.21	$12.21	$0.87
1916.....	12,637	81,513	312,143	9.51	9.91	0.97
1915.....	13,000	90,162	343,716	9.76	10.18	1.09

*Does not include ore from development.

Two crosscuts have been driven—the Pena Blanca—Esperanza, beginning at the S. E. end of the Esperanza No. 3 and running in a S. W. direction to develop the southern territory, and the Pena Blanca S. W. crosscut, starting at the junction of the Southwest and Jucuara veins in Block 84, and planned to reach Jucuara gulch. With this connection made, additional water power and cheap timber are obtainable from the western side of the mountain. The cost of lumber was reduced from $22.50 to $12.50 per 1,000 board feet since the tunnel was completed. Rock passed through was not favorable for ore deposition. The Esperanza crosscut opened some ore, which is being developed.

Underground workings are scattered. Shrinkage stoping is mostly employed. Little timber is required. The mine has over 60 miles of track and 40 miles of piping for air.

Equipment: at Rosario, two 1,200-h. p. hydro-electric plants, hoists, 5, 6, and 7-ton electric locomotives in the mine, 2-air compressors, machine-drills, sawmill, 400-ton cyanide mill using zinc dust precipitation, machine shops, assay office, hotel, store, schools, 1,500 employees, including 50 white, and a military garrison consisting of a commandant, 58 officers and men. Labor conditions are good.

At San Marcos—three 50-h. p. oil-driven air compressors, laboratory, shops and dwellings. A 35-ton flotation plant was burned in 1920, but is being rebuilt and may include a cyanide unit.

Production: at Rosario; beginning with 1914, includes a certain proportion of stope filling.

Year	Ore Treated Dry Tons	Extraction Silver, %	Gold, %	Extracted Silver, Oz.	Gold, Oz.	Total Cost per Ton
1920.....	140,100	86.07	94.52	1,711,349	8,001	$8.51
1919.....	133,900	85.66	94.00	1,584,579	10,200	9.50
1918.....	129,900	86.75	88.31	1,587,468	9,748	9.41
1917.....	141,218	93.79	94.00	1,670,612	13,790	7.49
1916.....	128,030	89.04	94.24	1,810,886	14,989	6.30
1915.....	117,790	87.45	92.32	1,748,803	15,211	5.74
Total since 1912	845,758					

In addition, San Marcos mill recovered 249,751 oz. silver and 967 oz. gold in 1919; 268,337 and 1,109 oz. in 1920. The flotation concentrates are shipped.

New York & Honduras Rosario is an extensive property making good profits. Its resources are extensive, and exploration continues to open up new mines. Reports contain a wealth of interesting mining and metallurgical information.

Operations, suspended early in 1921 to await better silver prices, were resumed, November first.

NICARAGUA

NICARAGUA MINING CO.

Office: 1218 Locust St., Philadelphia, Pa.

Officers: B. C. Warnick, pres.; C. J. Fox, v. p.; W. H. Steigerwalt, sec.-treas.; with C. A. Daniel, W. H. Bilyeu, W. S. Duling, Barry Searle (cons. eng.) and J. M. Steele, directors. Granville S. Borden, gen. supt.

Inc 1919. **Cap.** $2,000,000; $1 par; non-assessable; 1,000,000 being issued early in 1920.

Property: in the Pis Pis district, 100 miles from the Atlantic Coast, 160 miles from Prinzapolca, which is 90 miles north of Bluefields. Supplies are handled by the Tunky Transportation & Power Co., a subsidiary of the Eden Mining Co.

Andesite is the prevailing rock of the district, and is cut by diabase dikes and by numerous quartz veins. The main vein system runs N. E. and S. W. and dips 25 to 75° N. W. The vein zone contains many branch, cross and parallel veins, and is cut by faults. The vein quartz contains gold and silver, together with a complex mixture of copper, lead and zinc sulphides.

The company owns the following mines:

(1) the Concordia group discovered in 1894, from which gold worth $1,200,000 was extracted by simple amalgamation, which only saved 46%. The claims cover an area of 300 by 10,000′, and include water-power sites that will generate from 300 to 1,000 h. p.

(2) the Lone Star claims of 113 acres, also 1,070 acres of farm land and a 7-acre water power site, completely equipped with 30-stamp mill, 500-h. p. hydro-electric plant, shops, etc., costing $270,000. This mine has yielded $1,200,000; though only 50% of the assay value was recovered.

Development: has proven a block of ore averaging 8⅓′ thick, 925′ long, and with an average back of 456′, which contains 262,383 tons of ore averaging $10.82 per ton. Gross value of ore developed, $2,839,931. With an 80% recovery, net gross value is $2,271,953. With a working expenditure of $4 per ton or $1,052,531, the net profit is $1,222,415. A 150-ton mill is expected to treat this tonnage in 5 years.

(3) the Bonanza-Mars mines of 335 acres, plus 1,600 acres of farm land, together with general equipment, consisting of hydro-electric plant, 100-ton stamp-mill and cyanide plant, houses, etc., which cost $400,000. Reserves are estimated at 2,000,000 tons with over 90,000 tons that will average $12 per ton, available. This mine has yielded over $1,200,000.

The consolidation of these producing properties and their operation by modern methods, are expected to yield large returns. Development has been confined mainly to the Neptune vein of the Bonanza and a 9-stamp amalgaing mill with cyanide unit was put into commission Oct., 1920.

NICOYA MINING CO. — **COSTA RICA**

Property sold to **American Manganese M. Co.**

SABANA GRANDE-HONDURAS MNG. CO. — **HONDURAS**

Controlled by **New York & Honduras Rosario Mng. Co.**, which see.

SILVER LEAD MINING CO. — **GUATEMALA**

Address: Sansare, Guatemala.

Property: near Sansare, 9 miles from rail. Reported in August, 1918, that a wide deposit of pyrrhotite, containing nickel and cobalt had been opened.

TONOPAH NICARAGUA CO. — **NICARAGUA**

Controlled by the Tonopah Mining Co. of Nevada.

Property: the Santa Rita mines, 30 miles from the Eden Mining Co.'s mine. Diamond-drilling was completed in July, 1918. Work to date has developed 984 232 tons of carbonate ore, assaying 63 cents gold and 4.832% copper; 163,556 tons of sulphide ore, averaging $3.41 gold and 10.287% copper, and 308,800 tons of sulphide ore, containing 27 cents gold and 3.365% copper. There is also 35,500 tons of tailings, assaying $2.73 gold and 1.97% copper. The aggregate is 1,492,088 tons, carrying 91 cents gold and 5.059% copper. Work has been suspended until it is practicable to erect a mill, for which tests have been made but prevailing high costs and decline in metal prices have prevented company from going ahead.

WEST END OPOTECA MINES CO. — **HONDURAS**

Office: Syndicate Bldg., Oakland, Calif. Mine at Opoteca (or Rosario), Honduras.

Officers: F. M. Smith, pres.-treas.; J. F. Carlton, v. p.; Geo. C. Ellis, sec., with L. W. Bennett, Rufus P. Jennings, C. P. Murdock and K. L. Oliver, directors. J. W. Sherwin, gen. mgr.; J. R. Blair, auditor; Paul Neer, mine supt.

Inc. 1920. **Cap.** $3,000,000; $1 par.

Property: 1,500 acres, including the Opoteca mine, operated by Spaniards in early days. Silver ore, with values of 2 to 3 oz. up to 30 to 40 oz. per ton, occurs in caves and chambers in limestone. When orebodies have been delimited and probable tonnage determined, mill and hydro-electric power plant will be erected.

On April 1, 1921, the West End Cons. Mng. Co., which had financed development, turned the property over to the West End Opoteca, receiving 1,788,486 shares for the property. These shares were distributed as a dividend to West End Cons. shareholders. Including moneys expended by West End Cons., total disbursements to April 1, 1920, were about $62,000.

WEST INDIES

Including Cuba, Hayti, San Domingo, and Porto Rico.

BETHLEHEM CUBAN IRON MINES CO. CUBA

(Formerly Spanish American Iron Co.)

Address: 111 Broadway, New York City.

Subsidiary of Bethlehem Steel Co. and is practically a consolidation for operating purposes, of the **Juragua Iron Co., Bethlehem Iron Mines Co.** and **Spanish American Iron Co.**

Owns (1) the hematite iron mines at Vinent, 4 miles from Daiquiri, on south coast of Cuba, near Santiago, and (2) the Mayari open cut, brown iron ore mines at Woodfried, near Nipo Bay, on north coast of Cuba, in Oriente province, with 17½ miles railroad to Felton on Nipo Bay, where it has a nodularizing plant, loading piers, etc.

Production: in 1919, 279,700 tons: in 1920, 561,268 tons of 58% ore.

Juragua Iron Co.

(Operated under lease by Bethlehem Cuban Iron Mines Co.)

Owns about 10,000 acres of iron ore land at Firmezu, Oriente province, Cuba, with its own railroad 15.46 miles long to its docks at La Cruz, on Santiago harbor.

Production: 212,013 tons in 1915; 39,784 in 1916; 17,128 in 1917. Later shipments included with Daiquiri output.

BLANTON COPPER MINING SYNDICATE SAN DOMINGO

Inactive. **Address:** The Bourse Bldg., Philadelphia, Pa. **Mine office:** Bucaro, San Cristobal, Santo Domingo.

Officers: E. J. Hedden, pres.; H. A. Smith, sec.; J. B. Thom, treas.; with M. W. O'Boyer, A. D. Blackinton, J. F. Wilt, directors. F. T. Eddingfield, mgr., Santo Domingo; Otto Peterson, supt.

Inc. Feb. 16, 1910, in Delaware. **Cap.** $500,000; $25 par; $360,000 outstanding. Authorized bond issue, $400,000; $180,000 outstanding. Annual meeting, first Monday in January. Total receipts from ore sales from October, 1915, to July 15, 1916, amounted to $45,193, or net cash $32,440, for 857 tons selected ore, the ore averaging 12.4% copper and $1.00 in gold and silver. Shipments from January-July, 1917, totaled 231 tons of 12.78% copper ore. This ore is hand sorted about 10 to 1. Property examined and reported on by F. Lynwood Garrison, Thos. F. Donnelly, Henry D. Adams, and F. T. Eddyfield.

Property: 1,700 acres, held under government concession, including the Bucaro mine, on the Rio Nigua, 27 miles west of San Domingo, bought of

San Christobal Mining Co. Property shows orebodies in limestone, near a porphyry contact, one orebody in the Bucaro mine carrying chalcopyrite, bornite and chalcocite, all auriferous and argentiferous.

Development: by tunnels, the work aggregating 3,500′ in 1917. Company reports 35,000 tons ore blocked out and that property is near the profitable stage. The Ferdinand vein opened for 200′ on No. 1 level is said to average 16′ of 4% ore for 150′, and has 25,000 tons nearly probable ore. The Santiago vein appears to be 40′ to 80′ wide and assays ½ to 1½% copper for levels 130′ apart along 200′ drift.

Company out of funds and properties idle.

CUBA COPPER CO. **CUBA**

Dead; see Vols. XIII and XIV. Company operations discontinued in 1916 and property operated for 2 years thereafter by the **Cuba Copper Leasing Co.**, which see.

CUBA COPPER LEASING CO. **CUBA**

Subsidiary of International Minerals and Metals Corp. (q. v.).

Office: 61 Broadway, New York.

Was a subidiary of Beer, Sondheimer & Co., (q. v.), which owned entire capital stock. Company leased and operated property of Cuba Copper Co. (q. v.) 1916-18; management of owning and leasing companies was the same. At end of 1919, company owed Beer, Sondheimer $1,238,094.

HAYTI MINES CO. **HAYTI**

Address: 25 Broad St., New York City.

Inc. 1910, in New York. **Cap.** $1,000,000; shares $5 par; non-assessable.

Is a New York corporation, Property is held by the Miniere de Terre Neuve, a Haitian corporation, whose title is direct from Haitian government, to whom company must pay 5% royalty on all copper or other ores mined, from a concession covering 250 square miles N. W. of Gonaives, Hayti.

The property at Memé contains a contract metamorphic deposit of bornite ore in garnetized Tertiary limestone, invaded and altered by andesite and by quartz diorite. Also veins of copper ore in the eruptive rock at and near the village of Terre Neuve. Considerable surface stripping and numerous shallow shafts and short tunnels have been driven on the property, and shipments of sorted ore made to New York smelters. Reports on property made to Vogelstein & Co. by Duncan Rogers and Bela Low. Examination also made by J. H. France and W. H. Weed.

LOS CERROS COPPER CO. **CUBA**

Office: Blackstone Bldg., Cleveland, Ohio.

Officers: W. I. Boardman, pres.; W. C. Watkins, v. p.; Sherman C. Dalbey, sec.; W. L. Rees, treas.; Col. D. H. Pond, gen mgr.

Inc. Aug. 12, 1905, in Arizona. **Cap.** $500,000; shares $100 par.

Property: 2 claims, 100 acres, also 1,500 acres of non-mineral land, near Fomento, Prov. de Sta. Clara, Cuba, opened by 3 shallow shafts and 5 tunnels, longest 250′, showing ore assaying 10% copper, 20 to 25% zinc, 20% sulphur and 30% silica, with gold and silver values. Zinc apparently decreases at depth, The vein has a 12′ to 15′ gossan outcrop along its strike. Property is an antigua. The ore though mostly low-grade and zinciferous can be concentrated and property is considered worthy of further development under competent direction.

MATAHAMBRE MINES **CUBA**

Address: A. H. Diaz, Consulado 57, Havana, Cuba. D. F. McCormick, Matahambre, Pinar del Rio.

Property: 12 patented claims, leased by estate of M. L. Diaz, about 1,000 hectares, in province of Pinar del Rio, 110 miles west of Habana.

Geology: ore occurs in lenses in a series of fault veins cutting the sedimentary rocks; the ore is chalcopyrite, assaying 12% copper, 1 oz. silver and a trace of gold.

Development: by adits to 5th level from which depth a 3-compartment 700' vertical shaft is down to the 12th level. Workings total about 25 kilometers.

Equipment: at the mine includes 350-h. p. electric hoist, 3-ton skips, 42" picking belt, gyratory crushers, and a 450-ton concentrator containing Marcy mills, and a flotation plant. A 2,000' aerial tram connects storage bins and mill. At Port St. Lucia, company has a power plant equipped with 1,000 k. w. turbo generators, three 450-h. p. oil engines, 12,000 ton storage bins, wharf, lighters and tugs. A 6-mile aerial tram and macadam road connect mines with the port and an 11,000 volt double circuit transmission line supplies power.

Production: at the rate of 2,500,000 lb. monthly totals 120,000,000 lb. copper and 400,000 oz. silver as follows:

before 1916	16,000,000	lb.	copper
during 1916	17,000,000	"	"
" 1917	17,000,000	"	"
" 1918	20,000,000	"	"
" 1919	20,000,000	"	"
" 1920	20,000,000	"	"

PINAR COPPER CO. **CUBA**

Address: C. H. Hyde, 120 Broadway, New York.

Officers: C. H. Hyde, pres.; Caldwell Hardy, v. p.; with W. H. Hinkle, I. J. R. Muurling, G. H. Rohrdanz, and C. S. Sweetland, directors.

Cap. $5,000,000; shares $1 par; $3,546,000 outstanding. Listed on New York Curb. Registrar & Transfer Co., New York, agents.

Property: El Mono claims adjoining the Matahambre copper mines, near city of that name in Pinar del Rio, Cuba.

PONUPO MANGANESE CO. **CUBA**

Out of business. Formerly controlled by Chas. F. Rand, 61 Broadway, New York City. See Vol. XIII for description.

SPANISH-AMERICAN IRON CO. **CUBA**

Succeeded by **Bethlehem Cuban Iron Mines Co.**, which see.

WEST INDIES MINES DEVELOPMENT CO. **CUBA**

Property: the Constancia and other copper mines near Vinlales, Western Cuba, and north of the Matahambre mine. M. Paetzold, former Austrian consul at Habana, controls mines.

SOUTH AMERICA

Companies listed by countries and alphabetically.

ARGENTINA

ENCRUCIJADA MINE **ARGENTINA**

Three miles N. of Caldera district, Chiliceto department, province of La Rioja, shows silver-gold-copper ore. Was equipped with blast furnace which proved to be too small for profitable operation, Inactive, 1921.

FAMATINA CO., LTD. **ARGENTINA**

Dead. Fully described in Volume XIV. Property was owned by **Corporation Minera de Famatina**, which see.

FAMATINA, CORPORACION MINERA de **ARGENTINA**

Address: care Dr. Santiago O'Farrel, Buenos Aires, Argentina.

Property: about 850 acres in 4 groups, formerly owned by **Famatina Co.**, Ltd., a British concern, in the Mexicana district, Chilecito department, La Rioja province, on eastern slope of Famatina range at an elevation of 15,000', includes the San Pedro, Upulungus, Espiga and other veins. Mineralization occurs at or near the contact of quartz-diorite with sedimentaries in veins

generally normal to the contact. The veins are narrow, 24" to 33", and ore values at depth range from 2.5 to 6% copper, $5.50 to $12.25 gold, and 1 to 6 oz. of silver.

Development: largely by tunnels up to 600' in depth. Total drifting on San Pedro is 5,000' and 6,300' on Upulungas.

Equipment: mines are connected with R. R. at Chilecito by 22 mile cable way and with smelting plant at Santa Florentina, 17 miles distant. Smelter consists of two 75-ton roasters, two 100-ton blast furnaces, a 150-ton reverberatory and 2 converters; charcoal is used for fuel. During last seven months of 1920. the output was 733 tons of copper.

LOS BAYOS MINE — **ARGENTINA**

Property: in Los Bayos district, department of Chiliceto, Los Rioja Province. Ore is copper-silver-gold. Equipped with 2-mile cableway connecting with concentrator. Has been considerably developed and was a producer. Now inactive.

NATIONAL LEAD CO. OF ARGENTINA — **ARGENTINA**

A branch of National Lead Co. of 111 Broadway, New York, organized to manufacture mixed metals in the republic.

SAN JUAN MINE — **ARGENTINA**

Property: 7 miles N. E. of Caldera district, department of Chiliceto, province of La Rioja. Copper ore occurs in contact of quartz-diorite with sedimentaries. Has been operating in a small way for many years, the ore being treated by chloridization roast at Totoral, 7 miles distant.

BOLIVIA

ANGLO-BOLIVIAN MINING SYNDICATE, LTD. — **BOLIVIA**

Subsidiary of **Aramayo Francke Mines, Ltd.**, which see.

Property: tin. silver and bismuth mines, including the early day Real Socavon, situated in the Potosi district, province of Potosi.

ARACA, EMPRESA DE ESTANO — **BOLIVIA**

Office: Oruro. or Santiago, Bolivia. Mine at Araca, Bolivia.

Property: in Araca district, province of La Paz, on the westerly slope of Quimsa Cruz range, 66 miles S. E. of La Paz and 3 miles S. of the Tanapaca mine. Two principal veins, Pireo and Central, occur in shales, sandstone and quartzite, near their contact with granite. Ore is cassiterite in a gangue of quartz, tourmaline, and iron oxides; silver is not present; average value 4% tin. Stopeable ore is over 3' and up to 50' wide.

Equipment: includes aerial tram from mine to mill (San Jose). Prior to war, annual production was 150 tons of barrilla (i. e. 60% tin concentrate); in 1919, it was 100 tons.

ARAMAYO DE MINES EN BOLIVIE, CIE. — **BOLIVIA**

Successor to **Aramayo Francke Mines, Ltd.**

Office: Geneva, Switzerland. **Mine office:** Quechisla, Bolivia.

Directors in England: F. A. Aramayo, chairman; Bernard Dale, L. A. Kensington, Robt. G. Ribon, and F. J. Torromé.

Directors in Bolivia: F. A. Aramayo, chairman and managing; C. V. Aramayo, C. Navarro, and M. Roberts (gen. mgr.).

Inc. Oct. 17, 1906, as Aramayo Francke & Co., Ltd. **Cap.** £600,000; shares £1 par; £597,090 outstanding. Name of company changed to present title, January, 1911.

To avoid increased taxation in Great Britain, company was liquidated and holdings transferred on Dec. 23, 1920, to a Swiss company.

Report for 19 months from June 1, 1918 to Dec. 31, 1919, showed; net profit, £663,905; with balance forward, £748,244; dividends and bonus, £268,690; balance £479,554. Assets include; cash, £74,672; bills receivable, £133; debtors, £290,218; tin stocks, £530,583; supplies, £288,463;

investments, £17,857. Liabilities include; creditors, £180,321. Profit in 1920 was £234,500, with exchange 22.5 francs to the pound.

Dividends: 6d in 1909; 1s 6d in 1910; 2s in 1911; 3s in 1911-12; 3s 6d in 1912-13; 2s. in 1913-14; 1s. 6d. in 1914-15; 3s. in 1915-16; 6s. in 1916-17, 9s. in 1917-18; 9s. in 1918-19; 4s. in 1920.

Property: the consolidated mining rights over the mountain group of Chorolque, 817 hectares, in Potosi province, containing tin, bismuth and wolfram, the concentration works of Santa Barbara, Santa Elena and Sala-Sala; the establishments of Cotani, with its mines; the Quechisla smelter; the mines at Tasna, covering 1,460 hectares, with concentrator and smelter at Buen-Retiro; the mines at Churquini, Chocaya, 81½ hectares, the estates of Quechisla and Atocha and the concentrating plant at Asllani, besides other mining rights of lesser importance.

At Chorolque the company operates 2 groups of mines, the Chorolque at 18,000′: with veins averaging 3′ wide cutting andesite near limestone contact. Company operations at Chocaya yield silver-tin ores from narrow (1′-3′) veins in dacite intrusive in slate. At Tasna, bismuth ores are mined. The finding of new orebodies in 1920 has prolonged the life of the Chorolque mine.

Company controls the Anglo-Bolivia Mng. Syndicate (q. v.) operating at Potosi.

Production—the products are varied, as shown below:

Year	Black Tin, Tons	Copper Matte, Tons	Silver, Oz.	Wolfram, Tons
1920	2,011	...	973,038	...
*1918-19	3,332	252	.....	...
1917-18	1,845	180	.....	...
1916-17	2,059	118	523,284	227
1915-16	2,095	19	110,000	148
1914-15	2,060	111	.....	...
1913-14	3,442	342	.....	...

*19 months.

Company is one of the largest operators in Bolivia.

AVICAYA, EMPRESA **BOLIVIA**

Mine address: Avicaya, via Pazna, Bolivia.

Property: in Pazna district, province of Oruro Massive cassiterite is found in quartz veins in porphyry; and disseminated ore carrying pyrite also occurs.

BEBIN HERMANOS, CASA **BOLIVIA**

Office and mine at Potosi, Bolivia.

Property: in Pazna district, province of Oruro. Massive cassiterite is was erected in 1920, and production was 5 tons of 55-60% tin concentrates per day. Company employs 400 men.

Is considered the second most important company in the Potosi district.

BERENGUELA TIN MINES, LTD. **BOLIVIA**

Office: G. E. Elgee, sec., Leadenhall Bldg., London, E. C. 3, England.

Directors: J. Macandrew, chairman; J. L. Barber, H. M. Read, Edward Harrington and Alfred Naylor. C. L. Price, mgr.

Inc. April 20, 1905, in Great Britain. **Cap.** £20,000; £1 par; changed to £40,000; 4s. par; all issued. Fiscal year ends June 30.

Profit in 1919-20 was, £25,126, with £3,357 previous balance forward; £10,000 distributed; £10,000 to general reserve; £8,483 carried forward. In 1920-21 there was a loss of £10,975 with a debit balance forward of £2,492.

Dividends: 20% in 1915-16 and 1916-17; nil in 1917-18; 15% in 1918-19; 25% in 1919-20.

Property: tin claims at Berenguela, province of Cochabamba equipped with a concentrating mill.

Production: 324 tons tin concentrate in 1915-16; 348 tons in 1916-17; 244 tons in 1917-18; 366 tons in 1918-19; 386 tons in 1919-20; 329 tons in 1920-21.

CARACOLES, EMPRESA MINERA — **BOLIVIA**

Acquired early in 1920 by Guggenheim Bros., 120 Broadway, New York. See **Pacuni Blanca.**

Property: in Quimsa Cruz district, La Paz province, on E. side of Quimsa Cruz range, shows several vein systems in granite; the veins are 1.5 to 6.5 feet wide, with a tourmaline-quartz filling carrying 8-10% tin and some zinc. The Huanchaca de Inquisivi, Pepita, Antofagasta, Llamero, Carmen Rosa, and San Enrique are the principal veins of the mines.

Development: is by adits; new owners propose driving a tunnel to cut Antofagasta and Pepita at depth.

Equipment: originally, 2 mills with a joint monthly production of 35 tons of tin concentrate. Reported that a new mill is to be erected to serve all mines. A 66-mile automobile road has been built connecting mines with Eucalyptus on the Antofagasta & Bolivia Ry.

COROCORO DE BOLIVIA, COMPANIA — **BOLIVIA**

Mine office: Corocoro, La Paz, Bolivia. G. B. Lott, mine supt.

Inc. April 23, 1873, in Bolivia. **Cap.** 1,025,000 bolivianos.

Property: 500 hectares; is the largest copper mine in Bolivia, employing, at last accounts, about 1,000 men. Mine 530 meters deep, is opened on steeply inclined beds of white to green sandstone and conglomerate carrying disseminated native copper, and rarely native silver, with occasional cuprite and chalcocite.

Development: by six vertical shafts timbered with 8x10" Oregon pine and equipped with electric hoists ranging from 50 to 180-h. p. The ore when mined is soft, and even when dry disintegrates readily. The copper is between the grains of sand so that grinding in the usual sense is not necessary. Two 12x18" jaw crushers will disintegrate 1,000 tons in 10 hours. Jigs obtain 95% of the total mill recovery. Capacity of mill is 200 to 250 tons of ore per day with heads assaying 2 to 3% copper.

Equipment: includes a narrow-gauge line between shafts and mill operated by gasoline locomotive, 1,500-h. p. Diesel engines and a mill. The product is exported as "copper mineral," production ranging from 800 to 1,200 quintals of 46 kilos, monthly, of "barillas de cobre" of about 85% average copper tenor. Copper sulphide, as chalcocite, is exported as crude ore at the rate of 1,500 metric tons monthly of 18% copper. Shipments are made to the Tacoma smelter.

COROCORO UNITED COPPER MINES, LTD. — **BOLIVIA**

Registered office: 5 Lothbury, London E. C., England. **Main office:** 7 Rue des Italiens, Paris, France. **Mine office:** Corocoro, La Paz, Bolivia.

Officers: Baron Rene de Batz, chairman; J. L. Barber, P. Bebin, A. Berthin, N. Berthin, G. Charbonnel, F. Harrington, L. Monnier, Baron C. Portalis, and Baron F. Portalis, directors; G. Bryans Wolfe, sec. in London; Roger Leo, sec. in Paris; F. J. Dorion, gen. mgr.

Inc. Aug. 6, 1909, in Great Britain. **Cap.** £700,000: increased in Jan. 1921 to £1,000,000; £1 par; 740,968 issued, fully paid. Company took over the properties of J. K. Child & Co., Ltd.; Sucession Noel Berthin; Compania Sud Americana de Cobre de Corocoro, and Carreras Hermanos.

Annual report for year ended June 30, 1920 showed total income £111,744; expenditures, £13,942; interest, £1,535; depreciation, £49,682; net operating profit, £46,583; reserve fund, £68,000; balance forward £6,942; total reserves £238,000; Assets total £1,170,299, include property £375,000; equipment, £273,000; Arica smelter, £112,576; live stock and furnish-

ing, £14,571; stock and supplies in Bolivia and on hand, £112,040; copper on hand and in transit, £222,478; debtors, £55,663. Liabilities include capital stock, £673,607; accts payable, £156,338; creditors, £95,082; profit and loss, £75,271.

Dividends: 120 francs in 1912-13; 60 centimes in 1913-14; 1 franc in 1914-15; 3 francs in 1915-16; 6 francs in 1916-17; and 6 francs in 1917-18; 2 f. in 1918-19; nil in 1919-20; 10% bonus in fully paid shares, Feb. 1921.

Property: 515 hectares at 12,000′ elevation, in the Corocoro district of central Bolivia. The principal mines are the Vizcachani, Santa Rosa and Guallatiri. The first was formerly owned by J. K. Child & Co.; the second, by Carreras Hermanos, and the third by the Noel Berthin estate.

Geology: the copper is found native in several beds of sandstone inter-stratified with reddish and brownish shale. The ore-bearing beds occur in 2 series, separated by a strong fault. Beds to the east of this fault are known as "ramos" and dip east, the copper-bearing strata being succeeded by a considerable thickness of red slates capped by green slates and limestone, overlain in turn by red clay and brown sandstone. Beds west of the fault are known as "vetas," or veins, and are much harder than the copper-bearing ramos. The mineralization is not uniform and the native copper occurs in particles scarcely visible to the naked eye, as well as in grains, plates, threads and, sometimes flat masses weighing several hundred pounds. The main fault known as Dorado vein, is also mineralized, and was once the main producer of the company, yielding sulphides and arsenides of copper. It is supposed that this fault was the feeding fissure whose solutions spread into the sandstone and were precipitated by organic matter; but there are also other geological theories.

The mine workings have not yet crosscut very far into the series, but show at least 4 ramos and 6 vetas, the four former are divided into 7 cuerpos, or beds, and the 6 veins into 10 to 14 beds. Some of these beds have 7 to 8 meters of homogeneous ore, the white ramos being 30 meters wide on the 10th level of the Vizcachani shaft, of which 8 meters are mined as ores. The beds average 10 meters workable thickness with an average content of 3½%.

The district is extremely arid, without timber, and almost without shrubs, and extensive use is made of a local fuel, called taquia, which is currently used for firing boilers and also for drying ores, and in the past was even used for smelting.

At the croppings of several beds, notably the Yanabarra, the ore is in the form of sulphides, which is hand-sorted into shipping and milling grades. The latter is sent to an 150-ton flotation plant, now in the course of expansion.

Development: the mine openings in the conglomerate strata stand fairly well, though with some crushing, and levels average 25 metres apart Winzes are inclined, with steps cut. Little timbering is used, except for shafts, owing to its great cost, timber being imported mainly from North America, and the workings are secured principally by the poteo or dry-walling system. Steel is used for arching lateral workings.

The property is divided into 4 operating units, the principal and active sections being the Corocoro and the Guallatiri. The former has a vertical shaft 420 meters deep, equipped with a steam plant, and ore-sorting and crushing plant. The Guallatiri has shafts of 180 and 350 meters. The Viscachani shaft is being sunk to the 15th level.

During 1919-20, total extensions including surface work, amounted to 29,326′. The mine output was 67,537 tons of sulphide ore, and 96,276 tons of native copper ore, of which more than one-half came from the 13th to 14th levels of Viscachani. The former averaged 1.92% and the latter 7.89% copper.

Equipment: native copper ore is treated in 3 mills of 10 to 100 tons daily capacity, making a product known as "barilla," or crude copper mineral.

of 80% copper tenor, which is shipped to Europe for refining. An electric power plant of 500-k. w., in which alternators are driven by semi-Diesel engines, has been erected. A low pressure steam turbine was added in 1921.

Production: in 1919-20 was 14,672,022 lb, of copper, of which 3,654,941 lb. was contained in native copper concentrated, 4,962,093 lb. in sulphide flotation concentrate, 6,024,771 lb. in shipping sulphide ore.

Owing to the remote and almost inaccessible location of these mines, past production has been small, compared with possibilities, but the company is making progress and output is steadily increasing since rail communication has been established. The property is considered decidedly promising.

GALLOFA-CONSOLIDADA DE COLQUECHACA, CIA **BOLIVIA**

Address: Lucre, Bolivia.

Property: the Manjon and Gallofa mines in the Colquechaca district, province of Potosi, 80 miles by road from Challapata on the Antofagasta & Bolivia Ry. The veins, Gallofa and Descubridora, are narrow fissures, 4" to 16" wide, in rhyolite near its contact with red sandstone; the first named largely barren, but with high-grade silver ore occurring in small shoots, while in the latter grade silver-tin ore is exposed.

Development: is by several long tunnels.

Equipment: 40-ton mill and flotation unit.

Production: from hand jigs has been 30-40 tons of concentrate per month.

GENERAL DE MINAS EN BOLIVIA, CIA **BOLIVIA**

A Bolivian company.

Property: in the Choknacota canyon, Quimsa Cruz district, province of La Paz, 20 miles S. of Araca, shows 2 principal veins in shale, the San Luis being 4 to 6' wide; the ore is quartz and cassiterite, with some zinc and copper as sulphides. A 4,000' aerial tram connects mine with mill, treating (in 1919) 25 tons of 10-12% tin ore per day; 2½ tons of 70% concentrate are produced.

HUAINACHUCHO MINE **BOLIVIA**

Address: Rafael C. Campos and Luis Calvo, lessees, Colquechaca, Bolivia.

Property: covers part of the Gallofa in the Colquechaca district, Potosi province, reached by an 80-mile road from Challapata on the A. & B. Ry. The vein is a 4"-8" fissure in rhyolite, low grade or barren except for small shoots of rich silver ore. Developed by tunnels.

Production: averaged 400 tons crude ore per month during 1919.

HUANCHACA DE BOLIVIA, COMPANIA **BOLIVIA**

Officers: Jorje del Rio, Calle Blanco No. 653, Valparaiso Chile; R. Conzinier, 22 Rue de la Pepiniere, Paris, France.

E. S. Suffern, agent, 135 Broadway, New York City.

Directors: T. F. Donnelly, pres.; Max Fontaine, v. p.; R. Wedeles, J. M. Ries Arrias and M. Edwards.

C. Leonard Ball, gen. mgr.; B. G. Lott, supt.

Inc. 1873, in Bolivia. **Cap.** £1,600,000; £5 par; all issued. Listed on Paris Bourse.

The year 1919 showed a profit of £4,453.

Dividends: £2,112,000 from 1899 to 1908, inclusive; nothing since.

Property: 3,300 acres, including silver mines at Pulacayo (or Huanchaca), Potosi. **Equipment:** includes 25-mile railway, and lixiviation plant.

Production: 2,572,000 oz. silver in 1920.

HUAYUA-POTOSI y MILLUNI, COMPANIA **BOLIVIA**

Office: Huet Hnos, La Paz, Bolivia.

Property: the Huayua-Potosi and Milluni mines at Milluni, La Paz province. Silver-free tin ore occurs in sedimentaries near their contact with granite.

INTERNATIONAL MINING CO. **BOLIVIA**

Offices: W. R. Grace & Co., 7 Hanover Square, New York; and La Paz, Bolivia.

Directors: D. S. Iglehart, J. Louis Schaefer, J. E. Zalles.

Inc. July 1, 1918.

Property: the Carmen tin-tungsten mine in Yungas district, E. of La Paz, idle since 1919.

Company has option on holdings of **Empresa Minera Tanapaca**, which see; development was underway at end of 1920.

LLALLAGUA TIN CO. **CHILE AND BOLIVIA**

Address: Oruro, Bolivia, and Arica, Chile.

Cap. £425,000. Financial statement for 1917 showed a profit of £1,407,048, of which £637,500 was distributed in dividends. Reserve funds totaled £1,316,000, including £850,000 for dividends and interest; £153,000 for new works; and £93,000 for exploitation.

Property: in province of Potosi, 42 miles S. E. of Machacamarca on the R. R. Cassiterite-quartz-pyrite ore occurs in sedimentaries near quartz-porphyry intrusions; as mined it carries 8% tin.

Development: by a main haulage tunnel called Siglo XX, which is 8,420 meters long, and cost 1,394,365 bolivianos. At the beginning of 1918, the ore reserves were 261,902 tons, averaging 14.33% tin, equal to 37,544 tons of metal.

Production: 7,460 tons of "barilla" (tin concentrate) in 1916, compared with 11,250 tons in 1917. Costs averaged $172.80 in 1916, and $156.80 per ton of concentrate in 1917, in 1918 and in 1919, probably 1,200 tons of barrilla per month.

At Arica, Chile, the company operates, through its subsidiary, the **Cia Chilena de Fundecion de Estano**, a smelter handling 1,500 tons of concentrate monthly; there seems however to be some question as to the success of smelting operations. Company is one of the greatest tin producers in the world, with a production record of 30 years.

MONTE BLANCO; EMPRESA MINERA DE **BOLIVIA**

A Chilean company.

Property: in Quimsa Cruz district, La Paz province. Cassiterite-quartz-tourmaline ore occurs in veins, 1' wide, along fracture planes cutting shales and quartzites, or as a stockwerk in quartzite up to 130' in width. Mine is connected by tramway and aerial tram with mill, equipped with Huntington and Chilean mills, jigs and tables. Monthly production is 30 tons of concentrate carrying 66% tin from a 2% ore. Tailings are retreated.

OLLA DE ORO (BOLIVIA) GOLD MINE, LTD. **BOLIVIA**

Probably dead. Fully described in Volume XIV. Formerly operated at La Paz.

OPLOCA DE BOLIVIA; CIA MINERA Y AGRICOLA **BOLIVIA**

Office: Santiago, Chile. **Sub-office:** Sucre, Bolivia.

Property: tin mines in the southern part of province of Potosi, principally in the Chocaya silver-tin district. Reported that company's operations are being expanded.

ORURO, COMPANIA MINERA DE **BOLIVIA**

Main office Compania 1264, Santiago, Chile. Mine at Oruro, Bolivia.

Officers: Carlos Besa, pres.; with Carlos Aldunate, Luis Barros, Alberto Gonzalez, Manuel A. Prieto and Horacio Walker, directors; F. D. Tupper, gen. mgr.; H. F. Grondijs, cons. engr.; E. Blick, mgr.; G. Wiessing, mill mgr.

Cap. Bolvianos, 4,000,000, outstanding 300,000 shares. Profit in 1919, B. 585,768; in 1920, B. 410,758. Dividends: B. 679,326 in 1919.

Property: at Oruro, includes the Mina Socovan, Itos, La Colorado, Atocho, and Escuelas, containing several veins, the principal ones being the Dolores and the Purisima.

Development: at Mina Itos by 420m. shaft on a vein 0.40m. wide,

which, in 1918, produced 7,246 tons of ore that averaged 16.5 kilos silver and 3.80% tin per ton. The Mina Socovan has 270 meter shaft from which 10,360 tons of ore was mined in 1918 that averaged 7.17 kilos silver and 1.69% tin.

Reserves: at Mina Socovan, about 23,900 tons that average 5.5 kilos silver per metric ton, and 1.15% tin. Mina Itos reserves total 3,700 tons, and average 28 kilos silver and 3.0% tin.

Equipment: includes hoists, 100-h. p. compressor, Diesel engine, electric power, buildings, etc. Mill at Machacamarca includes McDougall and Merton roasters, Hardinge mill, tables, jigs, etc.

Production: in 1918 was 1,110 tons of barilla (concentrate) carrying 59.41% tin; in 1919, 1,010 tons of barilla containing 14,088 kilos silver; in 1920, 905 tons barilla containing 14,499 kilos silver.

Company has a good property, ably managed.

For geology of district, see Miller-Singewald Min. Deposits of So. America, p. 110.

PACUNI BLANCA N. DILLON, EMPRESA MINERA — **BOLIVIA**

Acquired 1919-20 by Guggenheim Bros., 120 Broadway, New York.

Property: in Quimsa Cruz district, La Paz province, S. of the Caracoles group, which see. Two tungsten veins parallel joint planes in granite and are cut by the Veta Grande tin vein; widths are 10" to 2½'. Wolframite occurs with quartz, and ore averages 12% tungsten oxide. Monthly production was 35 tons of concentrate carrying 70% tungstic oxide and 2% tin. The mill has been dismantled and tin ore will be treated at new Caracoles mill.

PATINO — **BOLIVIA**

Controlled by Simon I. Patino.

Address: Uncia, Bolivia. Alex Grosberg, asst. gen. mgr.

Property: the Huanuni mine, about 15 miles E. of Machacamarca on the R. R.; Uncia, 45 miles S. E. of Machacamarca and near the Llallagua mine; and La Unificada in the Colquechaca district, 80 miles by road from Challapata on the A. & B. Ry.; all in the province of Potosi. La Unificada was formerly owned by Cia. Colquechaca Aullagas de Bolivia.

At Uncia, a cassiterite-quartz-pyrite ore occurs both in sedimentaries and in porphyry intrusions. At La Unificada, 3 principal tunnels open the Embudo vein, 4 to 8" wide, on a sandstone-rhyolite contact; vein shows generally low-grade silver-tin ore with small shoots of high grade.

In 1918-19, Uncia was producing 1,000 tons tin concentrate per month.

Simon I. Patino is an important tin operator and owns a ⅓ interest each in **Williams Harvey Corp.** and **Williams Harvey & Co., Ltd.** Also owns railroad to Huanuni from Machacamarca, connecting with the A. & B. Rv.; extension to Uncia will be made.

PENNY & DUNCAN, EMPRESA — **BOLIVIA**

Office: Oruro, Bolivia. Mines at Morococala in Potosi province and at Tres Cruces in province of La Paz.

PORCO TIN MINES, LTD. — **BOLIVIA**

Office: H. F. Ings, 148½ Fenchurch St., London, E. C. 3, England.

Directors: E. Hooper, chairman; L. A. Kensington, R. G. Ribon, and J. Macandrew. A. B. Reece, gen. mgr.; M. Roberts, cons. engr. Avelino Aramayo & Co., general agents in England.

Inc. Sept. 27, 1912, in England. **Cap.** £140,000; shares £1 par; 120,075 issued. Debentures: £19,900, 6%.

Statement for year ended Dec. 31, 1919, shows an operating loss of £8,693; debit balance, £23,360; creditors, £85,969. Assets include, cash £1,303; debtors, £115; ore and concentrate, £32,326.

Company was to be refinanced in 1921 or face foreclosure by debenture holders, Avelino Aramayo & Co

Property: 400 acres, 25 miles from Potosi. Mines were worked in the 16th century for silver, but are now worked for tin. The district is moun-

tainous, up to 17,000' at one point. (See Eng. & Mng. Journal, February 24, 1917).

Geology: the Porco company is working tin deposits in igneous agglomerate, tuff and quartz porphyry. The San Jose vein is a shattered zone with orebodies of massive pyrite, low in tin, but with 8 oz. silver per ton. One shoot is 500' long and 6½' wide. Another is 170' long and 8' wide, assaying 3% tin.

Development: by tunnels, open cuts and drifts. Reserves in 1918 were 315,000 tons of 1.67% tin content and Dec. 31, 1919 were 10,550 tons of 1.6% ore. These reserves have since been exhausted.

Equipment: includes 2½-mile aerial tram and a 100-ton mill, 2 ball mills, screens, jigs, Wilfley tables, Huntington mill, classifiers, Humboldt tables, buddles, etc. The tailing is cyanided for the silver. Mill at Agua Castillo recovers only about 60%.

Production: in 1915, 168,000 lb. tin; in 1916, 443,500 lb.; in 1917, 20,404 tons of ore yielding 307 tons of tin oxide; in 1918, 274 tons of tin; in 1919, 21,280 tons yielded 279 tons tin concentrate. During 1920 the mill treated mainly custom ore, and early in 1921 all operations were suspended.

ROYAL SILVER MINES, LTD. **BOLIVIA**

Operates silver-tin mines at Potosi, mining through the Socovan Real. This company, together with Bebin Hermanos and Luis Soux, controls operations at this famous camp.

SAN JOSE; CIA. MINERA DE **BOLIVIA**

Is a Chilian company operating tin mines at western edge of town of Oruro, province of Oruro, and mill at Poopo on the R. R.

SANTA TERESA MINE **BOLIVIA**

Owned by Gumuncio Bros., Colquechaca.

Property: in the Colquechaca district, province of Potosi, near the Huainacucho mine and on the same vein. Was producing high-grade ore and concentrate at last account.

SOUX HERNANDEZ, EMPRESA **BOLIVIA**

Office: and mine at Potosi, Bolivia. Luis Soux, owner.

Property: several mines in Potosi district, province of Potosi. Owns the first smelter erected in Bolivia. Production consists of bar-tin, 95% pure, tin concentrate and silver ore. Employs about 1,000 people.

This is the most important mining enterprise in the Potosi district.

TANAPACA, EMPRESA MINERA **BOLIVIA**

Property: is a consolidation of 2 small mines in the Araca district, La Paz province. Two veins Potosi and Allianca, in slate, are exposed on slope of the Choquetanga range. The former, 1.5 to 3' wide, shows a soft iron-stained ore with 4-5% tin; the latter, in a slate-quartzite contact 2.5' wide, shows quartz carrying 10% tin.

Equipment: includes 2 mills, that of Allianca has Chilian mill, jigs and tables. **Production:** of both mills is from 22-24 tons of concentrate per month.

Property is under option to the International Mng. Co. (q. v.)

TOTORAL; SOCIEDAD ESTANIFERA **BOLIVIA**

Office: Santiago, Chile. Mine at Totoral, 7 miles from Pazna, province of Oruro, Bolivia.

UNCIA; COMPANIA MINERA DE **BOLIVIA**

Office: Oruro, Bolivia. Company owns tin mines at Uncia, province of Potosi and is presumably controlled by S. I. Patino. See Patino.

BRAZIL

The mineral deposits of Brazil include two important gold mines and the remarkable diamond bearing conglomerates and gravels near Diamantina, in Minas Geraes, about 300 miles due north of Rio de Janeiro. It is also the

world's largest producer of monazite sand. Manganese was the most important mineral product of Brazil, in 1917 though the great deposists of iron ore are without doubt the most extensive undeveloped deposits of any country in the world.

BRACUHY FALLS CO. **BRAZIL**

Address: Joaquin de Almeida Lustoza, Ouro Preto, Brazil.

Property: the Serra do Mascate, Mendonca, and Inhotin iron deposits containing over 29,000,000 tons of iron ore.

BRAZIL, CIA. DE MIN. Y MET. DO **BRAZIL**

(Brazilian Mining and Metallurgical Co.)

Property: iron mines acquired from Antonio da Costa Lage of Rio.

BRAZILEVIA COMPANHIA METALLURGICA **BRAZIL**

Property: 8 manganese mines in State of Minas Geraes, estimated to contain 100,000,000 tons of ore.

BRAZILIAN IRON & STEEL CO. **BRAZIL**

Mail returned from last address: M. Harder, Rio de Janeiro, Brazil.

Property: the Cana and Santa Anna iron ore deposits containing 132,000,000 tons, and the Algeria and Cota deposits of 10,000,000 tons. A concession is held for construction of a railway.

ITABIRA IRON ORE CO., LTD. **BRAZIL**

Office: R. S. Long, 81 Gracechurch St., London, E. C. 3, England.

Directors: I. W. B. Pease, chairman; Sir A. E. Harris, F. W. Lund, Sir I. H. Benn, P. M. Gotto, Robt. Grant, A. J. Cruickshank and F. A. E. Samuelson.

B. H. Sanders, res. engr., Itabira, Brazil.

Inc. March 31, 1911, in England. **Cap.** £2,000,000, in 500,000 pfd., 359,438 issued; and 1,500,000 ord. £1 shares, all issued.

Notes: £345,000, holders having the right to form a new company to take over the property in 1921. No financial report issued since June 30, 1918. Company controls the Victoria Minas (Diamantina) Ry.

Property: 18,271 acres in the Province of Minas Geraes. Ore reserves are estimated at 140,000,000 tons of hematite, assaying 69% iron; also 20,000,000 tons of second grade, and 330,000,000 tons of soft ore. A royalty of 6d. (12c.) per ton is payable to the B. H. Syndicate, Ltd., the previous owners.

Reported that official permission has been obtained for construction of a smelting plant with annual output of 150,000 tons.

MORRO DA MINA, CIA. **BRAZIL**

Property purchased 1920-21 by **United States Steel Corporation.**

Property: in Lafayette district, Minas Geraes, near Queluz on the Estrada da Ferra Central do Bresil. Lenticular shaped manganese ore-bodies occur in granite, gneiss and schists; the ore as shipped carries 50.5% manganese.

Development: is mainly by open cuts. Operations began first in 1902 and in 1916 daily shipments were 700 tons of ore. Total production 1903 to 1916 was over 1,000,000 tons. Ore reserves in 1916 were 10,000,000.

This mine is said to show "the largest known deposit of high grade manganese ore."

OURO PRETO GOLD MINES OF BRAZIL, LTD. **BRAZIL**

Office: G. H. Wells, 6 Queen St. Place, London, E. C. 4, England.

Directors: Edwin Beer Taylor, chairman, Baron Oberkampf, M. Paisant, E. R. Hoakes, A. S. Taylor and E. de Wael. A. J. Bensusan, supt.: John Taylor & Sons, mgrs.

Inc. July 10, 1914 (originally Jan. 31, 1884), in England. **Cap.** £100,000 in 60,000 10% non-cumulative pfd. and 40,000 ordinary £1 shares, of which 29,661 and 39,429 are issued respectively. Recent profits have been £7,402 in 1914; £9,545 in 1915; £7,243 in 1916; £4,834 in 1917; £1,222 in 1918; £8,835 in 1919; £16,229 in 1920.

Annual report for year ended Dec. 31, 1920 showed; total receipts, £160,932; expenditures, £144,703; 1919 balance, £2,123 total, £18,353, expenditures, £13,791; extra dividends, £3,453; balance £1,108. Assets of £97,051 include cash, £16,526; treasury bills, £91,901; gold stock £11,082; debtors, £21,852; supplies, £36,485; liabilities include capital stock, £69.080; liabilities, £18,409; reserve fund, £5,000; profit and loss £4,561.

Dividends: 10% annually on preference shares extra 5% dividend payable June 24, 1921.

Property: a concession of 3½ sq. miles in the province of Minas Geraes, including the Passagem mine, which had ore reserves estimated to be 81,523 tons at end of 1919, compared with 81,874 tons at end of 1918. It is second only to the Morro Velho St. John del Rey in importance and worked since 1917. Reported that the Maquinee gold mine is being opened under an option.

Equipment: includes 1,000 cu. ft. compressor, arsenic plant, 80-stamp mill and cyanide plant, extracting 92% of the gold. The Santa Anna section of property contains workable manganese, which is being shipped. Ore is somewhat refractory, containing arsenic.

Production:	Tons	Gold, Oz.	Value
1920	82,100	27,585	£156,490
1919	81,500	28,232	131,215
1918	63,400	22,532	90,130
1917	82,500	28,840	115,432
1916	87,600	30,244	121,233
1915	85,400	30,203	120,591

The geology of the district and mine are described by Miller & Singewald, in Mineral Deposits of South America, 1919.

ST. JOHN DEL REY MINING CO., LTD. BRAZIL

Office: W. Pollard, sec., Finsbury House, Blomfield St., London, E. C. 2, England. Mine office: G. Chalmers, gen. mgr.; A. G. N. Chalmers, supt., Morro Velho, Minas Geraes, Brazil.

Officers: Sir H. P. Harris, chairman; J. R. Remnant, E. A. Goulding, H. LeRoy Lewis and C. F. W. Kup, (managing) directors.

Inc. 1830, in England. **Cap.** authorized, £800,000, in 600,000 ordinary, 100,000 preference, and 100,000 second preference shares of £1. Issued, £646,265, in 546,265 ordinary and 100,000 preference shares, fully paid. In 1891 capital was increased from £252,000 to £432,000; in 1893 to £462,000; in 1895 to £500,000; in 1895 to £600,000., in 1904 to £700,000, and in 1910 to £800,000. Preference shares are entitled to a non-cumulative dividend of 10% (paid free of income tax in December and June), and to priority for capital without further participation. Second preference shares will be entitled to a non-cumulative dividend of 10%, and to priority for capital over ordinary shares, without further participation. Net profit for year ended February 28, 1917, was £132,637; £130,503 in 1918; £124,167 in 1919; £136,349 in 1920; £167,749 in 1921. Reserve fund is £100,000.

Dividends: from 1842 to 1867, £896,500 on ordinary shares, since then these shares received a total of 320% to 1910, after which 10% per annum to 1920, and 3¼% in Dec., 1920 (interim)

Property: the Morro Velho and Culaba gold mines; and iron and manganese deposits in State of Minas Geraes. Considered the oldest and deepest modern mine in the world, as work has been continued since 1834, and workings were 6,426′ deep vertical. The iron deposits contain over 300,000,000 tons of ore carrying 60% metal. There is also a manganese deposit assaying 47 to 51% Mn and 8 to 11% Fe.

Development: below No. 22 level, 6,426′ deep, there has been opened

about 900′ of lode. Temperature on the 6,426′ level is 109° for the air and 116° for the rock. Reserves are estimated at over one million tons.

Equipment: complete mine, mill, and power plants. Treatment is by 130 stamps, 7 tube-mills, concentrators, roasting furnaces, cyanidation and filters. Aerial trams are used to advantage. Company operates a store, hotel, medical department, electric railway, farm and eucalyptus plantation. Power is generated by water at running cost of 3c. per h. p. day.

Production: to end of 1919 was 6,940,000 tons containing £13,350,000 in gold.

Year	Ore, Tons	Gold, Oz.
1920-21	151,299	98,311
1919-20	170,828	105,537
1918-19	167,854	99,874
1917-18	180,300	109,912
1916-17	187,400	$12.06 per ton

This is the most interesting mine in South America and in some respects one of the most remarkable in the world. It has been regularly operated since 1834 and although the deepest mine in the world, the orebody has maintained its size and value to the bottom level, 6,426′ below the surface.

SIDERURGIC MINEIRA, COMPANHIA — **BRAZIL**

Address: Bello Horizonte, Minas Geraes, Brazil. Also Amara Lanazi, Sao Paulo.

Property: extensive iron and manganese deposits near Sabara, in State of Minas Geraes, together with others in Ouro Preto and other departments.

Equipment: includes a 35-ton blast-furnace, and a plant containing 600-h. p. gas engine, air-compressor, 200 k. w. generator, etc., erected in 1918-19.

WIGG MANGANESE MINES, THE — **BRAZIL**

Address: Carlos Wigg, sole owner, Rua S. Pedro, 42-Seb. Rio de Janeiro Brazil. Gailey, Davis & Co., agents, Philadelphia, Pa. Arthur J. Wood, mgr.

Inc. 1870, in Brazil. **Cap.** $1,000,000.

Property: near Burnier Station. Central Railway of Brazil. State of Minas Geraes. Ore is a contact deposit in itabirite, and carries 50% manganese, under 5% silica, and 0.05% phosphorous. Workings are down to depth of 200′. Reserves are estimated at 600,000 tons.

Equipment: hydro-electric plant, hoists, pumps, compressors, and tramways.

Production: is 200 to 300 tons of ore daily. Some ore of 80 to 84% manganese dioxide is also mined and a 60-65% iron ore for several small blast furnaces in vicinity.

BRITISH GUIANA

BRITISH GUIANA GOLD CONCESSIONS CO., LTD. — **B. G.**

Address: Georgetown, British Guiana.

Property: mineral rights including the Peters mine on the right bank of Puruni river. Is equipped with mill. Total production is 40,228 oz. gold Idle since 1916.

DEMERARA BAUXITE CO., LTD. — **BRITISH GUIANA**

Owned by **Aluminum Co. of America**, which see

Property: the Three Friends deposit of high-grade bauxite at Akyma on the Demerara river. The ground is held under lease from the Crown, on a 10% royalty basis.

Equipment: includes crushing, washing and drying plant at Mackenzie with annual capacity of 288,000 tons, and a light railway connecting mine and plant, completed in 1920.

Production: total to end of 1918, 6,236 tons of crude bauxite: in 1919, 1,967 tons; in 1920, 31,379 tons of dehydrated bauxite were shipped to the U. S. Operations indefinitely suspended January, 1921.

GUIANA GOLD CO., LTD. **BRITISH GUIANA**

Address: J. Peters, sec., 14 Devonshire Sq., London, E. C. 2, England.
Mine address: J. Henderson, mgr., St. Mary's Camp, British Guiana
Directors: C. W. Dawson, chm., J. Henderson and Sir E. R. Davson.

Registered, March 21, 1905, to take over holdings of **British Guiana Expl. Synd. Cap** £50,000; 10s. par; divided into 50,000 com. and 50,000-10% pfd. shares; 15,514 preferred and all the common issued and fully paid. Perferred stock was constituted in February, 1920, when common was reduced to £25,000 by cancelling 10s. per share and is entitled to 10% cumulative dividends, and shares equally in net profits after common shares receive 10%.

Financial statement of Mar. 31, 1921, shows a loss of £3,575 increasing debit balance to £12,827. Dividends since 1907 total £46,875 or 97½% to 1918; none since. Assets include cash on hand £486; gold £731, stores £9,751; Creditors £9,074.

Property: placer rights on the Konawaruk river. Company which has a production record beginning with 1906, operates 4 bucket dredges. Output in 1918 was 4,289 oz. gold, 2,904 oz. in 1919, and 3,659 oz. in 1920. Total is 82,339 oz.

MINNEHAHA DEVELOPMENT CO., LTD. **BRITISH GUIANA**

Address: Georgetown, British Guiana.

Property: placer rights on Mahdia and Minnehaha creeks, the latter a tributary of Konawaruk river. Also owns gold quartz claims on upper Minnehaha creek, in No. 2 district, which were being explored in 1920. Placer work on Minnehaha was suspended early in 1919. Company is equipped with 2 bucket dredges. Production 3,267 oz. gold in 1918; 2,333 oz. in 1919; 2,579 oz. in 1920. Total since 1909, 32,236 oz.

CHILE

This country has been famous for its mineral wealth since the Spanish Conquest. The bonanza ores of the oxidized zone have been mined out by shallow mining operations. These numerous and varied deposits still offer attractive possibilities and the larger deposits warrant extensive and thorough prospecting work The intensive development of the larger deposits, require the investment of vast sums for equipment and development, but give promise of becoming great producers.

ALBION MINING CO., LTD. **CHILE**

Office: Broad St. House, London, E. C. 2, England.
Officers: Wm. D. Sawers, pres.; Chas. Hamilton, sec., with Geo. Stewart and Lawrence Pitblado (managing) directors.
Inc. Jan. 17, 1916, in England. **Cap.** £75,000; £1 par.

Property: 12 claims, 105 acres including the **Minas de Oro de Alhue,** at the head of Alhue creek, at an elevation of 3,000', 50 miles S. of Santiago, between Rancagua (near the Braden Copper Co.) and Melipilla, in the Province of Melipilla, Santiago, Chile. The country rock is mainly diorite, with bands of schists. Ore is a hard bluish quartz, with rhodonite, and the stoping width averages 6'. Ore assays $7 per ton in gold. The main lode, the Madariaga, was worked as early as 1700. Climatic and economic conditions are ideal.

Development: by tunnels and extensive stoping. The present backs are 1,300' and no sinking is necessary. Workings total about 4,000'.

Reserves: estimated at 21,500 tons blocked out, June, 1921.

Equipment: includes water-power and 100-ton mill and cyanide plant, in course of construction.

No figures of production are available yet.

ANDES COPPER CO. CHILE

Corporation dissolved February 5, 1918. See **Andes Copper Mining Co.**

ANDES COPPER MINING CO. CHILE

Subsidiary of Anaconda C. M. Co.

Address: D. B. Hennessey, sec., 25 Broadway, New York City. **Mine address:** Potrerillos, Chile. O. M. Kucho, mgr., Antofagasta, Chile.

Officers: B. B. Thayer, pres.; Wm. Braden, v. p.; C. F. Kelley, v. p.; A. H. Melin, treas., with John D. Ryan, Messmore Kendall and Wm. Wraith, directors.

Inc. Jan. 20, 1916, in Delaware. **Cap.** $50,000,000; $100 par.

Property: the Potrerillos mine at Chanaral, Chile, 1,003 acres; mill site claims, 1,200 acres; mill site potash claims, 2,954 acres: and inter-connecting mining claims, a total of 272,275 acres. The mine is 90 miles from the coast, in the main range of the Andes. The orebody is about 1,800′ long, 900′ wide and 850′ deep, and occurs in quartz porphyry intruded in limestone.

Development: churn drilling and underground openings proved up 100,000,000 tons of available 1.4% ore up to 1917. During 1917, sixteen drill-holes were finished, aggregating 12 000′ and proving an additional 5,434,081 tons of an average grade of 1.5411% copper.

During 1918, 2,990′ of drift work, raises, etc., was done; 11,800′ of drilling added 5,000,000 tons of reserves.

During 1919, 12,546′ of churn drilling opened up 33,000,000 tons of ore and in 1920, 9,086′ opened up 7,826,241 tons, making total estimated reserves of 218,262,503 tons, averaging 1.49% copper. To end of 1920 the main adit has been advanced 11,142′ and a 422′ inclined shaft sunk.

Equipment: includes a mine railway for transportation of ore and supplies from the mines to the reduction works, also railroad from mines to Chanaral.

The Quebrada pipe-line consisting of a 3″ steel line 17 miles long, with terminal reservoirs, was brought into Potrerillos in 1917 for the purpose of supplying the camp. The Asientos pipe-line aggregating a total of 96 miles, bringing in the water supply to Barquito for the purpose of supplying the railroad, was completed. Construction progressed on La Ola pipe-line, about 35 miles long, which is to bring water to the mill-site for the purpose of operating the concentrator when completed. Fifteen miles of wagon-road were constructed for this project in 1918. A supply of water for domestic use is being developed at Cajoncito. A model town is being built for housing 5,000 people, with churches, schools—both American and Chilean—office buildings, etc., at the millsite.

A 22,000-k. w. steam turbine electric plant is to be built at Port Chanaral. Power will be transmitted to the mines and works at 100,000 volts.

The Andes is an important addition to the list of big South American copper producers, ranking with Braden, Cerro de Pasco, and Chile Copper.

Potrerillos Railway Co.

Subsidiary of **Bethlehem Steel Corporation,** 111 Broadway, New York. per Mining Co. Office 25 Broadway, New York.

Officers: same as Andes C. Mng. Co.

Inc. January, 1916, in Delaware, **Cap.** $5,000,000; shares $100 par.

Company owns concessions granted by the Government of Chile for construction and operation of a railway in the Republic. A line was completed from the Port of Chanaral to a point on the Government railway, and from the station of Pueblo Hundido, on said line to the Potrerillos properties a distance of 60 miles. These properties are owned by the Andes Copper Mining Co.

BETHLEHEM CHILE IRON MINES CO. CHILE

Subsidiary of **Bethlehem Steel Corporation,** 111 Broadway, New York.

Property: 100 hectares at Tofo, Coquimbo, 5½ miles from the port of

Cruz Grande, estimated to contain 200,000,000 tons of ore averaging 67½% iron and 0.05% phosphorus, which is to be mined and transported via Panama Canal to the United States. Ore is mined by open cut methods, crushed at the mine and delivered to bins at waterside.

Equipment: includes electric power plant at Cruz Grande, ore crushing plant, and a 25-mile electric railroad.

BRADEN COPPER MINES CO. CHILE

Controlled by Kennecott Copper Corporation, and is the holding company of Braden Copper Co.

Office: 120 Broadway, New York.

General officers: S. R. Guggenheim, pres.; Stephen Birch, John K. MacGowan, E. A. Guggenheim, and W. P. Hamilton, v. p.'s; Leopold Frederick, treas.; W. E. Bennett, sec.; C. E. Moran, asst. sec.

Directors: Stephen Birch, Thomas Cochran, E. A., S. R. and H. F. Guggenheim, W. P. Hamilton, H. O. Havemeyer, John K. MacGowan, W. C. Potter, Seward Prosser and J. N. Steel.

Inc. May 26, 1909, in Delaware. **Cap.** $10,000,000; shares $5 par; increased 1911 to $14,000,000; issued $12,953,530 to December 31, 1920.

Bonds: authorized $20,000,000 issue of 15-year 6% sinking fund gold bonds, non-convertible, due February 1, 1931; $15,000,000 outstanding. For the purchase of this last issue a minimum of $1,000,000 per annum will be applied, payments being made semi-annually, starting February 1, 1917 Sales in New York during 1920 totaled $541,000. Range of prices was 93 in March and 79¾ in December.

Owns entire capital stock and bond issue of the Braden Copper Co. Farmers Loan & Trust Co., New York **registrar.** D. A. Crockett, 149 Broadway, New York, **transfer agent.** Annual meeting fourth Monday in June.

In December 1915, offer was made by the Kennecott Copper Corp. to purchase the stock of the company, payment to be made in Kennecott Copper Corp. stock. As an alternative stockholders had the privilege of receiving $15 in cash for each share of the Braden Copper Mines Co. As a result of this offer the Kennecott now owns 99% of the stock of the company, which based on the market value of stock at the time the offer was made, cost $42,281,300.

In Feb., 1921, company took a 5.95% interest, $2,380,000 total amount, in the Copper Export Association's $40,000,000 note issue.

Braden Copper Co.

Assets.

Balance sheet of December 31:	1920	1919
Property	$ 6,326,609	$ 6,314,201
*Construct. and equipment	27,261,672	25,699,104
Interest in steamships	394,339	394,339
Deferred charges	4,913,505	4,481,597
Materials and supplies, etc	5,729,766	7,198,566
Undistributed items in transit	8,007	352,394
Deferred accounts	337,382	63,477
Accounts receivable, etc.	801,635	676,862
Ore and copper on hand, etc.	7,301,496	8,076,347
Cash, etc.	388,834	276,638
Braden Copper Mines Co. bonds	499,460	.....
Total	$53,962,705	$53,533,525

*After deducting reserve for depreciation of $6,933,248 in 1920 and $5,461,562 in 1919.

Liabilities.

	1920	1919
Capital stock	$ 2,332,030	$ 2,332,030
Funded debt	4,000,000	4,000,000
Braden Copper Mines Co.—notes payable and loan account	20,013,527	20,836,300
Notes payable	1,000,000	.....
Accounts payable	789,546	558,866
Drafts payable	2,076,577	1,886,642
Accrued freight and interest, etc.	773,235	770,291
Kennecott Copper Corp. loan account	11,700,000	8,100,000
Loan from subsidiary company	50,000	125,000
Def. credits in suspense	235,898	310,542
Reserve fund account	102,243	160,811
Surplus from property	3,667,970	3,667,970
Depletion reserve	7,374,983	8,677,890
Earned surplus (def.)	153,304	2,107,182
Total	$53,962,705	$53,533,525

	1920	1919
Braden Copper Mines Co. and Braden Copper Co. Combined Income Account, years ended December 31:		
Operating Revenue	$10,446,551	$4,240,648
" Charges	8,354,293	3,921,658
" Profit	2,092,258	318,990
Other income	327,246	671,328
Total "	2,419,504	990,318
Taxes, interest, etc.	1,662,741	1,573,171
Balance to surplus	$756,763	$582,853

Combined Surplus Account, Dec. 31, 1920. Balance, Dec. 31, 1919, $5,017,804; adjustment of depletion reserves, $2,578,477; miscellaneous adjustments, $24,407; discount on bonds purchased for retirement, $150,379; income for year, as above, $756,763; total $8,527,830. Deduct: additional taxes paid in excess of prior years' reserves, $514,205; adjustments of plant and equipment accounts, including adjustments of obsolescence and depreciation, $1,586,832; depletion of ore reserves, $1,275,570; depreciation of construction and equipment, $1,540,834; loss on plant and equipment superseded or abandoned, $142,214; amortization of discount on bonds, $128,462; balance of unamortized discount on bonds, $1,284,615; total $6,472,732. Net earned surplus, Dec. 31, 1920, $2,055,098.

Net working capital, Dec. 31 was debit of $2,061,223, compared with credit of $4,840,637 in 1919.

Balance sheet of Braden Copper Mines Co. Dec. 31, 1920 showed assets $30,557,665, investments, etc. Liabilities, $12,953,530 for stock, $15,000,000 for funded debt; $375,000 for interest on bonds, and surplus $2,208,402 compared with $1,497,545 in 1919.

Braden Copper Co.

Office: 120 Broadway, New York. Mine office: Sewell, Chile.

General officers: same as Braden Copper Mines Co., with E. A. Cappelen Smith, v. p.; S. S. Sorenson, v. p. in charge of plant and operations and G. G. Thomson, purch. agent; Fred Hellman, cons. min. eng.

Operating officials: in Chile: L. E. Grant, gen. mgr.; W. J. Turner

asst. gen. mgr.; F. D. Helmrich, gen. mine. supt.; A. D. M. Rain, mill supt., M. S. Mazany, smelter supt.; J. Chambers, railroad supt.; G. F. Johnston, plant comptroller. F. J. Brule, cons. engr.; A. J. Noerger, chief elec. engr.; Alma Ek, chief mech. engr.

Inc. June 18, 1904, in Maine, and name changed to present title, Aug. 9, 1904. **Cap.** $2,332,030; $10 par; fully issued. Company is protocolized in Chile. Is controlled, through ownership of entire stock issue, by Braden Copper Mines Co. Has a $4,000,000 issue of 6% first-mortgage convertible bonds. Annual meeting, fourth Tuesday in July.

Property: the Teniente mines, 655 claims, 8,168 acres, including 16 acres at Rancagua. Mines are reached from Valparaiso by the Chilean State railroad, 158 miles to Rancagua, and from that point by company's narrow-gauge railway, 43 miles to the smelter and mill at Sewell, and 14½ miles farther to the mines. The elevation is 7,700 to 9,000', the mine being in a very rugged region on a part of the main range of the Andes.

Company has purchased 10,000 acres of mountain land, for a tailings site, which will hold 200 million tons of tailings. It is 8 miles from the mill and together with the dam, will cost $1,200,000.

Another purchase of 40,000 acres surrounding the mine put all the company's works, including the new smelter under construction at Caletones, on the company's own land and carries smoke easements on adjacent tracts.

A third purchase included sundry lots of land and water rights needed for the new power plant on the Pangal river and a right of way for the power line.

Geology: all the rocks are igneous and the rock at the mine is an andesite surrounding a plug of tuff, which fills the throat and crater of a volcano. This light gray tuff is no longer loose and friable, but cemented into a hard concrete-like mass. The ore deposit is unique, being a series of irregular lenses of ore formed about the border of the old plug, slightly tilted to one side. (Graham.) On one edge erosion has removed the mineral deposit. The volcanic vent is of nearly circular section 4,000' across, and filled by tuff and an agglomerate of rounded boulders of all sizes. The crater rim is surrounded by highly fractured and brecciated andesite, the fractures being mineralized around the circumference. The ore zone has been further fractured by porphyry dikes, which occasionally cut into the tuff.

The orebodies occur around, but outside the rim of the crater, in the andesite near its contact with the tuff. The ore consists of shattered andesite, often finely brecciated near the tuff contact, copper minerals filling the cracks and openings. The ore bodies are limited on one side by the tuff, but in the andesite the grade becomes lower, passing from breccia to fractured rock and fading out in the more blocky country rock. The fractures in the rock range from a mere film of sulphide up to seams 3 to 4" thick of mixed bornite and chalcopyrite, mainly the latter. The orebodies dip at 70° toward the center of the crater.

Five distinct orebodies have been proven, and four, the Fortuna, Teniente, Centinela and Bornite are worked. All are marked by strong outcrops stained with copper minerals. The zone of oxidation is shallow, ranging from a few feet to 150' in depth, and as the deposit consists of disseminated ore, it is believed that values will persist to great depth.

The Fortuna orebody is typical of all the deposits. It is lens-shaped in horizonal section, is developed for 3,000' in length and has a maximum width of 260'. Below the 4th level, 1,425' beneath the outcrop, little increase in size can be expected, as the rock is denser and ore is lower grade. The copper occurs as bornite and chalcopyrite, associated with ankerite and quartz. The Fortuna orebody is developed and ready for ore extraction. The shrinkage stoping system, similar to that employed at the Ray Cons., is used. Stopes are carried up 7 metres wide, with 5-metre pillars. The topography of the country is such that shafts are practically unnecessary; all ore can be taken

out through tunnels, and, even though parts of the mine are very wet, pumps are not required.

The mine was gophered by former owners for high-grade ore, which was followed and extracted wherever found. Average grade of Fortuna ore is lower than in El Teniente mine, but workings show copper sulphides and occasional metallic copper throughout the brecciated material for depth of 2,000′.

The **Teniente** orebody, which is supposed to be in the crater of the old volcano, is the largest and most important orebody of the property, having a length on No. 1 level, of 4,800′, an average width of 300′, and depth of 840′. It is in this orebody that the greatest increase of tonnage is to be expected. It is much the largest of the various orebodies and, with the exception of the small Bornite orebody, the richest.

No. 1 Teniente level and No. 2 Fortuna level have been extended along the tuff contact entirely around the crater, 2½ miles. The Teniente is the oldest mine of the district, having been worked by the Spaniards for the high-grade ore in the small veins.

The **Centinela** orebody is being mined above Teniente No. 3 level and will probably extend below it. The Bornite orebody worked out above the 4th level, is rich, but small, and no great extension in depth is looked for. Regimiento No. 2 orebody lies beyond the Fortuna, is lower grade and its size has not yet been determined.

New work from the beginning in 1916 to 1918 inclusive aggregates 276,-728′; in 1919 extensions 35,031′; in 1920, 47,470′.

In 1918-19, development was mainly on the Teniente side, where large quantities of good ore were disclosed. During 1920 and after, grade of ore sent to mill was lower than the average because of decreasing copper content of the Fortuna with depth and because southern upper part of Teniente now being exploited is lower grade than other sections. Driving of the new ore-pass gathering system is being pushed; ore caved down on the Teniente side will be sent to C level through passes, where it will be handled by motors to other passes, thence by the main electric railroad haulage-level, to the crushing plant at the mill. This new railway, completed April, 1918, is entirely underground; its grade being but 0.5%; trains of fourteen 22-ton cars are used. The two-unit (5,000 cu. ft. each) compressor station is underground. Mining methods were described by Frank Cameron in the "Min. & Sci. Press" of September 20, 1919.

The main 3-compartment 9′x20′ shaft, between C level and Fortuna 5, known as shaft A, 1,650′ deep was in operation by early 1921.

Ore reserves: calculated by Fred Hellmann, are as follows:

Year	Positive	Copper, %	Probable	Copper, %
9120.....	176,640.000	2.45	87,750.000	1.87
1919.....	174,600,585	2.45	92,000,000	1.91
1918.....	173,506,356	2.45	90,000.000	1.88
1917.....	149,192,000	2.42	90,000.000	1.88
1916.....	131,680,000	2.40	88,000,000	1.89

Electric power is used throughout. It is generated at the Coya hydro-electric plant on the Cachapoal river by four 2,000 k. w. Pelton wheels and generators, and a 4,000 k. w. vertical Francis turbine with generator, a total capacity of 15,000 k. w. Power is delivered to mine and mill at Sewell over a 16-mile 33,000-volt transmission line.

To handle 10,000 tons of ore per day, an additional hydro-electric power plant on the Pangal river, 6 miles from the Cachapoal power plant, will develop a total of 15,000 k. w. by three Pelton impulse wheels and generators. A new transmission line has been erected between these two power stations;

a new and second transmission line having already been installed between Cachapoal and Sewell, carrying current at 66,000 volts for the new smelter at Caletones and mill and mine at Sewell. Two units of the new power power plant were operating in 1920.

The motor-driven aerial tram, 2,630 meters long, with 550 meters drop and 1,000 tons daily capacity connecting the mine and mill, at Sewell, is used as a store delivery system. The main line, of 2,000 meters length, runs from the mill to the central transfer station, where connection is made with a 1,000-meter line to El Teniente mine and a 500-meter line to La Fortuna mine. A 5-mile aerial tram from the mill at Sewell to the new smelter at Caletones has been under construction.

Ore treatment: at the Sewell smelter there will be a 12,500-ton coarse-ore bin and a 10,000-ton crushing plant finished in 1921. The treatment plant is being enlarged from 7,400 to 10,000 tons daily capacity. The flow-sheet includes coarse-ore bin, gyratory crusher, rolls, Symons disc crushers, fine-ore bin, 16 Marcy mills, impact screens, trommels, Wilfley tables, 30 Hardinge mills, classifiers, two 60' Dorr thickeners, 11 gear-driven Minerals Separation flotation units of 20 cells each, Callow flotation units and Rateau-Battu-Smoot turbo-blowers of 20,000 cu. ft. of air per minute at 7 lb. pressure for the Callow plant; also a concentrate mixing and loading plant.

An experimental leaching plant was in operation during 1915, testing the process for extraction of copper from concentrate; it is believed that process can be successfully carried out on a commercial scale, but cost of plant would be large and inadvisable at the present time.

A sulphuric acid plant provides the acid required in the flotation cell. Wilfley table concentrates are roasted in two Wedge 7-hearth furnaces. The feed carries from 6 to 7% moisture, 16% copper, 13.6% silica, 28.6% iron, and 33.3% sulphur. Hearth temperatures, from 1 to 7, respectively, are 380, 460, 600, 750, 790, 680, 630° C. The furnace shaft makes one revolution in 3 min. 20 sec. and 12 h. p. is required to operate the furnace when treating 35 tons of concentrates per 24 hours. The calcine contains 2% sulphur.

The lead chambers are four in number (being added to), each with a volume of 46,750 cu. ft. and constructed of timber framing and ¼-inch lead sheets.

Since the smelter at Sewell was completed, several improvements have been made, the most important being the addition of nodulizing kilns. These are similar to the kilns used in the manufacture of Portland cement. In 1920, 72% of the concentrate was reduced to nodule form. The 4th and 5th nodulizers are largest ones ever built, being 8' in diameter and 100' long. Heat is applied by an oil burner at discharge end. By feeding nodules instead of raw concentrates the blast furnace capacity has been almost doubled and coke consumption was practically cut in two. On account of an irregular oil supply, a coal pulverizing plant was added to the nodulizers.

The smelter equipment consists of 14 storage bins for concentrates, lime, coke, etc; 4 sinter grates, with a daily capacity of 50 tons concentrates, roasted to 40 tons; 5 nodulizing kilns; 2 blast furnaces, whose daily capacity is 300 tons raw concentrates, or 600 tons nodulized concentrates; 3 Pierce-Smith basic-lined converters, two having 33 tuyeres, and other 17 tuyeres; 1 copper casting apparatus.

The new smelter at Caletones, 5 miles from Sewell, was to have been completed and in operation at end of 1921.

The complete works, including the concentrators and smelter, are planned to eventually treat 10,000 tons of 2% ore daily, at an estimated cost of 7½c. per lb. laid down in New York. Work was stopped during the war, but resumed late in 1919, and is now being carried on in accordance with the original plans prepared under direction of H. E. Skougor.

Production:

Year	Milled, tons	Copper, %	Concentrate, tons	Copper %	Mill recovery, %	Blister output, lb.	Price received, cts.	Cost per lb., cts
1920.	2,205,200	2.078	179,353	19.49	77.28	64,918,000	....	....
1919.	1,176,794	2.161	106,195	20.23	83.63	42,040,000	....	....
1918.	1,962,955	2.477	192,274	21.20	83.76	77,152,000	26.88	16.52
1917.	1,799,694	2.319	158,546	21.44	81.61	63,774,000	31.80	16.33
1916.	1,362,629	2.127	117,984	....	79.00	42,153,270	26.35	8.03
1915.	1,106,420	2.090	.....	....	74.92	32,733,576	....	8.78
1914.	900,299	2.120	.....	....	....	28,304,092	....	....
1913.	.....	....	.....	....	....	18,098,000	....	....
1912.	.....	....	.....	....	....	9,500,000	....	....

Copper is sold through the new firm of Guggenheim Bros.

Although operations at the Braden property have not yet fulfilled the expectations of its sponsors, it is believed that the treatment problems are solved, and with the completion of plant extensions and of the new smelter at Caletones, that profits will be large, though no prediction is ventured as to the date of dividends. Known ore reserves will last 50 years on a 10,000-a day basis, and extent of the orebodies is as yet only partly known.

CATEMOU; SOCIETE DES MINES DE CUIVRE DE — **CHILE**

Reorganized 1913 as Compania Minera de Calama. In August, 1916, property was sold to the **Chile Copper Co.**, which see.

CALDERA COPPER SMELTER — **CHILE**

Owned by the **Soc. de Minas Y Fundiciones de Carrizal** (q. v.), a subsidiary of the Am. Smelting & Refining Co.

Office: 120 Broadway, New York. **Operating address:** J. P. Chadwick, representative, Antofagasta, Chile. **Works address:** Caldera, Chile.

Has a 6,000 ton charge capacity per month. Not operating in 1920-21.

CARRIZAL; SOC. DE MINAS y FUNDICIONES DE — **CHILE**

Subsidiary of the American Smelting & Refining Co., 120 Broadway, New York City.

J. P. Chadwick, representative, Antofagasta, Chile.

Company owns smelters at Carrizal and Caldera.

Caldera: this smelting plant contains 3 copper blast-furnaces and converters, reducing 5,000 to 7,000 tons of charge monthly, mainly copper ore purchased from local mines. The plant ships from 400 to 600 tons a month of converter copper, which goes to Tacoma, Wash ,for refining.

Carrizal: this copper smelter, at Chanarcitos, contains but one blast-furnace, handling from 1,300 to 1,800 tons of charge monthly, the ore coming largely from the Astillas mine, which the company owns. The 300 tons a month of copper matte which the furnace producers is shipped to Tacoma.

The copper mining industry of both the Caldera and Carrizal districts was practically suspended in the early part of 1919 on account of the low price of copper. Both smelters were closed down during 1920.

CATEMOU SOCIETE DES MINES DE CUIVRE DE — **CHILE**

Reported to have been taken over by a Chilean syndicate, 1920-21.

Main office: 50 Boulevard, Emil Jacquemin, Brussels, Belgium. **Office:** 5 Rue du Helder, Paris France. **Operating and works office:** Estacion Chagres, Aconcagua, Chile. A. W. Lehman, gen. mgr.

Officers: Eugene Renevey, chairman; Max Lyon, managing director; Georges Renevey, Jean Renevey, Robert de la Bouglise and Robert Franklin, directors; Joseph Wouters, sec., in Brussels; Henry Saloman, in Paris.

Inc. June 2, 1899, in Belgium. **Cap.** f. 5,000,000; shares f. 500 par; divided into 10,000 preference shares at 8%, and 35,000 ordinary shares; non-assessable. Debentures f. 1,500,000 5% bonds. Annual meeting, last Friday in June.

Dividends: 4% in 1910, 5% in 1911, 6% in 1912, 6% in 1914, 8% in 1915, 12% in 1916; 8% in 1917.

Lands: 155 claims, with sundry miscellaneous tracts held in fee and under government concessions, including the Finca de Nilhue, total holdings of 30,000 acres, in the districts of Putaendo, Los Andes, Melipilla, La Laguna, Quillota and El Nilhue. Property includes numerous mines in Catemou, Melon, San Felippe de Caracoles and elsewhere, with quarries of fluxing material. The company's cattle ranch, Finca de Nilhue, maintains a herd of 1,200 cattle for transport and food, and is a valuable factor in reducing costs.

The local management reports that ores average 4% copper, and 2 oz. silver per ton. Veins carry the usual oxidized ores in a comparatively shallow surface zone, changing downward into chalcocite, bornite and chalcoyprite.

Los Mantos, or **Mantos Rojos,** mine opened in 1820, shows sandstone and limestone, cut by eruptive dikes, there being two blanket veins, of 5 to 7′ thickness, composed of calcareous matter impregnated mainly with bornite, with accessory chalcopyrite and occasional gray copper, ore ranging 3 to 4.5% copper, 1% lead, 2% zinc and 30 grams silver per metric ton. The oxidation zone has been eroded, leaving only sulphide ores. These blanket veins have been worked since 1835, and the ore, while low in grade, is particularly desirable for fluxing purposes.

Mining is done entirely by tunnels, at vertical intervals of about 50 meters and averaging about 1,200 meters in length with ore reserves developed ahead for 3 to 4 years extraction. Work is by contract, miners being paid 5 to 7 pesos per metric ton for ore won. Only about 8% of the ore broken is discarded as waste, and ore is concentrated by flotation or smelted direct. Ore is taken to smelters by a 1,580- meter aerial tram, with drop of 750 meters, having 500-kg. buckets. Cable last 2 years and guide cables last 5 years.

In 1918, Los Mantos mine employed 600 men, producing 5,000 tons of ore of 4% copper tenor monthly.

El Soldado mine, one of the Nogales group, and farther from the smelter being in the Commune of Melon, on the Calera e Cabildo railway, was opened 1841. This property has 15 known veins, of 5 to 7′ average width, carrying copper sulphides, with quartz gangue. The veins have a N. S. strike, with dip of 45° east, and lie on a fault contact between trachyte and feldspar-porphyry. The veins are faulted with throws of 1 to 2 meters. A second but parallel series of dikes and veins, but with reverse dip, intersect the other veins. Dikes of decomposed porphyry running with and alongside these cross veins, show occasional oxidized ores and aluminous silicates. The veins show many antigua openings and ore averages 5 to 6% copper.

Development: by tunnels, greatest vertical depth obtained being 80 meters; old workings are about 150 meters in length. The mine shows some immense chambers, one being called the Cathedral, in recognition of its vast size. In 1916 production was about 600 metric tons of high-grade ore monthly. Transportation by wagon cost 3 to 4 pesos per ton. An aerial tram is planned.

La Union group includes the Restauradora, San Jose and Virja mines, producing about 40 metric tons daily of 3 to 4% copper ore, mainly used for fluxing and secured with an average force of 150 men.

Miscellaneous mines include El Nilhuee mine, in the department of Putaendo, opened 1886; Las Maquinas de Catemu mine, in the department of Putaendo, opened in 1870; La Esmeralda mine, opened 1860; La Constancia and La Democracia mines, 10 kilometers from the smelter, carrying blanket veins, and La Marquesa, Malva, Tabourina, Caracoles (with 6% ore), Almendro y Pleito and other properties, in various stages of development, some of considerable promise.

The mines and works have telegraph and telephone communication. Forces, 1916, averaged 1,200 men, with the high average wages of 5 pesos for undeground workmen, and 4 pesos for surface labor.

Reduction works: include 2 smelters, each with converter plant, with aggregate capacity of 650 to 750 metric tons of ore daily, and 2 concentrating plants employing flotation, one situated at La Poza, 12 kilometers from the second, near Chagres Station on the Andes railroad, and at Chagres smelter. The Poza plant, with a daily capacity of 60 tons, treated 55,000 tons of ore assaying 3.5% copper, in the 3 years ended Dec. 1919, producing a 16.3% concentrate with an extraction of 80.6%. The Chagres concentrator has a daily capacity of 400 tons, and in 1920, treating ore averaging 4.7% copper, its extraction was 90.6%, with concentrate assaying 31.1%; cost per ton of ore was 14.22 pesos.

La Poza smelter, of 300-tons daily capacity, has 2 blast furnaces turning out 50% matte. The converter department has five 57x77" shells, with 12 tuyeres each, of the Copper Queen type, turning out cakes carrying 99.7% copper and 40 oz. silver per ton. There is a 40-ton briquetting plant and the converter department has a quartz mill. Power is furnished by a 165-h. p. Pelton water wheel and a 175-h. p. engine. Furnace blast is supplied by No. 6 Connersville blowers and converter blast is furnished by a Riedler air-compressor, with capacity to reduce 20,000 cu. ft. of free air per minute to 15 lb. pressure. Fuel is coke, one ton of coke smelting 6 tons of ore, ores treated being highly silicious, with slags averaging 0.4 to 0.5% copper. In 1918 La Poza and Chagres smelters treated 80,000 metric tons of ore, of 6% average tenor, yielding 4,000 metric tons fine copper. Employs 100 men at average wages of 4 pesos daily.

The converting plant at Chagres smelter contains a large horizontal Pierce-Smith machine.

Chagres smelter has 36x84" and 36x120" Allis-Chalmers cylindrical water-jacket blast-furnaces. Ores smelted at this plant carry excess of silica and alumina and are deficient in sulphur, necessitating the free use of low grade cupriferous pyrite and limestone, for fluxing. Reverberatory furnaces are 17x55' and 17x85'. A 2,000-h. p. hydro-electric plant has been erected.

Production: was 3,379,947 lb. fine copper in 1907; 4,060,873 lb. in 1908; 4,073,761 lb. in 1909; 4,920,500 lb. in 1910; 4,660,000 lb. in 1911; 6,960,000 lb. in 1912; 5,843,250 lb. in 1913; 7,878,465 lb. in 1914; 7,210,350 lb. in 1915; 11,082,330 lb. in 1916; 9,200,000 lb. in 1917; 9,100,00 lb. in 1918; 6,000,000 lb. in 1919.

Property is estimated by company to have, with further improvement, a productive capacity of 20,000,000 lb. fine copper yearly.

CENTRAL CHILI COPPER CO., LTD. CHILE

In 1921, a receiver and manager was appointed in Chile.

Address: Bromhead Bros. & Co., 10 Basinghall St., E. C. 2, London, England. Mine and works office: Panulcillo, Ovalle, Coquimbo, Chile.

Officers: E. A. J. Goldschmid, chairman and managing director; H. L. Bromhead, Andre Goldschmid and W. H. Patchell, directors.

Inc. Jan. 11, 1898, and is second reconstruction of the **Panulcillo Copper Co., Ltd.**, inc. Jan. 5, 1864, and reconstructed as the Central Chile Copper Co., Ltd., in June, 1894.

Cap. £400,000; shares £1 par; 312,468 shares issued. Increased from £300,000 in 1905, 30,000 new shares being offered to shareholders at par.

Financial statement for year ended Dec. 31, 1920 showed a net loss of £19,274, increasing total debit balance of £126,485. Assets include property, £237,817; equipment, £10,000; Tambillos mine, £12,436; stocks of ore and materials, £10,133; cash, £218; debtors, £1,015. Liabilities include, capital stock £312,468; creditors, £10,440; bank over draft, £71,804.

Dividends: 6 pence per share in 1900, 6 pence in 1901, and 1 shilling in 1907; none since.

Property: consists of the Panulcillo and Condessa Copper Mines and smelter, in the province of Coquimbo, Chile, also the Inagotable mines, 10 miles from Panulcillo and several properties in adjoining districts.

Development: principally by the 1,000-meter San Gregorio tunnel. Ore is mainly chalcopyrite, associated with pyrite, in limestone gangue, with some commercial production of malachite, azurite and chalcocite.

The Cocinera and Inagotable mines, are at Ferro Negro.

Equipment: a central power and compressor plant. Also a 400-ton smelter, connected with the Panulcillo Alto mine by tram, is 76 kilometers from Coquimbo. It is equipped with 3 calciners, 2 reverberatory furnaces, and one 46x180" and three 42x84" blast-furnaces. The smelter treats silicious custom ores, company's sulphides furnishing flux. Matte is crushed and exported to New York for smelting.

Production: fine copper, 1913, 2,274 tons; 1914, 2,491 tons; 1915, 2,737 tons; 1916, 2,721 tons; 1917, 2,817 tons of copper, smelted from 56,869 tons of ore; 1918, 1,821 tons, from 32,063 tons of company and 27,826 tons of purchased ore; in 1919, 1,000 tons of copper. Smelting operations suspended March, 1919.

CHANARAL: SOC. DES M. et U. de CUIVRE de **CHILE**

Office: 94 Rue de la Victoire, Paris France. **Mine and works office:** Chanaral, Atacama, Chile.

Officers: Eugene Renevey, chairman: preceding officers, D. Bethmont, A. DuBois, Georges Renevey and R. de la Bouglise, directors.

Inc. July 17, 1906, in France. **Cap.** 6,000,000 frs.; increased 1910, to 7,000,000 frs.; shares, 500 frs. par.

Property: 925 hectares, including 244 mining claims, the more important being Los Pozos, Las Animas, Cerro Negro at distances of 25 to 55 kilometers from the smelter at Chanaral, with which the mines are connected by rail. Property includes that bought, 1906, of Besa y Ca., and of Las Animas Copper Mining & Smelting Co., Ltd., 1909. Lands are a desert and water is scarce.

Las Animas deposit consists of a lode of 3 veins with parallel strike and dip of 70°, in wall rock of syenite, traceable 2 kilometers. Average width of the 3 veins is about 5', with ore occurring mainly in vertical shoots sometimes 100' in depth. Oxidized ores, to depth of 150 meters, are succeeded by sulphides, mainly with chalcopyrite, and some cupriferous pyrite. Gangue is silicious, or calcareous, or both. Ore shipped to smelter averages 4 to 5% copper.

The mine is opened by 4 shafts, three of which are used for hoisting. The fourth shaft is used at present for pumping. Depths of shafts vary up to 550 meters. The shafts are equipped with two steam hoists and Diesel engine hoist. Compressed air is used for drilling and sub-hoisting.

The **Los Pozos** deposit has 2 parallel orebodies in andesite, the Manto Verde having a silicious and Manto Atacama a ferruginous gangue. Width of orebodies has not been determined; cross-cuts, 70 meters long, still show mineralized headings and indicate large deposits of the porphyry type. The mine has been opened by a tunnel 300 meters long and 110 meters below the outcrop, by a 600-meter drift and by numerous cross-cuts. The mine is being developed by a system of raises, winzes and sub-levels, leaving the pillars to be mined later if filling can be done. The developed part of the Los Pozos deposit is entirely composed of oxidized copper ores; 9,000,000 tons of 2 to 2½% oxide ore have been blocked out. Probable and possible tonnages are much larger. Sulphides have been encountered in an adjoining mine on the Manto Verde orebody.

The Cerro-Negro deposit consists of a number of parallel ferruginous orebodies in andesite of similar type to the Atacama orebody. The deposit is not connected by rail with the smelter and therefore has never been much developed. It is considered to be of as great if not greater value than the Los Pozos deposit.

. . . The other deposits of the company are scattered over the territory of Chanaral, some being of the porphyry type with oxidized ores, others being true fissure-veins, with sulphides.

The smelter is located at the harbor of Chanaral. It has four water-jacket furnaces, one of 100, one of 80 and two of 50 tons. There are two converter stands. Converter shells are 1.68 meters in diameter and 2 meters in length. The basic process is used with excellent results in spite of small size of converters. Air at 10 lbs., is delivered to the converters by a two cylinder direct connected double expansion Walker compressor.

The product of the smelter is bar copper averaging 99 to 99½% copper and containing about 60 grams gold and 150 grams silver per metric ton.

In view of the increasing difficulties due to war conditions, the mines and smelter have been shut down in the course of 1918. In 1919 the smelter was severely damaged by a strong earth-quake.

Operations have not yet been resumed. It is believed that methods of ore treatment should be modified. Smelting should be given up and replaced by leaching in view of the large existing tonnage of oxide ores and of the progress made during these last years in the leaching process. Experiments have shown the easy solubility of the copper content of Chanaral oxide ores in diluted sulphuric acid.

Property is considered valuable and management good.

CHILE COPPER CO. CHILE

Office: 120 Broadway, New York.

Officers: Daniel Guggenheim, pres.; Albert C. Burrage, v. p.; Morris Guggenheim, v. p.; H. F. Guggenheim, v. p.; Jos. Clendenin, v. p.; E. A. Guggenheim, v. p., with Isaac Guggenheim, S. R. Guggenheim, William Loeb, Jr., John N. Steele, Albert C. Burrage, Jr., Russell Burrage, Chas. D. Burrage, H. L. Chalifoux, J. K. MacGowan, and E. A. Cappelen Smith, directors. W. E. Bennett, sec.; C. E. Moran, asst. sec. L. Frederick, treas.; D. A. Crockett, transfer agent, 149 Broadway, New York.

Inc. April 16, 1913, in Delaware. **Cap.** $135,000,000; $25 per; issued, 3,800,000; 600,000 shares held in treasury for conversion of $15,000,000 7%, 10-year and 1,000,000 shares for $35,000,000, 6% 15,-year gold bonds. Am. Trust Co., Boston, registrar. Shares are listed on the New York and Boston Stock Exchange. Company owns entire issued capital stock of the Chile Exploration Co. of New York.

Range of prices during 1920 was 21¼ in January and 7¾ in November. Sales totaled 89,889 shares in New York; in 1921, high was 16⅞ and low 9, with sales totaling 736,900.

Funded debt:

(1) Collateral trust convertible 7%, 10-year gold bonds, due May 1, 1923. $15,000,000 outstanding; convertible into stock at $25 per share; bonds are a direct obligation of the company and are secured by deposit of the entire capital stock of the Chile Exploration Co., the operating subsidiary of the Chile Copper Co. This is a closed mortgage.

(2) Collateral trust convertible 6%, 15-year gold bonds, series A, due April 1, 1932. This issue of $35,000,000 is convertible into Chile Copper Co. stock at $35 per share and secured, subject to the convertible 7s, by the capital stock of the Chile Exploration Co.

Price range of debentures in New York in 1921 was 99¾ to 90 for the 7s, and 87 to 66 for the 6s.

In Feb., 1921, company took a 7.58% interest, $3,032,000 total, in the Copper Export Association's $40,000,000 note issue, bearing 8% interest.

Financial Statement, years ending December 31:

Assets.

Year	Chile Ex. Co.	Chile Ex. Co.	Invest. in Notes & Loans, Liberty bonds	Call loans	Cash etc.	Total
1920..	$114,660,050	$21,771,061	$1,000,000	$5,600,000	$2,729,616	$145,760,727
1919..	113,191,418	23,272,958	1,008,854	5,100,000	2,890,670	145,463,900
1918..	111,878,446	18,523,239	1,008,050	5,000,000	1,282,741	137,692,476
1917..	111,853,956	15,522,003	.....	.....	22,338	127,934,220
1916..	109,984,065	11,405,733	.....	.....	16,956	121,406,754

Liabilities.

	Capital	Bonds	Acc'ts and notes pay.	Interest accrued, etc.	Total
1920.....	$95,000,000	$51,983,250	$28,372	$749,105	$145,760,727
1919.....	95,000,000	49,916,250	10,563	537,087	145,463,900
1918.....	95,000,000	42,353,250	5,474	333,752	137,692,476
1917.....	95,000,000	32,665,000	.....	269,220	127,934,220
1916.....	95,000,000	15,000,000	11,220,000	186,754	121,406,754

Chile Exploration Co.

Controlled by Chile Copper Co. Same officers, with E. A. C. Smith and H. C. Bellinger additional vice-presidents, the latter in charge of operations. G. G. Thomson, purchasing agent.

Officials in Chile: Burr Wheeler, gen. mgr.; Mat. Sample, mine supt.; L. W. Kemp, gen. supt. of reduction works; J. L. Oldright, supt. of leaching; Alfred Houston, gen. rep. at Santiago; W. F. Baseden, port agent, Antofagasta; Harvey Diamond, res. engr. at Tocopilla.

Consulting engineers: Fred Hellman, mining; E. A. C. Smith, metallurgical; H. A. Guess, milling; S. B. Williamson, civil; M. R. Hull, designing, and P. H. Thomas, power and electricity.

Inc. Jan. 11, 1912, in New Jersey. **Cap.** $1,000,000; $100 par; entire issue owned by Chile Copper Co.

Financial Statement, years ending December 31:

Assets.

Year	Property	Cons. equip. etc.	Invest. in steamers	Current	Total
1920.....	$5,162,794	$24,523,516	$1,073,958	$20,407,838	$51,168,106
1919.....	5,137,778	25,449,709	458,991	19,441,630	50,488,108
1918.....	4,992,810	21,916,986	426,665	21,230,713	48,566,175
1917.....	4,983,117	16,435,795	426,665	19,669,952	41,515,529
1916.....	4,944,300	18,183,818	811,280	10,913,012	34,852,400

Liabilities.

Year	Capital	Capital surplus	Notes pay & loan Ch. Cop. Co.	Current	Earned surp.	Total
1920...	$1,000,000	$13,684,000	$21,771,061	$3,547,220	$11,165,825	$51,168,106
1919...	1,000,000	13,684,000	23,272,957	3,124,296	9,406,855	50,488,108
1918...	1,000,000	13,684,000	18,523,239	5,684,885	9,674,051	48,566,175
1917...	1,000,000	13,684,000	15,522,003	6,118,311	5,191,215	41,515,529
1916...	1,000,000	15,000,000	11,405,733	5,656,449	1,790,218	34,852,400

Profit and Loss.

Year	Copper Sold	Sundry Income	Operat. Charges	Charg' Against Inc. & Sur.	Surplus	Prev. Surplus	Net Deduc.	Net Sur.
1920..	$17,711,021	$1,169,867	$10,205,765	$8,523,131	$151 992	*$287,795	$213,918	*$349,721
1919..	10,350,167	868,877	8,729,956	4,779,746	*2,290,658	2,787 882	785,019	*267,795
1918..	20,931,071	437,263	12,414,667	5,513,437	3,440 229	602,118	1,254,466	2,787,882
1917...	16,908,850	649,294	11,751,778	5,207,960	2,598 411	1,790,218	3,786,511	602,118
1916..	10,558,724	39,346	6,425,022	2,236,657	1,936,392	.....	.....	1,790,218

* Loss.

During 1921, there was a loss of $1,353,949 before depreciation and depletion. Cash and securities on March, 1, 1922, were $10,435,900.

Property: the copper deposit of Chuquicamata, province of Antofagasta, the largest known in the world, forms the crest of a low ridge at an elevation 9,600′ above sea level. Chuquicamata is 85 miles east of the Pacific ocean, on a branch of the Antofagasta & Bolivia Railway, 163 miles from Antofagasta. Company owns 740 claims, 7,601 acres; 2,080 acres are mineral land, the balance being plant site, waste dump area and claims covering limestone, iron ore, salt and sulphur deposits. See Vol. XIV for description of former holdings of Cia. Minera de Caloma acquired by Chile Copper in 1916.

Geology: essentially, the orebody occupies a shear-zone in granite with an outcrop 8,000′ long and an average width of 750′. The maximum length as proved up to the present time is 7,500′, with maximum and average widths of 2,200 and 1,340′. Since starting operations, to the end of 1920, 149 prospect holes were drilled; totaling 61,577′. The average of the entire deposit is estimated at 2.12% copper. The copper in the oxidized zone occurs in the form of brochantite, with a small amount of atacamite and chalcanthite. Underneath the oxidized ores lies a zone of mixed ore containing both oxidized and sulphide copper, and below this lies a sulphide zone containing chalcocite with pyrite, and with enargite towards the bottom. The latter zone can be treated in the customary way by water concentration and direct smelting, but for sometime, the oxidized portion only of the orebody will be treated. Vein mines occur along the eastern edge of the deposit, but are not being exploited at the present time.

Development: by the open cut method, five benches being now open. Total length of ore faces on all benches as of Dec. 31, 1920, was 7,680′, with an additonal 3,700′ containing both ore and waste. The benches vary in height from an average of about 30′ to a maximum of 150′. The ground is broken both by churn-drill and tunnel blasting. For the former method a total of 4,795 holes, with a length of 190,690′, have been drilled, and for the latter 93,340′ of lateral and vertical extensions have been driven, of which 38,651′ have been blasted. These figures represent the work accomplished since beginning of oprations to Dec. 31, 1920. The broken ore is handled by power shovels. The total ore mined during this period was 16,260,547 tons, averaging 1.60% copper.

During 1920, 2,134,665 cu. yd. of ground was broken, including 627,595 cu. yd. of waste; 764 drill holes measured 34,477′ and 5,919′ of blasting tunnels were driven.

As an aid in determining the reserves, 149 prospect holes, or 61,577′ have been drilled; but none in 1920.

Ore reserves: estimated as follows (by tons):

Year	Oxidized	Per ct.	Mixed	Per ct.	Sulphide	Per ct.	Total	Av. %
1920....	329,306,106	1.91	151,000,000	2.98	210,000,000	1.84	690 306,106	2.12
1919....	333,550,866	1.91	151,000,000	2.98	210,000,000	1.84	694,550,866	2.12
1918....	336,510,349	1.91	151,000,000	2.98	210 000,000	1.84	697,510,349	2.12
1917....	339,000,000	1.91	151,000,000	2.98	210,000,000	1.84	700,000,000	2.12
1916....	339,000,000	1.91	151,000,000	2.98	210,000,000	1.84	700,000,000	2.12

Equipment: at mine includes 9 No. 103-C electric, one No. 225-B electric and 10 95-B steam, shovels, the latter are being replaced by the more economical electric shovels. Thirty-two locomotives, varying in weight from 54 to 80 tons, are used for tramming purposes. There are also air compressors, 60 and 70-ton ore cars, railway shops and everything necessary for moving 15,000 tons of ore daily.

Treatment: the reduction plant, 2½ miles from the mine, which started operations May 18, 1915, has a capacity of 15,000 tons a day. Copper is recovered by leaching process as developed by E. A. Cappelen Smith; brochantite, the principal mineral, being readily soluble in dilute sulphuric acid. As it contains no arsenic, antimony or bismuth, the solution is not fouled by repeated use.

The ore is broken by two 84x50" jaw crushers, 3 No. 10 gyratory crushers, six 48" horizontal and twenty-four 48" vertical Symons disc crushers, to ⅜" size. It is then distributed to mastic-lined, concrete vats, of which there are nine, 110' wide, 150' long and 17.5' high, each with a capacity of 10,000 tons of ore.

The leaching process requires approximately 6 days for the complete cycle, 1 for filling the tank, 2 for leaching, 2 for washing and draining, and 1 for charging. The leached residue is taken from the vats by grab buckets operated on a traveling bridge, transferred to cars and piled on the waste dump.

Copper is precipitated from the pregnant solution by electric deposition, but before electrolysis the solution is dechloridized. The ore contains from .05 to .1% chlorine, which is extracted with the copper, in the leaching operation, and by agitating the solution with cement copper, the chlorine is precipitated as cuprous chloride. This is separated from the solution in settling tanks, and then dissolved in brine and agitated with scrap iron in revolving bronze drums, where the copper is precipitated in a finely divided condition suitable for dechloridizing more solution. The clear solution from the settling tanks goes to the electrolytic tank house, where it is electrolyzed using ordinary copper cathode starting sheets and insoluble anodes made of ferro silicon. The electrolytic tank house contains 894 tanks 19' long, 3½' wide and 4' 10" deep made of mastic-lined concrete. Of the 894 tanks 64 are used for making cathode starting sheets and 830 for electrolytic deposition of copper from solution. The solution enters the head tank of the system containing about 5% copper and 2½ to 3% free acid, and leaves the last tank containing 1½% copper and 7 to 8% free acid.

There is a gain of sulphuric acid from the brochantite in the ore amounting to 5-7 pounds per ton of ore treated; this permits discarding continually from the system sufficient solution to remove the iron introduced into the solution in the dechloridizing plant and by the corrosion of the ferro silicon anodes in the tank house.

An important feature of the operation has been the increased extraction each year since the plant started. The average extraction by the mill during the last three years was 88.09% in 1918; 89.57 in 1919; 92.12 in 1920. The maximum was reached in February, 1921, when an average of 94.1% was obtained for the month. The continued increase in extraction is chiefly due to finer grinding of the ore, although the high figure noted, was owing partly to a longer time treatment.

Since the ore contains no impurities such as are usually encountered in a copper refinery, the wire bar copper produced is exceedingly pure. At present is averages 99.95% copper and 101% conductivity, Mathiesson standar.d

Power for operating the reduction plant is generated at Tocopilla on the Pacific Coast by four 10,000 k. v. a., 53,300-h. p. total, steam turbines, served by oil-fired steam boilers. A 100,000-volt, 3-phase, 50-cycle, 87-mile steel tower transmission-line connects this plant with Chuquicamata. A large part of the power is utilized for electrolytic purposes, through seven

2,500-k. w. motor generators ,which convert 5,000-volt alternating current into 250-volt direct current. During 1920, this plant generated an average of 27,210 k. w. per hour.

Additional machinery increased the power-house capacity to 115,000 k. w. (153,300 h. p.) by adding three 25,000 k. w. turbo-generators. An 18,000 kw. unit was added also in 1921. A new 135,000-volt transmission line and sixteen 3,480-k. w. rotary converters added in 1919, provide the necessary 250-volt direct current. Total oil storage capacity is 165,000 barrels.

Transportation of copper and supplies being difficult, Chile Exploration and Braden Copper, early in 1916, jointly purchased two steamers, the "Sherman" for $790,000, and the "Republic," for $825,000, to trade between Chile and New York. The Chile Steamship Co. and Sherman Steamship Co. were formed to operate these vessels. The revenue from general carrying business soon repaid the purchase price and the owners were offered $1,250,000 each for them, but refused. J. K. MacGowan is president of both steamship companies. In 1921, two 70,000-bbl. tank ships were purchased to facilitate transportation of fuel oil.

There are over 9,000 persons at Chuquicamata, dependent on the company, which has erected 1,855 houses, staff quarters, club-house, 2 schools, and controls the townsite.

Production:

Year	Ore Treated. Tons	Copper, Per Cent.	Extraction, Per Cent.	Copper Pounds	Aver. price per lb., Cents	Net cost per lb., Cents
1921...	1,671,936	1.69	....	54,008,065	.....	.....
1920...	4,243,301	1.54	89.70	111,130,224	18.354	10.700*
1919...	2,961,465	1.62	86.00	76,717,872	18.972	19.780
1918...	3,745,083	1.64	82.20	102,136,000	24.713	17.885
1917...	2,904,191	1.76	81.80	88,370,000	26.400	19.920
1916...	1,742,748	1.74	77.15	41,306,000	25.560	15.460
1915†..	625,394	1.71	66.87	10,944,000	.....	18.550

*Exclusive of depreciation and depletion. †7½ months.

At end of 1919, plant capacity had reached 15,000 tons of ore per day, with an annual possible production of 145,000,000 to 155,000,000 lb. copper. Plans for further increase of annual capacity, first to 194,500,000 lb., next to 241,500,000 lb. and finally to about 303,500,000 lb. of copper have been prepared, but actual construction is held in abeyance until return of normal conditions. The latter stage involves handling about 35,000 tons of ore per day.

Annual report for 1920, announces that development stage of this huge enterprise has now been passed.

Copper is sold through the new metal-selling agency of Guggenheim Bros.

CHILENA DE FUNDICION DE ESTANO, CIA. CHILE

Subsidiary of **Llallagua Tin Co.**, (q. v.), operating mines in Bolivia.

In 1917, erected a 30-ton pig tin smelter at Arica, Chile, which was blow-in February, 1918. No later information.

COLLAHUASI la GRANDE; SOC. FRANCAISE des MINES DE CUIVRE CHILE

In liquidation; property and plant sold to **Poderosa Mng. Co.**, (q. v.) in 1921-22.

Property: in Collahuasi district, in S. E. corner of province of Tarapaca. Copper ores occur in lenticular masses in andesite, with oxidized zone reaching depth of 250'. The ores are generally high grade and carry silver. There is said to be no developed ore in sight, but prospects are considered promising.

COPPER MINES OF COPIAPO LIMITED, THE **CHILE**

Office: 210 Fenchurch St., London, E. C. 3, England

Property: is in the valley of the Copiapo river, province of Atacama. Company is a private concern and does not give out information concerning its holdings or operations.

GATICO; COMPANIA MINERA DE **CHILE**

Fully described in Vol. XI (1912-13).

Mine address: Gatico, Province of Antofagasta, Chile.

Property: 125 claims, 453 hectares, including 4 developed mines; also 15-hectare smelter site all in the Gatico district, near the sea. Claims contain 14 workable veins, ore averaging 8% copper, 0.2 oz. silver, and 30 cents gold per ton. Work was started in 1830.

The smelter is at the port of Gatico, 30 miles S. of Tocopilla, and 60 miles N. of Antofagasta. It includes blast-furnaces, converters, and power-plant.

Production: between 3,100,000 and 8,000,000 lb. of copper yearly from 1907 to 1916.

GUAYACAN, FUNDICION DE **CHILE**

Subsidiary of American Metal Co. (**South American Metal Co.**

Offices: 61 Broadway, New York; and Guayacan, Chile.

Inc. in 1917. **Cap.** £150,000; shares £1; 120,750 held by controlling companies.

Works represent an investment of $400,000 and include water-fronts on the harbor, barges, small mines, and copper smelter capable of producing from 350 to 500 tons of copper matte per month. Plant has been closed since 1917 on account of abnormal economic conditions.

NALTAGUA; SOCIETE Des MINES De CUIVRE DE **CHILE**

Main office: 80, Rue Taibout, Paris, France.

Mine office: El Monte, Melipilla, Province of Santiago, Chile.

Officers: Baron Emmanuel Leonino, chairman; with Vicomte A. de Montureux, H. Chapuis, Baron J. De Bethmann, H. Grandet, Baron B. De Senevas, Pierre Piron, Ch. Chalupt, and Jorge Matte, directors. A. Mercier Pageyral, gen. mgr.; Comte B. de Saint-Seine, cons. engr.; Pretor, Fontaine & Co., Valparaiso, agents in Chile.

Inc. Jan. 26, 1907, in France. **Cap.** 10,000,000 francs, in 100,000 shares; par value F. 100; increased to F. 14,000,000 in 1918 by subscription of 40,000 8% preference shares of F. 100 each. Debentures authorized F. 3,000,000, with 5% interest. Total assessments to date F. 3,000,000. Fiscal year ends June 30.

Net profits: were F. 36,000 in 1909-10; F. 195,000 in 1910-11; F. 595,000 in 1911-12; F. 603,000 in 1912-13; F. 318,000 in 1913-14; F. 716,000 in 1914-15; F. 2,043,000 in 1915-16; and F. 1,568,000 in 1916-17.

The fiscal year 1917-18 left a loss of F. 745,000. Interest on bonds was paid and drawn bonds were repaid.

Dividends: f. 300,000 in 1913-14; f. 500,000 in 1915-16; none since.

Property: is very extensive comprising that formerly held by the Compania Minera de Naltagua, 195 pertenencias of mineral land and the Naltagua farm with a total of nearly 2,000 acres., near El Monte Station on the Santiago-Melipilla R. R.

Copper deposits include 3 parallel blanket veins, striking north-south, and dipping about 30° east, with a width of 3 to 30'. They are opened for a length of 5 kilometers, and principally worked in the Trinidad, Las Vacas, San Ramon, Suerte, Venus, Brillante, El Gato, and Esperanza mines. These veins carry oxidized ores, changing at 65' depth to chalcopyrite, bornite and chalcopyrite in disseminated form, averaging 4% copper, and nearly self-fluxing. Property also contains a blanket deposit with 2% copper in a calcareous gangue, used as a flux; the vein has the same strike and dip as the others, and a porphyritic formation with low-grade values.

Equipment: There are several air compressors, a 2,000-h. p. hydro-

electric plant on the Rio Maipo, and abundant wood on the Naltagua ranch.

Transportation equipment includes several aerial trams and a private railway. The aerial tram from El Monte to San Antonio, where the tower station is located, is 5,600 meters in length, with 22 towers, of 22 meters maximum height, on concrete foundations, having greatest span of 386 meters. An incline tram, at San Antonio, connecting with the lower station of the aerial tram, is 300 meters long, at an incline of 30°, having a double line of rails. A 2½-kilometer railway connects the incline tram with the private rail system, which has a total length of 25 kilometers. Equipment includes 6 locomotives, with 2, 3 and 5-ton ore cars.

An experimental concentration plant to treat 100 tons per day was erected in order to determine the best method to concentrate these ores.

Smelter: The 300-ton smelter is at Naltagua, in the valley of the Rio Maipo, adjacent to the Rio Mapocho, 70 kilometers by river to the coast, and 225 kilometers to Valparaiso. Plant contains two 40"x160" blast-furnaces and two 17'x55' reverberatory furnaces of the Anaconda type, fired by pulverized coal.

The converter department has 3 stands, with 9 shells of the Copper Queen barrel type, an electric traveling crane with an hydraulic accumulator for rotating the shells and a large Pierce-Smith basic converter.

The smelter power plant includes 770-kw. engines, 4 Connersville blowers and a 200-h. p. air-compressor for converter blast. The boiler plant has five 200-h. p. boilers, three 300-h. p. boilers and a 30-meter steel stack.

Works were described by Mark R. Lamb in "Engineering and Mining Journal" of October 28, 1916.

About 1,500 men are employed at the mines and works, with average wages of 5 pesos at the mines and 6 pesos at the smelter.

Production: has been as follows: 293,209 lb. in 1908-09; 2,253,090 lb. in 1909-10; 2,486,772 lb. in 1910-11; 4,082,892 lb. in 1911-12; 4,703,005 lb. in 1912-13; 5,659,356 lb. in 1913-14; 6,504,004 lb. in 1914-15; 9,417,692 lb. in 1915-16; 9,241,030 lb. in 1916-17; and 8,054,497 lb. in 1917-18; 5,998,805 lb. in 1918-19. Above figures are for Chile bars assaying 99.1% copper.

No recent figures are available but smelter was operating up to mid-1921.

PODEROSA MINING CO., LTD. CHILE

Office: F. W. Bishop, sec., 145 Dashwood House, New Broad St., London, E. C., Eng. **Operating office:** R. O. Packard, gen. mgr., Casilla 855, Antofagasta, Chile. **Mine office:** Collahuasi, Tarapaca, Chile.

Directors: Chas. Fearn, chairman; L. W. Harris, V. Echeverria and W. J. Barnett.

Inc. Nov. 27, 1908, in Great Britain. **Cap.** £200,000; par £1; reduced in 1922 from £500,000; £5 par; fully issued and fully paid.

Financial Statement shows:

Yea.	Revenue	Total Charges	Profit
1920	£112,303	£ 76,789	£35,504
1919	58,003	59,602	1,599*
1918	60,100	.....	18,662*
1917	199,370	103,361	96,009
1916	119,738	52,039	67,699

* Debit.

Dividends: 5% in 1909; 10% in 1916; 12½% in 1917; 2½% in 1921.

Property: 37 contiguous claims, 185 hectares, or 457 acres, including the Poderosa, which is the principal producer, and the San Carlos, Rosario, and other mines. The lands lie at an extreme elevation of 15,400', among the rounded peaks on the western edge of the Bolivian plateau, a region

above the timber line, and barren of vegetation, with the exception of yareta, which constitutes the fuel of the district. Copper mines were worked in this district during the era of Spanish dominion, and previously by the Indians, as evidenced by remains of ancient furnaces, fragments of matte, scoria and tools left in old workings. Development of the mines was begun 1903, and regular ore shipments were started January, 1906.

In 1921-22, purchase of property and equipment of the Soc. Francaise des Mines Cuivre Collahuasi la Grande was in progress.

Geology: copper bearing lodes occur in fissured zones in andesite, with ore lenses up to 100′ long and 50′ thick that carry 18% copper and 6 oz. p. t. silver. Poderosa, or main vein, is a fissure without visible outcrop, lying alongside a diorite dike intrusive in dacite. The vein lies under the dike, but in places departs from it. It has numerous branches and parallel fissures. Secondary sulphides occur at 250′ below the surface.

Development: the Poderosa mine had several shafts, with a winze to the 10th level. At the Rosario, a new shaft reached the 5th level (410′) in 1921. Total extensions in 1920 were 2,957′.

Ore reserves are estimated, July, 1920, at 8,000 tons blocked out averaging 30% and 7,000 tons partly developed ore in the Poderosa mine. Dump reserves amount to 134,000 tons varying between 3.2 and 5% copper.

Equipment: includes power plant, ore-sorting plant, concentrator, etc. There are 175 men on the payroll, 95 being underground.

Production: in 1910 the mine yielded 10,902,080 lb.; in 1911 6,419,372 lb.; in 1912, 5,077,204 lb. In 1916, 3,948 tons of 28.7% copper and 9.4 oz. silver ore and concentrate was shipped; in 1917, 6,980 tons assaying 31.55% copper and 13.09 oz. silver; in 1918, 3,309 tons averaging 30.7% copper and 12.45 oz. silver; 1,498 tons averaging 31% copper and 12.97 oz. silver in 1919; 5,011 tons averaging 30.13% copper and 15.16 oz. silver in 1920.

Costs f. o. b. mine in 1920 were £12.55 per ton of ore and £44.66 per ton of copper.

Ore is shipped by railroad to Ollague, en route to Antofagasta.

SANTIAGO MINING CO. — CHILE

Subsidiary of Anaconda Copper Mining Co.

Office: 25 Broadway, New York.

Inc. 1917, in Delaware. **Cap.** $10,000,000; shares $25 par.

Property: Lo Aguirre mine, situated 20 kilometers W. of the City of Santiago, Chile. The mines consist of five groups, 500 acres, partly acquired by purchase from former owners and partly by denouncement. The Africana mines, also owned by the company, are 3 miles E. of Lo Aguirre: Lo Aguirre and Farfana farms of 17,387 and 980 acres, respectively, were secured for (1) their water-rights; (2) control of the intervening space between the two groups of mines; and (3) to avoid liability for damage to farmlands, near the proposed reduction works.

Development: in Lo Aguirre mine, the ore occurs as a disseminated deposit. Work begun in 1914, has developed more than 6,000,000 tons of ore carrying from 1.75 to 3.5% copper. The average of all tunnel samples was 2.44%. The ore is a mixture of sulphide and oxides. It is believed that the orebody contains a much greater tonnage, estimates showing 16,000,000 tons of probable ore, but a little over 6,000,000 is all that was definitely developed at beginning of 1918.

During 1918, eleven holes, aggregating 4,029′, were drilled, in addition to 6,900′ of underground work; in 1919 work amounted to 8,264′ of haulage drifts and raises and in 1920 to 8,121′.

In the **Africana** mine the ore occurs entirely as sulphides assaying 3.73% copper.

Development: by 2 vertical shafts, 2,000′ apart, to depth of 858′ and 423′. Total new work amounted to 3,672′ in 1919 and 8,403′ in 1920.

Equipment: includes hoisting engines, pumps, compressors and air-drills. Townsites have been established at both mines.

SOUTH AMERICAN METAL CO. OF CHILE CHILE

Subsidiary of American Metal Co., which owns entire capitalization.

Office: 61 Broadway, New York.

Inc. June, 1917. **Cap.** $250,000.

Company was organized for purpose of conducting a general trading business in South America, especially in Chile. It supervises the mining exploration carried on by the A. M. Co. on that continent, and also purchases copper ore and matte for refining in the U. S.

The copper smelter at Guayacan (q. v.) province of Coquimbo, Chile, is controlled by the S. A. M. Co.

VACAS, COMPANIA MINERA LAS CHILE

Address: E. David Pope, care El Nilhue, Chagres, Chile.

Property: the Vacas gold mine with 150 hectares, near the Pupio river, at southern end of the Aconcagua goldfield, between latitude 30° 30′ and 32° 00′ south; and near the Caruto, Magui, Cueca, and Talco mines. Las Vacas is practically the only gold mine now operating in Chile and has been worked for over 100 years.

Geology: the veins are in unaltered and hard granite and are richest near the contact with andesite dikes that cut and slightly displace them. Pegmatite quartz veins are also common through the granite, sometimes carrying gold which does not persist. The main vein is 3 to 12 meters wide in the upper, and from 5 centimeters to 2 meters in the lower workings. Sulphides exist right from the surface and carry gold in fine-grained friable pyrite, though none is visible to the eye. The ore averages a little less than an ounce per ton.

Development: to a depth of 1,000′ or more by incline shaft and cross-cut adit 300 meters long, connecting with shaft at depth of 60 meters. The principal workings are at bottom of the mine.

Equipment: 2 compressors, drills, pumps, geared hoist, and 10-stamp mill with amalgamating plates, classifiers, tube-mill, Dorr thickener, 3 Pachuca agitators. Moore vacuum-filter, and zinc boxes for precipitation of the gold from cyanide solutions. Amalgamation saves 66% of the gold value, but a total recovery of 90% is made.

COLOMBIA

This Republic is best known for its gold and platinum production which comes mainly from alluvial deposits The annual output averages over $5,000,000 in gold, about 400,000 oz. silver and 35,000 oz. platinum. The emerald mines are quite famous, and deposits of copper, zinc and lead are also known, but practically undeveloped and unworked.

ANGLO-COLOMBIAN DEVELOPMENT CO., LTD. COLOMBIA

Controlled by South American Gold & Platinum Co., which see.

BREITUNG MINES CORP. OF DELAWARE COLOMBIA

In process of dissolution. Fully described in Volume XIV.

BRITISH PLATINUM & GOLD CORPORATION, LTD. COLOMBIA

Office: 73 Basinghall St., London, E. C. 2, England.

Mine address: Mayolo & Co., local director, Buenaventura, Colombia.

Directors: T. J. Ive, chm.-mng. dir.; J. Mayolo, Walter Conan, and G. H. Short. C. A. Sack, sec. Inder, Henderson & Dixon, cons. engrs.; Johnson, Matthey & Co., technical advisors.

Inc. May 2, 1918, in Great Britain. **Cap.** £1,000,000, increased Dec. 1919, from £250,000; par £1; 596,788 issued. Company has an interest in **Colombian Proprietary Gold Mines.** and an option on all unissued stock.

Financial statement for year ended July 31, 1921, shows assets: property, £252,520; dredges, equipment and supplies, £158,683; buildings and furniture, £5,823, investments, £133,743; debtors, £6,053; cash, £44,542; platinum, and gold £17,432; development and general expense, £35,936. Liabilities include: capital stock £595,901; reserve account £33,493; credi-

tors, £13,398; P. & L. account, £11,940. Net proceeds from bullion was £22,389 and operating expense, £11,668. A balance of £17,800 was carried forward.

Property: extensive tracts of placer ground in the Choco district of Colombia, acquired from the **Consolidated Columbia Platinum & Gold Mines, Ltd.**, and from **Messrs. Pugliese, Frigerio & Mayolo**, also the entire assets and rights of the **Paris (Transvaal) Gold Mines, Ltd.**

Lands include: (1) at Bolivar and Colonia, 2,560 acres of gold- bearing ground, 50 miles S. of Buenaventura, said to contain enough pay gravel to supply several dredges.

(2) **Cimarronas**, 7,680 acres have been prospected by 40 shafts and 152 bore holes and contain 2,156,000 cu. yd. of an average value of 13.12 cents per cu. yd., or £117,909, figuring platinum at £12 per ounce.

(3) **Opogodo** ten square miles, of which 2¼ miles are estimated to contain 4,181,000 cu. yd. of 25.78d. (61.56c.) to 36.76d. (73.52c.) of dredgable ground, and 60,000,000 yd. of hydraulicking ground worth 10.3d. (20.6c.) per yd. Proportions of precious metals are 25% and 75% platinum. Net value of proved area is £1,703,145.

Equipment: consists of 2 dredges of 60,000 yd. monthly capacity each; motor launch and 2 steel cargo-boats.

Production: from Opogodo flat by dredge No. 1 from Jan. 15 to July 31, 1921, 1,516 oz. platinum and 446 oz. gold, from 177,000 cu yd. The gross return was 36.32d. per yard, at cost of 9.97d. per yd. From July 31, to Nov. 5, production was 582 oz. platinum and 176 oz. gold. Dredge No. 2 was to be operating by May, 1922. Up to end of fiscal year 1921, tributors produced 273 oz. platinum.

CHICAGO; LA MINA — **COLOMBIA**

Address: via Nechi or Zaragoza, Guamoco district, Colombia.

Property: gold-lead-zinc mine in Guamoco district. Ore is a heavy iron sulphide containing gold, the ore varying from $30 to $40 per ton. Plant includes water power, crusher, Hardinge mill, and counter-current decantation system of cyanidation. No figures of production available.

CHOCO PLATINUM PLACERS, INC. — **COLOMBIA**

Address: Andagoya, Colombia, John M. Relph, gen. mgr.

Inc. 1921, in Delaware. **Cap.** $600,000; par $1; fully paid. National Security Co., New York, registrar and transfer agent.

Property: mining rights for 20 years on Le Soledad tract 400 acres, in the Intendencia de Choco, covering 1½ miles along the San Juan river, and said to have 2½ to 3' of gravel carrying ½ oz. recoverable platinum per cu. yd. Total recoverable value estimated to be $5,000,000. It is proposed to work the deposit by the drift method.

COLOMBIA CORPORATION, LIMITED — **COLOMBIA**

Office: Henry Richards, sec. 341 Salisbury House, London Wall, London, E. C. 2, England. W. A. Prichard, gen. mgr., Medellin, Colombia.

Directors: Fred'k W. Baker, chm.; John A. Agnew, F. D. Richmond, Lord Bradbourne, A. Stanley Elmore and H. C. Porter; the same as Oroville Dredging.

Inc. Sept. 30, 1919, by the Oroville Dredging Co. to acquire the Constancia mine for $180,000. **Cap.** £510,000; £1 par. Half of shares are ordinary, and were allotted to Oroville Dredging as the purchase price, the other half are preference shares, entitling holders to half of the profits until a 100% dividend has been paid and 12½% thereafter; up to Dec. 1, 1921, 25% only had been paid on Pfd. shares.

Balance sheet, Dec. 31, 1920, shows assets total, £423,543 of which £72,065 is current: liabilities include loan from Nechi Mines, Ltd., £100,212 and current £4,583. On Nov. 24, 1921, cash bullion and accounts receivable amounted to £23,377; loan and accounts payable, £128,347.

Property: the Constancia mine near Anori, Province of Antioquia, 50 miles S. W. of the Pato (q. v.) dredging area, has 2 parallel quartz lodes of

the California type, each about 6′ wide and opened for length of 2,400′ out of 16,000 owned. The formation is mica schist cut by granite and diorite dikes; ore is quartz containing pyrite and chalcopyrite, and carries up to ½ oz. in gold. The mine has been worked for 140 years, and from 1914 to 1918 produced 46,000 tons of ore worth $311,000 under former ownership.

Development: by shaft and open cuts to 300′ depth under former owners; much of ground is exhausted down to the Tobon level. During 1919 and 1920, the Tortaro and Constancia (main) shafts were retimbered, a new (4th) level was opened, on adit driven to drain open cuts, and workings generally put into condition. New work amounted to 794′, and the large ore shoot found above was opened on 3rd level. Ore reserves are estimated to be 300,000 tons of $6 to $8 ore and 70,000 tons of probable ore averaging $8 to $10.

Equipment: includes an old one-stamp mill with cyanide unit, new hoist, 450 to 550-h. p. hydro electric plant with Pelton wheel and 29,500′ ditch, necessary buildings and 43½ mile motor road to Dos Bocas. A 300-ton mill is to be erected by about Jan. 1, 1923.

Production: in 1920, 11,617 tons of ore yielding $4.08 by amalamation and concentration. Concentrates are to be stored for treatment by new mill.

Options secured and other properties have been released.

COLOMBIAN MINING & EXPLORATION CO., LTD COLOMBIA

Office: H. S. Parnum, sec., 10 Throgmorton Ave., London, E. C. 2, England.

F. B. Powell, mgr., Marmato Mines, Medellin, Colombia, S. A.

Directors: Francis Allen, chm., with H. Lovegrove, R. F. W. Hodge, E. L. Heinemann, N. L. Jenks and G. E. Sully.

Inc. Feb. 1908, in Great Britain. **Cap.** £550,000; increased in 1920 to £1,000,000; £1 par; 800,000 shares issued.

Debentures: £50,000 6% 7-year, redeemable at £105; outstanding Dec. 31, 1919, £10,700.

Financial report for 6 years and 3 months ending June 30, 1920, showed, cash, £818; bullion in transit, £7,373; debtors, £4,736; total development and general expenditures, £195,787; liabilities include loans, £11,325, loans and interest, £30,345; creditors, £23,582; bills payable, £4,000.

Property: a 40-year Government lease acquired from the **C. W. Syndicate, Ltd.**, on 900 sq. miles in the Supia and Marmato districts of Colombia, at an annual rental of £3,200.

Reserves at Marmata were estimated by F. B. Powell at 509,080 tons of 40s. 6d. ($11.60) ore, plus 314,400 tons of 24s ore as stope filling. The gold is associated with marcasite and treatment may be troublesome.

Equipment: includes 40-stamp mill, tube-mills and cyanide plant. With 80% recovery. The first 3,000 ton unit of a new 10,000 ton mill was to be completed early in 1922.

Company also owns rights over oil-bearing properties and has organized the Colombian Oilfields, Ltd., to develop these holdings. The San Antonio M. & S. Co., Ltd., was organized to develop the silver mines on Marmato mill.

COLOMBIAN PROPRIETARY GOLD MINES, LTD. COLOMBIA

Controlled by British Platinum & Gold Corp.

Office: 73 Basinghall St., London, E. C. 2, England.

Directors: T. J. Ive, chm., G. H. Short, S. T. Cohn and H. J. Eder. The Portal Trust & Agency, Ltd., sec.

Inder, Henderson & Dixon, cons. engrs.

Formed in 1921. **Cap.** £200,000; par £1; 30,000 treasury shares. Working capital provided by sale of 60,000 shares at par.

Property: a gold bearing gravel area of 40 square miles in 12 claims, about 26,000 acres on the Llantin river, 70 miles S. of Buenaventura, formerly owned by Cia. Minera de Santa Rosa. A dredge with capacity

of 60,000 cu. yd. per month has been purchased for £40,000.

CONS. COL. PLATINUM & GOLD MINES, LTD COLOMBIA

Property: acquired in May, 1918, by British Platinum & Gold Corporation, which see.

FRONTINO & BOLIVIA (S. A.) GOLD M. CO., LTD. COLOMBIA

Office: J. J. Truran, sec., 184 Gresham House, London, E. C. 2, England. Mine office: La Salada, Colombia.

Directors: S. W. Stephens, chairman; T. H. Alexander, Sir H. P. Harris, Hon H. O'Neill, and R. C. Lyall. J. Reed, supt.; Pellew-Harveys & Co., cons. engrs.

Inc. July 18, 1911. **Cap.** £200,000; par £1; in 23,390 pfce. shares, all issued and 176,610 ord., 140,000 issued. Debentures amount to £39,134 10%, redeemable in 1926.

Report for year ended June 30, 1921, shows income from ore sales, £104,721, expenditures at mine £78,778; profit, £16,919. Balance carried forward, £27,014. Current assets, £95,325; current liabilities, £19,476.

Dividends: regular on preference shares and 10% on ordinary in 1915; 10% in 1916; 10% in 1917; 5% in 1918; 7½% in 1919; 10% in 1920; 5% in Jan. 1921; 2½% in Jan. 1922.

Property: mining rights over 12 sq. miles and surface rights over 40 sq. miles in Columbia, S. A. At the Silencio mine, the main producer, recent development has been on the 11th to 17th levels. During fiscal year ended June 30, 1921 new work amounted to 2,697′ compared with 4,313′ in 1920. Although there was a decrease of about $6 per ton in 1921 as compared with 1920, the ore width was increased by 5″. During 5 months after June 1921 the value of ore mined was about $20 per ton. Company also owns an interest in the **Marmajito Mines, Ltd.**, owning adjacent properties. About 850 men employed.

Ore reserves, June, 1916, were estimated at 42,200 tons; in 1918, at 58,500 tons, worth $18 per ton; in 1919 at 56,100 tons of $17 ore; in 1921, 53,200 tons of $16 ore. In July 1920, the Marmajito company reopened its properties.

Equipment: includes hydro-electric and steam plants; 2 compressors, pumps, etc. Ore is treated by a combination of sorting stamp mills, concentrators; pan amalgamation and cyanide, 10-stamp mill and cyanide plant.

Production, years ending June 30:

Year	Ore, tons	Gold, Oz.	Year	Ore, tons	Gold, Oz.
1915.....	25,971	26,938	1919.....29,020		23,958
1916.....	25,484	22,358	1920.....29,760		25,815
1917.....	23,642	20,653	1921.....29,420		21,910
1918.....	27,855	23,895			

In 1921 there was also produced 15,631 oz. silver compared with 17,197 oz. in 1920.

LIBERTAD, LA MINA COLOMBIA

Address: via Nechi, or Zaragoza, Guamoco district, Colombia.

Property: a gold mine in the Guamoco district, which has been profitably operated for over 8 years on a series of rich pockets occurring in quartz vein 2′ to 12′ wide. Ore is free-milling, and is treated in a 10-stamp mill with concentrator and cyanide plant.

MAMMOTH GOLD, SILVER & PLATINUM MINES COLOMBIA

Controlled by Assets Realizing Corporation of California which owns 60% of share capital and is itself a subsidiary of the Dupont Copper Co. whose address is 10 E. 43rd. St., New York City.

Address: J. V. Priest, 812 Merchants' National Bank Bldg., Los Angeles ,Cal.

Property: in Department of Bolivar, is a concession of about 48,000 acres with extensive placer holdings as well as quartz veins. Extensive

sampling shows that the placer properties carry between $2 and $3 per yd. in gold, with some platinum. This property was carefully examined in 1919, and full equipment taken in to work the gravel, using hydraulic elevators. Other assets on the property include rubber trees, vegetable ivory, mahogany, and Peruvian bark. There is also a surface seepage of oil on a part of the property.

MARMAJITO MINES, LTD. **COLOMBIA**

A subsidiary of Frontino and Bolivia (S. A.) G. M. Co., Ltd., which see.

NECHI MINES (COLOMBIA), LTD. **COLOMBIA**

Controlled by Oroville Dredging Co., Ltd., and Pato Mines, Ltd.

Office: Henry Richards, 341 Salisbury House, London Wall, E. C. 2, England.

Directors and officers: F. W. Baker, chm.; F. D. Behrend, A. S. Elmore, J. A. Agnew, and H. C. Porter. W. A. Pritchard, mgr.

Inc. Feb. 5, 1914, in Great Britian. **Cap.** £140,000, in 140,000 pfce. and 140,000 ord. 10s shares, all issued.

Financial results, years ending Sept. 30:

Year	Revenue	Profit	Cur. Assets	Cur. Liab.	Dividends
1920....	£198,462	£140,003	£198,133	£28,441	£ 49,000
1919....	98,670	61,995	120,247	41,320	72,250
1918....	86,000	25,841	.....	.....	35,000
1917....	98,093	52,267	144,869	68,238	100,000

Dividends: 25% on pfd. in 1916; 75% in 1917, 25% in 1918; 1919 and 1920.

Property: 400 acres of gold-bearing placer gravel land on River Nechi, Department of Antioqua, Colombia. Ninety acres of the tract contain 4,000,000 yd. worth £2,900,000 gross. The gravel now being dug is 50′ deep.

Production: dredging operations since 1915, are summarized below:

Year	Yardage	Yield	Per Yd., c.	Cost, c.
1920....	2,135,084	$816,188	38.20	7.14
1919....	1,042,464*	450,763	43.00	7.75
1918....	2,142,929	437,499	20.40	4.9
1917....	1,883,659	489,959	26.00	10.73
1916....	1,617,975	797,125	49.27	15.20

*Last 9 months, as during first 3 months the dredge was in Pato ground.

OLANO PLATINUM SYNDICATE, LTD. **COLOMBIA**

Address: Liquidators, A. J. Milne., Pinners Hall, Austin Friars, London, E. C. 2, England.

On April 15, 1921, went into voluntary liquidation.

Directors: A. J. Milne, J. H. Nicholson, F. K. McLean, Sir J. F. Ramsden.

Inc. Dec., 1919 in Great Britian. **Cap.** £46,500, in 45,000 ord. shares. £1 par and 30,000 def. shares, 1s. par.

Property: in Colombia, S. A.

OROVILLE DREDGING CO., LTD. **COLOMBIA**

Office: H. Richards, sec., 341 Salisbury House, London Wall, London, E. C., England.

Directors: F. W. Baker, chairman, F. D. Behrend, Lord Brabourne, A. S. Elmore, J. A. Agnew and H. C. Porter.

Inc. June, 1905, in Great Britain. **Cap** £700,000; £1 par; 686,538 issued. Acquired holdings of **Oroville Dredging Co.** of Calif. which is now in liquidation.

Report for year ended Sept. 30, 1920, shows—Assets: investments, £715,000; debtors, £7,911; war bonds, £24,595; Victory bonds, £8,523; cash £16,939. Liabilities include, capital stock, £686,538; outstanding

dividends, £11,254; creditors, £13,371; reserves, £19,008; profit and loss, balance, £42,797, after deducting dividends, £94,398.

Total income was £118,770, of which £110,534 represented dividends from subsidiary companies, and expenditures, £6,941, leaving balance forward, £111,829.

Dividends: 6d Dec., 1919; 9d March, June, Sept., 1920; 4s in 1921; 9d March, 1922.

Company is a holding corporation and controls the following companies—

Nechi Mines (Colombia) Ltd., 125,993 ord. sh. 10/par (£28,348); **Pato Mines (Col.) Ltd.,** 89,021 sh. £1 par, dividends £88,186; **Colombian Corp'n Ltd.,** 255,000 ord. sh. £1 par, 7pfd. sh. £1 each 5/pd.; **Natl. Mng. Corp'n. Ltd.,** 19,291 sh. £1 each 10/pd.

See descriptions under individual titles.

PARIS (TRANSVAAL) GOLD MINES, LTD. **COLOMBIA**

Liquidated in 1920 and holdings acquired by **British Platinum and Gold Corp'n., Ltd.,** which see.

PATO MINES (COLOMBIA), LTD. **COLOMBIA**

Subsidiary of Oroville Dredging Co., Ltd.

Office: Henry Richards, sec., 341 Salisbury House, London Wall, London, E. C., England. **Mine office:** Apartado 104, Barranquilla, Colombia.

Directors: Fred W. Baker, chairman; F. D. Behrend, H. S. Darby, A. Stanley Elmore, J. A. R. Agnew, and H. C. Porter. W. A. Prichard, supt.

Inc. Oct. 5, 1909. **Cap.** £100,000; shares £1 par; all outstanding; 89,021 shares owned by Oroville Dredging Co. The Pato Co. owns 14,000 shares of Nechi Mines, Ltd.

Financial Statement, years ending Sept. 30:

	Net Profit	Balance	Dividends
1920.....	£98,759	£188,234	£105,000
1919.....	29,724	195,475	.....

Dividends: 50% in 1919; 70% in 1920; 35% in 1919-20 (Dec.)

Property: 40,000 acres of gold gravel ground on the Nechi river, six miles from Zaragoza, Department of Antioquia. At last estimates, in 1913, 448 acres contained 19,092,650 cu. yd. averaging 29.1c per yd. to depth of 26.4'. Since then about 8,000,000 yd. has been dredged. The depth averages 31'.

Geology: the properties lie in an oval basin cut through by the Nechi river and surrounded by crystalline rocks; within the basin are flat tables of bedded gravel with red or blue clay strata that contain beds of peat or brown coal.

Equipment: includes hydro-electric power plant, and 8½ cu. ft. dredge, ice plant, and repair shops.

Production:

Year	Yardage	Yield	Per Yd., c.	Cost, c.
1920.....	1,437,600	$526,267	36.60	8.92
1919.....	1,379,331	489.953	35.50	8.77
1918.....	1,345,215	266.062	19.78	11.16
1917.....	1,181,945	650.522	55.40	11.20
1916.....	1,684,721	719.493	48.50	12.46
1915.....	1,308,470	618.884	47.30	11.40

PLATINUM & MINERAL ESTATES (COLOMBIA.) LTD. **COL.**

Address: A. J. Hardy sec., Empire House, Piccadilly, London, W. 1, England.

Directors: H. March, E. Cousens, M. A. Remson and J. Hegan-McGarry.

Inc. Nov. 12, 1919, in Great Britain. **Cap.** £25,000; in 20,000 7% pfd.

shares, £1 par, and 100,000 deferred shares, 1s par; 4,227 preferred and 96,000 def. issued.

The preferred shares receive all profits until they have had dividends totaling 100%.

Balance sheet of Dec. 31, 1920, shows cash £4, debtors £100. Preliminary expenses £500, general expense, £2,462, creditors, £4,181.

Property: option from J. Hegan McGarry on 200 sq. miles of gold and platinum bearing ground in Choco district, Colombia, S. A., for which company paid £5,000 cash and £5,000 in 100,000 fully paid deferred shares of 1s each.

SAN ANTONIA M. & S. CO. — **COLOMBIA**

A subsidiary of Colombia Mng. & Exploration Co., Ltd., which see.

SOUTH AMERICAN GOLD & PLATINUM CO. — **COLOMBIA**

Office: 61 Broadway, New York. **Mine address:** Andogoya, Colombia.

Officers: Adolph Lewisohn, pres.; Frederick and Sam A. Lewisohn, and E. H. Westlake, v. p.'s; F. M. Loper, sec.-treas., with James McDougall, A. F. Keene, J. H. Susmann, Walter Lewisohn, C. W. Stones, and J. Parke Channing, directors. N. C. Marshall, res, mgr.

Inc. Oct. 11, 1916, in Delaware. **Cap.** $10,000,000; $5 par; 1,800,000 issued, of which 1,466,018 are in escrow. Bankers Trust Co., registrar; Central Union Trust Co., transfer agent. Listed on New York Curb. Preferred stock was cancelled in 1919. Price range 1919-20-21, 14½ high, 3 low.

Bonds: $500,000; 7%, 10-years cumulative convertible income notes due 1926.

Company operates through a subsidiary (Compana Min. Choco Pacifico) Most of the shares are owned or controlled by Lewisohn Brothers, General Development Co., Consolidated Gold Fields of South Africa, Gold Fields American Development Co., and Johnson, Matthey & Co. of London.

Property: (1) about 10,000 acres, and (2) 50 miles of river beds and banks in the Intendencia of de Choco accessible from the San Juan river. Exceptional quantities of platinum and gold are said to be available; the ground so far prospected running as high as $6 per cu. yd., and averaging about $1.40.

Equipment: includes 3 steel dredges with monthly capacities of 40,000, 100,000 and 125,000 cu. yd. respectively; No. 2. began operating, Jan., 1921, and No. 3 in spring of 1922. With 3 dredges working, it is estimated cost will be 16c. per yard.

Production:

Year	Gold, oz.	Platinum, oz.	Value
1921	4,501	14,053	$1,100,000*
1920	1,520	6,967	800,000*
1919	972	6,349	700,000
1918	702	6,184	565,000

* Estimated.

DUTCH GUIANA

GUIANA DEVELOPMENT CO. — **DUTCH GUIANA**

Office: care T. T. Wilson, 120 Broadway, New York City.

Property: placer ground on the Maroni river, in Dutch Guiana.

Equipment: includes a 7-cu. ft. dredge, erected in 1920.

ECUADOR

Ecuador has only a small gold production, and although deposits of other metals are known, there are no operating mines. The total production of gold has in recent years averaged about $800,000 annually, coming mainly from the veins of the Zaruma district, in the southern part of the country.

AMERICAN ECUADOR TRADING CORPORATION ECUADOR

Address: Wetmore, Hedian & Co., Inc., 99 John St., New York City, and Esmeraldas, Ecuador, S. A.

Officers: L. L. Wetmore, pres.; Geo. D. Hedian, v. p.; Clark G. Drum, sec.-treas., Milton Kraemer, cons. engr., with A. R. Blake, directors.

Inc. in Delaware. **Cap.** $600,000 in $150,000 pfd. and $450,000 common; $5 par. Stock offered at $5 per share, with a share of com. stock as a bonus. Registrar and Transfer Co., New York, transfer agents.

Property: a controlling interest in two companies owning title in fee simple to 4 sq. miles of gold-platinum gravel ground on the Uimbi river, province of Esmeraldas, also a claim of 20 pertinencias on the Santiago river. Company is a gold platinum dredging proposition.

SOUTH AMERICAN DEVELOPMENT CO. ECUADOR

Office: 15 Broad St., New York City.

Mine address: A. M. Tweedy, res. mgr., Apartado 655, Guayaquil, Ecuador.

Officers: W. A. Kissam, pres.-treas.; J. W. Mercer, gen. mgr.; O. P. Ebling, sec.

Property: the Portovelo and Mina Grande gold mines in the Zaruma district, El Oro province. The company camp is Portovelo. Transportation of supplies is difficult and expensive, costing $85 to $95 per ton from New York. A 90′ head-frame costing $10,000 was erected in 1917. This mine contributes nearly all the gold produced in Ecuador. Veins are in fine-grained diorite and are often 15′ wide. Ore treated is a mixture of quartz and calcite, with 10% by weight of sulphides. Developed by shaft and adit, to depth of 700′.

Equipment: includes water-power, hoist, compressor, stamp mill and counter current decantation cyanide plant of 200-250 tons capacity.

Production: in 1920, mill treated 44,048 tons of ore and 46,049 tons of tailings were re-treated with a total output of $600,000 in gold and 65,000 oz. silver.

ZARUMA MINING CORPORATION, LTD. ECUADOR

Mail returned from former address, 156 Palace Chambers, London, S. W., England.

Directors: J. Rey, chairman; C. Brault, P. J. E. E. Chambost, A. E. Lund, E. Saladin and J. Vielle.

Inc. Jan. 31, 1913, in England. **Cap.** £120,000, in 110,000 pfd. £1 and 200,000 dfd. 1s. shares; 90,000 of former and all of latter issued.

Property: 1,838 acres in the Zaruma district. The Caridad lode contains gold-silver-copper-lead ore.

PERU

The mineral wealth of Peru has been famous since the days of the Incas, but the principal mineral products of today, copper, silver and oil, are produced by the aid of outside capital. The precious metal output is derived chiefly from copper ores, with a smaller amount from lead ores. The vanadium deposits are widespread, but production is mainly from the Minasragra mine which yields 80% of the world's supply of vanadium and is owned by the Vanadium Corporation of America.

The annual production averages about $1,250,000 in gold; 10,000,000 oz. silver and 46,000 tons copper.

AMERICAN VANADIUM CO. PERU

Merged 1919 into Vanadium Corp'n of America, which see.

ANGLO-FRENCH TICAPAMPA SILVER MINING CO., LTD. PERU

Mine office: Ticapampa, Huaras, Peru.

Offices: A. Dangerfield, 56 Cannon St., London, E. C. 4, England.
Paris office: F. J. Ruffier, 27 Rue Laffitte, Paris, France.

Directors: E. Quellennec, pres.; Baron J. de Catelin, managing; M. S. Stutchbury, M. Hentsch, C. Ledoux, P. G. Reumaux and R. de Thezillat. P. Fontenay, eng.

Inc. Dec. 10, 1903, in Great Britain. **Cap.** £140,000; £1 par; all issued.

Financial statement for year ended Dec. 31, 1920 shows an operating loss of 325,075 francs compared with profit of 858,699 francs for 1919. Loss deducted from share premium account leaves balance of that account, 1,619,263 francs. Reserve fund 424,076 francs.

Dividends: 169% from 1905 to 1917, inclusive, 27% being paid in 1917; 23% in 1918; 23% in 1919.

In 1915, absorbed the Peruvian Mining Trust Ltd. paying £16,100 in fully paid shares, and acquiring its silver mining property.

Property: the silver mine at Ticapampa, province of Huaras, Peru, formerly worked by the Com. Min. de Ticapampa for which company paid £1.800 cash and £70,000 in fully paid £1 shares.

Equipment: mining and milling machinery, and 100 km. railway.

Production: 374,400 oz. silver in 1916; 591,100 in 1917; 570,755 oz. in 1918; 352,165 oz. in 1919.

BACKUS Y JOHNSTON DEL PERU; SOC. MIN. PERU

(Subsidiary of Cerro de Pasco Corp'n.)

Main office: 134 Plateros de San Pedro, Lima, Peru.

N. B. Roper, gen. mgr., Casapalca, Peru; W. B. Donoghue, smelter supt.; J. D. Campbell, supt., Casapalca Mines.

Officers: A. J. Bennett, pres.; T. P. Jones, v. p.; with D. C. Babbitt, H. S. Hunter, and N. B. Roper, directors.

Inc. May 1, 1917, in Peru. **Cap.** £300,000; shares £1 par, fully paid. Company purchased practically entire holdings of the Backus & Johnston Co., a New Jersey corporation, fully described Vol. XI.

Cerro de Pasco Corp., which had held an one-half interest in the Natividad mine, is reported to own a very large interest in Backus Y Johnston.

Property: consists of several large groups of copper-silver mines in the Morococha and Casapalca districts, Peru.

Casapalca Mines: the principal mines in this district are the Carlos Francisco, Upper and Lower, the Cuarenta, Corina, Aguas Calientes and Chuquichuccho. The first named is devoloped by an adit, equipped with electric haulage, about 5,000′ long, which cuts the vein at a depth of about 2,500′ below the outcrop. The vein is being worked along a length of 7,500′ from the adit level, and from adits about 1,200′ and higher above the main adit. The output of the Casapalca mines is about 4,000 tons monthly averaging 2% copper and 40 oz. silver per ton including concentrates.

Morococha Mines: the company relies principally upon the Morococha district for its copper ores, the chief sources of supply being the Huillca, Natividad, Churruca, Isabel, Alicia, Favorita, Alapampa, Ombla, San Luis, Pacchapata, La Vieja, Manuelita and the mines of the Cia. Santa Clara, Cia. Minera de Pesares and of the Cia. La Blanca. All of these mines are operated by the company either on account of ownership, by partnership arrangement or on lease.

The Natividad, the deepest shaft of the district, is 500′ below the drainage tunnel level—a total of 1,000′. To provide for the deeper development of this and other mines of the district, a large central shaft is being sunk to a depth of 500′ below the level of the drainage tunnels and a pumping plant capable of handling 10,000 gallons per minute will be installed. The ore from the Morococha district is transported to the smelter, 32 kilometers distant, over the Peruvian Central Railway, which has a branch line 14 kilometers long running from Ticlio on the main line to Morococha.

Smelter: the smelter and concentrating plants are situated at Casapalca on the main line of the Peruvian Central Railway, 154 kilometers from the port of Callao, at an altitude of 13,700′. The company is operating at pres-

ent two of its three furnaces and four 96"x150" horizontal barrel type basic converters. The sintering plant consists of 20 roasting pots of 10 tons daily capacity each, and of three Dwight-Lloyd sintering machines. The smelter handles a considerable quantity of custom ore.

Concentrating plant: the concentrator rebuilt in 1921 contains a primary washing and picking plant, in which the ore from the Casapalca mines is first screened and washed and then hand-picked to remove waste and high-grade ore, the intermediate product going to the mill proper. The fines from the washer go direct to the smelter. The concentrating mill contains: one No. 5 gyratory crusher, one 36" Symons disc crusher, two 6' ball mills, one 4½' Hardinge regrinding ball mill, eight shaking screens, one 6' Dorr Classifier, six Butchart sand tables, four Deister fine sand tables, and seven Deister slime tables. Primary slime is thickened in two 30-ft. Dorr thickeners and treated by flotation in 9 K. & K. machines. Flotation concentrates are dried in leaf filters built at the plant.

The main power plant, situated on the Rio Rimac, 4 miles below the smelter contains two 800-k. w. generators driven by Pelton wheels, transmission being at 10,000 volts. At the smelter there are two 150- k. w. and one 125-kw. generators, also driven by Pelton wheels. Air is furnished as follows: for the furnaces, by one 118-cu. ft. and two 200-cu. ft. Connersville blowers, both driven by Pelton wheels, and by one motor-driven turbo-blower of 24,000 cu. ft. capacity; or the sintering pots, by 3 small rotary blowers of the Connersville type; for the converters, by a 14,000 cu. ft. Nordberg blowing engine, direct-driven by a synchronous motor; for the Casapalca mines, by 3 motor-driven air compressors with a combined capacity of 5,000 cu. ft. free air per minute. A 500-ton sampling mill and 16-oven coking plant were erected in 1919.

Production:

Year	Fine Copper, lb.	Silver, Oz.	Gold, Oz.
1914.....	11,115,176	2,948,338	1,734
1915.....	11,438,165	2,842,477	1,969
1916.....	19,395,396	3,262,499	2,587
1917.....	23,647,771	3,492,724	3,494
1918.....	23,940,043	3,351,294	3,810
1919.....	21,679,514	2,737,445	3,360
1920.....	16,268,273	2,465,809	2,442

CAYLLOMA; CONSOLIDADA SOC. ESPLOTADORA DE PERU

Office: Casilla 178, Valparaiso, Chile.

Officers: G. C. Kenrick, pres.; H. A. Barker, mgr.; L. J. Rosenshine, mill supt.

Inc. 1906, in Chile. **Cap.** £125,000; shares 5 shillings par. Gross sales of products in 1917 were £34,142.

Property: 500 acres in Province of Caylloma, Arequipa, Peru. The outcrop of vein now worked is over 13,000' long. Company took over property originally worked by the **Caylloma Silver Mining Co.**, formed in London in 1889. The first silver mines of the district were worked by Spaniards in 1630, and prior to that time by the Incas.

The mines, which are at 16,500' elevation, show andesite cut by quartz-rhodonite veins carrying rich silver minerals, together with galena and chalcopyrite. The ores of milling grade average 20 oz. silver per ton, the sorted ore 100 to 300 oz. silver per ton, with some gold.

Development: by 6,000' drainage tunnel tapping center of ore deposit.

Equipment: includes 80-ton treatment plant with 12 Nissen stamps, Deister tables, and cyanide works. Plant was reconstructed in 1919.

Production: the monthly output averages 110 tons of concentrate assaying 6 to 9 kg. (190 to 280 oz.) silver, with gold and lead. Cost of mining is $8; milling, $5; and total, $20 per ton of ore mined.

CERRO DE PASCO COPPER CORPORATION — PERU

Office: 15 Broad St., New York.

Officers: L. T. Haggin, pres.; Edward H. Clark, v. p.; with Ogden Mills, J. H. Harding, A. J. Bennett, Charles Steele, Allan McCulloh, directors. C. V. Drew, 2nd v. p.-purch. agent; H. Esk Moller, sec.-treas. W. J. Hamilton, gen. mgr., Lima, Peru.

Inc. Oct. 28, 1915, in New York, succeeding the Cerro de Pasco Copper Investment Co. **Cap.** 1,000,000 shares, without par value; 898,229 issued. Annual meeting second Wednesday in May. Columbia Trust Co., New York City, transfer agent; Bankers Trust Co., registrar. Listed on New York Stock Exchange. Shares were $67½ high and $31 low in 1919. In 1920 the high was $61⅜, and low $25; in 1921, range was $36½ to $23.

Bonds: $8,000,000, ten-year, convertible, 8% gold bonds issued in Jan., 1921, to pay for the new smelter, etc. An annual sinking fund, 20% of net earnings, to be set aside for their redemption; $140,000 of bonds were called Jan. 1922. Bonds (at $105) may be exchanged for stock at any time at $33⅓ per share.

Company owns $2,850,000 of the $3,000,000 capital of the Cerro de Pasco Railway Co. In 1917 the **Cerro de Pasco Mng. Co.** and **Morococha Mining Co.** were dissolved, and their assets and liabilities were transferred to this corporation.

Cerro de Pasco owns also a stock interest in the American Metal Co: and in the Soc. Minera Backus Y Johnston del Peru, which see.

Financial Statement: years ended December 31;

Assets.

Year	Mines and works	Investments	Current	Total
1921....	$33,255,629	$1,233,630	$15,403,242	$50,557,809
1920....	45,021,673	7,867,133	16,498,527	70,667,385
1919....	27,935,412	6,684,777	19,460,353	54,080,542
1918....	25,723,581	6,408,284	16,818,731	48,950,596
1917....	25,339,400	6,037,011	12,618,272	43,994,683

Liabilities.

Year	Capital	Bonds	Capital Surplus	Deferred	Current	Property & oper. surplus	Total
1921..	$6,200,000	$7,997,000	$32,497,656	$583,831	$3,248,984	$40,336	$50,557,809
1920..	5,000,000	.....	33,695,486	6,738,017	8,631,382	19,602,498	70,667,385
1919..	5,000,000	.....	18,545,145	1,829,619	5,275,612	23,429,796	54,080,542
1918..	5,000,000	.....	18,545,515	4,156,338	3,608,439	17,640,304	48,950,596
1917..	5,000,000	4,542,000	14,003,515	2,653,850	1,556,353	16,238,966	43,994,683

Profit and Loss.

Year	Sale of Metals	Dividends etc. rec'd.	Inventory	Total	Oper. Charges	Taxes	Depr. & Depl.	Profit
1921	$17,592,080	$1,333,129	—$2,651,994	$16,273,205	$12,754,792	$477,964	.....	$3,040,459
1920	11,463,572	2,319,890	+1,524,577	22,861,250	8,417,195	691,576	$3,402,721	618,433
1919	14,884,050	1,294,593	+2,005,359	18,184,002	11,574,510	919,036	3,406,828	2,283,628
1918	22,867,807	752,014	—124,970	23,494,851	13,492,123	1,344,388	6,758,424	499,916*

*$2,000,000 deducted for U. S. tax reserve.

Surplus Account.

	Profit	Previous Balance	Reserves Adjustment, etc.	Dividends paid	Balance
1920....	$618,433	$10,273,493+	$5,708,166	$3,592,909	$1,590,843
1919....	2,283,628	7,290,830—	4,291,944	3,592,909	10,273,494

Below follows consolidated income and surplus account for 1921:

Sales copper, silver and gold	$17,592,080
Dividends, etc., received	160,093
Freight and passenger earnings	1,173,035
Inventory Dec. 31.	4,357,183
Total	23,282,391

Inventory Dec. 31, 1920	7,009,177
Operating expenses, etc.	9,946,053
Custom ores	2,808,739
United States and foreign taxes	477,964
Interest on bonds	635,570
Balance	2,404,889
Dividends	449,115
Surplus	1,955,774
Profit and loss surplus	40,336

Dividends: initial of $1 March, 1916, and $3 in that year; $4 in 1919; $4 in 1920; 50 cents March, 1921; none since.

Property: at Cerro de Pasco consists of about 400 acres of land that includes three-fourths of the rich Cerro de Pasco district, with a smelter site and extensive coal tracts north of Cerro de Pasco.

Cerro de Pasco lies 14,300′ above sea level, rendering physical labor very fatiguing. The population of the town is about 6,000 of whom only a small percentage are white. The region is bleak and all food and supplies must be brought in from considerable distances. The year has but two periods, the wet and dry, the former from November to April. Both are said to be bleak and exceedingly disagreeable. Snow and hail fall at any time, summer or winter, but rarely remain on the ground as long as 48 hours even in winter. The fluctuation between mean summer and winter temperature is about 20° F. only, less than the daily variation.

Silver was discovered at Cerro de Pasco in 1630, and the mines produced to the close of the nineteenth century about 450,000,000 oz., from 40,000,000 tons of silver and copper ore, nearly all extracted by hand-work and carried 3 to 6 miles on the backs of llamas, to primitive smelters, whence the silver bullion was transported by llamas 200 miles to Lima, until 1870, when a railroad was completed to Oroya. Formerly only the copper ores of 25 to 40% were shipped.

Geology: the ore deposits occur in rhyolite agglomerates and tuff, forming the western part of a body of rhyolite 1¾ miles across, that is intrusive in, and surrounded by limestone. Over an area a mile wide and nearly 2 miles long, nearly every claim carries ore. The orebodies outcrop prominently as crestones, or ridges and carry gold, silver, copper, lead, zinc and cobalt. The oxidized zone carries considerable gold, running as high as 1 to 2 oz. per ton, occurring in rich but erratic shoots. The high silver values usually extend to about 100′ depth only, occasionally running up to thousands of ounces per ton, followed by rich silver-copper ores, which in turn at a little greater depth, are suceeded by ore low in silver but richer in copper, the copper ores being estimated to have averaged 15 to 30 oz. per ton in the old workings. Primary ores below the water level contain bornite and chalcopyrite, associated with pyrite, tetrahedrite, arsenopyrite and sphalerite, containing little silver and only traces of gold. There are occasional veins of high-grade silver-lead ores, with others carrying up to 8% zinc; practically all the copper ores are bismuthiferous, hence refractory in reduction. The ores carry about 35% silica and 14 to 30% iron, the excess of silica requiring considerable limestone for fluxing.

Development: the Cerro company is working its orebodies through 5 shafts to a depth of 800′. The surface of the property shows scores of tajos, big pits resulting from the caving in of old open cast workings, some of these being 300′ deep. The property lies in a basin, and the mines are very wet, especially below a depth of 400′. The Rumiallana drainage tunnel, begun April, 1877, by Henry Meigs, was completed 1907, by the Compania Empresa Socavonera del Cerro de Pasco, with which a financial arrangement was made, through a 5% stock interest given in the Cerro de Pasco Copper Co. obviating the payment of a 20% royalty.

The present company disregarded old workings and opened a new mine,

by 2 tunnels, of about 2 miles length each, and 5 new shafts. The Diamante, Pena Blanca, Carmen and Noruega 2-compartment shafts have 4 levels opened and are bottomed at 410′. The Excelsior shaft is 800′ deep with levels 100′ apart and serves the entire mine. Waste is used for filling, timber being very expensive, and used only for lining shafts and timbering important tunnels. The mines are equipped with powerful pumps. Reserves of ore blocked out are said to be kept 4 years ahead of smelter consumption, these including first-grade ore of 8 to 10% copper tenor, with good silver values, and second-grade ore, of uncertain copper tenor, though probably workable in the main.

According to M. R. Walker, the Rumiallana drainage tunnel is a working level, 30′ below the 400′ level. Shrinkage, square set, and cut and fill methods are employed. Reserves averaging 5% copper, were estimated in 1918 as sufficient for 20 years. All hoists are electric. Coal and oil-fired boilers are available. A total of 1,600 h. p. is used at the mines. Electric locomotives run on the main haulage levels, pulling six 22-cu. ft. ore cars; new cars are to be 40 cu. ft.

Additional to the tonnage of available copper ore there is estimated to be over 100,000,000 tons of oxidized silver ore assaying from 8 to 18 oz. per ton. Of this, 18,800,000 tons are blocked out, and contain a total of 200,000,000 oz. of silver.

A new main hydro-electric power plant at Oroya, is supplied by water from the Yauli river through a 4,700′ pipe line. Twin water wheels, of 5,000-h. p. at 300 r. p. m. each, operate under a 700′ head, and drive 4 generator units with total capacity of 15,000 kva., delivering a 2,300 volt current to 9 transformers, where it is raised to 55,000 volts for use at the mines, Morococha concentrator, smelter and collieries.

Reduction works: at La Fundicion, near Tinahuarea, 9 miles from the mines, are connected therewith by rail. All buildings are of steel frames, covered with corrugated iron. The plant treats a small quantity of custom ores and has a sampling mill with crushers, rolls and chain-bucket elevators. The works are terraced throughout, permitting the handling of material by gravity and are built on the unit plan.

The furnace building has twelve 2,000-ton flat-bottomed steel ore bins, filled from railroad tracks above, and loading into charging cars run along side, that are drawn by small locomotives on a narrow-gauge track running on either side of each furnace, 2 cars constituting a charge. There are five 56″x180″ water-jacketed blast-furnaces of about 300 tons actual daily capacity each. Slag is granulated by running water. The smelter building has a steel stack, 220′ high and 20′ in diameter. There are three 60′ reverberatory furnaces, fourteen 18′ six-hearth McDougal calcining furnaces and 6 Dwight-Lloyd sintering macrines.

Pulverized coal is burned in all furnaces. The process was described in the June, 1920, Min. & Met. of the A. I. M. & M. E. by C. L. McIntyre.

The converter department, in a separate building, has 4 Pierce-Smith basic lined converters. Product of the converter is 99% blister copper, in cakes, shipped to Baltimore for refining.

The Fundicion smelter is old, antiquated and built at too high an elevation, owing to rarity of atmosphere. It will be superseded in 1923 by a new plant, erected near Oroya, the junction point of the Cerro de Pasco Railway and the Central Railway of Peru. This site, some 2,000′ lower than the present smelter, is much nearer to both the Morococha mines and to the port of Callao from which bullion is shipped and where supplies and construction material are received. Smelter will embody the most modern and approved ideas. One unit reported to be in operation and plant is to be completed some time in 1923 at cost of $9,000,000, with total capacity of 2,500 tons of ore per day.

The Morococha property: includes the Gertrudis, San Francisco and

San Miguel mines. Company also owns the Natividad mine through the Backus Y Johnston company, now a subsidiary of Cerro de Pasco.

The Mina Gertrudis, opened 1897, on the Cerro San Marcello, west of Lake Morococha, shows 3 limestone beds with ore impregnations following the bedding planes; vein has strike of N. 51° E. and nearly vertical dip. It averages about 2 meters in width, with a paystreak of 60 cm. to 1 meter, carrying gray copper and chalcopyrite averaging about 14% copper and 1,000 grams silver per metric ton, balance of vein carrying about 5% copper and 300 grams silver per metric ton. The mine is developed by a tunnel, just above the level of Lake Morococha, mining through winzes sunk from short crosscuts in the hanging. Ore is hand-cobbed at the portal of the tunnel.

The Natividad mine is opened to about 306 meters depth, developing a vein about 4' wide, carrying ore averaging 14% copper and 14 to 70 oz. silver per ton. A new tunnel, planned to be 750 meters long, is being driven under the old workings.

The Mina San Miguel is developed by the Copaycocha and Vulcano tunnels, latter of about 100 meters length, and ore is mainly enargite, with some tetrahedrite and tennantite, associated with pyrite. Mine was opened 1893, and in 10 years produced 6,476,400 kg. fine copper and 10,794 kg. fine silver from ore averaging about 20% copper and 333 grams silver per metric ton.

The San Francisco is opened by a 4,000' tunnel, known as the Carlos Reynaldo adit. Production is approximately 20,000,000 lb. per year, smelted at the Cerro de Pasco works.

Cerro de Pasco Railway Co.

Subsidiary of Cerro de Pasco Copper Corporation. Results may be summarized as follows:

Year	Revenue	Charges	Profit	Balance available	Dividends	Current assets	Current liabilities
1920.....	$1,118,619	$857,358	$261,261	$1,147,243	$213,750	$678,791	$41,398
1919.....	998,587	829,734	168 853	1,355,886	285,000	595,100	63,870
1918.....	1,069,056	744,199	324,857	1,472.033	285,000	404,321	65,286
1917.....	1,043,090	682,570	350,519	1,631,675	484,500	391,206	55,538

The company has a main line of 83 miles, running from Cerro de Pasco to Oroya, where connection is made with the Central Railway of Peru, which runs thence 130 miles to Callao, the latter line being one of the most notable in the world, having cost $43,000,000 and gaining nearly 3 miles vertical elevation, reaching the highest altitude of any railroad on the globe, having an average grade of 2.5%, with no less than 37 tunnels, including the Galera tunnel of one kilometer length which cuts through a ridge of the Andes. The Cerro de Pasco railway has a branch to the coal fields, and, with all spurs, sidings and yards, has about 135 miles of standard-gauge track laid with 70-lb. rails. The main line has an average grade of 1.5%, with a maximum grade of 3%, and cost upward of $2,000,000 Equipment includes 13 locomotives, in addition to 6 light switching engines at the smelter, and 59 steel ore and coal gondolas, with a total of 247 forty-ton cars, rollling stock being of the best American manufacture. The railroad is on a paying basis.

The company employs about 2,200 men at the copper mines, 1,500 men at the smelter, 1,000 at the Goyllarisquisca coal mine, 400 at the Vincuscancha coal mine, and 200 at the Quishuarcancha coal mine.

In January, 1919, striking workmen at the Morococha dynamited the power lines, causing flooding of lower levels, and American employees had to abandon the camp.

Production: 3,389,787 lb. copper in 1906; 20,258,689 lb. in 1907; 23,646,921 lb. in 1908; 30,327,423 lb. in 1909; 31,713,012 lb. in 1910; 48,600,926 lb. in 1911; 45,272,000 lb. in 1912; 43,856,000 lb. in 1913; 40,753,000 lb. in 1914; 61,000,000 lb. in 1915; 71,452,000 lb. in 1916; 72,650,000 lb. in 1917; 71,910,000

lb. in 1918; 58,124,000 lb. in 1919; 50,004,104 lb. in 1920; 56,294,000 lb. in 1921. Silver and gold output were 4,347,247 oz. and 26,382 oz. respectively, in 1920. The total output for 13 years ending Dec. 31, 1920, was 660,779,611 lb. copper, 45,904,700 oz. silver, and 292,825 oz. gold.

Copper is refined and marketed by the American Metal Co., Ltd.

The Cerro de Pasco has been a costly undertaking, the total investment to date being $25,000,000. The ores are refractory and the great altitude of the old smelter, which is 14,300′ above sea-level, coupled with inefficient native labor, have given rise to an exceedingly complex and tiresome problem in ore reduction. The labor however is cheap, and this, together with the high silver content of the ore, places the company among the world's lowest cost copper producers. With its new reduction plants, Cerro de Pasco is in position to substantially increase its production, and to make substantial profits.

CERRO DE PASCO EXTENSION, INC. **PERU**

Name changed to Peruvian Copper and Smelting Co., which see.

CERRO VERDE MINE **PERU**

Address: Carlos J. Lohman, owner, Arequipa, Peru.

Mine address: J. A. Gibbons, mgr., Arequipa, Peru.

Property: 244 pertenencias, about 20 miles S. E. of Arequipa, 9 miles by automobile road from railway at Taibaya. Elevation of mine is 8,800′.

Geology: copper occurs in a disseminated deposit in rhyolite, near a contact with porphyritic diorite. Two irregular masses of granodiorite divide the rhyolite mass An oxidized zone about 220′ deep has silicates and carbonates; these pass downward into secondary sulphides changing at 320 to 450′ in depth to primary sulphides.

Development: property is being thoroughly prospected by churn-drilling and by underground work from a 430′ shaft. Work on the 250′ level totals 3,000′. The deposit is said to contain more than 10,000,000 tons that average between 2 and 2½% copper.

FERNANDINI, E. E. **PERU**

See Santa Barbara Mine.

FERROBAMBA, LTD. **PERU**

Office: F. F. Fuller, sec., 638 Salisbury House, London, E. C, Eng. **Operating office:** Arequipa, Peru. **Mine office:** Ferrobamba, Catobanbos, Apurimac, Peru.

Directors: A. C. Burrage, chairman; A. C. Adams, T. C. J Burgess, A. J. W. Lawson, C. D. Burrage, H. W. Brown and A. Solomon.

Inc. Nov. 5, 1909, in Great Britain. **Cap.** £150,000; 60,000 priority shares, 10s. par; 39,381 issued; 120,000 ordinary shares, £1 par, fully paid. Is registered in Peru.

Financial report of Dec. 31, 1920, shows, total expenditures in Peru, to date £52,767 being £1,723 for year 1920, expenditures in London, were £825 in 1920, or a total to date of £9,183. Sundry debtors, £65. Cash £36, liabilities include, loans and accrued interest, £15,406, creditors, £336

The Ferrobamba property is in central Peru at an elevation of 13,000′ above the sea and about 45 miles west of Cuzco, the terminus of the Southern railway, 500 miles from Mollendo, the seaport. The 207 claims are in 10 groups, covering 2,255 acres, in the Cotobamba district, state of Cuzco, Peru. The deposits show oxidized copper ores at the surface, underlain by sulphides largely bornite, and can be worked by steam shovels.

Property: includes valuable water-right concessions, from which it is planned to develop hydro-electric power, the rivers being fed by the melting snows of the Andes. The concessions include water rights to the Rio Chalhuahuacho and several affluents, and application has been made for similar rights on the Rio Apurimac, about 25 miles in an air line from Ferrobamba No. 1. Including the last named concession, the available water power is rated at 120,000 h. p.

The property has been divided into 5 zones, or groups, known as Ferro-

bamba No. 1, Ferrobamba No. 2, Katanga, Charcas and Bonanza. Conditions are much the same at these different properties and it is thought that all can be worked opencast.

Ferrobamba No. 1, 900 acres, shows an enormous mass of garnet rock, apparently of contact metamorphic origin, rocks being hornblende-biotite-granite and limestone altered into wollastonite by contact metamorphism for a remarkable distance in many places up to 3,000' from any recognized igneous contact. An area of 34 hectares of proven copper ground, 2,300' long and 1,640' wide, is estimated to carry ore of payable tenor to a depth of 200', or approximately 12,000,000 tons of ore.

Churn-drilling with Keystone drills from 1910 to 1912, together with underground work in 15 tunnels and in the shafts, proved 6,000,000 tons of ore averaging 3.7% copper and 1.3% sulphur.

Ferrobamba Nos. 2 and 3, 300 acres, constitute the Sulfobamba mine. Development to January, 1913, has proven 778,000 tons of ore carrying 2.25% copper, with 6.75% sulphur and 532,000 tons too low grade to work.

The Katanga or Reina de Cobre mine, 300 acres, is undeveloped.

The Charcas group, though having an area of only about 35 acres, contains a pyrite orebody 100 meters wide and 800 meters long, carrying chalcopyrite with pyrite, the face of a bluff of ore assaying 5% copper, 3 oz. silver and 9 grams gold per ton.

The Bonanza claims, 420 acres, lying 9 miles south of Ferrobamba No. 1, apparently resemble the other properties, but no mining has been undertaken.

Development: 8,300' of tunnel or adit work and continuous operation of 2 churn-drills.

Property has been examined and reported on by Frank Klepetko and W. H. Wiley. Property closed down awaiting railway transportation.

Company is inactive and property in charge of a responsible caretaker.

LAMPA MINING CO., LTD. **PERU**

Address T. S. Hancox, sec., 411 Tower Bldg., Liverpool, Eng. **Mine address:** E. C. P. Barber, gen. mgr., Santa Lucia, Peru.

Directors: J. L. Barber, chairman, S. Downs, H. P. Gamon, Maj. J. Grundy, W. H. Hasler.

Inc. June, 1906. **Cap.** £100,000; £1 par; all issued.

Financial report for year ended June 30, 1920, shows an operating profit of £8,024; dividends absorbed, £7,000; balance carried forward, £4,137, cash, £239; copper ore and matte, £12,988; supplies, £19,676; creditors, £20,553.

Dividends: 10% in 1919-20, none since.

Property: the Grundy, Cerillos Santa Catalina San Otto, San Carlosy Socavon, Esmeralda and Rubi copper mines, 17 pertinencias, at Santa Lucia station, province of Lampa, department of Puno, Peru. Also the Fuerra Electrica site and the Toropujani water power.

Equipment: includes water power plant and smelting plant.

MOROCOCHA MINING CO. **PERU**

Absorbed in 1917 by Cerro de Pasco Copper Corporation, and company dissolved.

NEW CHUQUITAMBO GOLD MINES, LTD. **PERU**

Office: 459 Salisbury House, London, E. C. 2, England.

Mine office: Joseph Crankshaw, res. mgr., La Quinua, Junin, Peru.

Directors: F. Lowy, chairman; F. E. Macfadyen and F. H. McCardie.

Inc. May 22, 1907, in Great Britain. **Cap.** £50,000; £1 par; 44,869 issued.

Financial statement for 24 months ending June 30, 1919, shows a loss of £4,926 and creditors, £8,124. **Dividends:** 36% from 1907 to 1916.

Property: 142 acres, the Esperanza, Carmen, Cacara and Santiago gold mines on Chuquitambo hill, 1,000' high at La Quinua near Cerro de Pasco, Junin, Peru, with replacement deposits of auriferous quartz lying with the

bedding of limestone where cut by andesite dikes. The ore is 65′ wide, and carries $4 to $25 per ton gold.

Development: by tunnels and open-cuts. **Equipment:** a 40-stamp mill and cyanide plant.

Production: £12,567 from 19,360 tons in 1916; £10,743 from 21,333 tons in 1917; £18,980 from 41,294 tons in 1918 and 1919.

Property is a gold mine 200 years old that has never been worked in depth. Present company has driven a 1,200′ tunnel, 600′ below the old Carmen workings and geological conditions indicate extensive orebodies below old workings.

PERUVIAN COPPER & SMELTING CO. PERU

Successor to **Cerro de Pasco Extension, Inc.**

Offices: 115 Broadway, New York; and Pachacayo, Peru, S. A.

Officers: J. A. Vandegrift, pres.; B. W. Steele, v. p.; F. W. Mason, sec.-treas., with C. S. Farnum, J. W Murray, F. T. Harrington and R. R. Carter, directors. M. W. Breden, asst, sec. Carl B. Neel, cons. engr.; C. C. Rossi, supt.

Inc. Aug. 10, 1917, in Delaware. **Cap.** $10,000,000; $1 par; non-assessable; 5,000,000 issued. U. S. Corporation Co., registrar; transfer office, 65 Cedar St., New York. Annual meeting, second Tuesday in March.

Stock offered at 70c. per share in 1920; quoted among unlisted securities, 15c. was bid and 25c. asked in Oct. 1921. Company said to have ample funds in treasury to carry out the construction and development work planned. No financial statement published.

Property: 1,101 acres of copper-silver and 40 acres of silver-lead claims at Yauricocha, in the district of Yauyos, on western slope of the Andes, 50 miles S. W. of Pachacayo on the Central Railroad of Peru, and 262 kilometers from Callao on the coast. Also owns 4,082 acres of coal land at Jautenhausi, 20 miles E. of Yauricocha, and 30 miles from Pachacayo. Examined by Frank Klepetko.

Geology: the Yauricacha ores occur in a contact between limestone and diorite. The orebody is vertical, runs N. W.-S. E. and has a length of 2,500′. Ore is carbonate changing to sulphide at water-level at 400 to 500′ below surface. Ore said to average 16% copper and 3 oz. silver.

Development: at Yauricocha, by 2 vertical main shafts, 225 and 400′ deep, and 4,000′ of workings. Reserves reported as 400,000 tons, plus 3,000,000 tons of probable ore to a depth of 300′. In January, 1920, a crosscut on the 225′ level was reported to have gone through 110′ of 23% ore and the 375′ level showed 130′ of 26% ore. Vein is said to be proven for 2,500′ in length and to 400′ in depth.

At the Felicidad copper mine, 3 miles W. of Yauricocha, little work has been done. The vein is said to be 300′ wide and 4,000′ long on surface, and it is expected to become a large mine.

The Jupiter and La Porfia silver-lead mines, 14 miles W. of Yauricocha and 6 miles E. of the coal mines, have not been worked by this company, though they yielded ore running 51% lead and 100 oz. silver per ton when worked by former owners.

The Jautenhuasi coal properties contain 4 veins of coal 3 to 4½′ thick with no partings. The coal cokes well and is good enough for boilers. Tests made at the Casapalca smelter were satisfactory and the coal gave good results in locomotives of the Central Railroad of Peru. Reserves are given as 40,000,000 tons. The Government of Peru is said to have voted $1,500,000 towards construction of a railway to these mines.

At Rangracancha, 6 miles W., company has another coal mine.

Equipment: includes a 300-h. p. hydroelectric plant with foundations for 600-h. p. steam and gasoline hoists, compressor, ½ mile of 3′ gauge tramway, complete 100-ton copper smelter, with two 50-ton reverberatory furnaces, machine-shop, warehouse, dwellings, and motor road under con-

struction. In January, 1921, 400 men were employed on the motor road and 200 at the mines.

Production: 1,541 tons of ore from the Yauricocha mine, reduced at the Casapalca smelter, averaged 23.68% copper and 2½ oz. silver per ton, giving a gross return of $153,422. None of this ore was selected, according to official reports.

Company proposes to increase the capacity of the smelter to 300 tons per day, which with cost of power plant, road, coal mine expenses, etc., will cost $1,500,000.

QUEQUENA; COMPANIA MINERA de **PERU**

Owners: Miguel Gamon y Rubio, Arequipa, Peru, and Manuel Chinchilla, Iquique and Valparaiso, Chile.

Property: about 18 miles S. E. of Arequipa, at an elevation of 11,000', in the same mountains as the Cerro Verde of the Andes Copper Co., contains 8 veins carrying from 18" to 5' in width. Ore consists of silicate and carbonate of copper, changing with depth to chalcocite and bornite with a quartz gangue and assaying from 4% to 60% copper, and up to 40 oz. silver per ton.

Development: by 2 old shafts, 250' deep. The property is practically virgin ground, the only work so far done being exploratory. Has shipped ore containing 15 to 30% copper and 25 to 40 oz. silver per ton. Idle.

SAN ANTONIO DE ESQUILACHE (PERU) MINES, LTD. **PERU**

Address: H. C. Rogers, Finsbury House, Blomfield St., London, E. C. 2, England.

Directors: H. J. Hardy, chairman. W. Bartlett, J. A. Nix and P. Bebin.

Inc. November, 1914. **Cap.** £300,000; £1 par; 291,966 shares issued, of which £208,700 was given for property.

Property: the gold-silver-lead mines, 365 acres near Puno, Peru, formerly owned by the San Antonio de Esquilache, Ltd.

Operations suspended until further working capital is raised.

SANTA BARBARA MINE **PERU**

Address: Eulogio E. Fernandini, Callao or Huancavelica, Peru.

Property: the Santa Barbara and other mercury mines at Huancavelica, in department of same name, about 30 miles S. W. of Izuchaca, eventually to be the nearest rail point. The deposits were first opened in middle of 16th century and are reputed to have produced 550,000 tons of quicksilver prior to 1790. But little work was done from 1839 to 1915, when Sr. Fernandini bought the mine. The mineral belt, 1 mile in width, follows a contact of limestone and sandstone, intruded by irregular masses of basalt and porphyrite. Cinnabar occurs as impregnations both in the sandstone and limestone, the ore containing 2% mercury.

Development: was by open-cut and tunnels, the Belen tunnel being nearly 2,000' long and cutting orebody about 500' deep. New work includes a 4,100' tunnel, some 700' below the Belen; at last account was advancing 130 to 145' per month.

Equipment: includes 106 h. p. hydro-electric plant and 6 small compressors. Experimental furnaces were operating in 1919-20 and making an 80-83% recovery.

SOUTH AMERICAN METAL CO. OF PERU **PERU**

Subsidiary of American Metal Co.

Organized to act as the representative of the Am. Met. Co., Ltd. in Peru, and to do a general business especially in connection with the buying and shipping of ore and matte for refining in the U. S.

TINTAYA MINE **PERU**

Property: 1,320 pertenencias, 10 miles S. E. of Yauri Cuzco, Peru, and 60 miles by good roads to Chuquibambilla on Juliaua Arzco Ry. Silicate and carbonates, as well as cuprite bornite, chalcopyrite and native copper are found.

VANADIUM CORPORATION OF AMERICA **PERU**

Formerly **American Vanadium Co.**

Offices: 120 Broadway, New York; Bridgeville, Pa.; and Minasragra, Peru.

Officers: J. L. Replogle, pres.; M. G. Baker, v. p.; E. F. Nickerson, sec.; L. K. Differderfer, treas.; with Charles M. Schwab, T. M. Schumacher, T. Coleman du Pont, Ledyard Cogswell, E. R. Tinker, H. P. Whitney, F. K. Sheesley, C. M. MacNeill, C. M. Walton, Jr., E. E. Fernandini and Joseph De Wyckoff, directors.

Inc. 1919, in Delaware. **Cap.** 300,000 shares, increased to 500,000 shares in 1920; no par value; 373,334 issued. Guaranty Trust Co., transfer agent; Chase Natl. Bank, registrar. Listed on N. Y. Stock Exchange.

Range of shares during 1919-20 was $97 high and $34 low. A total of 3,635,895 shares changed hands during 1920. In 1921, range was $41 to $25⅛, with sales totalling 912,700 shares.

Balance sheet, Dec. 31, 1921, shows assets $14,909,018, including properties, $10,379,524; patents and processes, $1,000,000, current assets, $3,397,882; def. charges, $131,612. Liabilities include capital stock, $14,323,697; current, $38,691; reserves, $639,429. P. & L. account shows a deficit of $92,799, as compared with $520,592 surplus in 1920; a total of $1,320,648 has been expended on plants and improvements. First 6 months of 1921 showed a net income of $86,613 and deficit of $60,291 after depletion and depreciation.

Dividends: initial quarterly of $1.50 per share on April 15, 1920; $4.50 in 1920; $1 in 1921.

Peruvian Property: vanadium mines at Minasragra, Peru, and smelters at Bridgeville, Pa., where ferro-vanadium is made.

The ore deposits, which are the richest and most productive vanadium deposits in the world, were originally located for coal but their real nature was discovered by the manager of the Hauranca smelter in 1905, who denounced them jointly with E. E. Fernandini. The latter sold out to J. J. Flannery, in 1908.

Geology: the mines, which produce 80% of the world's supply of vanadium, are in the Andes at an elevation of 16,800'. The orebody is a lens-shaped mass 300' long and up to 30' thick, enclosed in red gypsiferous shales near igneous intrusions of varying composition. The ore is made up of the hydro-carbon mineral quisoqueite, coke and patronite, a greenish-black sulphide of vanadium. (See Hewitt Trans. Am. Inst. Min. Eng., Vol. 4, 1909). The orebody is exploited by stripping and open cut methods. Tunnels and drilling have recently located a second large deposit. The ore as shipped has averaged 19% metal, but the reserves are of lower grade though estimated to contain 28,000,000 lb. vanadium in blocked out and probable ore.

Equipment: includes gasoline locomotives and equipment of open-cut work. Connection is being made with Peru Central Ry. at Jumasha, 28 miles distant by means of narrow gauge railroad and water transportation. A 500-h. p. hydro-electric power plant also is under construction.

Production: annual output of vanadium is about 3,000,000 lb., enough for 1,000,000 tons of steel. Ferro-vanadium sells for $5.00 per lb.

In December, 1919, the Vanadium Corporation announced that it had absorbed the **Primos Chemical Co.** of Colorado and its subsidiary companies, **Primos M. & M. Co. and Primos Exploration Co.**

Colorado Properties.

Company owns at Vanadium, Colo., about 4,700 acres of roscoelite bearing land, and mines at Bear Creek, Fall river and Placerville, developed by 400' shaft and tunnels. All work in this district was stopped late in 1920.

The Urad mine covering 570 acres, the first in America to be worked for molybdenite exclusively, is in the Daly district, 11 miles above Empire, Clear Creek county, Colo. Ore occurs in veins, is mined through tunnels and an open cut, the product being sacked and shipped. Equipment includes

compressor, 250-ton flotation mill and 2,400′ aerial tramway. Treatment was described by W. H. Coghill and J. P. Bonardi in the Eng & Min Journal of May 29, 1920.

Tungsten Department

1,534 acres, distributed over 5 sq. miles in the northern part of the Nederland district, Boulder county, Colorado.

Geology: rocks are gneissoid granite and a granite schist, which grade into quartz and mica-schist. These rocks are cut by dikes of pegmatite in which the ores occur as veins and streaks, carrying ferberite, black tungstate of iron, in a matrix of quartz and feldspar and crushed rock. Veins run N. and S. and usually dip steeply, rarely as little as 45°.

At the Conger mine three veins are open, the Conger, Middle and East. The first two unite on their strike on the 450′ level, making a large orebody. Ore shoots are lens-shaped, and show rapid pinching and enlargement. On the 200′ level the vein has been stoped for a total distance of 800′, and a big ore shoot has been stoped for 250′ long, 90′ high, and 8′ wide.

Development: the shaft is said to be 1,100′ deep, making it the second deepest tungsten mine in the world, the Atolia in California coming first. Levels are about 100′ apart, and shrinkage stoping is employed. A working tunnel connects with the shaft at the 150′ level.

Equipment: includes hoist and 300 cu. ft. compressor. A two-mile tramway from mine to mill hauls ore in trains of five cars of 1½-ton capacity by 3½-ton storage battery motor.

The Quaker and Oregon mines, about 4 miles from Lakewood, have a relatively small output, which is delivered to the mill by wagon. The Lone Tree mine, half a mile from Lakewood, has a high-grade orebody, 100′ long, stoped for 70′ high and as much as 20′ wide. The Quaker shaft is 325′ deep.

The Primos mill, at Lakewood has a capacity of 60 tons daily. It has a 100-ton bin for company ore, and six 15-ton bins for custom ore. After sampling, ore goes over 1⅛″ grizzlies, oversize to Blake crusher, then to 10 stamps of 1,000 lbs. each; delivering 3½ to 4 tons of 20-mesh pulp per 24 hours. Battery pulp goes to No. 6 Wilfley tables, making concentrates which are sent to settling tanks above Frue vanners, whose tailings go through settling tanks, with discharge to Dorr classifiers and sand to Prosser tube mill, whose product with part of settlers goes to Frue vanners. Tailings of vanners go to canvas tables. Milling practice produces concentrates carrying from 40 to 65% tungstic acid, with recoveries ranging from 65 to 85%.

As Vanadium Corp. has consolidated its reduction and refining departments, doing all work at Bridgeville, the two plants at Primos, Peru, are no longer of use. One has been sold and the second is to be.

URUGUAY

BERNARDO MINING SYNDICATE, LTD. **URUGUAY**

Address: N. R. Thompson, sec., 108 Victoria St., London, S. W., England.

Directors: B. W. Ritso, managing; S. Ransome and W. King.

Inc. June 22, 1920. **Cap.** £20,000; £100 par; 152 shares issued.

Property: mining concessions at Pampa, Dept. of Tacuarembo, which contain gold deposits.

VENEZUELA

EL AMPARO MINE, LTD. **VENEZUELA**

Address: Guasipati, Roscio, Venezuela.

Property: the old and famous La Paz gold mine in the Roscio district, State of Bolivar, said to have been almost worked out late in 1918. Equipped with 10-stamp mill, pans, tables, and cyanide plant.

GOLD FIELDS OF VENEZUELA, LTD. **VENEZUELA**

Address: El Peru, Venezuela.

Property: claims showing gold quartz veins, 4 miles west of El Callao in Roscio district, State of Bolivar, southwestern Venezuela. A plant employing 2 Chilean mills treats $15 to $20 gold ore by amalgamation and cyanidation. Company is developing and treating ore on a small scale, 1921-22.

INCREIBLE, COMPANIA ANONIMA MINERALO. **VENEZUELA**

Address: Caracas, Venezuela.

Property: the Increible gold mine at Guasipati, 8 miles N. E. of El Callao, in southwestern Venezuela. Development work is said to have proven a large tonnage of milling ore. **Equipment:** includes 20-stamp mill and cyanide plant.

Production: over 40,000 tons of ore yielding $10 per ton by amalgamation, with $5 in the tails recoverable by cyanidation.

NEW CALLAO GOLD MINING CO. LTD. **VENEZUELA**

Address: El Callao, Venezuela.

Property: the famous Callao mine and the Callao La Union, Nueva Hanza alluvial mines: also the Culebra and El Porvenir vein mines near El Callao in southeastern Venezuela. The old mine is full of water, but some of the lesser mines, are very promising.

The company is French and its financial condition is weak owing to the present status of European affairs. It is however, operating on a reduced scale.

SOUTH AMERICAN COPPER SYNDICATE, LTD. **VENEZUELA**

Office: 2 Broad Street Place, London, E. C. 2, England; and Aroa, Port of Tucacas, Venezuela.

Directors and officers: H. Edwards, chairman; J. A. Agnew, T. O. Callender, H. Maulbourguet, and C. N. Murphy, Erd. James, sec.; G. B. Butterworth, gen. mgr.; C. H. Stewart, cons. engr.

Inc. March 27, 1907, in Great Britain. **Cap.** £50,000; 2 shillings par; 250,000 issued. Notes £37,500 of 7% issued in November, 1918; convertible into shares at 5/per share.

Dividends: 25% in 1909; 30% in 1910; 145% in 1911; 250% in 1912; 350% in 1913; 75% in 1914; 62½% in 1915; 150% in 1916; 200% in 1917.

Property: the Aroa mine and the San Antonio and Titiara mines, covering an area of 40 sq. miles, 55 miles from port of Tucacas, Venezuela. The Aroa orebody is 50'-75' wide on the surface, and dips N. E., the Titiara orebody is similar, but has not been opened up to the same extent. Drilling operations began in March, 1920. The ore consists of pyrite and chalcopyrite.

Equipment: includes 200-ton smelter.

Production: in 1916, 1,188 tons matte containing 317 tons copper and 12,482 tons ore shipped, containing 846 tons copper; in 1917, 1,940 tons matte containing 394 tons copper and 25,000 tons ore containing 1,309 tons copper. In 1922, C. H. Stewart reported a reserve of 600,000 tons of 5% copper and that 5,000 tons monthly could be mined immediately. A new smelter is being built.

YURUARI COMPANY **VENEZUELA**

A Venezuelan company, owned in Caracas, Venezuela.

Property: gold-bearing gravel tract in Cicapra district, 25 miles N. W. of El Callao. The gold is in decomposed schist, and churn-drilling is said to have revealed several million yards of ground worth $1 per yd., which could be worked at cost of 50 cents. At last accounts a 200-yard clamshell dredge was at work.

EUROPE

FINLAND

FINNISH-AMERICAN MINING CO. FINLAND

Dead. See Vol. XIII for description of company. Property now owned by Swedish interests.

FRANCE

FRENCH IRON ORE CO., LTD. FRANCE

Address: Sir W. Hughes, sec., Dartmouth House, 2 Queen Anne's Gate, London, S. W., England.

Inc. May, 1918, in Great Britain, as a close corporation, to explore and prospect for minerals in France.

GERMANY

MANSFELD COPPERSCHIST MINING CO.

(Mansfeld'sche Kupferschieferbauende Gew.)

Mine office: Eisleben, Prussian Saxony, Germany.

Officers at last accounts: Dr. Dittrich, Dr. Lehmann, Dr. Leugnick, E. Kreuser, Dr. Winbisch and I. J. Tobias, executive committee; Bergrat Dr. Vogelsang, gen. mgr.

Inc. 1852, as a consolidation of numerous independent operators, and reorganized, April 10, 1876, under laws of Prussia. **Cap.** 69,120 shares, apparently without assigned value.

Dividends: have been 90 marks per share in 1900; 45 in 1901; 15 in 1902; 40 in 1903; 40 in 1904; 80 in 1905; 120 in 1906; 70 in 1907; nothing in 1908 and 1909; 10 in 1910; 15 in 1911; 45 marks in 1912; no information available since.

Treasury shares to the amount of 2,000,000 marks, and a new issue of 5,000,000 marks, were authorized 1908, to provide for the deepening of shafts, rebuilding and enlarging of the electric plants at the Krughütte and Kupferkammer works, construction of new copper and brass works at Hettstedt, and other improvements.

Forces employed are upwards of 22,000 men, and exclusive of the Westfalen coal mines, averaged 19,735 men 1912, of whom about 70% were employed at the mines and 13% at the smelters.

Property: the Mansfeld copper mine, together with several large coal mines in Westphalia, and a potash bed near Wansleben, opened by a shaft, which has been in operation since 1903. Landed holdings also include considerable tracts of forest.

The coal mines at Langendreer, near Hamm, Westfalen, include several adjoining mines, with 4 operating shafts, and in connection is a coke plant of about 225,000 metric tons yearly capacity, production averaging about 2,500 metric tons coal and coke daily. There are 2 crushing plants, 1 near Walzwerke and the other at Rothenberg.

The Mansfeld mine was opened A. D. 1199, was immensely profitable during the fourteenth and fifteenth centuries, but the industry nearly suffered extinction during he Thirty Years' war. Activity was resumed in 1671, when the right of working the mines was declared free, this resulting in the building up of a great number of small independent operators. The present company was first formed 1852, as a consolidation of the various small mine operators and smelters, and the merging of many small inter-

ests has resulted in a nearly seventeenfold increase of production, from 1,179 metric tons fine copper and 6,489 kilograms silver in 1852.

Geology: the ore of the Mansfeld mine is kupferschiefer, a 12" bed of fine-grained bituminous shale, lying nearly horizontal, having a dip of about 5° only. A thickness of but 8" is workable, but the bed underlies an area of several hundred square miles. The ore contains slightly argentiferous chalcopyrite, bornite and chalcocite, disseminated in very fine grains through the kupferschiefer. Lying just under the kupferschiefer is an arenaceous shaft, also carrying chalcopyrite. There also is a slightly cupriferous limestone bed, known as the Dachberg. The kupferschiefer carries 2.9 to 10% copper, and ores smelted average 2.5 to 3% copper and 0.015 to 0.020% silver.

Owing to the great age and extent of the old workings, the headings usually were 2 to 4 kilometers from the shafts, hence the actual mining was done under considerable disadvantage, the thinness of the bed and the great extent of the workings rendering it necessary for miners to work on their sides, stomachs or backs, as in coal mines, wearing boards upon their trunks and thighs, in order to protect themselves from the rock floors. Recent mining operations are through a row of 6 deep-level hoisting shafts, intersecting the kupferschiefer at depths of 300 to 600 meters. Three other shafts reach the seam at still greater depths, and 2 of these also intersect a bed of excellent carnalite. These shafts are all circular, 6 meters in diameter, with a lining of brick, backed by concrete. Many of the scores of old shafts which average about 400 meters in depth, are used for ventilation, safety and raising water. The principal new shafts are the Hohenthal at Helbra, the Hermann at Helfta, and the Paul at Helmsdorf. All new shafts have steel headframes. Underground haulage, formerly done by horses, has been supplanted by electric locomotives, in the newer workings. Ore is hand-sorted on reaching surface, and waste rock, including considerable limestone, is used for underground filling.

Water from the entire mine is drained to the Hohenthal, Ernst and Niewandth shafts, whence it is raised by steam and electric pumps to the main adit, 150 meters below surface.

Equipment: includes the most modern improvements. Many shafts have cross-compound steam hoists, with conical drums for deep winding, but the Hermann and Paul shafts and the newer exploratory shafts have electric hoists employing the Ilgner system of balancing. All hoisting is done by double-deck cages holding 4 cars. Electric power is generated by gas engines at the Krughutte and Kupferkammer reduction plants.

The Krughutte power station has two 1,300-h. p. units, the blast furnaces being connected with 2 parallel gas trunks, taking blast gases to a purifier house, where there are Zschokke and Theisen centrifugal washers, through which the gas passes, and is then dried by passing through a Theisen vapor separator, going thence to a gasometer of 500-cubic meters capacity, from whence it is drawn as required to two 1,300-h. p. Ochelhauser gas engines, direct-connected to a Siemens-Schuckert 3-phase alternator of revolving field type. Current is transmitted to various works at 3,000 to 10,000 volts, and there stepped down for use.

Transporation is by railway lines and a number of Otto aerial trams, the Hermann mine having a 7-kilometer electric aerial tram.

The Mansfeld has numerous reduction plants, including 2 smelters for raw ores, 2 roasting smelters with acid plants, 2 matte smelting works, and a desilvering plant, the various works having a total of 13 reverberatory furnaces.

The method of reduction is by heap roasting and calcining in shaft furnaces. Roast heaps are built about 1,000 meters long, 6.5 meters broad at the bottom and 3.5 meters broad at the top, and 2 meters high. The only fuel used is a little brushwood, at the edges and bottoms of heaps, and each heap is roasted about 4 weeks. If the the ore carries any fines, these

are screened, briquetted and added to the roast heaps. Roasting reduces the ore 7 to 10% in weight, but is done more for the elimination of carbon dioxide and bituminous matter than to throw off sulphur, he latter running only 2 to 3% in the raw ore, while the bituminous matter ranges 10 to 17% and carbon dioxide 7 to 13%. There are 2 roast stalls near the shafts, and at the furnaces the first-fusion product is a matte carrying 40% copper and 0.25% silver. This matte is broken up and roasted in calcining kilns, and the roaster matte, with the addition of 5 to 10% raw matte, is smelted in reverberatory furnaces to white metal carrying 74 to 75% copper and 0.45 to 0.50% silver. The slags from the white metal carry 4 to 6% copper and are returned to the shaft furnaces. Slag is utilized extensively for the manufacture of slag brick and paving blocks. The white metal is ground in Krupp ball mills and sent to the Saigerhutte refinery.

The Kochhutte, at Helbra, is the principal smelter, treating about three-fifths of the total production. There are 8 furnaces, 1 held in reserve, of circular shaft type, using cold blast. The Krughutte treats the rest of the ore. This plant, at Eisleben, near the mines has 6 furnaces, one being held as a spare, all of circular shaft type, with forehearths, using cold blast.

The Eckardtthutte, at Leimbach, has 4 copper furnaces of circular shaft type, using cold blast. This plant also has 1 lead stack, producing silver and lead matte, and makes a little nickel speiss from resmelted fine dust. The Eckardtthutte has an acid plant, with 72 kilns and 5 lead acid chambers, employing the chamber process of acid making.

The Kupferkammerhutte, at Hettstedt, has 3 circular shaft furnaces, but employs a hot blast. The acid plant at the Kupferkammerhutte has 82 kilns and 6 lead acid chambers, turning out 50 metric tons of 50° Beaume sulphuric acid weekly.

The Gottesbelohnunghutte is one of the smaller and less modern smelters, equipment consisting of 13 small reverberatory furnaces, 17 roasting furnaces and 2 small furnaces for refining slags.

The Saigerhutte is mainly a refinery, including a desilvering plant, operating on the Ziervogel process, which roasts the matte and retains the silver as a sulphate which is dissolved in water and the solution run over metallic copper, which precipitates the silver, the cement silver so secured being pressed and resmelted to metal 999 fine. The final furnace product, after the extraction of the silver, is blister copper of 99.7 to 99.8% tenor.

Production: in 1919 latest available was 17,255 metric tons compared with 20,632 in 1917 and 25,000 in 1913. Early production was 5,865,898 lb. in 1867, increased to 15,230,287 lb. in 1877, to 29,176,000 lb. in 1887, and 40,230,400 lb. in 1897. Recent production has been as follows: 42,500,278 lb in 1903; 41,629,349 lb. in 1904; 43,824,141 lb. in 1905; 40,108,000 lb. in 1906; 38,822,000 lb. in 1907; 39,686,800 lb. in 1908; 41,891,400 lb. in 1909; 44,769,800 lb. in 1910; 45,955,600 lb. in 1911; 45,188,600 lb. in 1912. Production in 1912 was secured from 873,305 metric tons of cupriferous material smelted.

The Mansfeld is handled with high technical skill, and its orebodies, by reason of their vast extent, are among the largest known. No detailed information has been available since 1913.

SAXON TIN & WOLFRAM MINING CO.,LTD. **GERMANY**

Liquidated in conformity with the Act of 1918. See Vol. XIII for description of company, etc.

GREAT BRITAIN

ABER LLYN, LTD. **GREAT BRITAIN**

Address: T. A. Evans, sec., 28 Threadneedle St., London, E. C., England.

Inc. April, 1919. **Cap.** £70,000; 5s par; 248,000 shares issued

Financial statement for year ended June 30, 1920, showed cash, £10,-

037; debtors, £145; stocks on hand, £1,992; calls in arrear, £5,550; creditors, £1,113.

Property: 1½ miles from Bettws-y-Coed, Carnarvonshire, North Wales, formerly owned by Aber Llyn Zinc Mines, Ltd. and said to contain large reserves of 8.5% zinc ore. Company also holds an interest in gold properties in Rhodesia and Portuguese Zambesia.

AFRICAN ORE CONCENTRATION SYNDICATE, LTD. ENGLAND

Liquidated in 1920. Described in Volume XIV.

ALLIHIES COPPER MINES, LTD. IRELAND

Address: F. C. Rycroft, ces., 4 Buckingham Gate, London, S. W. **Mine address:** R. B. Ash., mgr., Allihies, Co. Cork, Ireland.

Inc. Nov., 1919. **Cap.** £80,000; £1 par; 54,000 shares issued.

Property: Allihies mine at Allihies, Co. Cork.

ANTRIM IRON ORE CO., LTD. IRELAND

Address: J. O. McGifford, sec., Victoria Chambers, Victoria St., Belfast.

Inc. March, 1891, in Dublin. **Cap.** £75,000, in 6,000 A shares, £2 par and 21,000 B shares, £3 par; all issued.

Dividends: at rate of 10% annually with 5% bonus.

Property: iron mines formerly owned by County Antrim Iron Co., Ltd. Operated as a close corporation and reports not published.

BRITISH ALUMINUM CO., LTD. GREAT BRITAIN

Address: G. W. Jeffery, sec., 109 Queen Victoria St., London, E. C., England.

Inc. April, 1910. **Cap.** £1,500,000, and 300,000 6% non-cumulative pfd. and 1,200,000 ord. shares, £1 par; 299,570 pfd. and 1,001,034 ord. shares issued.

Debenture stock, authorized £750,000; outstanding £631,479, redeemable at 110%, Dec. 31, 1951. Prior lien debentures, 5% authorized £1,000,000, issued £800,000; outstanding £727,400; redeemable at 105, Dec. 31, 1951.

Financial report for year ended Dec. 31, 1919, showed operating profit £348,108; dividends, £78,036; £15,714 carried forward.

Dividends: 10% yearly since 1916; bonus of 2 ordinary shares for every 3 ordinary shares held, was distributed in 1919.

Property: company controls bauxite mines in Ireland and France and plants in Ireland, England and Norway.

BRITISH SULPHIDES SMELTING CO., LTD. GREAT BRITAIN

Address: R. P. Butcher, sec., 75 Queen Victoria St., London, E. C., England.

Directors: B. Hallett, A. G. Hog, B. B. Kingsford and E. W. D. Longden; in Sydney: H. C. Macfie, managing, J. S. Richardson, H. B. Jamieson, A. W. Marshall.

Inc. May, 1899. **Cap.** £800,000 in 100,000 pfd. and 700,000 ord. shares, £1 par; 11,500 pfd. and 5,000 ord. shares issued and fully paid.

Company was originally incorporated to acquire British patent rights from Sulphides Reduction (New Process) Ltd., but the deal was never consummated.

Reported in 1920 to have acquired holdings of the Broken Hill Options, Ltd., N. S. W., Australia, for £5,000 in cash and £100,000 in £1 shares.

CALLOOSE TIN MINES AND ALLUVIALS, LTD. ENGLAND

Address: A. J. Culley, sec., Friars House, New Broad St., London, E. C. Local address: Chapel Street, Camborne, Cornwall.

Inc. 1919. **Cap.** £125,000; 5s. par.

Property: a group of tin mines covering 1,400 acres, in Gwinear district, Cornwall, held under long time lease from General Exploration & Finance Synd., Ltd.

CHEMICAL & METALLURGICAL CORP., LTD. ENGLAND

Address: J. A. Stocker, sec., 701 Salisbury House, London Wall, London, E. C., England. A. S. Elmore, managing director.

Inc. 1919. **Cap.** £1,200,000 in 200,000 five per cent cum. pfd. shares and 1,000,000 ord. shares, £1 par.

Company acquired the British and foreign rights to the Elmore process for the treatment of complex ores.

CONSOLIDATED WELSH MINES, LTD. **WALES**

Address: H. N. Price, sec., 467 Bank Chambers, 329 High Holborn, London, W. C.

Inc. July, 1919. **Cap.** £300,000; £1 par; 120,757 shares issued.

Property: mineral claims on the Gogerddan Estate, Cardiganshire, North Wales.

CORNWALL TIN MINES & ALLUVIALS, LTD. **ENGLAND**

Office: Boston House, 63 New Broad St., London. E. C.

Inc. 1920. **Cap.** £125,000; 5s. par.

Property: tin mines in Cornwall, held under lease from General Ex & Finance Synd., Ltd.

CROMFORD MINING & MINERALS CO., LTD. **GREAT BRITAIN**

F. C. Young, sec., Cromford Moor Mine, Cromford, Matlock.

Inc. Sept., 1918. **Cap.** £10,000, in 4,000 pfd. and 6,000 ord. shares, £1 par; 3,130 pfd. and 4,006 ord. shares issued. Debentures, authorized £6,000; £310 issued.

Property: Cromford Moor mine, at Cromford, Derbyshire.

DOLCOATH MINE, LTD. **ENGLAND**

Office: Jos. F. Odgers, sec., Camborne, Cornwall. Bewick, Moreing & Co., gen. mgrs.

Directors: R. A. Thomas, managing, Oliver Wethered, J. M. Holman, E. W. Janson, F. A. Robinson, C. A. Moreing and M. Rogers.

Inc. July 15, 1895, in England. **Cap.** 350,000 ord. shares, £1 par; all issued; 350,000 priority shares, 1s par; 297,166 issued. **Debentures:** £75,000 of 6% participating, issued February, 1918.

Operation for the year 1918, resulted in a profit of £22,927, plus £9,548 from previous period. In 1919 there was an operating loss of £37,573 and in first half of 1920 a further operating loss of £11,275, leaving a debit balance of £11,825. Report for 18 months ending Dec. 31, 1921, showed, receipts, £51,488; expenses, £67,832; operating loss, £16,344; total debit balance forward, £23,642.

Dividends: since 1896 total 135% (£1,356,430); last one, 7½% paid 1913.

Property: the most famous tin mine of Cornwall, worked from 1700 to 1799 for copper and which from 1799 to 1867 yielded ore carrying copper and tin, together with small amounts of arsenic, silver, and cobalt, to the total value of £3,234,693.

In 1918, Dolcoath, with the East Pool & Agar, Ltd., purchased the mineral rights to 9,000 acres of the Tehidy Estate for £90,000, Dolcoath taking a 66% intrest.

Development: by 3,000′ shaft and extensive workings. Prior to 1915, the annual advance was up to 1,500 fathoms, but in 1919 was only 150 fathoms and in 1920 about 125 fms. A comprehensive drilling campaign completed in 1919, was not successful in locating new ore reserves.

Equipment: includes machinery for the 3,000′ shaft, 16 Holman pneumatic stamps, concentrators, and Elmore flotation plant.

Production:

Year	Ore Treated, Tons	Black Tin (tons) (70 % Metal)	Costs Per Ton
1920 (1st half)	30,052	338	$14.50
1919	61,703	732	11.73
1919 (half)	28,877	387	11.22
1918	61,499	827	10.76
1917	69,714	967	8.64
1916	79,347	1076	6.52
1915	82,967	1187	6.36
1914	105,302	1439	5.89

Ore reserves have been exhausted and the property closed down pending refinancing.

EAGLE LEAD CO., LTD. **WALES**

Address: C. Codling, sec., 8 Princes St., London, E. C.

Inc. March, 1920. **Cap.** £105,000, in 100,000 ord. shares, £1 par, and 100,000 def. shares 1s par; all deferred shares and 50,000 ord. shares issued.

Property: a lease on the Pandora lead-zinc mine in North Wales.

EAST HALKYN MNG. CO., LTD. **WALES**

Address: W. H. Humphreys, sec., 9 Old Bank Bldg., Eastgate, Chester, England.

J. Powell, mgr., Rhosesmor mine, Halkyn.

Inc. March 22, 1890. **Cap.** £20,000; £1 par; all issued; 15,000 fully paid; balance 10s called.

Financial report for 1919 showed an operating profit of £262. Dividends paid since 1892; 12½% in 1918; 5% in 1920.

Property: 637 acres on Halkyn Mountain, Flint county, Wales, includes the Rhosesmor mine.

Production: in 1919, 961 tons of lead ore.

EAST POOL & AGAR, LTD. **ENGLAND**

Office: J. F. Maynard, sec., Carn Brea, R. S. O., Cornwall, England.

Directors: H. M. Rogers, chairman; J. M. Holman, J. C. Gardner, E. A. Loring, and C. A. Moreing. Bewick, Moreing & Co., gen. mgrs.; M. T. Taylor, supt.; J. W. Partington, chemist.

Inc. Jan. 11, 1913, in England. **Cap.** £100,000; shares £1 par; changed to 480,000 of 5s. par in August, 1917; all issued. In April, 1919 capital increased to £1,500,000 and 120,000 new shares of 5s each were issued at rate of 1 for every 4 held.

The net profit for 1916 was £22,485, of which £9,116 was paid in dividends. In 1917, profit was £59,651, and £24,061 in dividends. In 1918, profit was £103,784 and dividends £60,000. In 1919, profit was £5,522, with realizable assets of £168,213, and in 1920 there was a loss of £28,008.

Dividends: 15% in 1916; 25% in 1917; 50% in 1918; 10% in 1919.

Property: a 42-year lease on 2 mines at Illogan, Cornwall, that were worked from 1834 to 1912. In 1918 company acquired a 33% interest in the Tehidy Estate, Tehidy Minerals, Ltd., (q. v.) for £30,000 and also own a large interest in the adjoining Tolgus Mines, Ltd.

Development: in 1917 and 1918, because of Government demands, was largely confined to opening ore for immediate extraction, and but little exploratory work was done in 1919. In 1920, a crosscut was driven on 1,500′ level to reach Rogers lode which was 40′ wide, only 75′ above, and a 2,000′ tunnel was advanced 890′ to undercut the Tolgus workings. This work opened profitable ore in 2 other lodes, assaying 45 to 70 lb. tin oxide per ton, and the Great lode, 13′ wide, carrying 150 lb. wolfram and 8 lb. tin, but in spite of these favorable conditions, low metal prices forced a shut-down on Feb. 12, 1921. Extensions in 1918 were 4,215′, plus 1,078′ of diamond drilling, and 3,874′ in 1919.

The mine was opened by the 1,500′ Agar shaft which collapsed in May 1921; reported that new shaft is to be sunk.

Equipment: includes steam and electric power, Cornish and motor-driven pumps, compressors, hoists, shops, assay office, 12 Holman pneumatic stamps, 6 tube-mills, 32 concentrators, slime plant, and magnetic separators. Late in 1919 a flotation process was evolved by which the cassiterite could be floated with a 90% recovery.

Production: years ending December 31:

Year	Tonnage	Black Tin, tons	Wolfram, tons	Arsenic, tons	Copper, tons	Value
1920....	74,433	874	47	500	...	£175,767
1919....	65,895	1005	72	589	10	165,544
1918....	75,401	1280	57	420	...	200,276
1917....	77,287	.....	...	...	...	176,000
1916....	81,395	706	100	527	118	...

Costs in 1920 totaled 55/11, or $13.56 per ton, against a yield of 47/3, or $11.46 per ton, exchange figured at $4.85.

GEEVOR TIN MINES, LTD. ENGLAND

Office: F. C. Cann, gen. mgr., Pendeen, Cornwall.

Directors: Oliver Wethered, chairman; B. H. Nicholson, J. A. Stoneham J. Vivian Thomas. E. J. Andrews, sec.

Inc. Feb. 22, 1911, in Great Britain. **Cap.** £90,000; increased in 1919 to £180,000; shares 10/ par; 180,000 shares issued 10s. pd., 180,000 issued 7s. 6d pd. Debentures; £25,000 authorized, nil outstanding.

Profit for 15 months ended March 31, 1918, was £8,177, of which £6,000 was distributed. Net profit for year ending March 31, 1919, was £17,854. Profit for 1920 was £11,992. Dividends: 10% in 1917; 20% in 1918; 10% in 1919.

Property: 208 acres at Pendeen, St. Just, Cornwall. Four lodes are worked, and a mill containing 8 Holman pneumatic stamps and tables of 200 tons daily capacity is at work. Reserves are given as 130,000 tons of tin-bearing ore. Development in 1919-20 was quite satisfactory. The Wheal Carn mine has been unwatered and good ore is being developed. Company is also interested in the South Crofty in Cornwall and Rayfield (Nigeria) Tinfields Co.

Production, in recent years: (March31)

.....	Tonnage	Yield
1920.....	28,324	£69,064
1919.....	25,919	76,514
1918.....	25,919	76,514
1917-18 (15 months).....	26,313	56,860
1916-17 (15 months).....	28,683	43,350

Tin concentrate amounted to 432 tons or 34.16 lb. per ton in 1920. Costs were 38s. per ton.

Milling operations were suspended in January, 1921 pending completion of the Victory shaft, and to await improved metal market.

GLENDINNING ANTIMONY MINES, LTD. SCOTLAND

Address: C. Clayton, sec., 6 Cross Lane, Eastcheap, London, E. C., England. E. C. Semmens, mgr.

Inc. 1919. **Cap.** £35,000; 1s. par. A close corporation.

Property: Glendinning antimony mine at Westerkirk, Dumfriesshire.

GREAT WESTERN ORES, LTD. ENGLAND

Address: H. Warner, sec., 56 Cannon St., London, E. C., England. J. Paull, gen. mgr.; J. Chynoweth, mine mgr.

Inc. 1917. **Cap.** £15,000; £1 par; all issued.

Property: a working lease on the Castle-an-Dinas wolfram mine at St. Columb, Cornwall.

Production: in 1919 (to Sept.), 3,350 tons of ore milled, yielding 40% tons of wolfram. Only development work being done.

GRENVILLE UNITED MINES, LTD. ENGLAND

W. H. Stentiford, liquidator, 1 Broad St. Place, London, E. C., England. On Jan. 4, 1921, it was resolved to wind up voluntarily.

Inc. July 2, 1906, in Great Britain. **Cap.** £100,000; 10s. par; £90,000 issued. In 1919 company was refinanced and two 5s. shares issued for original 10s. shares, 3s. 6d. paid.

Balance sheet of Sept. 30, 1921 showed loss, £8,414; cash, £115; bill rec., £1,743; debtors, £330; tin, £746; supplies, £2,118; calls in arrear, £2,318; creditors, £7,947; bank loan, £3,000.

Dividends: £21 to 13/6 paid by old company to 1911 on £100,000 £1 shares; 90% from 1911 to end of 1913; nothing since.

Property: a tin-bearing tract at Camborne, Cornwall, on which there is a concentrating plant.

Production: from 1913-1918 inclusive, 451 tons black tin, valued at £82,664; in 1919, 33,856 tons of ore, containing 353 tons black tin valued at £43,730, a recovery of 23.35 lb. per ton. Employed 378 men in 1919.

Closed down in 1920 and mine under water.

GWINEAR TIN MINES, LTD. **ENGLAND**

Address: G. W. Haydon, 63 New Broad St., London, E. C., England.

Inc. 1919. **Cap.** £60,000 in 240,000 shares, 5s par; 180,017 shares issued. Debentures: £15,000.

Property: Carzise tin mine at Gwinear, Cornwall.

HALKYN MINING CO., LTD. **WALES**

Address: F. J. Warmsley, sec., 29 Eastgate Row North, Chester.

Inc. 1883. **Cap.** £10,000; £1 par; all issued.

Property: in Halkyn Mountain district, county of Flint, Wales.

Production: in 1919, 429 tons lead and 456 tons blende.

HARTHORPE LEAD CO., LTD. **ENGLAND**

Address C. A. Hall, sec., 62 Oxford St., London, W. 1, England.

Inc. 1920. **Cap.** £10,000; in 2,000 pfd. and 8,000 ord. shares, £1 par; 666 pfd and 7,602 ord. shares issued.

Property: at Wolsingham, Durham, England.

KILLIFRETH MINE LTD. **ENGLAND**

Address: E. J. Andrews, sec., Capel House, New Broad St., London, E. C., England.

Inc. 1912. **Cap.** £175,000; £1 par.

Property: a lease on the Killifreth, Wheal Busy and Hallenbeagle mine at Scorrier near Chacewater, Cornwall.

KINGSDOWN (HEWAS WATER) TIN MINES, LTD. **ENGLAND**

Address: D. H. Edwards, sec., 14 Broad St. House, London, E. C., England.

Inc. 1919, to succeed Kingsdown Sett, Ltd. **Cap.** £60,000; 2s each, 550,000 shares issued.

Property: a lease on 80 acres, 3 miles from St. Austell, Cornwall. Developing.

LANNER SYNDICATE, LTD. **ENGLAND**

Address: Aikman & Glen, 121 St. Vincent St., Glasgow. **Mine office:** Lanner, Cornwall, England.

Inc. 1914, in Edinburgh. **Cap.** £90,000; £1 par; all issued.

Property: mines and plant formerly owned by Tresavean Mines, Ltd., at Lanner, Cornwall. In 1919 development amounted to 1,376'. Mill treated 31,380 tons of ore, producing 345 tons black tin, 77 tons crude arsenic, 27 tons copper precipitate, valued at £51,664. About 320 men employed.

LEADHILLS CO., LTD. **SCOTLAND**

Address: E. F. Wilson, sec., 5 South St., Finsbury, London, E. C. W. B. Skewis, mgr., Leadhills, Lanarkshire, Scotland.

Inc. 1903 as reorganization of Leadhills Silver Lead M. & S. Co., Ltd. **Cap.** £20,000; £1 par; 17,045 shares issued.

Accounts for year ended June 30, 1920 showed an operating profit of £528. Last dividend, 1919-20, 2s.

Property: at Leadhills, Lanarkshire, Scotland.

Production: 1918-19, 1,841 tons lead ore; 1919-20, 1,990 tons.

LEVANT TIN MINES, LTD. ENGLAND

Address: Francis F. Oats, St. Just, Cornwall, England. E. J. Andrews, sec., 4 London Wall Bldgs., London, E. C.

Inc. February, 1920, in Great Britain. **Cap.** £160,000; shares 10s par; 240,000 issued. Company succeeds the Levant Mining Co., organized in 1872.

Property: the Levant mine, on a cliff facing the Atlantic Ocean, 6 miles from Land's End in Cornwall, adjacent to the Geevor mine. There are 2 system of lodes, which intersect. They are in granite and "killas" (clay-slate). The mine, operated since 1820, is practically dry, in spite of being partly under the sea.

Development: by 1 main and 2 blind shafts, reaching depth of 2,100', and many miles of workings. There are 3 blocks of unworked ground said to be worth developing.

Equipment: includes steam power, 50-h. p. pump, hoists, 30 Californian stamps, and 76 Cornish stamps, concentrating machines, etc.

Production: to end of 1918, the total was 3,800 tons of crude arsenic sold for £32,657; 136,562 tons of copper ore for £859,303; and 21,959 tons of black tin for £1,531,977. The last three years for which returns are available follows:

Year	Arsenic Tons	Copper Tons	Black Tin Tons	Total Value
1918.....	52	54	278	£60,137
1917.....	86	146	372	53,815
1916.....	202	155	437	49,926

Operations suspended.

LISBURNE DEVELOPMENT SYNDICATE, LTD. WALES

Address: E. A. Wakefield, 80 Bishopsgate, London, E. C. R. R. Nancarrow, Pontrhydygroes, Ystrad Meurig, Cardiganshire, Wales.

Inc. 1907. **Cap.** £20,000; in 4,000 pfd., and 16,000 ord. shares; £1 par. Financial statement June 30, 1920, showed operating loss, £1,243; debit balance, £1,229.

Property: about 7,500 acres, near Aberystwyth, Cardiganshire, of which 2,500 acres are being operated by a subsidiary, the **Welsh Mines Corp'n., Ltd.**

MINERALS SEPARATION, LTD. ENGLAND

Office: H. C. Hankine, sec., 62 London Wall, London, E. C. England

Directors: Francis L. Gibbs, chairman, John Ballot, Sir Ernest M. Clarke, J. C. Moulden, Seth Gregory, H. A. Krohn, W. W. Webster. W. Broadbridge, chief engr.

Inc. in 1903, to carry on metallurgical operations. **Cap.** £50,000; shares £1 par; all issued and fully paid; increased to £500,000 in November, 1919.

Profit in 1920 was £16,629 compared with £15,673 in 1919. The 1920 balance carried over from previous year was £32,889. Cash was £26,646; debtors, £61,455; investments, £72,308, War Loan, £30,800. Treasury bills (cost), £491,949.

Dividends: 50% in 1917 to 1918; 25% in 1919; nil in 1920.

The chief assets of the company are a number of patents (said to be over 50) for flotation processes and machines for recovery of concentrates from silver and lead, zinc, copper, and other ores. The use of flotation has been as great an advance in the treatment of zinc and copper ores as the cyanide process has been for gold ores. United States, Canadian, and Mexican Minerals Separation patents are owned by Minerals Separation North American Corporation, which see. In August, 1919, the patent rights for Spain were reported licensed to the Penarroya company (which see) which is to act as agent; also to the Societe Minerals et Metaux in France.

NATIONAL MINING CORPORATION, LTD. **ENGLAND**

Office: A. E. Ford, sec., 428 Salisbury House, London, E. C. 2, England. Canadian address: 802 Lumsden Bldg., Toronto. J. B. Tyrrell, cons. engr. for Canada.

Directorate: H. Gudalla, chairman, Walter McDermott of the Consolidated Mines Selection Co., J. A. Agnew of the Burma Corporation, F. A Govett of the Lake View & Ora ya Exploration Co., F. W. Baker of the Mexican Corporation, S. Christopherson of the Consolidated Gold Fields of South Africa, B. Kitzinger of the National Bank of South Africa, A. S. Elmore of the Chemical & Metallurgical Corporation, Sir H. S. Barnes, Sir E. M. Edgar and H. D. Lewis.

Inc. October 25, 1919, in Great Britain. **Cap.** £3,000,000; £1 par; 2,500,000 shares issued; 10s called. The corporation is organized for financing of mining and metallurgical companies.

Report dated Dec. 31, 1920, shows investments and shares, £905,943, (cost); loans, cash and debtors, £335,000; creditors, £22,229; accounts payable, £245,000. Receipts were £81,644; expenditures, £59,308; profit balance, £22,336.

Company is interested in Burma Corporation, Ltd., Santa Gertrudis Co., Ltd., Mexican Corp'n, Ltd., Tanganyika Concessions, Ltd., White Reserve Mine, Ontario, etc.

NORTH WALES IRON & MANGANESE CO., LTD. **WALES**

Address: A. Hampson, 8 Cook St., Liverpool, England.

Inc. 1903. **Cap.** £55,000; £1 par; all issued. Report for year ended Sept. 30, 1919, showed a profit of £8,542; dividends absorbed, £8,250; balance forward, £294.

Property: 188 acres at Rhiw, near Pwllheli, Carnarvonshire, Wales.

ORE CONCENTRATION CO., LTD. **ENGLAND**

Office: 701 Salisbury House, London, Eng. **Directors:** Alex. Stanley Elmore, chairman, F. E. Elmore, Walter McDermott and B. C. Hinman. J. A. Stocker, sec.

Inc. Nov. 18, 1905, in Great Britain. **Cap.** 230,000 ord. shares of £1 each, 224,544 issued, and 20,000 pfd. of £1 each, 8,795 issued.

Company owns the Elmore patents for concentration of ore by the use of oil and has installed plants at several low-grade copper properties.

PORKELLIS TIN MINES, LTD. **ENGLAND**

Address: E. J. Andrews, sec., 54 New Broad St., London, E. C., England. E. Gordon, mgr.

Inc. 1915. **Cap.** £80,000 in 160,000 shares 10s each; 80,000 shares issued. Debentures authorized and issued, £15,000. 10%.

Property: Porkellis mine at Wendron, near Helston, Cornwall.

Equipment: includes 100-ton mill, four suction gas engines, hoists and boilers.

Production: in 1919, 2,746 tons milled yielded 26½ tons black tin valued at £3,424.

ST. IVES MINES, LTD. **ENGLAND**

Address: J. F. P. Baxter, 244 High Holborn, London, W. C., England.

Inc. 1916 as Wolfram Camp, Ltd., name changed in 1919. **Cap.** £150,000; £1 par; 60,102 shares issued.

Property: Giew and Trenwith mines, also the St. Ives group, in St. Ives district, Cornwall, formerly owned by St. Ives Cons. Mines, Ltd., in liquidation.

Production: at the Giew mine in 1919, 15,162 tons milled yielded 194 tons black tin valued at £28,152.

SHROPSHIRE MINES, LTD. **ENGLAND**

Address: E. W. Lowe, sec., Pinner's Hall, Austin Friars, London, E. C.

Inc. 1916. Is a consolidation of Shropshire Lead Mines, Ltd., and Wotherton Barytes and Lead Mng. Co., Ltd.

Property: near Minsterley, Shropshire, England.

SOUTH CROFTY, LTD. **ENGLAND**

Office: Josiah Paull, mgr., Carn Brea, Cornwall.

Directors: F. Allen, chairman; H. J. Meyerstein and H. Lovegrove; T. W. Evans, sec.

Inc. July 18, 1906, in Great Britain. **Cap.** £50,000: 5s par: all issued, increased to £100,000 in June, 1919.

Profit for 1917 was £43,852. Reserve fund is £16,000. Profit for 1918 was £67,554; in 1919, £300; in 1920, £3,056.

Dividends: 66% from 1909 to Dec. 31, 1920, including 70% for 1918, 25% for 1919 and 10% for 1920.

Property: 184 acres, includes the South Wheal Crofty, New Cooks Kitchen, North Crofty and the Trevenon, arsenic-copper-tin-tungsten mine at Illogan and the Castle Dinas tungsten mine at St. Columb, Cornwall. Equipped with concentrating plants.

Development: in 1920, 3,766' of work wos done.

Production: years ending December 31:

	Ore, tons	Gross Value
1920	69,960	£145,841
1919	68,056	113,765
1918	67,588	195,784
1917	70,055	189,981
1916	71,706	103,087

Costs are around 35/ per ton.

SOUTH PHOENIX, LTD. **ENGLAND**

Address: H. Archibald, sec., 27 Old Jewry, London, E. C., England.

Inc. 1920, to succeed South Phoenix Tin Mine, Ltd. **Cap.** £10,000: 5s par.

Property: lease on tin mines at Minious, Siskeard, Cornwall.

TEHIDY MINERALS, LIMITED **ENGLAND**

Office: J. F. Maynard, sec., 20 Copthall Ave., London, E. C., England.

Mine office: East Pool Mine, Carn Brea, Cornwall. Bewick, Moreing & Co., gen. mgrs.

Inc. February, 1919, in Great Britain. **Cap.** £40,000: £1 par: 10/- called up; increased in September to £300,000: £290,000 issued, 150,000 shares are held by Viscount Clifden.

The Dolcoath and East Pool & Agar companies have large interests in Tehidy.

Reported for period July 1, 1918 to Dec. 31, 1920, shows income, £27,480; administration expense, £10,744; income tax, £8,429; net balance £9,621. Liquid assets, £40,065.

Property: the mineral rights on more than 26,000 acres in Cornwall, previously owned by the Basset since 11th century and Clifden estates, including the Tincroft East Pool and Agar, Ltd., South Crofty and other tin mines; also deposits of silver-lead ore, hematite and china clay, considered to be the most important mineralized area in Cornwall. Besides the famous Rogers tin lode, the ground contains several others. A large production of tin and other products has been made in the past, but there is yet a great area of unexplored ground. The lodes have been worked mainly in the "killas" (clay slate), but as the tin content increases in the granite, extensions will be made in this formation. It is proposed to start extensive lateral development of the principal fissures. Diamond-drilling is also to be done. Geology studied by Malcolm Maclaren; mining methods by W. A. Macleod.

TINCROFT MINES, LTD. **ENGLAND**

Office: F. E. Martin, sec., Carn Brea, R. S. O., Cornwall.

Directors: Jas. Wickett, chairman; T. R. Bolitho, J. Gilbert, J. W. H. Bolitho, H. Rich, and W. D. Coode.

Inc. May 20, 1900, in England. **Cap.** £62,500, in 50,000 priority and 200,000 ord. 5s shares, of which all and 96,953, respectively, are issued. Debentures: £30,000 authorized, of which £15,500 have been issued.

Financial statement for half year ending June 30, 1920, shows receipts £37,936 and net loss £2,436; the loss in 1919 was £17,483.

Dividends: priority shares received 10% in 1907, 5% in 1912 and 1913, 10% in 1917, and 110% in 1918.

Property: 142 acres at Carn Brea, Cornwall, has a lode 3 to 15′ wide, dipping 60°, and opened to a depth of 1,248′ in granite. Ore carries arsenic, copper, tin, and wolfram.

Equipment: includes beam hoist, 2 Cornish pumps, motor-driven compressor, and 200-ton dressing plant using ordinary gravity and Nissen stamps, concentrators, and magnetic separators. Employs 598 men. Operation suspended January, 1921, and lease surrendered in June.

Production:

	Ore treat, tons	Black Tin, tons	Av. Rec. Tin, (lb.)	Total Cost p. t. milled	Rec. p. t.
1920 (b)....	16,931	136	18.00	40/	44/9
1919 (a)....	15,849	144	20.30	47/8	43/9

(a) 6 months to Dec. 31, 1919; (b) 6 months to June 30, 1920.

TOLGUS MINES, LTD. **ENGLAND**

Address: J. F. Maynard, sec., East Pool Mine, Carn Brea, Cornwall. Bewick, Moreing & Co., mgrs.; M. T. Taylor, supt.

Inc. 1919. **Cap.** £80,000; £1 par; 55,000 shares issued.

Property: Great South Tolgus and South Tolgus tin mines, at Illogan, Cornwall, acquired from East Pool and Agar, Ltd.

TREBURGETT CONS. MINES, LTD. **ENGLAND**

Address: G. D. Cahill, sec., 8 Adams St., Adelphi, London; W. C.; O. Swete, mgr.

Inc. 1919. **Cap.** £50,000; 5/ par; 108,685 shares issued.

Property: Treburgett silver-lead mine at St. Teath, Cornwall. The mine was reopened in 1919, the old workings, a 144′ shaft and 1,080′ adit cleaned out and the necessary equipment installed.

TYNDRUM LEAD & ZINC MINES, LTD. **SCOTLAND**

Controlled by Kinta Tin Mines, Ltd., of Malaya.

Office: H. P. Hood, sec., 65 London Wall, London, E. C. 2. England.

Directors: W. A. Luning, C. G. Lush, A. Joshua and W. Illingworth. Mine mgr., A. Ireloar.

Inc. June 25, 1918. **Cap.** £55,000; in 50,000 6% cumulative £1 pfd. and 100,000 1s. common shares; 30,000 and 60,000 issued.

Property: a lease on the old Tyndrum mines, 480 acres, in S. E. corner of county of Perth ½ mile from Tyndrum. A lead-zinc bearing lode has been uncovered for 1,700′, largely virgin ground. Lead content of ore runs as high as 10 to 12%.

Development: to depth of 350′ by adit levels, with possibility of reaching 1,000′ by such openings. Work is being largely confined to No. 4 level.

Equipment: includes 75-ton concentrator and 5,000,000 gal. reservoir, and mine is to be connected with the Caledonian Ry. The mill is still in the experimental stage, and the ore treated comes from dumps and old stope filling. The mill output averaged 8 tons of lead and 7 tons of zinc concentrate per week in 1920.

UNION MINING & SMELTING CO., LTD. **WALES**

Address: A. N. Stockdale, sec., 20 Lawrence Lane, London, E. C.

Inc. 1919. **Cap.** £500,000; £1 par; 362,875 shares issued.

Accounts to March 31, 1921, show cash, £290; debtors, £325; calls in arrears, £13,936; creditors, £4,014.

Property: the Moelwyn mine, 886 acres and the Bwlchyplwr mine, 135 acres, at Llanfrothen, Merioneth, Wales, both formerly owned by the Union Zinc Mng. Co., Ltd.

UNITED MINES OF CORNWALL, LTD. ENGLAND

Address: P. W. Bullock, 7 Stone Bldgs., Lincoln Inn, London, W. C., England.

Inc. 1920. **Cap.** £5,000, in 4,750 pfd. shares, £1 par and 5,000 ord. shares, 1s. par.

Property: in Cornwall.

UNITED STEEL CO.'S, LTD. ENGLAND

Office: Phoenix Special Steel Wks. The Ickles, Sheffield, England. Manganese mines address: C. R. Valentine, mgr., Shimoga, Mysore, India. A. O. Peech, chm. of directors; A. Blackmore (sec.) and F. S. Tomkins, routine directors.

Inc. March 25, 1918. **Cap.** £9,343,915 in 1,330,000 6% cumulative pfd. (1,317,516 issued) and 8,013,915 common (8,006,599 shares issued), par £1. Funded debt totals £2,473,048.

Company is a consolidation of the Workington I. & S. Co. and other companies operating blast furnaces, steel works, collieries, and iron mines in Cumberland, etc., England and manganese mines in India.

Manganese properties: the Kumsi and Shankargudda mines in Shimoga district, State of Mysore, 150 miles S. E. of Goa; a 40-mile branch connects Shimoga with the Madras & Southern Mahratta Ry., which delivers ore to the port of Marragoa. The Workington company began operations in 1906. The Kumsi shows a mineralized zone 450' wide, and from 2,000 to 3,000' long, with wad and psilomelane in parallel bands, associated with quartzite and dolomite. Ore composition is 30 to 36% manganese, 2 to 20% iron, 1 to 6% silica and 0.01 to 0.14% phosphorus. Development is by open-pit and entirely by hand work. The two mines are connected with Shimoga by narrow gauge tramways.

WEARDALE LEAD CO., LTD. ENGLAND

Office: Harry Clark, sec., 4 St. Nicholas Bldgs., Newcastle on Tyne, England. E. P. Deas, chairman of board of directors; H. A. Willis, Anthony Wilson, Henry Louis, tech. advisor.

Inc. Sept. 18, 1900, in Great Britain. **Cap.** £100,000; £1 par; 97,919 issued.

Operating profit for 1920 (Sept. 30) was £10,841; previous balance, £8,914; dividends and bonus absorbed, £12,240; balance forward, £5,005. Operating loss in 1921 was £10,828; deficit, £3,287.

Dividends: total 37/10 ($8.98) per share from 1901 to 1918, when 2/6 (60 cents) was paid. The distribution in 1919 was equal to 7½%; in 1920 10%.

Property: a 60 year lease from 1917 on 80 sq. miles of mineral land at Weardale, Durham, containing deposits of galena and fluorspar in limestone. The milling plant was remodeled in 1919-20.

Production (Sept. 30.): in 1917, the 5,452 tons of ore smelted yielded 4,348 tons of lead; in 1918, 4,281 tons of ore gave 3,405 tons of lead. Output for 1919 was 2,837 tons of lead, and 11,500 tons of fluorspar; in 1920, 2,774 tons leda ore and 9,374 tons of fluorspar; in 1921, 1,563 tons lead ore and 6,870 tons fluorspar.

WELSH MINES CORPORATION, LTD. WALES

Address: E. A. Wakefield, 80 Bishopsgate, London, E. C. R. C. Nancarrow, mgr.

Inc. 1919. **Cap.** £50,000, in 44,000 10% pfd. shares, £1 par and 120,000 ordinary shares, 1s. par; 31,000 pfd. and all ord. shares issued.

Property: includes several lead-zinc mines, the lands covering mining and water rights over 2 square miles in Cardiganshire, formerly owned by Lisburne Devel. Synd.

WILLIAMS HARVEY & CO., LTD. ENGLAND

With smelters at Liverpool and at Hayle in Cornwall, is the largest producer of tin in Europe. A subsidiary, the Williams Harvey Corp. (q. v.) was incorporated in the U. S. about 1916.

The National Lead Co. owns ⅓ of the capital stock, as does Simon I. Patino (q. v.), one of the largest individual tin operators in Bolivia.

GREECE

ANGLO-GREEK MAGNESITE CO., LTD. GREECE

Office: J. D. Henderson, 24 Finsbury Square, London, E. C. 2, England.

Directors: C. F. Colville, chairman; J. MacLaren, W. G. Waldron and J. Hogg, gen. mgr.

Inc. Aug. 21, 1902, in England. **Cap.** £176,250 in 50,000 8% cum. pfd., 125,000 £1 ord. and 25,000 1s. dfd. shares, of which 37,845, 97,581 and 15,728 are issued, respectively.

Report for year ended Dec. 31, 1919, showed a profit of £13,715; balance, £50,095; dividends absorbed, £21,310; reserve fund, £24,000; balance carried forward, £4,785.

Dividends: 7% each year on pfd. shares; on ord. shares from 1904-1917, inclusive, is 181%; 1918, 5%; 1919, 25%; 1920, 10% and bonus of 1 new ord. share for each 2½ ord. shares held; and 1,325% on dfd. shares 1911-1917 inclusive; 1918, nil; 1919, 300%; 1920, bonus of 1 ord. share for 2½ def. shares held.

Property: 5,000 acres near Pyli on the island of Eubea, Greece, mostly magnesite bearing.

Equipment: mining machinery suitable for open-cut work, 4-mile aerial tram, ore trams, etc.

Production: not given, but operations must be highly profitable judging by profits. Much of the ore comes to the United States in normal times.

ITALY

ENGLISH CROWN SPELTER CO., LTD. ITALY

Office: W. Saberton, sec., White's House, Port Tennant, Swansea, Wales.

Directors: R. J. E. Francis, chairman; W. H. Edwards, J. L. Richardson, and Sir G. Thomas.

Staff: E. W. Carlyle, supt., Ponte-di-Nossa, Bergamo, Italy.

Inc. March 9, 1883, in Great Britain. **Cap.** £100,000; shares £1 par; 84,000 issued.

Accounts for year ending Dec. 31, 1920, show an operating loss of £5,902; debit balance, £3,126.

Dividends: total 400% since 1883; 15% paid in 1918.

Property: zinc deposits at Oneta, province of Bergamo, Italy.

Equipment: hydro-electric plant and concentrating works in Italy, and smelter in Wales. The plant was closed, June, 1920.

Production: 10,862 tons of calamine and blende in 1916; 5,263 tons in 1917; 2,975 tons in 1918; 7,047 tons in 1919.

LIBIOLA COPPER MINING CO. LTD. ITALY

Office: C. J. Whitaker, sec., 120 Fenchurch St., London E. C. 2, England. **Mine office:** Sestri Levante, Genoa, Liguria, Italy.

Officers: T. V. Anthony, chairman; H. Hubert James, and C. L. H. Loeffler, directors; Robert H. Craven, mine mgr.

Inc. January, 1867, in Great Britain, and reconstructed 1888. **Cap.** £252,000; shares, £5 par, all issued.

Report for year ended Dec. 31, 1919 showed an operating loss of £3,969; debit balance, £1,258; in 1920 there was a credit balance of £234.

Dividends: 2s 6d in 1903; 3s 6d in 1904; 3s 6d in 1905; 2s 6d in 1907; 2s in 1908; 1s 6d in 1909; 1s 6d in 1910; 2s in 1911; 3s in 1912; 2s 6d in 1913; 1s 6d in 1914; 1s 6d in 1915; 1s 6d in 1916; 1s 3d in 1917, the total being £5 14/ per share.

Property is worked through a subsidiary company, organized under laws of Italy.

Property: 4 claims, leasehold, 1,000 hectares, also a half-hectare mill-site, including the Libiola mine, in the Carrara district, northern Italy. The mine, worked by the Romans, and reopened 1867, has about 12 miles of workings. The orebodies in serpentine and diabase, carry chalcopyrite associated with pyrite, ores estimated by management to average 3.45% copper and 45.03% sulphur. In 1920 reserves were estimated at 6,325 tons copper ore and 37,560 tons pyrite.

Equipment: includes a 150-h. p. steam plant, 60-h. p. electric plant and a 30-h. p. hydraulic plant, with 90-h. p. used at the mine and 150-h. p. at the mill; one hoist, and two air compressors of 12 drills aggregate capacity. The mine has a machine-shop, smithy and carpenter shop, all of stone and saw mill. The mill covering 550 square meters is built of reinforced concrete and stone and has a daily capacity of 180 tons.

Production: 17,984 tons pyrite and 1,687 tons copper in 1916, 16,930 tons pyrite and 1,252 tons copper in 1917; 12,936 tons pyrite and 1,001 tons copper in 1918; 35,560 tons pyrite and 436 tons copper in 1919; 6,309 tons pyrite and 2,297 tons copper in 1920.

Property is well managed and yields small though satisfactory returns. Operations continued without serious interruption during the war, but mine was closed down in 1919.

NORWAY

AAMDALS KOBBERVERK, A. S.

Address: Telemarken, Norway. N. A. Nielson, Skippergaten 27, Christiania, chairman; H. H. Dahll, Aamdals Verk, Telemarken, mng. director.

Property: about 300 acres of mineral land besides considerable forest land. The ore is low grade, carrying chalcopyrite and bornite, averaging 2% copper, with a gangue of slate and quartz. Reserves in 1919 were 800,000 tons of ore containing 12,000 tons of copper.

The concentrating works, built in 1915, consist of coarse-sorting house, crusher, mills, jigs, tables and flotation plant for slime. Concentrates contain 25% copper. An electric smelter was erected in 1919.

Production: 900 tons concentrates per year, equivalent to 225 tons metallic copper.

ALTENS KOBBERGRUBER — NORWAY

Idle since 1908, and resumption of operations very uncertain. See Vol. XIII for description.

Office: care of Sulitelma Aktiebolag, Stockholm, Sweden.

DUNDERLAND IRON ORE CO., LTD. — NORWAY

Office: C. A. Frith, 70 Lombard St., London, E. C. 3, England.

Directors: A. O. Cautley, J. H. Gretton and S. C. Magennis, C. Bannatyne, mgr.

Inc. April 22, 1902, in Great Britain. **Cap.** £700,000; shares £1 par; all issued; originally £2,000,000. **Bonds:** £150,000 of prior lien.

Property: iron ore deposits from 3 to 35 miles from Mo, on the coast of Norway, connected by 17 miles of rail with Storforshei, near Mo. About 80,000,000 tons of 39% ore has been proven.

Equipment: the concentrating works at Guldsmedvik, of 2,000 tons daily capactiy, awaits normal conditions before operations start. Product is shipped to England.

FOLDAL COPPER & SULPHUR CO., LTD. — NORWAY

Office: 33 Old Broad St., London, E. C. 2, England. **Mine office:** W. H. Lund, mgr., Foldal, Alvdal, Norway.

Officers: Sidney St. J. Steadman, chairman of board of directors; W. A. Carlyle, cons. eng.; D. N. Forbes, sec.

Inc. Jan. 27, 1906, in Great Britain. **Cap.** originally £350,000; shares £1 par, in £150,000 preferred and £200,000 deferred stock. Company reorganized in 1914 and capitalization reduced to £185,000; shares £1 par; 28,000 shares issued, December 31, 1915.

Balance sheet; for 1916, included: Assets—mining properties, £60,000; equipment, £52,479; ore stocks, £17,405; provisions and livestock, £16,006; debtors, £19,669; cash, £18,478. Liabilities—capital stock, £28,000; mortgages and liens, £155,074; creditors and credit balances, £21,911. Net receipts from ore sales amounted to £8,808. Operations for the year showed a loss of £1,610, with a total debit to date, £18,712.

Property: about 3,000 acres, at Foldal, Norway, timbered and including 4 old mines, known as the Juliana Marie, Knutshovd, Foldal, Grey, Moltke and Grimsdal, worked for about 150 years. Mine, opened mainly by tunnels, shows a vein of about 12′ average width, carrying massive cupriferous pyrite, with only traces of arsenic, vein giving every indication of persistence. Ore estimated to average about 2% copper and 46% sulphur. Property also has some ore of high copper tenor.

Development: during 1915 amounted to 5,385′, compared with 6,328′ in 1914. The main shaft was sunk to the 6th level, but exploratory work on this and the 5th and 7th levels did not fulfill expectations of the management.

Equipment: includes an excellent mining plant, installed at a cost of £105,000, and company has expended about £22,000 for substantial mine buildings. A large waterfall, on the Einuna river, held under a 25-year lease, subject to renewal, at annual rental of £25, has been improved with a hydro-electric power station. Good wagon roads have been built.

A 22-mile Pohlig aerial tram, which is one of the longest in the world, built at a cost of £38,412, runs from the mines to the Alvdal railway, and has a capacity of 40 metric tons per hour. Miscellaneous improvements include a telephone line, and a quay at Trondhjem, for ore shipments.

The tonnage of clean ore shipped from the mine to the railway was—

Year	Tons	Copper, %	Sulphur
1910	58,558	1.93	46.31
1911	48,832	1.96	45.84
1912	45,334	1.99	46.38
1913	38,579	1.85	44.79
1914	40,457	1.84	44.87
1915	58,400	1.81	44.33

Property considered promising and management good. No report issued since 1915.

ORKLA GRUBE-AKTIEBOLAG — **NORWAY**

Address: N. E. Lenander, mgr., or V. B. Lange, Lokkens Verk, Norway.

Officers: Marcus Wallenberg, pres.; Th. Fearnley, v. p., at last accounts.

Inc. October, 1904, in Norway. **Cap.** 16,000,000 kroner ($4,160,000); shares 180 kroner ($46.80) par.

Dividends of 7% are paid.

Property: at Meldalen, Norway. Deposits are lenses in gabbro. Ore is a cupriferous iron pyrite, carrying 2% copper and 42 to 44% sulphur. The mine is opened by the main or Wallenberg 5-compartment shaft, 1,193′ deep.

Equipment: five 1,200-h. p. electric hoists, four 1,400-h. p. compressors, two 130-h. p. pumps and a mill of 500,000 tons annual capacity.

Production: in 1915 was 180,000 tons, and in 1916, 100,000 tons. No recent returns.

ROSTVANGEN AKTIESELSKABET — **NORWAY**

Head office: Skippergaten 19, Christiania, Norway. **Mine office:** Rostvangen, via Tonset, Norway.

Directors: Johan Didrichsen, chairman; V. Koren, managing director; B. Bredesen, mgr.

Inc. May 18, 1908, in Norway.

Mine: is connected with the Kristiania-Trondhjem railway by an aerial tram.

Production: (annually): 40,000 tons of pyrite containing an average of 2.5% copper and 45% sulphur.

SULITELMA AKTIEBOLAG — NORWAY

Office: Drottninggatan 6, Stockholm, Sweden.

Directors: Gustaf Akenius, pres.; N. P. Mathiasson, v. p.; Claes Anderson, R. M. B. Schjolberg, Edwin Klinton, Andr. Zuale, emgr.

Inc. 1890, in Sweden. **Cap.** 7,021,000 kroner, increased from 3,000,000 kr.; 500 kr. par. Annual meeting in May.

Dividends: 6% was paid in 1907; and total to end of 1911 was 2,460,000 kr. Operating loss in 1919 amounted to 2.5 million kroner.

Property: 214 claims, 50,000 hectares, more or less mineralized, mainly in the Fauske Herred district of Nordland. Lands include the Sulitjelma, Carlotta, Ciken, and Altens groups of mines. The company also owns the Vaddasguisa mine, in the Oksfjorddalen, in Skjervo and Kvaenangen herreds, the Vaddasguisa being the largest and best ore deposit so far known in the Oksfjorddalen.

The Sulitjelma mines are situated within the Arctic Circle on the shore of Lake Langvand, 400′ above sea-level and 12 miles E. of Fineidet, a port on the Saltenfjord. Discovered 25 years ago, they have been developed into an enterprise in which 1,600 workmen are employed, and in which the Knudsen pyrite smelting process was invented and is still in operation.

Geology: ore consists of cupreous iron pyrite and pyrrhotite usually disseminated throught a layer of mica-schist 0.2 to 7 meters thick and 100 to 800 meters long but sometimes as solid mass of sulphide. This occurs in flat lenses at the contact between schist, amphibolite, and olivine gabbro, the lenses dipping at 10°-60°. Seventeen orebodies outcrop and 15 are under development.

The ore as mined is sorted by hand into 4 grades; viz the socalled sulphur ore, containing 3% copper, and 44% sulphur, which is shipped to acid makers; second, the richer ore which carries 6% copper and 32% sulphur, and is smelted at the mines; third, concentrating ore with 1.8% copper and 22% sulphur, which is treated by water concentration and by the Elmore process; fourth, the waste, carrying 0.25% copper and 3% sulphur, is discarded.

The ore as mined, before sorting averages 2.7% copper, 44.5% sulphur, 42% iron, 2% zinc and 7% to 8% insoluble.

Development: by 3,700′ incline shaft, with 4,500 meters of tunnel work, with a 1,200 meter level. Workings total over 12 miles. Underground haulage is by electricity. Longwall stoping is the general method used.

Reserves: Feb. 21, 1922, totalled 2,459,728 tons of which 1,700,000 tons are blocked out.

Equipment: includes eight 20-h. p. hoists, 5 air compressors, 3 at the mines and 2 at the smelter. The mine has pneumatic drills. Temple electric drill, and 18 pneumatic hammer-drills in service. There are 3 saw-mills, a general store, 3 schools, a church and a lodge, with a large number of dwellings for employees, the company owning a total of 320 buildings.

There is an extensive system of aerial tramways, with 15 stations and 2 power stations, the tram system including a 4-mile line to the Jakobsbakken mine.

The Mill: of 1,000 tons daily capacity is equipped with 3 Hadfields and five 13x24″ Krupp Grusonwerk crushers, 15 sets of rolls, 76 Harz jigs, 17 Ferrari concentrating tables, 1 slime table and 62 sizers.

The mill also has two Mineral Separation units.

There is a separate mill of 12,800 sq. ft., containing an Elmore vacuum

oil flotation plant, the largest Elmore plant in the world, having 18 units, with a productive capacity of about 25,000 tons of 6.5% copper concentrate yearly. The plant went into commission, April, 1909, and in the first year of operation produced about 8,000 tons of concentrate, carrying 6.75% copper, with a recovery of better than 80%. This Elmore plant is not only the largest installation in existence, but has given perfect satisfaction, redeeming all promises. Many small Elmore units, installed at other copper mines in other parts of he world, have proven unsuccessful, but the high saving and low costs of the Elmore plant at the Sulitjelma show that the process, under suitable conditions, is a commercial as well as a technical success. The Elmore people state that the plant operates at minimum working costs, consuming for each ton of ore treated, only 2.7 lb. of the cheapest kind of common fuel oil, and no acid. Practically the entire production of the Elmore plant at Sulitjelma has been from tailings that were wasted before the installation of this process. The daily capacity of the milling department is 1,600 tons.

The Smelter: the 160-ton smelter, at Fagerlid, 2 to 5 miles from the various mines and receiving ore by aerial trams, has a 50-ton water-jacket blast-furnace; one reverberatory furnace; two 50-ton pyrite smelting converters of the Knudsen type; a Wedge calcining furnace, a gas-fired reverberatory furnace, with hearth 15x60′, and a converter stand, with 10 shells of the Manhes type, 5′ diam. and 5′ 6″ long. First-fusion product is a matte of 30 to 40% copper and final product is blister copper assaying 99.2% sent for refining to the Helsingborg Kopparverks Aktiebolag, at Helsingborg , Sweden, where there is a leaching plant, in connection with the works. Ores smelted average 6 to 8% copper, 32 to 34% sulphur, 34 to 36% iron and 2 to 4.5% alumina, with traces of lime and magnesia.

The smelter employs the Knudsen discontinuous pyrite process, which largely utilizes the calorific value of the sulphur effecting a considerable saving in fuel cost. Pyritic and chloritic ores are smelted, the former yielding a fusible slag, the viscosity of which is much increased by the addition of the chloritic ore. For this reason slag is run into the forehearth and allowed to settle for 90 minutes, after which pyritic fines are added. The Knudsen furnaces, of 20 tons capacity each, are lined with magnesite blocks, set close together and luted with a bond of magnesite mortar and tar, applied hot. The wear is confined to the under portion of the furnace, up to 30 to 50″ above the tuyeres, and is comparatively small, the working furnaces having run for 179 to 459 charges before linings required repairing. Two men are sufficient to work a furnace, 2 others attending to the forehearth, each forehearth sufficing for 2 or 3 furnaces. The loss in smelting low-grade ores amounts to 10% only, slags running only 0.2 to 0.3% copper, as against a former loss of about 15% of assay values, and the cost of smelting under the Knudsen process is given as 3s. per ton of ore, this covering wages, transportation of ore to the smelter and cost of fuel. Converter costs were said to be under $1 per metric ton in 1913.

Miscellaneous enterprises of the Sulitjelma include the ownership and operation of 7 steamers, 2 tugs, 40 barges, and a 13-kilometer private railway system, known as the Sulitjelmabanen, of 750-mm. gauge, equipped with 3 locomotives and 120 freight cars.

Production: the total to May, 1919, was 1,917,354 tons of cupreous iron pyrite and 368,836 tons of smelting ore.

Year	Tons Raw Ore,	Lb. Copper,	Year	Raw Ore, Tons	Copper, Lb.
1918.....	133,433	.....	1910.....130,000		9,000,000
1917.....	224,488	.....	1909.....	.....	.....
1916.....	215,675	.....	1908.....	.....	.....
1915.....	.....	.....	1907.....120,000		8,140,562
1914.....	.....	.....	1906.....	.....	7,000,000
1913.....	.....	.....	1905.....	90,000	6,225,856

1912.....	134,750	11,000,000	1904.....	100,000	7,614,688
1911.....	.....	.....			

Sulitjelma has by no means reached the peak of its productive capacity, though by far the largest copper producer in Norway, and one of the richest copper mines in Europe. The management is progressive and competent and has shown a very high degree of technical ability. In January, 1920, the mine was closed on account of large stocks on hand; operations were reported resumed early in 1921.

PORTUGAL

ERVEDOSA TIN MINES, LTD. **PORTUGAL**

Address: F. C. Bell, sec., 30 St. Swithin's Lane, London E. C., England. J. Paull, cons. engr.

Inc. 1920. **Cap.** £150,000, in 100,000 7% cum. pfd. ordinary £1 par and 200,000 ord. shares, 5s par; all pfd. ordinary and 185,000 ord. shares issued.

Property: 150 hectares, near Ervedosa on the Tuella river, N. of Mirandella, formerly owned by the Soc. des Minas d'Etain d'Ervedosa, Paris.

MASON & BARRY, LTD. **PORTUGAL**

Office: 87 Cannon St., London, E. C., England. **Mine office:** Pomarao, Alemtejo, Portugal. F. J. Rich, gen. mgr.

Directors: Jas. Francis Mason, chairman; D. G. Barry, deputy chairman; Edw. O. Barry, managing, and Henry Edw. Beddington, Philip O'D. Greene, sec.

Inc. June, 1878, in Great Britain, and reorganized June 2, 1892. **Cap.** £210,000; £1 par; 185,172 issued.

Profits were £68,325 in 1906; £66,135 in 1907; £56,701 in 1908; £30,934 in 1909; £65,458 in 1910; £64,546 in 1911; £85,665 in 1912; £76,211 in 1913; £31,338 in 1914; £59,737 in 1915; £99,167 in 1916; £18,499 in 1917; £772 in 1918; £6,047 (loss) in 1919; £67,685 in 1920; £115,772 in 1921. Balance carried forward Dec. 31, 1920, £38,391.

Dividends: paid regularly since organization, ranging from 2s. to 13s. per share. Recent dividends have been as follows: 13s. in 1901, 11s. in 1902, 7s. in 1903, 7s. in 1904, 7s. in 1905, 7s. in 1906, 6s. in 1907, 6s. in 1908, 5s. in 1909, 6s. in 1910, 6s. in 1911, 7s. in 1912, 7s. in 1913, 3s. in 1914, 6s. in 1915, 9s. in 1916, 2s. in 1917; nil for 1918; 2s. for 1919; 5s. for 1920; 8s. and a bonus of 2s. for 1921, all less income tax. Total to date, £1,629,505, plus return of capital £740,688.

Property: the San Domingos copper and sulphur mine at Mertola, Portugal, just over the border of Spain, and in the same belt of pyrite deposits as the Rio Tinto, Tharsis and others. The mines are operated under a 50-year lease ending October, 1958.

Geology: A mineral zone of about 200′ width, and proven length of 2,000′, carries lenses of cupriferous pyrite averaging slightly under 1% copper and about 50% sulphur, the principal values being in suphur rather than in copper. With increasing depth copper contents have decreased slowly but steadily.

Development: to depth of nearly 1,000′ by several shafts and extnsive drifting.

Ore reserves: were 7,500,000 long tons at the end of 1918.

The copper ore is leached as at the Rio Tinto. Sulphur ore is shipped to various works in Europe and America.

The company owns a railway to Pomarao, a tide-water port on the Rio Guadiana, where there is a shipping pier and tugs.

Production: maximum was 8,353,229 lb. fine copper in 1901, and recent production has been as follows: 6,605,750 lb. in 1904; 6,088,320 lb. in 1905; 5,519,360 lb. in 1906; 5,871,040 lb. in 1907; 6,186,880 lb. in 1908; 5,299,840 lb. in 1909; 6,619,200 lb. in 1910; 6,548,280 lb. in 1911; 7,925,120 lb. in 1912;

202,176 tons of ore in 1916; 154,762 tons of ore in 1917; 80,079 tons in 1918; 60,522 tons in 1919; 93,812 tons in 1920; 148,261 tons in 1921. Shipments amounted to 41,827 tons in 1919; 226,739 tons in 1920; 204,400 tons in 1921.

Apparently the San Domingos is no longer an important copper producer, but the property, which has a long and honorable record of production, is carefully managed. Abnormal conditions due to the war have hampered operations for several years.

WOLFRAM MINING & SMELTING CO., LTD. **PORTUGAL**

Office: S. J. C. Air, sec., 20 Copthall Ave., London, E. C. 2, England.

Directors: M. Philips, chairman; F. Gates, managing; F. Goddard, and E. Laffargue, T. Gribble, mgr.

Inc. July 15, 1909, in Great Britain. **Cap.** £100,000; £1 par; 80,000 issued. **Dividends:** total 55% from 1909, to 1916, inclusive; none since.

Report for year ended Sept. 30, 1919, showed an operating loss of £5,654; balance forward, £24,326; cash, £16,194; metal stock, £36,217; debtors, £876; investments, £7,114; creditors, £12,669.

Property: a tract of 1,800 acres near Silvares, province of Beira Baixa, Portugal, carrying tungsten (wolfram) deposits, and equipped with two concentrators.

Production: 235 tons of wolfram concentrate in 1914; 300 tons in 1915 and 337 tons in 1916. Developing at last account.

RUSSIA

BOGOSLOVSK MINING CO. **RUSSIA**

Address: via Verknaya or Goroblagodatskaya on the Perm-Gornozavodsk railroad, Department of Perm, Russia.

Property: 2 groups of copper claims, 15 by 1 mile in area, 6½ miles S. E. of Verknaya, Department of Perm, eastern slope of the Ural mountains.

Geology: the mineralized belt is on the line of other deposits of copper pyrite on the eastern slope of the Urals, being a continuation of those at Kyshtim, Sissert, and Kalata. Country rock is granite and "keratophyre," a soda-felsite porphyry. The former is not productive where massive. Copper-bearing pyrite occurs as lenses in a belt of highly altered argillaceous schist, intersected by several porphyry dikes. A gossan cap, 60′ thick, is always found on top of the ore, but the outcrop is covered by 3′ to 10′ of soil and debris, the country being swampy and covered with thick forest and undergrowth. Drill holes show the depth of oxidation to be 60′. Gossan carries $3.90 to $10.28 gold per ton, and may be treated by cyanidation.

Development: by surface pits, shafts, and drill-holes, last mentioned put down from 95 to 735′. Ore reserves to a depth of 660′ amount to 3,400,000 tons, averaging 3.6% copper. At 686′ depth the lens is 50′ wide. At depth of 105′ in No. 7 Bogoslovsky shaft, ore assayed 33.5 to 43.8% sulphur, 9.2 to 26.9% silica, 27.1 to 38.0% iron, traces to 0.43% zinc and 4.6 to 12.65% copper. A sample of 976 tons from between the 70 and 105′ levels yielded 7½% copper at the Bogoslovsky smelter, which has a capacity of 60,000 tons of pyrite ore per annum, plus other ore.

Equipment: includes hoists, 300 and 1,050 cu. ft. compressors, and reduction works to be erected.

No recent information.

CAUCASUS COPPER CO. **RUSSIA**

Office: E. W. Lowe, Pinners Hall, Austin Friars, London, E. C. 2, England.

Directors: J. Colquhoun, chairman; M. Grancini, Viscount Grimston and E. B. Lockhart.

500 issued. **Debentures:** £42,620 of 5% firsts, and £1,850,000 of 5% seconds of which £752,000 series A., are outstanding out of a total of £850,000, and £486,000 series B. out of £500,000 authorized.

Inc. Oct. 4, 1900, in England. **Cap.** £1,000,000; shares £1 par, 513,-

No accounts have been available for 7 years owing to the war, but in 1915 the debit balance was £178,319. Creditors, loans, and bills payable amounted to £236,400; and debenture interest accrued, £76,447.

Property: near Dzansul, Department of Kutais, Caucasus, southern Russia. In 1912 reserves were estimated at 3,600,000 tons of 3.1% copper ore. In 1914 the Turkish army took possession, but was ejected 5 months later. A little work was done late in 1916, but none since 1919.

Equipment: includes a 1,000-ton mill using flotation.

Reserves 1912 were 3,600,000 tons of 3.1% copper ore.

Production: 3,030 tons of copper in 1911; 2,992 tons in 1912; 3,936 tons in 1913.

RUSSIAN MINING CORPORATION, LTD. .. **RUSSIA**

Officers: Henry Richards, sec., 341 Salisbury House, London, E. C. 2, England.

Directors: F. W. Baker, chairman; Walter McDermott, A. S. Elmore, Baron A. de Gunzberg. Advisory engineer and agent in Russia, A. Gernet.

Inc. Jan. 6, 1911, in England. **Cap.** £250,000; £1 par; £245,250 issued.

The latest finanacial report, shows a loss for 12 months to March 31, 1918 of £3,594; and a profit for 18 months to Sept. 30, 1919 of £16,000, leaving a debit balance, £18,485.

Current assets, Sept. 30, 1919, were £83,114 and liabilities, £6,442, compared with assets, £61,794 and liabilities, £24,881, March 31, 1917.

Property: in the Altai region of western Siberia was sold to **Altai Mines, Ltd.**, which see. Company has an interest in collieries in southern Russia and in the Inter-Russian Industrial Corporation. Company has also acquired rights for the Elmore zinc-lead recovery process in Russia, Norway and Sweden.

Altai Mines, Ltd.

Address: H. L. H. Owen, 341 Salisbury House, London, E. C. 2, England. H. A. Kursell, mgr.

Inc. in Russia, in 1917, with capital of 100,000 shares of 100 rubles par, to accquire holdings of the Russian Mining Corporation, Ltd., which now holds 20,400 of the 36,400 shares received for its property.

Property: mining concessions in the Altai region of western Siberia includes the **Zmeinogorsk** of 12,292 sq. miles and the **Zyrianovsk** of 21,195 sq. miles. Minerals have been mined here from early times and records show an output of 45,550,000 oz. silver, 30,000 tons of copper and 500,000 tons of lead up to 1866. The Zyrianovsk property has a series of lenses of complex ores; those developed, are estimated to contain 315,000 tons, assaying 22% zinc, 11% lead, 2.5% copper, 15 oz. silver and 0.35 oz. gold per ton. The war greatly hindered exploration, but the Byelousovsk copper mine on the Zmeinogorsk concession promises well. Drilling has proven an ore-body 3,300′ long, averaging 10′ 6″ in width, estimated to contain 1,000,000 tons of ore that averages 3.55% copper, 9.08% zinc, 1 gr. gold and 60 gr. silver per ton. Drilling has shown at depth the copper values increase and the zinc values diminish. The **Berezovsk** mine, W. of Byelousovsk has been explored by drilling, said to indicate 200,000 tons of ore averaging 11.57% zinc, 8.55% lead, 0.94% copper, 1.7 gr. gold and 191 gr. silver per ton. At the **Lazonrievsk** mine several veins, 1-5′ wide, have been disclosed averaging 5% copper, and at the Zmeinogorsk mine are 10,000 tons of gold bearing ore developed, with 30,000 tons high grade barite on the dumps. Transportation is much easier than in other mining regions of Siberia, however, all operations have been suspended owing to political conditions in Russia.

RUSSO-ASIATIC CONSOLIDATED, LTD. **RUSSIA**

An amalgamation of the Irtysh, Kyshtim, Russo-Canadian, and Tanalyk corporations, formed late in 1919.

Office: J. P. B. Webster, London, mgr. and sec., Pinners Hall, Austin Friars, London, England.

Directors: Leslie Urquhart, chairman; C. J. Cater Scott, deputy chairman; Edw. P. Andreae, R. Gilman Brown, E. Mackay Edgar, D. P. Mitchell, D. Morgan, Saveli Polak, T. Blair Reynolds, C. A. Reid Scott and A. John Hugh Smith.

Inc. 1919, in England. **Cap.** £12,000,000; £1 par. Shares issued in exchange for property holdings amount to 9,628,351 shares; 3,442,838 for Irtysh; 2,520,000 for Kyshtim; 1,768,152 for Russo-Canadian, and 725,982 for Tanalyk. Shareholders in Irtysh, Kyshtim, and Tanalyk received 2 new shares for each old one held; Russo-Canadian stockholders get one new share for each preference share, and one new share for every 2 shares common held. Russo-Asiatic assumed the Irtysh and Tanalyk debentures, (614,217 shares), and the Irtysh options, (555,194 shares).

Financial statement at time of consolidation showed; cash due from Russo-Canadian Co., £830,000; cash due from Irtysh Corpn., £115,000; cash receiv. from share options, £278,581; liabilities, Kyshtim Corpn., £80,000; Tanalyk Corpn., £18,000.

Balance sheet of Dec. 31, 1920, showed: **Assets:** interests in Russian mng. companies, £8,175,052; expenditures in other interests, £25,959; sundry invest., £3,067; debtors, £700; cash rec. from Russo-Canadian Dev. Co., £721,649; cash, £170,785, prel. expenses, £36,670; balance, £47,822; total, £9,181,707. **Liabilities:** include capital issued, £8,461,587; debentures, £614,117; unclaimed debenture interest, £2,754; sundry creditors, £103,249.

Property: freehold and leasehold mining, agricultural and forest land, mining claims and concessions in the Urals and Western Siberia covering 2,500,000 acres and including 12 developed metal mines with 7,260,000 tons proven ore reserves, and coal mines having an output of 400,000 tons per annum. The properties are fully equipped and when operations are resumed, annual production should amount to 18,000 tons copper, 20,000 tons zinc, 12,000 tons of lead, 140,000 oz. gold and 1,700,000 oz. silver. In 1920 company acquired an option on 36,000 acres mineral land in the departments of Gard and Lozere, France, and development work is underway. An early resumption of operations at the Russian properties depends on political conditions but will probably occur in 1923.

Irtysh Corporation, Ltd.

Assets acquired by Russo-Asiatic Consolidated, Ltd., (1919), and corporation in liquidation.

Inc. November 27, 1914, in England. **Cap.** £2,000,000; £1 par. **Debentures:** £1,000,000 of 6% authorized, £500,000 issued, bonds £20 and £100 each, of which 84,140 have been converted into shares at £2 10s. each, under rights now expired, leaving a balance of £415,860 outstanding.

Company acquired the whole capital of two Russian companies the **Ridder Mining** and **Kirgiz Mining**. To January, 1918, the Irtysh had advanced £979,528 to these companies.

Property: the Ridder, Sokolni and other zinc-lead-copper mines in the Altai region, Western Siberia, and the Ekibastrous coal basin, of 25 sq. miles area with equipment for a production of 250,000 tons per year.

Ore reserves: in 1917 were estimated at 945,000 tons of sulphide ore assaying 31.2% zinc, 18.1% lead, 1.5% copper, 9.7 oz. silver and 0.47 oz. gold; also 2,229,000 tons of concentrating ore containing 6.7% zinc, 3.5% lead, 0.5% copper, 1.7 oz. silver, and 0.7 oz. gold per ton. There are 360,000 additional tons of sulphide ore carrying gold in Sokolni mine, making a total of 3,534,000 tons, containing on estimated profit-value of £13,000,000.

Equipment: first unit (50,000 tons) of a concentrating mill of 200,000 tons per annum capacity, power plant, coke plant, zinc distillation plant of 20 blocks of retorts (6 finished), lead smelter, refinery and accessories, 143-

mile railway, 8 river steamers and 28 barges; also a farm to supply food to employees.

The ore is mined and treated at the Ridder property, carried 63 miles by rail, 430 miles by river, and then 80 miles by rail to the colliery and smelters.

Production: amounted to 210 tons of 99% spelter in 1916, and 431 tons in first half of 1917. A considerable tonnage of zinc and lead concentrates is on hand. Closed down owing to political disturbances. When in full operation this great property will add considerably to the world's metal output.

Kyshtim Corporation, Ltd.

Assets acquired by Russo-Asiatic Cons., Ltd. (1919) and company in liquidation. J. P. B. Webster, liquidator, Pinners Hall, Austin Friars, London, E. C. 2, England. Operatng office: Moscow, Russia. Mine office: Kyshtim, Perm, Russia.

C. J. C. Scott, chairman of board of directors; Leslie Urquhart, mng. director; P. A. Ivanoff, mng. director; R. G. Brown, cons. engr.; and T. J. Jones, advisory eng. in Russia.

Inc Oct. 29, 1908, in Great Britain, to acquire the entire share capital of the Kyshtim Mining Works, a Russian corporation. **Cap.** £1,260,000; shares £1 par; 1,254,240 issued and fully paid. Debentures authorized, £650,000 at 6%, all issued and redeemed.

Dividends: initial 5% dividend paid in December, 1912; total in 1912, 22½%; 25% in 1913; 5% in 1914; 10% in 1915, paid in November, 1916.

In December, 1917, the interest held in the Kyshtim Mining Works Co. was transferred to the Russo-Canadian Development Corporation, the Kyshtim Corporation receiving debentures in the new company in exchange.

Property: 2,198 sq. miles, or 1,406,700 acres, the mineral lands covering 189,000 acres, the remainder being farm and forest areas, all situated in the Government of Perm, southern Urals, Russia. The copper mines, 36 miles from Kyshtim, are connected by company's own line with the Government railroad. The iron mines are important, and the timber not only used for fuel and mining purposes, but also sold to the public.

Principal copper mines are the Amerikansky, Ivanoff, Koaniukoff, Smirnoff, and Tissoff. Ore reserves June, 1917, were given as 3,000,000 tons, averaging 2.8% copper, 0.1 oz. gold and 1 oz. silver per ton.

Geology: the pyrite ore of Kyshtim is a compact dense, massive aggregate of granular pyrite, barite, and quartz, carrying irregular blotches, streaks, and minute grains, of chalcopyrite, sphalerite, and tennantite. The orebodies, have four distinct roughly horizontal and parallel zones: (1) the gossan zone, extends from the surface to a maximum depth of 60', (2) the zone of loose baritic sand, extends from the bottom of the gossan to a maximum depth of 150', the greater part of which lies beneath the level of the ground-water; (3) the loose, leached sulphides, reach from the bottom of the baritic sand to a maximum depth of 180', gradually changing into (4) the underlying, firm, massive, mainly unaltered sulphide ore. Downward enrichment of secondary sulphide does not occur in the form of a commercially important zone, but has taken place to a relatively slight degree along the immediate walls, especially the hanging wall, to the greatest depth yet attained in exploration which is 600' below the ground-water level.

Equipment: complete mine plants, also smelter at Karabash capable of producing 10,000 tons of copper yearly. There are 3 blast-furnaces of a total capacity of 1,500 to 1,800 tons daily, and one 100' gas-fired regenerative-type reverberatory for fine ore and flue dust. Company has an electrolytic refinery at Kyshtim, with annual capacity of 14,000 tons of copper.

Production, years ending January:

Year	Copper, Tons	Year	Copper, Tons
1917	5,000	1915	7,642
1916	6,392	1914	7,588

In 1914 total cost was £37.84 per ton of copper, which is equal to 8.1c. per lb. In Januuary, 1918, the Bolsheviks nationalized the Kyshtim properties but it is reported that this was changed later.

Tanalyk Corporation, Ltd.

Assets acquired by Russo-Asiatic Cons., Ltd., and company in liquidation.

J. P. R. Webster, liquidator, Pinners Hall, Austin Friars, London, E. C. 2, England.

Inc. April 15, 1912, in Great Britain. **Cap.** £450,000; shares £1 par; £362,991 outstanding. **Debentures:** £200,000 authorized and £198,357 issued.

Property: 28,350 acres of mineral land, and timber rights on 300,000 acres of forest in the Orenburg Government, in the southern Urals. The actual title to the property is held by the **South Urals Mining & Smelting Co., Ltd.**

Development: the mines, several miles apart, which have been worked, include the Mambet, Ulali, Tanalyk, Troitsk, Tuba, Epaevsky, and Sebaeva, containing an estimated total of 570,700 tons of sulphide ore averagnig 2.63% copper, 0.084 oz. gold, and 1.45 oz. silver per ton. The Sebaeva contains 450,000 tons of this total. There is also 157,340 tons of oxidized ore assaying 0.38% copper, 1.35 oz. gold, and 6.73 oz. silver per ton. The Semeonovsky mine contains a reserve of 98,500 tons of ore, carrying no copper, but with 0.50 to 0.61 oz. gold and 0.65 to 0.75 oz. silver per ton. The Tuba mine contains 45,000 tons of ore with 1% copper, 3 to 3.1 oz. gold, and 16 to 20 oz. silver. The profit in sight, at pre-war prices for metals, is estimated at £2,500,000.

Equipment: steam-power, hoists, compressors, railway, smelter of 8,000 tons monthly capacity, amalgamation mill at Tuba, and cyanide plant at Semeonovsky. Blister copper is refined by the Kyshtim company.

Production: in 1914, 252 tons blister copper, and 12,000 oz. silver; in 1915, 564 tons copper, 11,415 oz. gold, and 98,440 oz. silver; in 1916, 687 tons copper, 22,000 oz. gold, and 137,000 oz. silver; in 1917 (9 months), 700 tons copper, 22,000 oz. gold, and 145,000 oz. silver.

The Russian revolution has interfered greatly with operations, but Tanalyk will eventually be a large producer of copper and precious metals.

Russo-Canadian Development Corporation, Ltd.

Inc. 1917, in Canada. **Cap.** 1,000,000 7% non-cumulative preferred, and 2,000,000 common shares; $5 par; all issued. Company organized to acquire from the Irtysh, Kyshtim, and Tanalyk Corporations all the issued capital of the Ridder, Kirgiz, Kyshtim Mining Works, and the South Urals M. & S. companies registered in Russia; also the capital of the Mining & Metallurgicial Bank, the Trading Company and the Prospecting Co. Merged with the Russo-Asiatic Consolidated, in 1919.

Prospecting Company, The

Inc. in Russia. **Cap.** 200,000 rubles. Company holds the mining interests of the Russo-Canadian Development Corporation, which in 1919 was taken over by the Russo-Asiatic Cons., Ltd.

Property: concessions covering about 73 sq. miles have been located. In the mineralized area of 1,550 acres of the Steppe region there are 5 porphyry deposits and 7 veins with favorable indications. Prospecting has been done by drilling.

RUSSO-ASIATIC CORPORATION, LTD. **RUSSIA**

In liquidation. J. P. B. Webster, liquidator, Pinners Hall, Austin Friars, London, E. C., England.

The assets, comprising shares in the Russo-Asiatic Consolidated, Ltd., are now (1921) being distributed to shareholders.

SOUTH URALS MINING & SMELTING CO., LTD. **RUSSIA**

A subsidiary of the Tanalyk Corporation which is now included in holdings of Russo Asiatic Cons., Ltd.

VERK ISETZ CORPORATION RUSSIA

Address: Kalata, Ural district, Russia.

Property: the Kalata mines, 145 miles N. of Kyshtim, eastern Urals, Russia, opened early in the last century mainly for pyrite for acid manufacturing.

Geology: The ore deposits are copper-bearing schists similar to those worked by the Kyshtim and Sissert companies. Ore is pyrite with bands of magnetite. Silica content is only 2%, with 2.3% copper, 43.5% iron and 50% sulphur.

Development: on the 406', 455' and 560' levels the main shoot is 560' long and 84' wide, yielding 3,000 tons of ore per foot of vertical depth. This ore is nearly solid pyrite. Timbering must be done soon after extracting ore. Slag is used for filling stopes. The deepest of the 3 shafts is 770'. Mining in 1915 cost $1.80 per ton.

Equipment: electric hoist with 3½-ton skips, coarse crushing plant, compressors and smelter designed by F. W. Draper. The latter consists of two blast-furnaces, 287" by 56", producing a 12.5 to 13.5% copper matte, two 12' Great Falls type converters, turbo-blowers, refinery and 3,000 kw. power plant. In 1915 there was reduced 169,760 tons of charge, equal to 530 long tons daily. Fuel consumption was 1.66% of the charge, or 2.49% of the ore, practically pyrite smelting. Slags contained 0.33% copper. No recent figures are available owing to the war and revolution.

SERBIA

BOR, SOCIETE DES MINAS DE

Address: Bor, Serbia. Head office in Paris, France.

Property: is a well known copper mine that was operated by the Germans during the war. In January, 1919, the French administrators visited the property, reporting that it had been actively worked from 1915 to 1918, that the physical condition was good, and that all machinery, equipment, and furnaces, were intact.

SPAIN

ALMADEN QUICKSILVER MINES CO. SPAIN

Address: Almaden, Province of Ciudad-Real, Spain.

Company is controlled by the Government of Spain, but the output is sold under contract to the Rothschilds in London. Part of the output is reserved for domestic consumption, the remainder being for export. By reason of its great production and cheap costs, Almaden is one of the controlling factors in the quicksilver industry of the world.

Property: probably the greatest quicksilver mine in the world, at Almaden, 120 miles N. E. of the Rio Tinto copper mines and 130 miles S. W. of Madrid, province of Ciudad-Real. The Athenians, Romans, and Moors worked deposits for several centuries.

Geology: the rocks consist of steeply upturned slates with interbedded limestones and quartzites, which weather out in steep, rocky outcrops. The strata are broken by diabase dikes and other igneous rocks.

The orebodies consist of 3 parallel nearly vertical quartzite veins about 72' apart in the lower levels, and from 26' to 46' average width. The walls are well defined, hard and permit stopes 25' wide. The workable orebodies are 20'-30' wide and nearly 1,000' long, and will average 8% to 10% mercury. Faces of 25% ore are not uncommon. On the lower levels much metallic quicksilver occurs with the cinnabar and pyrite.

Ore reserves, Jan. 1, 1920, were officially said to contain 15,000 metric tons or about 440,000 flasks.

Development: is very extensive down to the 11th level. The San Teodora vertical hoisting shaft is 984' deep and there are 2 accessory shafts.

A winze opens the orebody to the 12th level and shaft will be sunk to 1,250' in 1922.

Equipment: includes 10 pairs of Bustamente subliming furnaces, two Cermak-Spirek continuous-movement furnaces for fine material, and 3 double-pan furnaces of the same system for coarse ore.

Production: is 70-80 tons of ore daily or 16,000 tons yearly. The last official figures, those for 1917, show that 13,166 tons of ore treated, yielded 1,823,477 lb. quicksilver or 911.7 tons, a recovery of 6.93%.

For description see H. W. Gould, Mng. & Sci. Press, April 23, 1921. Employs 2,000 men, of which only about 130 do actual mining, 348 build walls underground, 411 work in the furnace plant and the balance on general surface work.

In October, 1916, the mines were leased for 15 years, to avoid the rising cost of production while under government control. The maximum price that the Treasury must pay for mercury is based on an average net cost of production for the period 1911-16. The Treasury fixes the number of flasks to be produced and the dates of delivery. The contractor is to spend 30,000 pesetas ($6,000) yearly in exploration and to erect an electric power plant. The Government pays the contractor for improvements either by amortization of 5% yearly on the works and 10% on the machinery; or if preferred by the Treasury, through appraisal of their real value at the time it resumes charge of the improvements.

Costs: $8.29 per flask in 1900, when the selling price was $45; and $15.22 in 1915, when the price was $94.

ARAMO COPPER MINES, LTD. SPAIN

Liquidated. See Volume XIV.

CALA; SOCIEDAD ANONIMA MINAS DE SPAIN

Office: Estacion S. 2d, Bilbao, Spain. **Mine office:** Cala, Santa, Olalla, Huelva, Spain.

Officers: Don Enrique Areilza, pres.; Don Jose del Castano, Bilbao, v. p.; Don Ernesto Bengoa, sec.; Don Juan de Areito, managing director.

Inc. Aug. 31, 1900, in Spain. **Cap.** 15,000,000 pesetas shares (acciones) and 7,000,000 obligaciones.

Accounts for 1916, the last obtainable, show a current balance of 143,240 pesetas and expenditures of 175,573 pesetas for construction account; 185,540 pts. for interest on bonds; 98,198 pts. for interest on accounts and 50,000 pts. loaned to Coto Teular Co., leaving a balance of 30,050 pts. Total expenditures to date amount to 5,803,317 pts., for mine account, and 14,914,332 pts. for railway account. Total all accounts, 31,153,638 pts.

Property: a group of 8 mines, 345 hectares, at Cala, near the Pena and Rio Tinto mines, carrying extensive bodies of magnetic iron ore and cupriferous pyrite. Company owns and operates a 97-kilometer railroad from the mines to San Juan del Aznalfarache, on the Guadalquivir river, in the adjoining province of Selvilla. The mill reduction works were installed in 1917.

Production: for 1916 was 23,973 tons of ore. Shipments were 12,669 tons crude ore; 7,346 tons calcined ore, 1,010 copper mineral, the total value being 286,536 pesetas. No later figures procurable.

CAMPANARIO; SOCIETE DES MINES DE CUIVRE DE SPAIN

Address: 5 Rue du Helder, Paris, France. **Mine office:** Valverde del Camino, Huelva, Spain.

Abel Suais, chairman of board of directors.

Inc. Dec. 20, 1906, in France. **Cap.** f5,000,000; shares f500 par.

Property: seven hundred hectares, including 6 old mines, and actually having about 250,000 tons of cupriferous pyrite in sight.

Equipment: includes an elaborate and extensive surface plant.

Production: about 40,000 tons of pyrite annually, ore being first treated by lixiviation and cementation to recover its copper content, and residue sold for sulphur. No exact figures available.

CASTILLO DE LAS GUARDAS; SOC. ESPANOLA DEL **SPAIN**

Office: Apartado 12, San Sebastian, Spain. **Mine office:** Castillo de las Guardas, Sevilla, Spain.

Officers: Edmond Delage, chairman; Julio Astoreca, sec.; Henri Largillier, managing director, with Louis de Beauce, Georges Thorel, J. Sesage, Henri Mayonssier, Leon Luzeret, Fernando Merino, Alejandro Gandarias, Augustin Yza, Marcos Munoz, Feliz Rene Savaste and Manuel Fernandez-Balbuena, (engr.) directors. Francisco Zarrage, manager.

Inc. July 12, 1901, in Spain. **Cap.** 7,500,000 pesetas, increased later to 10,000,000 pesetas; shares 500 pesetas par; issued 9,000,000 pesetas. Annual meeting in March.

Property: 240 hectares, 23 kilometers from Zalamea la Real, having a 15½ kilometer private railway, known as the Ferrocarril de Minas Castillo y Empalme Ronquillo, connecting at Estacion Ronquillo with the Ferrocarril Sevilla y Cala.

Mine shows granite-porphyry and diabase, carrying 5 orebodies one of which under development, has a lens of 40 meters width and 220 meters length, proven for depth of 165 meters, carrying cupriferous pyrite averaging about 1.5% copper, 0.5% lead, 0.13% zinc and occasionally up to 2 oz. silver and 4 grams gold per metric ton. Mine was discovered 1843 and worked in a small way, until taken over by the present company, 1901.

Development: by the following shafts; Menesses, 142 meters; Don Pablo, 142 meters; Malacate, 100 meters; Colorado, 110 meters; Dos de Mayo, 40 meters; Remedies, 42 meters.

Equipment: includes a 683-h. p. steam and electric plant, with two 200-h. p. hoists, good for 140 meters each, 250-h. p. air compressor.

The company owns 353 buildings, with stone shops, also maintains separate schools for boy and girls, a hospital for workmen and their families, and a town hall.

CORDOBA COPPER CO., LTD. **SPAIN**

See same title under India.

Former holdings in Spain fully described in Volume XIV.

ESPERANZA COPPER & SULPHUR CO., LTD. **SPAIN**

Address: Frank A. Cassini, sec., 62 London Wall, London, E. C. 2, England. Mine office: Zalamea La Real, Huelva, Spain.

Officers: T. D. Lawther, managing director; Alex. McNab, G. Murc Ritchie, chairman; preceding are directors.

Inc. Feb. 14, 1906, in Great Britain as successor of Spanish Minerals Development Co., Ltd. **Cap.** £350,000; shares £1 par; fully issued, fully paid.

Net earnings were £27,553 in 1908; £19,961 in 1909; £14,754 in 1910; £29,562 in 1911; £32,730 in 1912; £14,647 in 1913; £8,412 in 1914; £23,490 in 1915; £50,277 in 1916; £20,368 in 1917; £4,761 in 1918; £2,040 in 1919; £14,598 in 1920.

Dividends: 5% in 1908; 5% in 1909; 2% in 1910; 3% in 1911; 5% in 1912; 10% in 1916; 5% in 1918 and 1920.

Property: the Esperanza group, 1,833 acres, including 833 acres of mining rights, 55 miles from the port of Huelva. Holdings include the Esperanza, Nueva Esperanza, Angostura, Forzosa and Santo Tomas mines. Some of these properties were worked in very ancient times showing characteristic narrow Roman shafts, with foot-holes alternately, on either side, for ingress and egress of miners.

The Angostura mine had 231,000 tons ore reserves, and Esperanza and Forzosa mines 507,000 tons ore reserves, January, 1917.

Nueva Esperanza yielded 1,029 tons in 1912, 107 in 1913, and 534 in 1914. Development of Nueva Esperanza, San Daniel, and Forzosa properties by diamond drilling, shaft sinking and crosscutting, was in progress, 1917-18; results were disappointing and operations were suspended October 1918, at Angostura and Forzosa, and in January, 1919, at the Esperanza.

Total ore reserves at end of 1916 estimated at 738,000 tons, 872,000 tons in 1917, 886,000 tons in 1918, 882,000 tons in 1919, and 835,000 tons in 1920.

In 1919, reserves totaled 190,000 tons cementation ore and 86,000 tons smelting ore.

Equipment: includes two leaching plants dealing with mine liquors and making 98 tons of copper in 1913; 82 tons in 1914; 135 in 1915, and 127 in 1916.

Company has a private narrow-gauge electric line connecting with the Buitron railroad. The power plant consists of 4 Premier gas engine units, each with a suitable gas producer plant, with electric generators, giving economical and satisfactory service.

Production: begun July, 1906, has been as follows: 20,421 long tons of ore in 1906; 54,276 tons in 1907; 87,894 tons in 1908; 103,140 tons in 1909; 112,143 tons in 1910; 108,650 tons in 1911; 97,681 tons in 1912; 95,897 tons in 1913; 111,457 tons in 1914; 86,288 tons in 1915; 108,725 tons in 1916; 86,633 tons in 1917; 62,720 tons in 1918; 71,176 tons in 1920. Company produces no metallic copper directly from its ore, but the copper contents of the pyrite shipped amounts normally to about 100,000 tons yearly. Total shipments in 1919 amounted to 33,996 tons and in 1920 to 82,970 tons. In 1919 company acquired control of the **Cyprus Sulphur & Copper Co.**, Cyprus.

HUELVA COPPER & SULPHUR MINES, LTD. SPAIN

Office: C. Forbes, sec., 6 Old Jewry, London, E. C. 2, England. **French office:** 9 Bl'v'd de la Madeleine, Paris, France. **Mine office:** Cueva de la Mora, Huelva, Spain.

Directors: P. Lyttleton Gell, chairman; H. Gaillochet, v. p.; Ad. de Chuzouliere, G. Dyckhoff, E. Chopy, P. E. de Caplane, G. Chanlaire, J. Roux-Brahic, and Comte C. de Leusse; L. Delafosse, mgr.

Inc. Oct. 28, 1903, in Great Britain. **Cap.** £400,000; increased 1907 to £600,000, but reduced again in July, 1912, to £420,000; 279,139 shares issued and fully paid.

Financial statement, years ending June 30:

Year	Revenue	Operating Charges	Profit at Mine
1920.....	£205,317	£204,650	£ 666
1919.....	219,000	219,213	213*
1918.....	203,490	186,896	16,594
1917.....	247,928	225,436	22,493
1916.....	178,578	169,185	9,393

*Loss, abnormal costs and fluctuations in Spanish Exchange are given as causes of the above poor results.

Dividends: none have been paid since October, 1907, when 5% was distributed.

Property: the Cueva de la Mora and Monte Romero tracts comprising 246 hectares (507 acres) and other properties of 650 hectares, lying between the Rio Tinto and Tharsis properties, Huelva, Spain. The total area is 3,400 hectares. Lands are favorably located and are traversed by the Olivargas and Juliana rivers. The company is re-foresting its lands with pine and eucalyptus.

There are five producing mines, the Monte Romero, La Corta, Aguas Tenidas, Esperanza and Victoria.

In 1919, reserves totalled 190,000 tons cementation ore and 86,000 tons smelting ore and in 1920, 14,500 tons cementation ore, 67,000 tons smelting ore and 32,000 tons complex ore, a total of 113,500 tons.

Equipment: includes a pyrite smelter, cementation beds, etc. The company has built a complete town for its workmen, numbering about 1,200 men, the town having a normal population of about 5,000. The company's

buildings include schools and hospitals, with necessary mine structures. Transportation is by a 13-kilometer railway, connecting with the Zafra y Huelva line.

Production: was 5,563 tons of cupriferous pyrite in 1905; 20,523 tons in 1906; 34,905 tons in 1907; 48,511 tons of ore and 67 tons of cement copper in 1908. Production of fine copper is estimated at 175,000 lb. in 1905; 600,000 lb. in 1906; 1,000,000 lb. in 1907; 1,350,000 lb. in 1908; 25,000 tons of 5% ore shipped and 45,000 tons sent to cementation plant in 1909.

In 1915-16, 61,730 metric tons of ore yielded 3,856,600 lb. copper, in 1916-17, 63,385 metric tons gave 3,863,612 lb. copper; in 1917-18, 70,042 tons and 8,606 tons custom ore gave 3,621,200 lb. of copper: in 1918-19, 61,996 tons of company and 7,625 tons of custom ore yielded 4,437,440 lb., in 1919-20, 66,243 metric tons and 5,862 tons custom ore yielded 3,634,396 lb. copper.

PENA COPPER MINES, LTD. SPAIN

Office: Ernest Johnston, sec., 295 Salisbury House, London, E. C. 2, England. **Mine office:** Nerva, Huelva, Spain.

Directors: C. C. D'Anvers, chairman; M. Paisant, C. A. Massaouti, R. G. Levy, E. Porges and John F. Allen. Henrique Schreck, gen. mgr., Pena Mines, Huelva, Spain; F. Allen, cons. eng.

Inc. Sept. 19, 1900, in Great Britain. **Cap.** £750,000; shares £1 par; 537,600 issued.

Dividends: 1903, 5%; 1904, 5%; 1905, 4%; 1906, 7½%; 1907-1914, nil; 1915, 6%; 1916, 6%; 1917, 7½%.

Report for year ending Dec. 31, 1920, showed a profit for year of £68,813, and balance carried forward, £32,944.

Company was formed to acquire a copper and sulphur mine in the south of Spain that had, for two or three years previously, been worked by a Belgian company. Small dividends were paid from 1903 to 1906. An independent branch railway to the mine was constructed and opened in 1914, and since that time the earnings of the company have steadily improved.

Property: 1,724 acres, the Pena del Hiero group of 17 old mines, 2 miles N. E. of the Rio Tinto mine. Ore extraction is by open quarry work, the overburden being stripped off. Ore reserves are estimated as 397,385 tons, December, 1919.

Production:

Year	Tons mined	Ore shipped, tons	Copper recov'd, tons
1910	132,559	144,810	1,017
1911	131,367	124,323	1,004
1912	84,698	80,844	793
1913	68,759	5,734	703
1914	58,832	31,028	597
1915	122,120	140,616	667
1916	161,283	210,438	598
1917	160,121	145,120	587
1918	91,827	72,023	554
1919	57,333	47,897	529
1920	82,751	124,034	516

PENARROYA, SOCIETE MINIERE ET METALLURGIQUE DE

Office: Paris France; and Penarroya, Spain. Henri Jequier, metallurgist; Dr. Auguste Hollard, cons. eng.; Bradley, Bruff & Labarthe, cons. construction engs. (San Francisco, Calif.)

Inc. in France. **Cap.** 73,125,000 francs; ($14,625,000) in 292,500 shares of 250 francs par value.

Profit in 1917 was equal to $2,799,723, from which $279,978 was applied to amortization and reserve, leaving $2,519,808 net. Dividends absorbed $2,350,000.

Dividends: 40 francs per share, equal to 16% on the capital, was paid in 1917. In 1920, two dividends paid amounted to 11,600,000 fr.

Property: lead-silver mines at Penarroya, Province of Teruel, Spain; also coal mines nearby; lead mines in the Pyrenees and mines in Algiers and Tunis, northern Africa.

Equipment: includes a 10,000-h. p. hydro-electric plant, a smelter at Penarroya, one at Marseilles, France, at Megrive in Tunis and the Noyelles Godualt works, formerly owned by the Malfidano company. A complete new reduction works contains crushing and sampling machinery, roasters, Dwight-Lloyd sintering machines, 4 blast-furnaces for lead and one for copper ore, powdered coal plant, converters, and refinery. Entire equipment was made in America.

Company controls or owns every lead smelter in Spain. In August, 1919, it became sole owner in Spain of the Minerals Separation flotation patents.

Production: in 1919, 59,950 tons galena and 73,803 tons lead; in 1920, 54,697 tons galena and 75,509 tons lead.

RIO TINTO CO., LTD. **SPAIN**

Secretary and offices: J. Gorden Macleod, 3 Lombard St., London E. C. 3, England. **Mine,** at Rio Tinto, Huelva, Spain. **Works office:** Port Talbot, South Wales.

Officers: Sir Charles Wm. Fielding, chairman; Earl of Denbigh, Viscount Milner, Sir Arthur H. D. R. Steel-Maitland, and John M. Macdonald, directors: Turquand, Youngs & Co., auditors; G. W. Gray, supt. of mining; A. J. Caddick, cons. engr.

Inc. March 29, 1873, in Great Britain. **Cap.** £3,500,000; increased, November, 1905, from £3,250,000 shares £1 par in £1,625,000 cumulative 5% preference shares and £1,875,000 ordinary shares, fully issued and paid. The new issue of 50,000 ordinary shares, par £5, was sold to share holders at £63 per share, netting the company £3,150,000 for the redemption of an outstanding bond issue of £2,989,740, at 4%, which was fully retired. Transfer form, common; fee 2s. 6d.; warrants to bearer are issued in denominations of 1, 5, 10 and 25 shares, fee 1s. per warrant, fee for conversion into registered shares, 2s 6d. per certificate. Stock Exchange settlement; all shares quoted in the official list. Fiscal year ends with calendar year; accounts are issued in April, and an interim semi-yearly report is issued in October. Dividends are also payable in Paris by the Société Generale, 29 Boulevard Haussmann.

Dividends: on the old ordinary shares, of £10 par, 1879 to 1896, ranged from 6s. in 1886 to 38s. in 1896. On the present ordinary shares of £5 par; dividends have ranged from 40% in 1897 to 110% in 1906. Dividends were small at first, because the company was seriously handicapped by 3 different sets of mortgage bonds, bearing 5% interest. In 1895 the mortgage debt was consolidated into a single issue of £3,600,000 1st mortgage debentures, bearing 4% interest, with a sinking fund and semi-annual redemption, which would have extinguished the mortgage in 1919, but, by the use of new share capital November, 1905, floated at the tremendous premium of 1,160%, the company placed itself in an impregnable financial position, the credit for this able stroke of finance having been due mainly to Mr. Fielding. Recent dividends on ordinary shares have been as follows: £3 12s. 6d., or 72½%, for 1901; £2 10s., or 50%, for 1902; £3 10s., or 70%, for 1903; £3 10s., or 70%, for 1904; £4, or 80%, for 1905; £5 10s. or 110%, for 1906, £4 7s. 6d., or 87½%, for 1907; £2 15s., or 55%, for 1908; £3, or 60%, for 1909, with an interim dividend of £2 10s. for 1910; £2 12s. 6d., for 1911; £4 10s. in 1912; £3 15s. in 1913; £1 15s. in 1914; £2 15s. in 1915; £4 15s. for ordinary and 5s. for preferred in 1916; £4 10s. in 1917; £2 10s. in 1918, £2 in 1919; none for 1920 and 1921, breaking a record of continuous payments since 1879. In 1920, only preference dividends were paid (5s.); and £772,586 invested in British War Loan and gilt edge shares.

Financial report for year ended Dec. 31, 1920, showed, operating profit, £108,169; previous balance, £348,670; dividends absorbed, £81,250, balance forward, £375,589. Reserve fund, £500,000; staff provident fund £199,132

Property: 16,000 acres, freehold, of which 4,710 acres were granted from the Spanish Government. Mining operations are conducted in an area of practically 5 sq. miles.

Geology: orebodies of the Rio Tinto occur as mammoth lenses with clay-slate on the S. and porphyry to the N., and are capped by large masses of iron-ore gossan. The main orebody is cupriferous pyrite, carrying copper in the form of minute grains of chalcocite and chalcopyrite. The deposit has been leached to a depth of 100' where the zone of secondary enrichment begins, continuing to an average depth of 300'. Ore ready for extraction amounts to about 56,000,000 tons, but diamond-drill borings have shown untouched orebodies carrying upwards of 130,000,000 long tons of ore, giving sufficient reserves for about 60 years' production, and it is unlikely that the full extent of the orebodies available has been proven. The ore is cupriferous pyrite, used largely in the manufacture of sulphuric acid, but there is also a siliceous ore consisting of copper sulphides disseminated in a silicified porphyry gangue.

For removal of overburden there are 14 steam shovels, the largest having dippers of 4 cu. yds. capacity, and about 2,000,000 cu. meters of overburden is removed yearly, though this figure has been considerably exceeded in some years under exceptional requirements.

The ore when mined is graded in 3 classes: (1) smelting ore carrying 4 to 6% copper; (2) export ore about 3.5% copper, and 45 to 50% sulphur; (3) leaching ore has 1.5 to 2% copper only. The average amount of copper contained in the ores leached has ranged from 1.5% copper, in 1876 the first year of production by the present company, to 3.234% in 1884

The output of the mine for 1912 was 2,406,969 tons, carrying 2.18% copper. Since then the tonnage has gradually increased. The ores carry an average of 1.5 oz. silver per long ton, with traces of gold, and considerable silver is saved, by the Claudet process, at the smelter. About one-third of the total production is exported for sulphur contents, about one-third smelted, and the balance either leached or sent abroad. In the zone of secondary enrichment. The ores average 4 to 5% copper and with depth decline gradually in value, until at about 1,000' depth the average copper tenor is only about 1.25%. Owing to the ore being unusually rich in sulphur the shipping ores of the Rio Tinto are in good demand, and in addition to supplying various British works the company exported washed sulphur ore in large quantities to Germany, France, Belgium, and a number of acid works in the United States. **Reserves:** on the surface were estimated in 1917 to contain 18,540,000 tons of ore in the leach-piles, containing 150,000 long tons of copper.

Development: Rio Tinto has three mineral zones, known as the South or Nerva lode, the San Dionisio or Middle lode and the North lode, in addition to which there are two smaller detached lenses adjacent to the North lode, which also are being worked opencast. There are 5 different mines, of which 4 are worked opencast, and one underground. The underground mine is worked pillar-and-stall, with levels at intervals of 1215 meters, levels being opened 4 meters high and the entire floor divided into galleries and crosscuts of 4x4 meters, leaving pillar of 6x6 meters, which is not entirely satisfactory method of extraction, leaving as it does more ore in the pillars than is mined.

The **San Dionisio** mine, the westernmost and deepest of the group, has a shaft of nearly 1,200' depth. The work of changing over the San Dionisio for opencast extraction was begun 1907, and completed 1911. The overburden, consisting principally of porphyry and slate, was removed by steam shovels and carried through tunnels on the different levels, similar work being done on the South lode, opencast extension. Ore will be mined by

steam shovels to as great a depth as practicable, below which it will be necessary to hoist by shafts to the lowest tunnel level. The San Dionisio is likely to be the chief source of ore supply for several decades to come and work has been planned systematically for 10 years in advance.

Most of the ore mined is hauled out through tunnels without the need of shafts or engines. The lowest tunnel now in use for the 2 main lodes, the South and Dionisio, has not proven deep enough and management plans driving a new tunnel, 200' below the present one, which will be 3 miles long, and will require 3 to 4 years for completion.

Wherever possible mining has been done by open pit workings which have the great advantage of giving complete extraction of the ore. The depth of the largest pit is about 600' and beyond the great pit the immense orebodies are worked by drift-stopes, the caoping being blasted and sent down the shafts to fill and hold the ground as the ore is removed. Steam shovels have replaced manual labor to a considerable extent in opencast ore extraction.

Smelter contains 5 blast-furnaces of 250 tons capacity of ore daily and 15,000 to 25,000 tons of blister copper annually; 4 McDougall roasters; a 50-ton daily sulphuric acid plant; and a leaching plant having ponds with a capacity of 5,540,000 cu. meters of ore. The blister contains 98.58% copper, 19.35 oz. silver, and 0.25 oz. gold per ton.

Production: 1876-1916, was 20,000,000 tons of pyrite shipped, and 40,000,000 tons of ore treated locally, a total of 60,000,000 long tons, this ore yielding 730,000 long tons fine copper. No production figures are available since 1913, on account of war reasons, but considering strikes and temporarily reduced yields, these figures are approximately correct. In 1913 there was shipped 652,168 tons of pyrite, while 1,207,403 tons of 2.19% ore was treated at the mines. This total of 1,859,571 tons compares with 2,406,969 tons in 1912; respective copper outputs were 44,978,880 and 57,395,520 lb.

In July, 1919, the daily output was 4,000 tons of 46% sulphur ore and 1,000 tons of highly siliceous, high-grade copper ore. There were 9,000 men on the payroll. Operations were seriously hampered during 1920 by labor trouble, and the mines were practically idle during last half of year.

The management of the company is both technically and financially above criticism, and the mine itself, after 3,100 years of production, requires no commendation.

SAN MIGUEL COPPER MINES, LTD. **SPAIN**

Liquidated. Fully described in Volume XIV.

THARSIS SULPHUR & COPPER CO., LTD. **SPAIN**

Head office: George Reid, sec., 136 W. George St., Glasgow, Scotland. **Mine office:** Huelva, Spain. **Works** in Great Britain; Hebburn-on-Tyne, Willington Quay, Cardiff; and Glasgow.

Directors: W. P. Rutherford, chm. and managing director; Albert J. J. Messean, Hugh Brown, F. Alexis Ducoing, Sir Herbert E. Maxwell S. C. Hograth, F. .A L. Leprince-Ringuet, T. G. Hardie, G. E. I. Messean, Lord Glenconner.

Inc. Oct. 27, 1866, in Great Britain. **Cap.** £300,000, since increased by amalgamation with other companies and the issue of new capital, to £1,250,000. Shares £2 par, fully paid.

Dividends: begun 1868, have been paid since without the lapse of a single year, and have averaged 18% per annum. To the end of 1920 they amounted to the magnificent total of £10,999,057, putting this company well to the front among profitable mines of the world. In 1919 dividends amounted to £109,375 or 12½% less income tax, and in 1920 to £131,250 or 15%.

In addition to dividend disbursements, the company has written off sums aggregating £2,729,109, and on Dec. 31, 1920, had £357,530 in cash and securities. Net profits of operations have ranged from a minimum of

£27,052 in 1868, to a maximum of £478,878 in 1899, with £162,743 in 1909; £161,211 in 1910; £188,140 in 1911; £253,066 in 1912; £246,727 in 1913, £156,310 in 1914; £103,291 in 1915; £199,150 in 1916; £158,078 in 1917; £126,295 in 1918; £103,797 in 1919; £134,949 in 1920; £45,945 in 1921

Property: a number of cupreous and iron pyrite mines at Tharsis in the province of Huelva, Spain, some of which were worked in ancient times by the Romans, and possibly by the Phoenicians before them.

At the present time the ore comes principally from the **Calanas**, or La Zarza mine, from which 328,237 tons of sulphur ore were extracted in 1918; 253,661 tons in 1919, 251,620 tons in 1920; 222,577 tons in 1921. This mine has many million tons of ore now awaiting extraction, and the depth of the orebody is still undetermined.

In the earlier years of the company, the Tharsis group of mines was its principal source of supply, but the richer ores of that property becoming exhausted the Calanas mine became the mainstay of the company's prosperity. The Sierra Bullones mine at **Tharsis** also supplies a part of the company's output yielding 33,946 tons in 1921 compared with 59,821 tons in 1920, and 7,140 tons in 1919. The North Lode output was 4,235 tons in 1921, compared with 2,477 tons in 1920. The North Lode is also developing into a big producer.

The company also owns the **Almagrera** and **Lagunazo** mines, both within a few miles of the Tharsis group.

The Tharsis group is connected with the port of Huelva by the company's railway, 29 miles long, from which a branch line, 18 miles, runs to the Calanas mine.

Production: owing to the low copper content of the ore now being worked, the company's production of refined copper is much reduced, having fallen from 13,544 tons (30,258,560 lb.) in 1884 to 4,066 tons (9,107,840 lb.) in 1917; 3,246 tons in 1918; 260,801 tons in 1919; 313,918 tons in 1920.

UNITED ALKALI CO., LTD. SPAIN

Office: Cunard Bldg., Liverpool, England. **Mine office:** Valverde del Camino, Huelva, Spain. **Works offices:** Widnes and St. Helens, Lancashire, England.

Officers: Max Muspratt, chairman; E. Mount, sec., C. Kaesmacher, mgr.; Alex. Hill & Steward, cons. engrs.

Inc. in Great Britain. **Cap.** £6,105,240. Net earnings were £287,721 in 1919 from which £93,871 was disbursed for interest on debentures.

The company is primarily a chemical and manufacturing corporation, copper mining being merely a small branch of its business, which embraces 46 subsidiary works and corporations, some of the plants of very great size. The company has its principal works at St. Helens, Runcorn, Widnes and Glasgow, making extensive use of Spanish pyrites, which are burned for sulphur, after which the cinder remaining is leached for copper.

The company's copper properties in Spain include the Sotiel Coronada mines; also the Castillo del Buitron mines, held under lease from the Cia. Anonima de Buitron, and Tinto and Santa Rosa mines, all in the province of Huelva. These properties show typical Huelvan slates, carrying lenticular contact deposits between slate and porphyry, having a general N.-W. strike, with dip from 30° to vertical, carrying cupriferous pyrite.

The Sotiel Coronada mine, 666 hectares, produces cupriferous pyrite ores and cement copper equivalent to an annual output of about 1,000,000 lb. fine copper yearly.

Mining is done by both underground and opencut operations, with overhand stoping, with dry walling and rock filling for depleted stopes. All pyritic ore above 1.5% copper is exported, the low-grade ores being leached at the mine, and washed sulphur ore exported.

The Castillo del Buitron property is a group of 4 concessions, 47 acres,

at Zalamea La Real, and includes La Poderosa group of 6 hectares, adjoining, and the Concepcion mine of 6 hectares, at Almonaster. The 2 principal lenses of ore of the Castillo del Buitron group are the Levante, with a length of 150 meters, but of irregular outline, and the Poniente, about 200 meters long. Production of this group averages 1,500,000 lbs. fine copper yearly.

The **Tinto & Santa Rosa** group includes La Santa Rosa and El Tinto mines, having a combined area of 141 hectares, at Zalamea La Real. The Santa Rosa mine has 2 parallel lenses, with 7 levels opened, and the Tinto mine has ores said to average about 1.5% copper and 46% sulphur. The group has 9 shafts, and was estimated 1908, by the Spanish Government, to have 1,500,000 metric tons of ore developed. Production from this group is estimated at about 2,000,000 lb. fine copper yearly.

The company controls the Ferrocarril del Buitron, a narrow gauge railroad running from Castillo del Buitron to Huelva, equipped with 18 locomotives.

Production: from Spanish mines was 100,000 metric tons of cupriferous pyrite and 1,350 tons of copper precipitates in 1920. The company formerly was a large purchaser of iron pyrite, but its own mines now meet its requirements.

SWEDEN

LAKE COPPER PROPRIETARY CO., LTD. **SWEDEN**

Office: E. M. E. Culverhouse, sec., 85 London Wall, London, E. C. 2, England.

Directors: Col. Lynch-Staunton, chairman; R. C. Lambert, Edw. Manville and Jas. Swinburne. James Swinburne, cons. elec. engr.

Inc. March 18, 1906. **Cap.** £300,000 in 298,000 ord. £1 shares; 255,500 issued and 40,000 def. 1s. shares, all issued. Debentures £500,000, 6%, issued June, 1912; repayable in yearly drawings between December 1922-1932; issued £218,180.

Company paid £200,000 cash for all the shares of the Lake Copper Grufaktiebolget. owning 1,500 acres of mining leases.

Balance sheet for year ended Dec. 31, 1920, shows cash, £8,807; shares and rights in other companies, £259,326; mortgages, £9,744; advances to mining companies, £279,977; machinery, £14,644; machinery suspense account, £11,503; total, £584,003; outstanding capital, £257,500; debentures, £218,180; loans, interest, etc., £4,030; P. & L., £8,422.

Property: the Stora Strand and Vingnas mines about 90 miles N. of Gothenburg, Sweden. Orebody on the Stora Strand has been proven for over 10 miles in length and to 800′ depth and carries copper-silver-gold values. Reserves estimated at 100,000 tons of ore. Ore occurs in a slate bed and averages 2% copper.

Development: by 13 shafts on the Stora Strand and 4 on the Vingnas.

Equipment: (at Stora Strand mine) three air-compressors, drills, electric hoist. A concentration mill was put into operation early in 1921.

ASIA

The mines are arranged alphabetically by countries.

ANATOLIA-SERDJILLER SYN., LTD. **ASIA MINOR**

Office: W. F. Garland, sec., 6 Queen St. Place, London, E. C. 4, England.

Directors: Sir E. A. Barry, chm., et. al.; John Taylor & Sons., mgrs.; W. H. Rundall, supt.

Inc. Jan. 21, 1914. **Cap.** £40,000 increased from £25,000, Dec. 1920; par 10s; 72,237 shares issued, of which Sudan Gold Field Co. owns 33,333;

40,000 shares are only 1/10th paid. Expenditures in year ended March 31, 1921, were £15,790. Current assets exceeded liabilities by £20,128.

Property: an option on the Cremaste Gold and Silver Concession, 1,840 acres, at Cartal-Kaya, Dept. of Bigha, 25 miles from the Dardanelles. No work was done during the war but was resumed in mid-summer of 1921. Examined by E. R. Woakes.

KARA BURUN MERCURY SYN., LTD. ANATOLIA (ASIA MINOR)

Address: Aidin, near Smyrna, Turkey in Asia.

Property: contains cinnabar-bearing quartz veins in schist near limestone. Mining is done by open-cuts, and ore as low as 0.25% mercury is mined, concentrated by screening and the lump ore calcined in two double Spirek furnaces the fines going to a Cermak-Spirek furnace. Total output of mine 30 tons daily.

Production: about 3,000 flasks of quicksilver yearly. No recent data.

CHINA

It is difficult to procure specific data concerning the operating mines or active mining companies of China.

The geology of the country and its mineral resources, are described in various books, but the foreign owned mines are few and those operated by Chinese firms are with few exceptions, private enterprises. The American consular service reports that the following firms are interested in mining:

Chater, C. P.	C. E. Richardson.
China Mining & Metal Co., Ltd.	R. W. Weymouth.
Hongkong Iron Mining Co., Ltd,	The China Crude Ore Export Co., Ltd.

The above firms can probably be reached through the American Consulate at Hongkong.

The Wah Chang Mining and Smelting Co. is the world's largest producer of antimony. The largest iron mines of China are in Tayeh. The Han-yeh-ping company's mines produced 600,000 metric tons during 1919, compared with 596,000 tons in 1918. About half of this is used in the company's iron and steel works.

CHULING MINING WORKS **CHINA**

Address Swatow, China.

Operates a lead mine and smelter in Chenping district, producing slabs of 187 lb. each of high grade soft lead 99.97% pure. Production started 1921. Smelter is a small native furnace handling but 3 tons per day.

EASTERN PIONEER CO., LTD. **CHINA**

In liquidation: H. M. Willis, liquidator, 10 Walbrook, London, E. C. 4, England. Company, registered in 1899 with capital of 300,000 £1 shares, all issued, decided mid-1921 to dissolve and transfer assets to the **Yang-tse Corp., Ltd.**, which see. Each share held by E. P. stockholders being exchangeable for one pfd. ordinary 5s share of Yang-tse, with 2s assessment of which 1s has been paid.

KWONG TU GOVERNMENT GOLD MINES **CHINA**

Address: Kwong Tu, Sen Ping St., Harbin, China; or 14 Hwang Tu Kenk, Peking, China. **Mine address:** Tai Ping Kou, Amur River, (North Manchuria) China.

Officers: Kwong Wu, pres.-mgr.; Y. L. Sen, sec.; T. K. Shu, treas.; Chas. F. Holman, supt., Harbin.

Is a Government enterprise with unlimited capital.

Property: placer ground on the Amur river, Amur province, from which gold has been won by sluicing for past 20 years. A 7-cu. ft. Yuba Mfg. Co. dredge was erected late in 1920, and operations begun in following spring.

NEW YORK ORIENT MINES CO. **CHINA**

Main office: 242 Water St., Augusta, Me. **Office of secretary:** 14 Wall St., New York.

Inc. 1916, in Maine.

This syndicate composed of various well-known American engineers has been endeavoring to secure desirable mining concessions in the Orient for several years. See Yunnan Ming Hsing Mng. Co., a subsidiary.

PAO HUA CO. **CHINA**

Address: Chihtsun, China. Company is an associate of the Wah Chang Mng. & Sm. Co.

Property: antimony mines in Yunnan province, near Chihtsun on the Tonopah-Yunnan R. R. Equipped with smelter, producing high grade metal.

WAH CHANG MINING & SMELTING CO., LTD. **CHINA**

Main office: Changsha, China. **Other offices:** 9 Ningpo Road, Shanghai, China; Wah Chang Trading Corporation, Woolworth Bldg., New York; H. M. Newhall & Co., Newhall Bldg., San Francisco; and H. E. M. Bourke, 21 Great Winchester St., London, E. C. England.

Officers: Y. H. Wang, pres.; H. Y. Liang, v. p.-chief engr.; K. C. Li, v. p.-New York mgr.; M. C. Wang, v. p.; N. F. Chu, v. p.-treas.; S. L. Tang, supt.-asst.-treas.; K. K. Chang, sec.; T. W. Tseng, asst. sec.; D. C. Chow, Shanghai mgr. **Auditors:** Y. G. Chow, M. H. Li, and C. F. Tsai. Directors: H. L. Shuan (chairman); H. Q. Liang, Q. Yang, C. T. Chow, D. W. Tang, P. Q. Yuen, H. K. Liang, L. C. Tsow and F. C. Chow.

The Wah Chang company was formed in 1898, under, the name of Kiu-Tung Antimony Mining Co., and was the first antimony mining company in China. In 1908 it was reorganized, and obtained a patent for its antimony smelting process from the Chinese Government. In addition to this, the company obtained a monopoly of the smelting of antimony in the province of Hunan, to extend over a period of 10 years as from 1908. It has since been extended for a period of 25 years. Under this monopoly, no company has the right to erect works in the province, unless the consent of the Wah Chang company is obtained. The patent granted extends over the whole of China.

The main office is situated at Changsha, next to the antimony works, which extend over a large area, and includes in addition, a lead plant, warehouses, etc.

The Pao Hua Co. (q. v.), operating in the province of Yunnan, is associated with Wah Chang company.

Antimony Mines: (1) the Yi-Yang, a good property with modern mining equipment. A railway has been built to connect the mine with the river; (2) the An-Hua mines; and (3) the Lu-Lin mines.

Tin Mines: the An-Yuen and Poo-sha.

Tungsten Mines: the Yao Kan Sian and Ton An mines. Each mine is controlled by a subsidiary of the Wah Chang Company.

Lead Mines: the Tien For Tai mines.

Products: the principal product is the WCC Antimony, with a guaranteed minimum purity of 99% Sb., but assaying 99.6% and over. Company also markets Chinese needle antimony, white oxide of antimony, and antimony ore; tungsten concentrates, which assay 70% WO_3 and over; lead and zinc ores; and Chinese No. 1 tin ingots. The antimony, tin and tungsten are shipped all over the world. The lead is entirely disposed of in China for domestic purposes.

At the antimony works the Herrenschmidt process is used. This was described by K. C. Li in a paper prepared for the American Institute of Metals, and reprinted in the E. & M. Journal of October 20, 1917, also by C. Yu Wang in Bull. 136, of the A. I. M. E. in April, 1918. The ore mined is low-grade. In 1915 and 1916 there was extracted from accumulated residue over 9,000 tons (20,160,000 lb.) of metals. The works treat custom ore.

This company is the largest antimony producer in the world and supplied 55 to 65% of American imports since 1915. Exports of antimony from Changsha to the United States during 1916, amounted to 4,762 tons

valued at $2,681,190, against $1,500,000 in 1915. The 1917 figures were 3,292 tons worth $245,672 (U. S.) plus 454,836 Hankow taels (83 to 106 cents U. S.) Exports from Changsha in 1917 to all countries were 21,333 tons of crude antimony, valued at $2,252,807; 102 tons of ore, $9,394, and 14,884 tons of regulus, $3,258,712.

WAH CHANG TRADING CORPORATION.

Head office: Woolworth Bldg., New York.

Officers: K. C. Li, pres.-treas.; G. K. Li, v. p.; Guy C. Riddell, sec.

History: in the winter of 1914-15 the Wah Chang Mining & Smelting Co., Ltd. decided to open a branch office in America for the direct sale of its products. The business, which began in a small way with the handling of antimony metal and tungsten ore only, rapidly developed, and in 1916 it was decided to form a New York corporation under the above title with a capital of $10,000. It did not become operative until March 1, 1918, when the capital was increased to $100,000, and the entire business of the Wah Chang Mining & Smelting Co., Ltd. branch office was taken over.

In April, 1918, the capital was increased to $1,000,000, and in May, 1919, was again increased to $2,000,000. The Wah Chang Trading Corporation became the sole representative of Wah Chang M. & S. Co., outside of China, and consequently took control of Wah Chang M. & S. Co.'s agencies abroad. The scope of the business has been greatly extended, and now includes antimony metal (crude and oxide), tungsten and other ores, tin, silk, etc. as imports, and machinery, pig iron, railway equipment, soda ash and other chemicals, aluminum, brass and general equipments as exports.

YANG-TSE CORPORATION, LTD. CHINA

Office: E. R. D. James, sec., 2 Broad St. Place, London, E. C. 2, England.

Directors: H. Edwards, chm.; R. Jaeger, J. P. Kendrick and H. W. L. Way.

Inc. Sept. 19, 1898. **Cap.** £300,140; 1,120,000 pfd. ordinary, 5s par, 20,000 ordinary, £1 par, and 2,800 deferred shares, 1s par; 2nd and 3rd class all issued, and 508,620 of pfd. ordinary of which 291,652 are fully paid, the remainder 4s paid.

Company was organized to acquire concessions in China and elsewhere, and in Aug., 1921, took over the **Eastern Pioneer Co., Ltd.** with its Sze-Chuan mineral concession in S. W. China, agreeing to exchange its pfd. ordinary stock with that of the E. P. Co. on an equal basis, but E. P. stockholders to be assessed 2s per share. Revolutionary conditions in China have seriously handicapped operations.

YUNNAN MING HSING MNG. CO. CHINA

Address: Tengyueh, Yunnan, China.

Officers: Wu Shih-shun, pres.; J. W. Finch, engr. in chief; J. A. T. Robertson, met. engr. There are 5 directors.

Inc. under a Chinese charter in Sept., 1919; with capital of $1,000,000, by the Government of Yunnan province and **New York-Orient Mines Co.**

Property: an old lead--zinc-silver mine which is being reopened. Reported that a tin property in Cochiu and the Tungchwang copper mine are under investigation.

YUSENG MANGANESE MNG. CO. CHINA

Address: Changsha, Hunan, China.

Company operates manganese deposits. The construction of a reduction plant has been postponed indefinitely.

CYPRUS

CYPRUS SULPHUR & COPPER CO., LTD. CYPRUS

Office: F. A. Cassini, sec., 62 London Wall, London, E. C. 2, England

Directors: G. M. Ritchie, T. D. Lawther and D. Maxwell. G. C. Nevitt, mining engr.

Inc. Oct. 28, 1909. **Cap.** £20,000; par £1; divided into 2 classes, A. & B. of 10,000 shares each; a large stock interest is owned by Esperanza Copper and Sulphur Co., Ltd., of Spain. Name of company originally New Lymni, Ltd., was changed in 1919. Expenditures for 1920 were £7,633; and liquid assets £2,838.

Property: a concession covering a copper mine at Lymni, Polis Papho, with reserves of 3,000,00 tons of 1% and 400,000 tons of 2% copper ore at end of 1910. Development and experiments in ore treatment are being continued.

Examined by Wm. Young Westervelt.

DUTCH EAST INDIES

These islands, especially Billiton and Banca, are noted for their important production of tin, from 20,000 to 25,000 metric tons per annum. But the precious metals are also produced, the output in 1919 amounting to 92,000 oz. of gold and 1,002,000 oz. of silver.

AEQUATOR, MYNBOUWMAATSCHAPPIJ — SUMATRA

Address: Pajakombo, Sumatra's Westkust, Dutch East Indies.

Property: a concession, includes the Mangani mine, granted in 1919, covers quartz veins in andesite. The ore carries manganese with gold and silver values.

Production: in 1919 was 76 kgm. gold and 11,639 kgm. silver.

ALGEMEENE INDUSTR. MYNBOUW en EXPL. MAATSCHAPPIJ (Kliripan Mine) — JAVA

Address: Batavia, Java. **Mine address:** Djokja, Java.

Property: 2 concessions including the Kliripan mine, granted in 1893, in Djokja district. The orebodies occur in a limestone-mary contact. Production to date is small.

BANCA TIN MINES — BANCA

Comprise the very important Government owned alluvial deposits on the E. and N. coasts of the island of Banca. Pay gravel is found underlying clay, sand and gravel up to 65′ deep, and carries about 3% cassiterite. Development is by open cuts. There are central concentrators in the different districts.

Production: in 1919 was 12,401 metric tons of tin.

BILLITON MAATSCHAPPIJ — BILLITON

Address: Tandjong Pandan, Billiton, Dutch East Indies.

Property: a concession covering the whole island of Billiton about 1,700 sq. miles, granted in 1852 and expiring in 1927, ⅝ of net profit being paid to the Government.

Cassiterite (tin oxide) occurs in alluvial deposits or in lodes at, or near the contact of granite with sedimentaries. Alluvial deposits near the surface are exhausted and deeper deposits up to 80′ are explored by hand drilling; 9½ oz. to the cu. yd. is workable. Two lode mines, Tikoes and Gartoemedang, are worked, the ore carrying 2½% cassiterite.

Development: of alluvial deposits is by hydraulic and dredging methods and of lode mines by open cut and shaft; that of Tikoes being about 350′ deep, with 3 levels and over 6,000′ of total workings.

Equipment: includes a 4,000 k. w. electric power station, a large number of oil engines, suction and bucket dredges, hoists, compressors, etc. Also 2 concentrating mills handling 200 tons of ore daily. Labor is largely Chinese; 17,000 are employed directly and indirectly.

Production: of tin in metric tons; 4,632 in 1914; 5,276 in 1915; 5,977 in 1916; 6,479 in 1917; 8,250 in 1918; 7,207 in 1919. In 1917, 2,915 tons of the total output was recovered from 2,576,369 cu. yd. of alluvial.

About ⅓ of the Billiton product is smelted on the island, the remainder is shipped to the **Poeloe Brani Smelting Wks.**, Straits Settlement.

EXPLOR. & EXPLOIT. MAATSCH. BOLANG MONGONDOU **CELEBES**
(Goeroepahi and Mintoe mines)

Address: Goeroepahi, Menado, Celebes, Dutch East Indies.

Property: consists of 2 concessions in Menado district, island of Celebes, granted in 1917, includes the Goeroepahi and Mintoe mines. Gold and silver-bearing quartz veins occur in late Tertiary andesite. Mintoe has not reached the producing stage.

Production: at Goeroepahi in 1919 was 359 kgm. gold and 215 kgm. silver.

KETAHOEN, MYNBOUW **SUMATRA**

Office: Batavia, Java; or at mine, via Benkoelen, Sumatra, Dutch East Indies.

Property: on island of Sumatra, is a large and well equipped silver-gold mine. For geology, see Redjang Lebong. Closed down since 1918.

KINANDAM-SUMATRA MYNBOUWMAATSCHAPPIJ **SUMATRA**

Address: Pedang, Sumatra, Dutch East Indies.

Property: a concession, which includes the Salida mine, on the W. coast of island of Sumatra, granted in 1909. Quartz veins occur in andesite, ore carries gold and silver.

Production: in 1919 was 223.5 kgm. gold and 6,409 kgm. silver.

LEBONG SIMPANG MINE **SUMATRA**

This and the Tambang Sawah mine are Government owned. Both are in the Benkoelen district, island of Sumatra, and show gold and silver-bearing orebodies in andesite. Still in prospective stage.

PALELEH, MYNBOUWMAATSCHAPPIJ **CELEBES**

Address: Batavia, Java. **Mine office:** Menado Celebes, Dutch East Indies.

Property: a concession in Menado district, island of Celebes, granted in 1897, includes the Paleleh mine. Orebodies occur in brecciated and propylitic rocks, and contain pyrite, chalcopyrite, galena and sphalerite, with gold and silver.

Production: was 288 kgm. of gold and 286 kgm. silver in 1919.

REDJANG LEBONG, MYNBOUWMAATSCHAPPIJ **SUMATRA**

Office: Batavia, Java.

Mine address: Lebong Donok, Benkoelen, Sumatra, Dutch East Indies.

Property: a concession in the Benkoelen district, island of Sumatra, granted in 1899. It includes the Redjang Lebong a large and well-equipped mine producing silver and gold.

Geology: the gold-silver deposits are of Tertiary age and closely connected with andesite and dacite flows and trachyte. The veins are persistent and formed of finely-banded quartz with a little calcite, and variable quantity of sulphides. Selenium is always present.

Equipment: water-power, full mining equipment. The mill contains stamps, tube mills, sand and slime tanks and a cyanide plant. Decantation and filtration are practised.

Production: in 1919 was 21,089 oz. gold and 123,476 oz. silver.

SIMAU, MYNBOUWMAATSCHAPPIJ **SUMATRA**

Address: Batavia, Java, **Mine address;** Lebong, Tandai, Benkoelen, Sumatra, Dutch East Indies.

Property: two concessions granted in 1906 and 1916 in the Benkoelen district, island of Sumatra, includes the Simau and Gloemboek mines. Ore deposits carrying gold and silver are closely related to flows of Tertiary andesite and trachyte.

Production: from the two mines in 1919 was 1,111 kgm. gold and 8,336 kgm. silver.

SINGKEP TINMAATSCHAPPIJ **SINGKEP**
Singkep tin mines

Address: Singkep, Riouw, Dutch East Indies.

Property: a tin-mining concession covering the whole island of Singkep, granted in 1893, and a concession on undersea areas S. E. of Singkep, granted in 1907. Geology is similar to that of the Billiton Co., which see. Alluvial deposits are worked through adits, or by offshore dredges handling beach and littoral gravels.

Production: in 1920, land deposits yielded 239 and sea shore deposits 379 metric tons.

SOENGAI PAGOE, N. V. MIJNEN SYND. **SUMATRA**

Address: Batavia, Java, Dutch East Indies.

Property: 4 concessions in district of Sumatra's Westkust, granted in 1916. Lead-copper ore, with gold and silver, occurs in granodiorite and serpentine rocks. Is not as yet a producer.

TAMBANG SAWAH MINE **SUMATRA**

See Lebong Simpang Mine.

TOTOK, MYNBOUWMAATSCHAPPIJ **CELEBES**
(Totok Mine)

Address: Batavia, Dutch East Indies.

Property: a concession in Menado district, on the northern peninsula of the island of Celebes. Gold ore occurs as white quartz forming pockets and stringers in metamorphic limestone overlying amphibole-andesite.

Production: in 1919 was 157 kgm. of gold and 73 kgm. of silver

FEDERATED MALAY STATES

This peninsular is best known for its tin mines which produce 35,000 to 40,000 tons annually, or about 30% of the world's supply. Gold mining is also carried on though apparently not very profitably.

The mineral industry is controlled by British and Australian investors, as is also the case in Siam, and to some extent in the Philippine Islands.

ASAM KUMBANG TIN DREDGING, LIMITED **MALAYA**

Offices: Taiping, Perak, Federated Malay States and Challis House, Martin Place, Sydney, New South Wales, Australia.

Directors: A. W. Freeman, chm.-mng. dir.; W. A. Freeman, A. H. Rix and F. Leverrier. Hy. K. Bennett, sec.; Miss L. B. White, sec. at Sydney; A. J. King, mgr.

Inc. June 30, 1920, in Federated Malay States to take over holdings of an Australian company of same name (see Vol. XIV), now in liquidation, with W. A. Freeman, liquidator. Stock of old and new companies were exchanged share for share. Dividends 3s in 1920. **Cap.** £150,000; £1 par; 75,000 issued, of which Austral Malay owns 22,525 shares. Financial statement of old company June 30, 1920, shows assets of $1,196,240, of which $30,619 was cash and accounts receivable: liabilities include $410,349 in loans and accounts payable. Surplus transferred to new company was $143,034. Of the loans $278,000 was due the **Kampong Kamunting Tin Dredging, Ltd.**, later reduced to $11,143, by issuance of 25,000 Asam shares. For 6 months ended June 30, 1920, ore sales were $388,699; operating expense, $83,471; and net profit, $134,548.

Property: 845 acres of tin-bearing alluvial ground near Taiping. There were 331 holes put down, revealing 18,850,000 cu. yd. carrying 0.9 lb. tin oxide per yard; also 32 bores showing 2,000,000 yd. of 0.58 lb. gravel.

Equipment: a new dredge of 100,000 yards monthly capacity was installed early in 1920.

Production: for 6 months ended June 30, 1920, was 239 tons tin oxide from 522,400 cu. yd. of material at a cost of 15.98c. per yard. Recovery has equalled the estimated tin content of the ground.

AUSTRAL MALAY TIN, LIMITED MALAYA

Officers: directors and officers, same as Asam Kumbang Tin Dredging (q. v.), except that H. Huntsman takes the place of A. H. Rix on the directorate.

Inc. June 30, 1920, in Federated Malay States. **Cap.** £50,000; £1 par; 20,000 issued. Was formed to take over holdings of an Australian company of same name (see Vol. XIV), now in liquidation, with W. A. Freeman, liquidator. Stock of old and new companies were exchanged share for share.

Dividends: 3s. in 1920.

Company is a holding corporation interested in the Asam Kumbang (22,525 shares), Kampong Kamunting (8,000 shares) Larut Tin, Ulu Yam Tin (21,600 shares), and Kamunting Tin, which see. Other properties after being explored and proven, are organized into operating companies. In 1920, 15 properties were investigated.

Balance sheet Dec. 31, 1920, shows assets, $536,090, which includes $60,000 loan to Asam Kumbang; cash and accounts receivable, $6,619; current liabilities were $3,136. Gross income was $39,790 largely in dividends received, and expenses were $13,598.

BADAK COMPANY MALAYA

Successor to Badak Mining Syndicate, in April 1920.

Office: M. I. Murchie, legal mgr., Melbourne, Australia. J. R. Raleigh, gen. mgr.; H. F. Scarborough, field mgr.

Inc. 1919, in Victoria. **Cap.** £750,000; par £1; each of 400 Badak syndicate shares issued was exchangeable for 1,000 shares of new company, and holders had privilege of subscribing to 200,000 contributing shares at 4s.

Property: 5,000 acres at Jeneri, State of Kedah. On strength of drill holes giving up to 22 lb. tin per yard, shares of former company jumped £2,000 each early in 1920. A check on these high results was at first reported, but later drilling proved the ground, all but valueless. The whole business was apparently sufficiently scandalous to warrant Government investigation.

BADAK MINING SYNDICATE MALAYA

See Vol. XIV. Succeeded by Badak Company, which see.

CHENDAI CONSOLIDATED, LIMITED MALAYA

Offices: Station Hill, Redruth, Cornwall, England; and Ipoh, Perak, Federated Malay States.

Directors: F. D. Bain, chm.; and W. P. H. Chappel, S. Wicett, sec.; H. L. Armstrong, mgr.

Inc. March 19, 1914, in England. **Cap.** £60,000; £1 par; £45,950 issued.

Balance sheet for year ended April 30, 1920, shows revenue of £1,169 and loss of £823. Supplies and cash amounted to £1,398, and accounts and notes payable, £2,280; surplus was £186.

Property: 300 acres in Kinta district, State of Perak. Part of area is alluvial and is leased to tributers, who mined 37 tons of black tin in 1920. **Equipment:** includes a 60-ton mill which did not operate in 1920, the Chendai lode mine being idle.

CHENDERIANG TIN DREDGING, LTD. MALAYA

Office: Bright & Galbraith, Ltd., sec., 7 Martin's Lane, Cannon St., London, E. C. 4, England.

Directors; J. I. Philips, chm.; Sir. Ernest Birch, W. Arthur Addinsell, R. L. Corbett and Jas. Sellar. N. F. Dare, gen. mgr.; M. T. N. Black, cons. engr.

Inc. Feb. 6, 1914, in Great Britain. **Cap.** £120,000; £1 par; 92,500 issued. During year ended March 31, 1921, net profit was £5,251. With previous balance there was available £10,444. Excess of assets over liabilities was £24,960. Profit in 1920, £12,720.

Dividends: 7½% in 1915-16; 5% in 1916-17; 10% in 1917-18, none 1918.

19; 10% in 1919-20; none since.

Property: 1,400 acres of tin-bearing ground, with options on 250 additional acres in State of Perak. **Equipment:** includes pipe-line, giants, elevators, dredge, etc.

Production:

Year	Ground moved, cu. yards	Black tin saved, tons	Average per yard, lb.	Cost per yard, cents
1920-21	965,000	339	0.79	8.5
1919-20	930,000	287	0.69	7.4
1918-19	890,000	169	0.44	..
1917-18	1,035,000	254	0.54	8.0
1916-17	1,100,000	260	0.53	7.4

Tributers produced 87 tons in 1920 and 104 tons in 1921.

F. M. S. TIMAH **MALAYA**

Office: Bright & Galbraith, Ltd., secs., 7 Martin's Lane, Cannon St., London, E. C. 4, England.

Directors: John I. Philips, chm.; Sir Ernest W. Birch and W. Arthur Addinsell.

Registered May 1, 1920, to take over holdings of company with same name, registered Oct. 16, 1912. **Cap.** £90,000; par £1; all issued in exchange for issued stock (15,000 one pound shares) of old company. H. A. Huntley (address as above) is liquidator.

Balance sheet June 30, 1921, shows **assets** £112,870, of which investments was £86,798 (156,000 market value) and current £9,277; accounts payable were £22,869. P. & L. account for 14 months to June 30, 1921, shows net loss of £15,639. **Dividends** of old company, 1913-19 total 310% none since.

Company was organized to acquire and handle tin mineral lands of the Federated Malay States; and was instrumental in selling properties to Chenderiang Tin, Kampong Kamunting Tin and Kamunting Tin Dredging companies.

In year ending with June, 1921, prospecting work revealed favorable indications but actual development has been postponed. Late in 1921 company took over part of the **Ipoh Tin company's** mineral holdings and one dredge.

GOPENG CONSOLIDATED, LIMITED **MALAYA**

Offices: Station Hill, Redruth, Cornwall, England; and Ipoh, Perak, Federated Malay States. London transfer office: Portland House, 73 Basinghall St., E. C. 2.

Directors: F. Douglas Osborne, chm.; W. R. H. Chappel, Martin Edwards, S. Howard Lanyon, Cuthbert J. Pike, Ronald H. Savory and Tom Wickett (sec). Osborne and Chappel, gen. mgrs.; W. R. Marks, mgr.

Inc. Sept. 24, 1912. **Cap.** £400,000; £1 par; 395,768 issued.

Revenue for year ended September 30, 1921, was £108,271 of which £102,535 came from tin sales; the profit was £54,484 which with adjusted previous balance gave £80,448 after plant depreciation. Balance forward was £21,083. Cash was £7,794 and investments £84,031; current liabilities were £47,936. Profit in 1920 was £97,400.

Dividends: 10% in 1912-13; 6⅔% in 1913-14 and 1914-15; 15% in 1915-16; 17½ in 1916-17; 14 1/6% in 1917-18; 15% in 1918-19; same in 1919-20 and 1920-21.

Property: 1,843 acres of tin-bearing placer ground at Gopeng, Perak. The gravel is 50' deep in places, and rests on limestone. The Ulu Gopeng section was turned over to tributers in 1919. Reserves are large. Company also owns rubber plantations, the Sanglop Estate being owned jointly with Kinta Tin Mines, Ltd., Gopeng's partner in its water supply.

Equipment: storage dams, 45" pipe-line, 8 miles long (the minimum flow being 5,500 cu. ft. per minute), several giants and tailing dams.

Production:

	1920-21	1919-20	1918-19
Gravel hydraulicked, yards.....	1,429,000	1,115,196	1,423,283
Recovery per yard, pounds	1.47	1.48	1.32
Value per yard, cents.....	61.50	102.79	70.92
Cost per yard, cents.....	25.79	33.61	26.02
Total black tin, tons.....	933	734	836

IDRIS HYDRAULIC TIN, LTD. **MALAYA**

Office: A. H. Cullen, sec., 73 Basinghall St., London E. C. 2, England.

Directors: C. V. Thomas, chm.; W. R. H. Chappel, F. D. Osborne, W. J. Payne and R. H. Savory. Osborne & Chappel, gen. mgrs.; H. V. Ephraums, mine mgr.

Inc. Nov. 7 ,1913. **Cap.** £150,000; par £1; 120,000 shares issued and fully paid, in which Tronoh Mines, Ltd. holds an interest. In 1919, profit was £12,571; previous balance was £3,017; balance forward, £3,646. Current assets were £17,082 and liabilities, £1,462.

Dividends: first in 1914; total through 1920 is 42½%.

Property: 1,932 acres of tin-bearing ground in Kinta valley, State of Perak, includes Bati Karang, Snudong and Kranji mines. Equipped with hydro-electric plant and 3 pipe lines.

Production: 245 tons tin ore in 1919; 262 tons in 1920.

IPOH TIN DREDGING, LTD **MALAYA**

Office: 4 London Wall Bldgs., London, E. C. 2, England; and Ipoh, Perak, Federated Malay States.

Directors: R. Pawley, chm.; R. Sancroff Baker, Alex Durward and E. T. McCarthy. J. Barnes, sec.; The Borneo Co., Ltd., mgrs., Singapore, India. L. G. Attenborough, mgr.

Inc. Sept. 25, 1913, in Great Britain. **Cap.** £90,000; £1 par; 89,600 issued; increased to £225,000 in February, 1920; 200,000 issued fully paid.

Balance sheet of March 31, 1921, shows assets, £164,759 of which war bonds was £10,719; cash and receivables, £19,455; tin stock and stores, £15,735. Current liabilities were £2,567. Surplus was £255. Tin sales for 15 months ending with March 31, 1921, were £37,037, with a total revenue of £38,760 and net loss, £1,429.

Dividends: 5% in 1916; 10% in 1917; 10% in 1918; and 10% in 1919; last 10%, Feb. 1920.

Property: 574 acres at Ipoh and 143 acres at Kamunting, State of Perak, of tin-bearing ground, in part bought from the Borneo Co., Ltd., early in 1920 for 20,800 shares. One dredge is operating and one additional is to be erected. Ten acres averaging 41' deep was worked out 1920-21. Total acreage exhausted, 53.

Production:

	Ground dug	Black tin, tons
1921 (3 mos).....	120,500	52
1920.....	536,200	162
1919.....	666,700	169
1918.....	635,420	246
1917.....	603,700	264

Because of the depressed metal market, company was unable to carry out its plan of expansion, and in Nov. 1921, sold part of its land and one dredge to F. M. S. Timah, Ltd., which made part payment in stock.

KAMPONG KAMUNTING TIN DREDG. LTD. **MALAYA**

Offices: Challis House, Sydney, New South Wales, Australia, and Taip-

ang, Perak, Federated Malay States.

Directors: A. W. Freeman, chm. and mng. dir.; W. A. Freeman, F. Levenrier, H. Huntsman and J. R. McGregor. H. K. Bennett, sec.; Miss L. B. White, sec. at Sydney; A. J. King, mgr.

Inc. Nov. 24, 1916, in Federated Malay States. **Cap.** £150,000; £1 par; £140,000 issued.

Revenue for half year ended June 30, 1920, was £72,413, of which £42,701 was profit, and £782 was carried forward. Current assets total £24,871, and liabilities, £310.

In July, 1920, 25,000 shares of Asam Kumbang company were acquired as part payment of $278,000 loan to that company. Loan of $35,000 was made to Ulu Yam company in same period.

Dividends: 30% in 1916; 32½% in 1917; 50% in 1918; 42½% in 1919; 42½% in 1920 to Sept.

Property: 1,242 acres of tin-bearing alluvial ground near Taiping, which is worked by two dredges. By the end of 1919, 158 acres were exhausted. The estimate life is from 10 to 12 years.

Production:

Year	Ground dug, yards	Tin oxide, tons	Cost per yard, cents	Profit per yard, cents
1920 (6 mos)	914,400	373	22.0	10.5
1919	1,912,100	771	9.6	17.5
1918 (6 mos)	915,300	324	8.4	20.1
1917 (6 mos)	965,000	432	7.2	21.0

In 1920, 2 sections under operation, drilling had shown 1.14 and 0.74 lb. of tin per yard and respective recoveries were 1.25 and .58 lb.

KAMUNTING TIN DREDGING, LTD. MALAYA

Offices: 7 Martin's Lane, Cannon St., London, E. C. 4, England; and Penang, Federated Malay States.

Directors: J. I. Philips, chm.; Sir Ernest W. Birch, E. J. Byrne, W. Arthur Addinsell and Herbert C. P. Woolmer. Bright & Galbraith, Ltd., sec.; R. L. Naish, gen. mgr.

Inc. May 2, 1913. **Cap.** £300,000; increased Dec. 1919 from £150,000; £1 par; issued, 148,835 fully paid, 130,000 one half paid, June 30, 1920.

A profit of £10,380 was made during year ended June 30, 1921. With previous balance and other income there was available £17,026 and balance forward was £8,989. **Dividends:** 20% in 1915-16; 5% in 1916-17; 10% in 1917-18; 10% in 1918-19; 10% in 1919-20; 5% in 1920-21.

Property: 1,468 acres of tin-bearing alluvial ground near Taiping, Perak. From 220 drill-holes put down to an average depth of 36' the average tin content was 1.37 lb. A 7-cu. ft. dredge is at work and 2 others of 100,000 cu. yd. monthly capacity each are to be erected.

Production:

	Gravel dug, yards	Black tin, tons	Aver. value per yard	Cost per yard
1920-21	963,500	430	25c.	15c.
1919-20	948,500	350	30c.	14c.
1918-19	836,500	323	26c.	10c.
1917-18	834,013	397	34c.	10c.
1916-17	936,500	369	20c.	8c.

KINTA TIN MINES, LTD. MALAYA

Offices: 65 London Wall, London, E. C. 2, England; and Osborne and Chappel, mgrs., Ipoh, Federated Malay States.

Directors: W. A. Luning, chm.; C. C. Inchbald, and A. Joshua, H. P. Hood, sec.

Inc. May 17, 1900, in Great Britain. **Cap.** £120,000; £1 par; all issued.

Profit for year ended Dec. 31, 1919 less depreciation was £21,833; with previous balance, £25,966 was available. Balance forward was £4,566. Net current assets were £31,755. Gross profits first half of 1920 were £33,402. Company has stock control of Tyndrum L. & Z. Mines, Ltd., of Scotland, which see.

Dividends: 280% to Oct. 29, 1920.

Property: 923 acres owned or under lease, situated in State of Perak, Federated Malay States.

Equipment: storage dams and pipe-line used jointly with the Gopeng Consolidated, and with which it is interested also in rubber plantations, and hydraulic apparatus.

Production: 476 tons of black tin in 1915; 548 tons in 1916; and 610 tons in 1917. For years ended Dec. 31; in 1919, 436 tons black tin from 1,092,572 cu. yd.; in 1920, 419 tons. Cost in 1919 was 17c. per yard.

KLEDANG TIN MINING CO., LTD. **MALAYA**

Office: Station Hill, Redruth, Cornwall, England. **Mine office:** care Osborne & Chappel, gen.-mgrs., Ipoh, Federated Malay States.

Directors: C. V. Thomas and Harry Rich. Tom Wickett, sec.

Inc. Feb. 19, 1910. **Cap.** £50,000; par 10s.; 95,379 fully paid shares issued. Debentures: £12,350 7½s. outstanding in hands of trustees.

Balance sheet Feb. 29, 1920 shows assets, £64,060 of which current was £958; current liabilities were £2,670 and reserves, £1,039. Gross revenue was £415 with a £98 deficit; this plus debenture interest increased debit balance brought forward to £4,139.

Property: tin mines, 123 acres in the State of Perak, leased to the adjoining Teluk Kruin Tin Co., Ltd., on a 10% royalty, Kledang's only income. Equipment includes hydraulic machinery.

KRAMAT PULAI, LTD. **MALAYA**

Officers: A. H. Cullen, sec., Portland House, 73 Basinghall St., London, E. C. 2, England; and B. W. Thunder, mgr., Ipoh, Federated Malay States.

Directors: S. H. B. Blandy, chm.; C. G. Ogilvie, W. J. Payne, and C. V. Stephens.

Inc. Oct. 19, 1907. **Cap.** £100,000; £1 par; all issued.

Financial statement, Dec. 31, 1920, shows £34,326 from ore and £4,259 from lessees; net profit was £15,194 and £24,937 total available.

Dividends: 10% in 1912; 10% in 1913; 7½% in 1914; 12½% in 1915; 10% in 1916; 20% in 1917; 25% in 1918; 15% in 1919; 20% in 1920.

Property: 1,395 acres, of tin ground at Pulai, Kinta district, State of Perak, a prospecting license on 1,114 acres adjoining, and a lease on 57 additional acres, worked by 3 hydraulic elevators. Ground carries scheelite also, but production was suspended, Sept. 1920.

Production: 177 tons tin concentrate and 70 tons scheelite in 1918; 125 and 101 tons in 1919; 112 and 194 tons in 1920.

LAHAT MINES, LTD. **MALAYA**

Offices: Portland House, 73 Basinghall St., London, E. C. 2, England; **Mine address:** Ipoh, Perak, Federated Malay States. Company belongs to the Tronoh group.

Directors: W. J. Payne, chm.; Stephen Hy. Moore, Herbert S. Sugden and Alex G. Mackie. A. H. Cullen, sec.; Osborne and Chappel, mgrs.

Inc. Nov. 26, 1906. **Cap.** £120,000; £1 par; all issued.

Revenue in 1920 was £101,145 including royalties, of which £15,173 was profit and £12,000 was paid as a 10% dividend. Cash investments, etc., were £51,903, with accounts payable, £14,593. Surplus was £6,097.

Dividends: 106% from 1909 to December, 1920.

Property: 540 acres of alluvial tin land at Lahat, in Perak worked for several centuries. The main deposit is on a granite-limestone contact. Ore is mined by open cut and shaft, and output increased 1920, by adoption of drifting system following a rich lead or channel.

Equipment: 220-k. w. Diesel generator, 160-h. p. gas engine, hoists at

pits, water and gravel pumps, monitors, elevators, puddlers, etc. Electric power is purchased.

Production:

Year	Ground treated, yards	Tin oxide, tons
1920	283,083	534
1919	212,351	465
1918	229,039	399
1917	242,433	...
1916	242,461	...

LARUT TIN DREDGING CO., LTD. **MALAYA**

Probably idle; one of many companies in which **Austral Malay Tin, Ltd.** is interested. Said to have tin-bearing ground in State of Perak yielding 1.10 lb. per cu. yd. No information since 1917-18 when Malcolm Newman was manager.

MALAYAN TIN DREDGING, LTD. **MALAYA**

Offices: Portland House, 73 Basinghall St., London, E. C. 2, England; and Batu Gajah, Perak, Federated Malay States.

Directors: E. W. Birch, chm.; S. H. B. Blandy, Walter J. Payne and C. V. Stephens. A. H. Cullen, sec.; Wm. T. Back, act. mgr.

Inc. May 9, 1911, in England. **Cap** £250,000. increased Dec. 1918 from £125,000; £1 par; 180,000 issued.

Accounts for year ended June 30, 1920, show a revenue of £118,806, of which £31,279 was profit. Balance carried forward was £35,469 (less excess profits duty), compared with £47,869 and current liabilities, £25,305. Investments include Kramat Pulai shares.

Dividends: 10% in 1913; 5% in 1914; 20% in 1915; 25% in 1916; 25% in 1917; 10% in 1918; 20% in 1919; 20% in 1920.

Property: 1,697 acres in tin-bearing ground in the Kinta valley, State of Perak, of which 29 acres were exhausted, June, 1921.

Equipment: includes 4 steam-driven (coal) dredges, with 2 more of 120,000 cu. yd. monthly capacity each to be added in 1921. Operations began in 1913.

Production:

	Yardage	Tin saved lb. per yd.	Cost per yd., cents
1920-21	3,258,200	0.64	...
1919-20	2,558,500	0.52	15.2
1918-19	3,256,540	0.49	10.6
1917-18	3,220,300	0.57	8.2
1916-17	3,141,300	0.59	8.2

NORTH TAIPING TIN DREDGING CO., LTD. **MALAYA**

Address: Taiping, Perak, Federated Malay States. Company is registered in Penang, Straits Settlements.

Property: tin-bearing placer ground near Taiping, adjoining that of Asam Kumbang company, with a recoverable tin oxide content of 1.0 lb. per yard.

Equipment: one dredge taken over from the Bangnon Valley Tin (of Siam), in early 1919.

PAHANG CONSOLIDATED CO., LTD. (THE) **MALAYA**

Office: A. Giffard, sec., Blomfield House, London Wall, London, E. C. 2, England.

Directors: J. E. Champney, chm.; E. H. Finch, J. A. Scrimgeour, H. Frisby, Jr., and H. W. Thomson. The Borneo Co., mgrs., Singapore; J. T. Marriner, gen.supt.

Inc. 1906. **Cap.** £500,000; in 100,000 7% pfd. shares; £1 par; all issued, and 1,600,000 common shares; 5s. par; 1,500,000 issued.

Financial statement for the years ending July 31, shows a profit in 1915 of £103,963; £98,925 in 1916; £161,113 in 1918 and £68,414 in 1919. In 1920, total revenue was £455,806, of which £459,554 was for tin sales; net profit was £156,021, with balance forward after deductions of £22,437. As of Dec. 14, 1920, current assets were £182,197; accounts payable, £55,556 and reserves, £120,225.

Dividends: on preferred shares have been paid regularly, plus extras of 2½% in 1913; 5% in 1914 and 1915; 8%, 1916-17 and 1917-18; 5%, 1918-19; 8%, 1919-20. Common shares received 12½% in 1913; nothing in 1914; 15% in 1916; 20%, 1916-17 and 1917-18; 15%, 1918-19; 20%, 1919-20.

Property: mining rights over approximately 200 square miles of land containing tin lodes in State of Pahang. Company's rubber plantations, 3,800 acres were transferred to a new concern in 1920.

Development: there are 8 deep mines, in which a total of 7.50 miles of new work was done in 1919-20; workings total about 100 miles. Ore reserves amount to 700,000 tons. The Nicholson and Williks shafts are 1,626' and 1,200 deep respectively; the lodes opened by these shafts are the largest producers; one shoot is reported 48" wide carrying 6% tin.

Equipment: is remarkably complete, including hoists, pumps, turbo-generator, power-plant, compressors, ground tramway, steamers and barges on river, Diesel oil engines, 50 gravity and 4 Holman pneumatic stamps and concentrating plant, also complete medical department for 4,500 employees (mostly native). New machinery was installed 1920-21.

Production:

Year	Ore treated, tons	Tin oxide saved, %	Tin oxide, tons	Value of oxide, per ton	Cost per ton of ore treated
1919-20.....	178,200	...	2,199	$1.572	$14.15
1918-19.....	236.100	...	1,815	1.222	8.32
1917-18.....	187,300	1.69	2,114	879	5.38
1916-17.....	156,700	...	2,772	595	5.95

The tin oxide contains 71.5% metal A small output comes from alluvial deposits worked by lessees.

This company is doing a large business, about which the shareholders are kept well informed.

PENGKALEN, LIMITED **MALAYA**

Offices: Station Hill, Redruth, Cornwall England; and Osborne & Chappel, gen. mgrs., Ipoh, Federated Malay States.

Directors: Fred D. Bain, J. W. T. Bolitho; W. R. H. Chappel, W. B. Harris and Stanley Wickett. Tom Wickett sec.

Inc. Aug. 22, 1907, in Great Britain. **Cap.** £200,000 in 100,000 pfd. ord. 10% and 100,000 ord. shares; £1 par; increased from £100,000 March, 1920; 90,000 of each issued.

Financial statement for year ended September 30, 1920, shows total revenue of £36,142, of which £6,474 was from royalty and £27,926 from power sales. The profit was £15,412. After paying dividends and depreciation, the balance was £8,578. Cash and investments totaled £75,254 and accounts payable, £6,848.

Dividends:

Year	Preferred, %	Common, %
1919-20.....	12½	2½
1918-19.....	15	5
1917-18.....	15	5
1916-17.....	12½	2½
1915-16.....	12½	2½

Property: 450 acres near Lahat, and 226 acres acquired 1919 at Pengkalen, Perak, carrying alluvial tin. The new ground shows 0.53 lb. per cu. yd. at depth of 48' in one section and 1.06 at 45' in a second section.

Operates an electric power-plant, a new 1,200 k. w. generator being added in 1921. Company operations were suspended at end of 1918 to await erection of new dredge; in the meantime the ground is worked by lessees and company derives a revenue from the sale of electric current.

Production: 102 tons of black tin (7% metal) in 1916; 111 tons in 1917, 97 tons in 1918; 17 tons in 1918-19; 295 tons by lessees in 1919-20.

RAMBUTAN, LIMITED — **MALAYA**

Offices: Station Hill, Redruth, Cornwall, England; **Mine address:** Osborne & Chappel, gen. mgrs., Ipoh, Federated Malay States.

Directors: F. Douglas Osborne, chm.; Ronald H. Savory, C. V. Thomas, Stanley Wickett and F. E. Mair. Tom Wickett, sec.

Registered. May 30, 1905, in Great Britain. **Cap.** £100,000; £1 par; all issued.

Revenue for year ended June 30, 1920 was £26,580, of which £12,952 was profit. Cash and investments amount to £48,784, and sundry creditors, £13,556. Surplus was £4,243.

Dividends: 5% in 1907; nothing from 1908 to 1914; 5% in 1915; 10% in 1916; 13½% in 1916-17, 1917-18, 1918-19; 15% in 1919-20; 13½ in 1920-21.

Property: 690 acres of tin-bearing ground in Kinta district, State of Perak.

Equipment: hydraulicking plant, storage dam, and 20" pipe-line carrying 2,000 cu. ft. of water per min. ample for one Pelton wheel, four 1½" to 2½" nozzle monitors, one water-lifter, with 1½" nozzle, and 6 elevators with 1½" to 2½." nozzles. Pressure varies from 90 to 140 lb. per sq. in. Elevators lift from 15 to 69 feet.

Production:

Year	Yardage sluiced	Recovery per yd., lb.	Black tin, tons	Value per yd., ¢	Cost per yd., ¢
1920-21.....	516,000	0.79	182	39.51	20.37
1919-20.....	504,752	0.95	212	68.53	26.43
1918-19.....	502,812	0.77	172	44.37	22.05
1917-18.....	505,700	1.07	242	64.84	16.90
1916-17.....	580,000	1.0	259	23.70	7.52
1915-16.....	607,000	0.8	215	17.18	7.48

SEREMBAN TIN MINING CO., LTD. — **MALAYA**

Office: Tom Wickett, sec., 1 Station Hill, Redruth, Cornwall, England. **Mine address:** Osborne & Chappel, Ipoh, Federated Malay States.

Directors: F. D. Bain, S. H. Lanyon, F. D. Osborne, H. Paige, and C. J. Pike.

Inc. July 26, 1897. **Cap.** £24,000; par £1; all issued and 93% paid. At end of fiscal year Sept. 30, 1919, surplus was £6,823. Cash was £4,348; accounts payable, £142.

Dividends: from 1899 to end of 1919 amount to £32,900; last of 1s in 1917-18.

Property: tin gravel concessions in Seremban, State of Sungei Ujong, now operated by tributers. Company's income is derived largely from its rubber plantations.

SOUTHERN PERAK DREDGING, LTD. — **MALAYA**

Office: A. H. Cullen, 73 Basinghall St., London, E. C. 2, England.

Directors: Sir E. W. Birch, chm.; S. H. B. Blandy, and W. J. Payne. F. W. & R. Payne, cons. engrs.

Inc. July 24, 1919. **Cap.** £125,000; par £1; 110,000 issued fully paid. Property, equipment, etc., as of June 30, 1920, was £41,300; cash, £23,415 and investments, £53,822. Current liabilities were £451.

Property: 225 acres of alluvial tin ground in Batang Padang district.

State of Perak, one mile from Temoh, 142 acres of which are estimated to contain 4,000 long tons of tin concentrate that will average 70% tin. A bucket dredge with 120,000 cu. yd. monthly capacity, was to begin operating mid-1921.

SUNGEI BESI MINES, LTD. **MALAYA**

Office: A. H. Cullen, sec., Portland House, 73 Basinghall St., London, E. C. 2, England. **Mine address:** G. W. Simms, gen. mgr., Selangor, Federated Malay States.

Directors: C. V. Thomas, chm.; W. J. Payne, S. H. Moore, and F. D. Osborne.

Inc. Oct. 5, 1909. **Cap.** £180,000; par £1; 111,407 issued fully paid, of which **Tronoh Mines, Ltd.,** owns 40,000 shares. Receipts for 1920 were £83,815, of which 83,223 was from ore sales; with a net profit of £17,615.

Dividends: first in 1916 with total of 35% to end of 1919; 15% in 1920.

Property: a lease on the Sungei Besi tin mines, 117 acres, in Kuala Lumpur district, State of Selangor. Drilling is underway on 25 additional acres on the N., now being acquired. Company has also a lease on the Kepong mines, which are however not profitable at 1922 metal prices. Equipped with puddling plant.

Production: in 1918 was 405 tons of ore from 202,887 cu. yd.; in 1919, 423 tons from 194,582 yd.; in 1920, 363 tons from 197,796 yd. From Kepong, 230,000 yd. yielded 121 tons of ore additional in 1920.

TAIPING TIN DREDGING CO., LTD. **MALAYA**

Address: Taiping, Perak, Federated Malay States.

Company registered in Penang, Straits Settlements, is operating a tin-bearing area in Malaya with dredge acquired from Deebook Dredging early in 1919.

TEKKA, LIMITED **MALAYA**

Offices: Tom Wickett, sec., Station Hill, Redruth, Cornwall, England; and Osborne & Chappel, gen. mgrs., Ipoh, Federated Malay States. C. H. Preedy, mgr.

Directors: F. D. Osborne, chm.; W. R. H. Chappel, S. H. Lanyon, Stanley Wickett and H. Rich.

Inc. March 15, 1920, to take over mineral holdings of company of same name (see Vol. XIV). **Cap.** £500,000; par £1; 358,577 shares issued, Old stockholders received 4 new shares for each old share held, with privilege of subscribing to 40,000 additional shares. Company controls **Tekka-Taiping, Ltd.,** which see.

Profit of old company for year ended January 31, 1919, was £72,166, plus £13,336 from 1918, making £85,502 available; £37,987 was carried forward to 1920. For year ending March 31, 1921, total receipts were £53,834 with net profit, £20,502. Investments were £29,573 and cash, £9,709. Surplus was £1,778.

Dividends: of old company 69/6 ($16.62) per share since 1909, exclusive of shares of Takka-Taiping distributed in 1913; 8/6 in 1918; 8/6 in 1919. By new company; 9d in 1920; 4½d in Jan. 1921.

Property: about 500 acres of tin-bearing land in Kinta district, State of Perak. Bedrock is limestone.

Equipment: water supply for hydroelectric plant, monitors and elevators; tailing dams; magnetic separator; 2 locomotives.

Production:

Year	Yardage sluiced	Yield per yd., lb.	Black tin, tons	Cost per yd., ¢
1920 (April '20 to Mar. '21)....	549,005	1.49	367	57.40
1920 (11 mos. to Dec.).....	.....	1.82	358	43.61
1919.....	.....	...	450	
1918.....	487,950	2.35	510	21.04
1917.....	452,000	2.43	507	14.00

Company is an important tin producer, with a promising future

TEKKA-TAIPING, LIMITED (OLD) **MALAYA**

In voluntary liquidation from Nov. 1, 1919. Is a subsidiary of Tekka Limited, which see.

Address: Tom Wickett, liquidator, Station Hill, Redruth, Cornwall, England.

Inc. Sept. 29, 1913, in Great Britain. **Cap.** £90,000, £1 par; 65,000 issued. Company was reorganized in fall of 1919, see below. Liquidator's account for Nov. 1, 1919 to Oct. 13, 1921 shows receipts, £54,276; a 10% distribution and £18,611 available for distribution.

Dividends: 20% in 1916; 20% in 1917; 20% in 1918; and 5% in January, 1919.

Property: 2,046 acres of tin-bearing gravel ground near Taiping, state of Perak.

Equipment: includes a dredge and gravel pumps.

Production:

Year	Yardage	Tin saved per yd., lb.	Value per yd., c.	Cost per yd., c.
1918.....	767,000	1.21	....	...
1917.....	903,200	1.15	28.26	9.26
1916.....	938,000	1.26	29.00	6.40

TEKKA-TAIPING, LIMITED (NEW) **MALAYA**

Subsidiary of Tekka Limited, which see.

Offices: Tom Wickett, sec., Station Hill , Redruth, Cornwall, England; and Osborne & Chappel, cons. engrs., Ipoh, Federated Malay States.

Directors: J. W. Horton Bolitho, W. R. H. Chappel, J. L. Holman, F. Douglas Osborne and Harry Rich. F. N. Cox, mgr.

Inc. Oct. 17, 1919, to take over mineral holdings of company of same name (see above and Vol. XIV), now in liquidation. Stock exchanged, old for new on a 1 to 5 share basis, and 64,993 shares offered to stockholders at par. **Cap.** £500,000; £1 par; 400,000 shares issued, of which 335,007 were fully paid, remainder one-half paid on Oct. 31, 1920.

Balance sheet of Oct. 31, 1920, shows investments, £35,655; stores, £11,458 and cash £28,256; current liabilities were £4,128. Surplus was £23,242. Total receipts were £71.643 of which £70,992 was ore sales.

Dividends: by former company total 80% on £65,000 through 1919. By new company 5% in 1920 and 1¼% February, 1921.

Property: 2,046 acres of tin-bearing gravel ground in Larut district, State of Perak, near Taiping.

Equipment: includes 2 dredges and gravel pumps.

Production:

Year	Yardage	Tin saved per yd., lb.	Value per yd., c.	Cost per yd., c.
1920.....	892,020	0.99	67.29	26.25
1918.....	767,000	1.21	....	....
1917.....	903,200	1.15	28.26	9.26
1916.....	938,000	1.26	29.00	6.40

Figures for 1919 not available.

TELUK KRUIN TIN CO., LTD. **MALAYA**

Address: Ipoh, Federated Malay States.

Property: tin-bearing ground at Kledang Hill, Perak, 4 miles W. of Ipoh; also adjoining property of Kledang Tin Mng. Co. taken under lease in 1919. Result of hydraulic operations on the latter has not thus far been satisfactory.

TRONOH MINES, LTD. **MALAYA**

Offices: Portland House, 73 Basinghall St., London, E. C. 2, England; and Tronoh, Federated Malay States.

Directors: C. V. Thomas, chm.; S. H. Moore, F. D. Osborne and W. J. Payne. A. H. Cullen, sec.; J. H. Rich, mgr.

Inc. Dec. 3, 1901, in Great Britain. **Cap.** £200,000, increased Aug. 1919 from £160,000; £1 par; all issued. Company owns a large interest in **Sungei Besi,** and lesser interests in **Tronoh South** and the **Idris Hydraulic.**

Gross income for 1920 was £218,372 with net profit of £21,463 making £44,463 with previous balance, and £24,463 after dividend.

Dividends: total 500% from 1902 through 1918; 30% in 1919, 10% in 1920; 10% in 1921 for half year. Also, a 25% stock dividend in 1919.

Property: 2,679 acres of tin land and 2,000 acres of timber land in Kinta district, State of Perak. Company is expected to take over Tronoh South, Ltd. Some part of ground is alluvial. No. 3 mine, which is 140' deep, is operated by tributers.

Equipment: includes Puddling and washing machines; and 3 dredges that are at work.

Production:	Yardage	Lb. tin per yd.	Cost per yd., c.
1920	1,004,081	2.50	48
1919	1,246,163	2.53	46
1918	1,336,639	2.29	38
1917	1,399,835	1.66	15
1916	1,639,661	2.25	13

In 1920 the total output of black tin was 1,122 tons, compared with 1,407 tons in 1919. This is one of the largest producers of Malaya.

TRONOH SOUTH, LTD. **MALAYA**

Offices: A. H. Cullen, sec., Portland House, 73 Basinghall St., London, E. C. 2, England, and Tronoh, Federated Malay States.

Directors: C. V. Thomas, chm.; Sir E. W. Birch and W. J. Payne.

Inc. Oct. 27, 1911. **Cap.** £100,000; par £1; all issued fully paid, in which Tronoh Mines, Ltd. has an interest. In 1919, there was an operating loss of £3,642 and a deficit of £2,283. On Dec. 31, cash and investments were £27,169, and current liabilities, £2,674.

Dividends: total 20%, from 1914 to July, 1918.

Property: 258 acres of tin alluvial ground in Kinta Valley, State of Perak. Operations ceased in mid-1918 and reported property to be sold to Tronoh Mines, Ltd., which see. In 1920, new ground at Chemar was acquired and operations resumed.

ULU YAM TIN DREDGING, LTD. **MALAYA**

Address: Taiping, Federated Malay States.

Due to unexpected cost of dredge, company was reported to be £58,000 in debt in spring of 1921. A substantial stock interest in company is held by **Austral Malay Tin, Ltd.**

Property: a tract of tin-bearing placer ground in State of Perak, part of which is estimated to contain sufficient material for one dredge for 10 years, and to run 0.80 lb. tin oxide per cu. yd. Dredge completed and operations started early in 1922.

YUKON GOLD CO. **MALAYA**

See under this title in United States section of this volume.

INDIA

The Kolar goldfield, in the State of Mysore, is the one important gold producing area of India. The mines are all under one management with offices in London, and are all operating on one lode—the Champion Reef. This is a rather thin quartz vein, much folded in places, encased in hornblende-schist, which is surrounded by granite rocks. Operations are now at a depth of 4,000' or more. The gold is free and its extraction easy by amal-

gamation and cyanidation. Production averages around £2,250,000 annually. All machinery is driven by electricity generated 90 miles distant. The field has a very promising future.

ANANTAPUR GOLD FIELDS, LTD. **INDIA**

Office: W. L. Bayley, sec., 6 Queen St. Place, London, E. C. 4, England.

Directors: Sir Donald Robertson, chm.; V. Herbert Smith, H. C. Taylor and A. E. Taylor. John Taylor & Sons, mgrs.-cons. engrs.

Inc. Feb. 1, 1906. **Cap.** £100,000; par £1; divided in 40,000 pfd., 30,446 issued, and 60,000 common shares, all issued.

Financial statement, March 31, 1921, shows revenue of £2,396, largely dividends from associated companies, and £974 expense. Current assets were £12,805 and liabilities, £204.

Dividends; 60% in 1908-9 in shares of North Anantapur and 90% in 1911-12 in shares of Jibutil Gold Mines; otherwise none.

Anantapur Gold is practically a holding company, with options on a large acreage in the Anantapur district of Madras. Presidency, near Ramagiri, on which prospecting only is being done. Other holdings were sold to **North Anantapur** and **Jibutil Gold Mines** companies for cash and stock. In addition to stock distributed as dividends, Anantapur Gold owns 30,218 com. and 827 pfd. shares of North Anantapur and 535 Jibutil pfd. shares.

BALAGHAT GOLD MINES, LTD. **INDIA**

Office: W. L. Bayley, sec., 6 Queen St. Place, London, E. C. 4, England.

Directors: Lord Ribblesdale, chm.; Sir Donald Robertson, A. C. J. de Lothiniere, Hy. C. Taylor and Arthur E. Taylor. John Taylor & Sons, gen. mgrs.; W. Pritchard, supt.

Inc. Oct. 18, 1919, as a reorganization of **Balaghat Gold Mng. Co., Ltd.** **Cap.** £154,000, in 95,400 10% pfd. fully paid, and 212,600 ord. shares 9s paid, 10s par; all issued. Capital decreased from £308,000 on reorganization. Company has stock interest in Anantapur and North Anantapur companies.

Gold bullion for 14 months in 1920 realized £163,716 and net operating profit was £33,296. Current assets over liabilities, Dec. 31, were £35,706. Surplus was £23,509.

Dividends: total 132½% on pfd. shares from 1900 to 1907 and 52½% on ord. shares from 1901 to 1906; none until 1920, then 10% on pfd.; 12½% on pfd. and 11¼% on com. in 1921.

Property: 1,565 acres in the Kolar gold field, State of Mysore.

Development: by shafts and extensive workings to the 4,000′ level. On the 2,600′ level a shoot, assaying 1.7 oz. gold was 3′ 4″ thick and opened for 842′ long in 1920. Reserves in 1920 were 91,755 tons, compared with 75,030 tons in 1919. Also, 177,000 tons of tailing that carry recoverable values.

Equipment: is complete, including mine plant, stamp mill, and cyanide plant. A new 130-ton sand plant has been added, and slime plant increased to 250 tons.

Production:

Year	Ore, tons	Tailing, tons	Gold, oz.
1920	38,550	65,950	28,067
1919	33,600	62,800	25,395
1918	26,745	54,130	22,135
1917	28,525	61,600	19,929
1916	29,476	57,438	17,725

BALAGHAT GOLD MINING CO., LTD. **INDIA**

Succeeded by Balaghat Gold Mines, Ltd., which see.

BALUCHISTAN CHROME CO., LTD. **INDIA**

Office: W. H. Antram, sec., 19 St. Swithin's Lane, London, E. C. 4, England.

E. Davis, chm. of board of directors and mng. dir.; E. Oughton, asst. mng. dir.

Inc. July 29, 1914, in Great Britain. **Cap.** £1,650,000 in 55,000 10% cum. pfd., and 110 ord. shares of £1 par, all issued.

Profit in 1919 was £24,938, and £62,542 was carried forward. Net current assets were £22,000. Dividends: 10% on pfce. in 1917; 12½% pfce. and 20% on ord. in 1918; 10½% and 5% in 1919.

Property: 6,176 acres of mineral land in the Hindubagh district of Baluchistan.

Production: 10,417 tons of chromite in 1917; 21,724 tons in 1918, 18,839 tons in 1919.

BENGAL IRON CO., LTD. **INDIA**

Successor to Bengal Iron & Steel Co.

Offices: C. E. Rutter, sec., Clutha House, 10 Princes St., London, S. W. 1, England; and Martin & Co., mng. agts., Calcutta, India.

W. T. MacLellan, chm. of directors and mng. dir.; J. Angus, cons. engr.; R. H. Nichols, gen. mgr., Kulti, Bengal, India.

Inc. Dec. 5, 1919. **Cap.** £2,500,000 in 750,000 7½% cumulative pfd., 500,000 issued, and 1,750,000 common shares, 1,572,983 issued; par £1.

Company has leases on Burrakur Ironworks, 1,500 acres, at Kulti, including four 80-ton blast furnaces, on coal mines, and on iron mines at Manharpur and Salai, in Singhbhum district, Bengal. The former are connected by 20-mile railway with the reduction works. Employs 10,000 Indians.

Reported that a new company with registry in India was to be formed, to succeed this one.

BURMA CORPORATION, LTD. (OF INDIA) **INDIA**

Office: T. E. Dixon Smith, sec., 22 Merchant St., Rangoon, India. London agt. D. Anderson, 1 London Wall Bldgs., E. C. 2.

Directors: Sir T. R. Wynne, chm.; C. F. Clifton, Gerard Lovell, John Hogg, and A. T. W. Paine.

Staff in Burma: P. E. Marmion, gen. mgr.; A. R. Oberlander, gen. supt.; W. R. Degenbardt, chief engr.; A. B. Colquhoun, mine supt.; P. J. A. Plummer, smelter supt.; B. W. Lennon, mill supt.; L. McDonough, railway supt.

Inc. Dec. 17, 1919, in Rangoon, India, to take over assets of Burma Corp., Ltd. (of London) and its subsidiary Burma Mines, Ltd., in which the parent company held a 99.8% stock interest. **Cap.** Rs. 20,00,00,000; par Rs. 10; Rs. 13,54,16,890 issued, fully paid, in payment of aforesaid assets. Funded debt; £1,000,000, first mortgage 8% convertible 10 year debentures, all issued.

Gross revenue of 1920 was £1,206,757. After deducting operating expense, £719,360, development, £12,221, etc., profit was £455,516, reduced to £246,770 after appropriations for taxes, depreciation, interest, etc. Balance sheet of Dec. 31, 1920, shows cash, investment and accounts receivable, £610,767, and accounts payable, £403,021.

Property: 2,496 acres, including the ancient mines at Bawdwin, Upper Burma, is one of the greatest lead-silver-zinc mines developed in the past decade. Company also owns iron, coal and limestone deposits and timber lands.

Geology: ore deposit is a replacement of a fine-grained, dark-colored, silicified rhyolite, the impregnated zone being over 100′ wide in places. Walls are not well defined. Ore is an intimate and complex mixture of sulphides, with irregular and varying amounts of lead and zinc. The best ore, carrying up to 50% lead, 50 oz. silver, and 25% zinc, is in the core of the deposit. Silver, which occurs as argentite, is constant as 1 oz. silver for each 1% of lead, irrespective of the zinc content. The vein has been developed for over 2,000′ along its strike. Copper is making its appearance in the north end.

Development: by the Chinaman tunnel and the 7,400′ Tiger tunnel, 8′ by 10′ in cross section and driven 500′ below the former. The two tunnels

are connected by an interior shaft. The Tiger tunnel is the main haulage and drainage-level. Mining is done by square-set and timberless rill system. The Chinaman and Shan orebodies are connected by haulage-ways on the 653, 430, and 300′ levels. Mine has over 20 miles of workings.

Ore reserves: at end of 1920 were 4,429,458 tons, assaying 23.2 oz. silver, 25.3% lead, and 17.7% zinc; of which 335,681 tons is copper ore averaging 23.2 oz. silver, 12.8% lead, 7.7% zinc, and 11% copper.

Equipment: a 60-mile 24″ gauge railway connects the mines with the new reduction works at Namtu, 13 miles distant, and with the Government line at Namyao. Mine has 2 Diesel engines, compressors, machine-drills, crushing plant, a new 800-ton concentrating mill employing jigs, tables, was in operation at end of 1920, but its flotation unit has not as yet met with success. Roasting furnaces, sintering pots and machines, 3 blast-furnaces, and steam turbo-blower. Also a 3-turbine 5,000 h. p. hydroelectric plant at Masam, 40 miles distant. For a 700 ton output, 2,300 employees are essential.

Production:

Year	Lead, tons	Silver, oz.
1921 (11 mos.)	30,651	3,235,682
1920	23,821	2,869,727
1919	18,535	2,164,856
1918	18,641	1,970,503
1917	16,957	1,525,844
1916	11,088	1,105,603

Despite its substantial output, Burma Corp. is still somewhat in the preparatory stage but can look ahead with fair assurance when its metallurgical problems have been solved, and if and when it can obtain and hold an adequate labor supply.

The plan adopted in 1919 involving new smelter and refinery to produce 60,000 tons of lead and 6,000,000 oz. silver was abandoned as too expensive, and in early 1921, was modified to deal with a daily output of 700 tons to yield annually 45,000 tons of lead and 4,500,000 oz. silver. Construction of zinc works and new lead smelter were therefore suspended, and capacity of existing lead smelter increased from 1,800 to 3,000 tons, and silver refinery in proportion. E. P. Mathewson engaged as consulting engineer, in a report of Jan. 1922, concurs in company s modified policy, and recommends (1) that attempts to save zinc be discontinued for the present, (2) that ore be selected and about 40% of mine run be smelted direct, (3) that power plant be increased by addition of another turbine, (4) that transportation be improved, (5) that a bag house be constructed, (6) that conditions governing the labor supply be improved. These recommendations are to be followed.

BURMA CORPORATION, LTD. (OF LONDON) INDIA

Incorporated in England in 1913, it owned 99.8% of issued stock of its subsidiary, Burma Mines, Ltd. Company was dissolved, as of Aug. 23, 1920, its assets, as well as those of Burma Mines, Ltd., being taken over by the new Burma Corp., Ltd., (q. v.), incorporated in India. Shareholders of old company received fourteen Rs. 10 shares for each £1 share held.

BURMA MINES, LTD. INDIA

See Vol. XIV. Both this and the parent company, Burma Corp., Ltd. (of London) were liquidated beginning mid-1920, and assets of both transferred to a new company, Burma Corp., Ltd. (of India), which also assumed Burma Mines debts.

CAPE COPPER CO., LTD. INDIA

Address: Rakha Mines P. O., Singhbhum, Chata Nagpur, Bengal, India.

Company operates the Rakha Hills copper mine at Surda, also a smelter, details of which will be found under the above name in the African section of this book. Company has optioned part of its ground to the Cordoba Copper Co., which see.

CENTRAL PROVINCES PROSPECTING SYN., LTD., THE INDIA

Office: Ernest Wallis, sec., 305 Winchester House, Old Broad St., London, E. C. 2, England. Col. Thos. Gracey, chm. of directors, Lt. Col. Thos. Gracey, mng. dir.; Hy. R. Holmes, agt.-gen. mgr.

Inc. Jan. 30, 1908. **Cap.** £300,000; par £1; all issued and fully paid. Financial statement of Dec. 31, 1920, shows net profit, £83,041 and £91,324 available with previous balance. Balance forward was £19,224. **Assets** include investments, £210,235; ore on hand and sold, £139,873; bills and accounts receivable, cash, etc., £194,048. **Liabilities** show bills and accounts payable, £169,302 and reserves, £243,331.

Dividends: 1908 (first) through 1918, plus bonuses, total 217½; 16% and 8% bonus in 1919; 8% in Oct. 1920.

Property: manganese mines in the Nagpur, alaghat and Bhandara districts, Central Provinces. The orebodies occur interstratified with highly metamorphosed sedimentaries. Company has been a consistent producer and reports at end of 1920 an ample supply of manganese ore available, but no market. In 1906, output was about 283,000 tons.

CHAMPION REEF GOLD MINES OF INDIA, LTD. INDIA

Office: F. H. Williams, 5 Queens St. Place, London, E. C. 4, England.

Directors: Lord Ribblesdale, chm.; Sir J. D. Rees, Sir J. F. F. Homer, Mrs. M. M. E. Tennant and Edgar Taylor, C. F. Heathcote, supt.; John Taylor & Sons, gen. mgrs.

Inc. Oct. 31, 1921, as a reorganization of **Champion Reef Gold Mng. Co., Ltd.**, in order to replenish the treasury. **Cap.** £260,000; 10s par; share all issued with credit of 4s paid; 1s has since been called. Stockholders of former company receiving 1 share of new for each 4 shares of old stock held.

Financial statement to Jan. 13, 1922, shows receipts, £44,155 of which £26,357 was stock assessment and £17,776 gold bullion; after deducting expenses, cash balance was £23,609.

Dividends: by old company, beginning with 1894, total £4,619,966; last of 4d on Jan. 29, 1921.

Property: 1,095 acres in the Kolar field, State of Mysore, India.

Development.: by shafts, the deepest being Carmichael's and Glen's Secondary, 6,091′ and 6,094′; and many miles of workings. During 1920 there were 9,281′ of new openings, including 620′ of shaft sinking, against 8,702′ in 1919.

Ore reserves: are estimated at 248,846 tons, a decrease of 44,669 tons. Results in 1920 were not of great importance but in 1921, deep workings exposed narrow shoots, 6 to 10″, averaging 1.73 oz. gold which it is believed can be worked at a profit. Operations have been handicapped by "rockbursts".

Equipment: complete modern mining plant, with 140 stamps, tube-mills, and cyanide plants. Native labor is employed, the pay roll numbering several thousand. A modern medical department is maintained by this and the other companies in the field.

Production; years ending Sept. 30:

Year	Ore, tons	Tailing, tons	Gold Value
1920	145,746	196,877	£375,426
1919	140,553	206,922	356,104
1918	138,030	205,320	399,505
1917	149,612	200,616	435,111
1916	194,311	285,492	497,329
Total since 1892	4,375,739	.....	13,759,128

In 11 months, 1920-21 production was 53,760 oz. in gold.

The Champion Reef has been one of the world's great gold mines, and it is now expected that it can be rejuvenated by deep development made possible by increased working capital.

CHAMPION REEF GOLD MINING CO., LTD. **INDIA**

Company in liquidation, F. H. Williams, liquidator, 5 Queen St. Place, London, E. C. 4, England. Last report, Sept. 30, 1920, shows excess of liquid assets of £132,344 and surplus, £40,272. See Vol. XIV. Assets and liabilities transferred to Champion Reef Gold Mines of India, Ltd., (q. v.), stockholders of old company accepting new stock on a shart for share basis plus a 6s assessment.

CORDOBA COPPER CO., LTD. **INDIA**

Office: 5-6 Queen St. Place, London, E. C. 4, England. **Mine address:** N. Kitto, supt., Rakha Mines P. O., Singhbhum district, Chota Nagpur, Bengal, India.

Officers: Edgar Taylor, chairman; Hugh F. Mariott, C. O. Villiers, Lord Vaux of Harrowden, Richard E. Carr, J. E. Champney, directors; Geo. Handel Wells, sec.; John Taylor & Sons, mgrs.; J. Hocking, mine supt.

Inc. Aug. 5, 1908, in Great Britain. **Cap.** £200,000; shares 5s par; all issued, and fully paid. Company is a consolidation of the **Cerro Muriano Mines, Ltd.**, and **North Cerro Muriano Copper Mines, Ltd.**

Financial statement for year ending Dec. 31, 1920, shows expenditures in India, £3,386; in London, £2,129; total, £5,516; receipts were £4,262. Balance sheet shows cash, investments and sundry debtors, £70,572; liabilities, £738.

Dividends: in 1912, 20%; in 1913, 20%; in 1914 and 1915, nil; in 1916, 10%; nothing since.

In September, 1919, company announced the sale of its mining properties in Spain for 1,000,000 pesetas. See Vol. XIV for a description of these holdings.

Property: an option on 20 sq. miles of promising ground of the Cape Copper Co., in the Singhbhum district of Bengal, near the Rakha Hills mine, about 6 miles S. of Rakha Mines Sta. on the Bengal-Nagpur Ry., including the Mosaboni, Laukesra, Surda, Dhobani and Badhia mines. The surface and old time workings show a wide zone of copper-bearing schist with seams of chalcopyrite. Work up to end of 1920 was exploratory, and comprised various prospect shafts and trenches.

GARIAJHER MINE **INDIA**

Property: a manganese mine in Gangpur native state, Province of Orissa, Bengal, 250 miles westerly of Calcutta. Has practically been a continuous producer since 1908. The ore, mainly psilomelane, occurs as much folded flat dipping reef, 8 to 16' thick interbedded with schists and quartzites, averaging 49% manganese. The largest of 7 exposures can be followed for 720'. Developed by open-cast work. A 6-mile narrow gauge tramway connects mine with the Bengal-Nagpur railway.

GENERAL SANDUR MNG. CO., LTD. **INDIA**

Address: Ballary, Madras, India.

Property: manganese mines in the Sandur hills, Kamataru district, some 300 miles N. W. of Madras. The deposits, tabular in form, occur in phyllites and slates, and are up to 100x700' in extent. The minerals are wad and psilomelane. Ore averages 45% manganese, 12% iron, 1% silica and 0.02% phosphorus.

INDIAN IRON & STEEL CO., LTD. **INDIA**

Address: Asansol, Bengal, India.

Inc. March, 1918. **Cap.** £1,000,000.

Company is (June, 1921) erecting two 150-ton blast furnaces at Asansol, in the Raniganj coal area, 130 miles N. W. of Calcutta, with estimated annual capacity of 110,000 tons of pig iron and 73,000 tons ferro-manganese. Its iron mines near Gua Buru, Singhbhum district, Bengal, are said to show

large reserves, with 100,000 tons mined by mid-1921. Employs 5,000 persons.

INDIAN MINES DEVEL. SYN., LTD. **INDIA**

Offices: W. L. Bayley, sec., 6 Queen St. Place, London, E. C. 4, England: and W. R. Coleridge, agt., 8 Strand Rd., Rangoon, Burma, India. M. Low, chm. of directors; John Taylor & Sons, mgrs.-cons. engrs.

Inc. July 14, 1919. **Cap.** £20,000; par £1; 13,338 shares issued, 17/6 paid, of which Mysore Gold Mng. Co. owns 3,333.

Company formed to acquire and deal in mineral properties. Prospecting is underway.

JIBUTIL (ANANTAPUR) GOLD MINES, LTD. **INDIA**

Officers: W. L. Bayley, sec., 6 Queen Street Place, London E. C. 4, England.

Lord Vaux of Harrowden, chm. of directors. John Taylor & Sons, gen. mgrs.

Inc. Nov. 29, 1913, in Great Britain. **Cap.** £250,000; in 50,000 pfd all issued, and 450,000 ord., 422,465 issued, of which 330,543 are 8s paid only; 10s par. Preference shares get 20% per annum.

The year ended Sept.30,1921, resulted in a loss of £4,896. Cash, etc. totaled £18,817, and accounts payable, £3,763. Debit balance, £64,519.

Property: about 3 sq. miles in Anantapur district of Madras, India.

Equipment: 20-stamp mill and cyanide plant.

Production: from December, 1913, to September, 1918, the total output was 35,816 oz. gold from 128,570 tons of ore. Milling operations suspended Oct. 1918 and part of machinery has been sold, but exploratory work has been continued.

KANBAUK (BURMA) WOLFRAM MINES, LTD. **INDIA**

Offices: W. J. Groves, sec., 34 Great St. Helen's, London, E. C. 3, England; and Foucar & Co., 63 Merchant St., Rangoon, India.

C. I. Lock, chm. of directors, C. M. Lyons, mgr.; H. D. Griffiths, cons. engr.

Inc. March 24, 1917, in Burma. **Cap.** £190,000; £1 par; 139,666 issued. Debentures, £60,000 authorized; £50,000 issued at 10% for 5 years.

Profit for 1919 was £6,578, with balance forward, £32,024. Liquid assets over liabilities, Dec. 31, 1919, were £20,053. Reserves were £21,725.

Property: lease of 4,732 acres in the Tavoy district of Burma, carrying tungsten and tin deposits. A concentrating plant is at work.

Production: 305 tons of wolframite in 1916; 358 tons in 1917; 377 tons in 1918; 294 tons in 1919.

MAWCHI MINES, LTD. **INDIA (BURMA)**

Office: J. A. Henderson, sec., 2 Broad St. Place, London, E. C. 2, England. **Mine office:** Mawchi, via Toungoo, Burma.

H. Greenwood, chm. of directors; F. M. Ball, mgr. in Burma. J. D. Hoffman, cons. engr.

Inc. Nov. 2, 1914, in Great Britain. **Cap.** £250,000; £1 par; 221,120 issued, of which **Southern Shan States Syn., Ltd.,** owns 135,632 shares. Also £50,000 of 6% debentures. Company holds stock interest in **Kassa Mng. Co.** of Nigeria, Africa.

Profit for year ended June 30, 1919 was £19,559 which with previous balance made £36,192 used for writing down development. Current assets exceeded liabilities by £47,251.

Dividends: 5% in 1916; 10% in 1917; and 5% in 1918.

Property: a concession of 11 sq. miles, 16 miles from Pazaung, in Southern Shan states, Burma, for which company pays rental and royalty to the government. Tin and tungsten deposits are worked, and reserves were 71,939 tons of ore estimated to carry 4.97% mixed concentrate.

Production: 639 tons of mixed concentrate from 22,071 tons in 1916-17; 678 tons in 1917-18; 1,030 tons in 1919.

MYSORE GOLD MINING CO., LTD., THE **INDIA**

Office: F. H. Williams, sec., 5 Queen St. Place, London, E. C. 4, England.

Directors: Lionel Holland, chm.; J. D. Rees, Mrs. H. J. Tennant, W. F. Garland, Edgar Taylor, and Hy. Claude Taylor. R. H. P. Bullen, supt.; John Taylor & Sons, mgrs.

Inc. July, 1880, in England. **Cap.** £610,000, increased in 1919 from £305,000; 10s par; all issued. Company has a 3,333 share interest in Indian Mines Devel. Syn., which see.

Gross revenue in 1921 was £672,547 of which £648,762 was from bullion and profit, £207,800; with previous balance, £213,030 was available and balance forward after deductions was £108,838. Liquid assets, Dec. 31, 1921, were £620,763; liabilities, £112,760. Reserves were £181,857.

Dividends: total 3,275% to end of 1921 equal to £9,085,520. In 1922, 1s plus 6d bonus on March 31.

Property: 6,517 acres at Kolar, State of Mysore.

Development: by shafts over 4,000′ deep and extensive workings on a narrow lode. Reserves were 837,000 tons at end of 1921. Due to abnormal conditions, development was 51,000′ less than normal during the years 1914-1918. Extensions in 1920 were 11,737′ and in 1921, 18,428′. Except in the Ribblesdale section of the mine, results have not been particularly encouraging.

Equipment: complete, with 160 stamps, tube-mills and cyanide plants.

Production: to end of 1921 was 5,043,362 oz. gold from 6,137,653 tons of ore.

Year	Ore, tons	Gold Yield, oz.
1921	202,289	129,686
1920	233,503	156,801
1919	270,425	163,719
1918	293,186	174,301
1917	307,126	198,556
1916	305,845	197,303
1915	304,408	207,724

The Mysore has been one of the world's largest gold mines. Its depleted ore reserves are quite low-grade, but inasmuch as zones of impoverishment overlying high-grade ore are a feature of the mine, a campaign of deep development is underway made possible by the recent increase of capital.

NORTH ANANTAPUR GOLD MINES, LTD. **INDIA**

Office: W. L. Bayley, sec., 6 Queen Street Place, London E. C. 4, England.

V. Herbert Smith, chm. of directors; John Taylor & Sons, mgrs.; J. G. Vivian, supt.

Inc. June 23, 1908, in Great Britain. **Cap.** £125,000, in 25,000 pfce. (all issued), and 100,000 ord. (91,253 issued); £1 par. Preference shares are entitled to 20% per annum. **Anantapur Gold Fields, Ltd.,** owns a ⅓ stock interest.

Profit for year ended June 30, 1921, was £30,355. Current assets were £97,091, liabilities, £4,619 and surplus, £17,793.

Dividends: from 1912 to March, 1921, the pfce. shares received a total of 202½%, and ordinary shares 32½%.

Property: 1½ square miles in Anantapur district, Madras. A 2-year option on the Baragunda copper mine in northern India was relinquished 1920-21. In 1919-20, option was secured on Sideshur copper block, about 10 sq. miles, in Rakha hills, Shota Nagpur, Bengal between holdings of Cape Copper and Cordoba Copper companies. Exploration has begun.

Development: by 5 shafts. Ore reserves, June 30, 1921 were 7,000 tons

only and as no new discoveries have been made operations will cease shortly

Equipment: includes 35-stamp mill and cyanide plant.

Production, years ending June 30:

Year	Tons	Gold, value
1921	8,800	£61,823
1920	9,000	62,592
1919	14,200	49,569
1918	20,100	57,287
1917	26,500	57,705

The gold mine is nearly exhausted, but the new copper property is considered promising.

NUNDYDROOG COMPANY, LTD., THE **INDIA**

See Vol. XIV. Succeeded by Nundydroog Mines, Ltd., (q. v.) with same capitalization and to which assets and liabilities were transferred Nov. 3, 1920; old stockholders receiving new stock on a 50-50 basis plus a 6s assessment; old company being liquidated with W. L. Bayley, liquidator, 6 Queen St. Place, London, E. C. 4, England; last report, Dec. 31, 1920, shows £29,625 excess liquid assets and surplus of £34,956.

NUNDYDROOG MINES, LTD. **INDIA**

Office: W. L. Bayley, 5 Queen St. Place, London, E. C. 4, England.

Directors: V. Herbert Smith, chm; P. C. C. Francis, Sir Robt. Taylor and Edgar Taylor. C. H. Richards, supt.; John Taylor & Sons, mgrs.

Inc. Nov. 20, 1920, to take over Nundydroog Co., Ltd. and provide additional working capital. **Cap.** £283,000; 10s par; all issued at time of incorporation and credited with 4s paid; 6s called since. Shares of old and new companies were exchanged on an equal basis. Cash on hand, Jan. 17, 1921, was £27,264.

Dividends: by old company since 1888 total £2,500,377 through 1920; £14,150 on Sept. 29, 1921.

Property: 1,497 acres at Kolar, State of Mysore, between the Balaghat and Ooregum and covering the same lode for 1 mile in length.

Development: by 4 shafts deepest, 4,494′ at end of 1919; a fifth, 18′ diameter, had reached 2,492′ at end of 1920. Total advance in 1919 was 9,743′. Reserves are estimated at 184,900 tons at end of 1919.

Equipment: complete including a mill with 80 stamps and cyanide and slime plants.

Experience of neighboring mines was believed to warrant development below 4,000′, and in mid-1920 reported that £170,000 would be needed for development and additional plant, necessitating increase of capital.

Production:

Year	Ore, tons	Gold Yield, oz.
1921	105,682	63,022
1920	102,431	71,531
1919	103,529	77,166
1918	102,731	78,757
1917	99,345	79,586
1916	98,000	80,401
1915	94,000	82,822

Total production from 1882 is 2,114,109 tons yielding £7,240,570 in gold to end of 1920.

OOREGUM GOLD MINING CO. OF INDIA, LTD. **INDIA**

Office: F. H. Williams, sec., 5 Queen St. Place, London, E. C. 4, England.

Directors: M. Low, chm.; Sir J. D. Rees, Sir Donald Robertson, Edgar and Hy. C. Taylor. H. M. Cooke, supt.; John Taylor & Sons, mgrs.

Inc. Oct. 25, 1880, in England. **Cap.** £410,000; in 240,000 pfd. £1 shares (all issued), £62,216 paid and 580,000 ord. 10s shares (481,544 issued).

Gross revenue for 1920 was £478,298 and net profit, £226,018. Liquid assets at end of year were £229,918; liabilities, £57,766. Surplus, £70,-570. Reserves were £157,479. Company has a 3,333 share interest in Indian Mines Devel. Syn., which see.

Dividends: com and pfd., total £2,815,479 through 1918; £93,174 was paid each in 1919 and 1920; £39,058 in 1921.

Property: 931 acres at Kolar, State of Mysore. Also, license secured in 1919, to prospect extensive mineral areas in State of Kharsawan.

Development: by vertical shafts, two being 5,700′ (62 levels) and 6,000′. A new circular shaft is being sunk. Extensions in 1919 were 10,766′ and 10,-654′ in 1920. Reserves amount to 422,656 tons, a decrease of 5,310 tons.

Equipment: complete with 120-stamp mill and cyanide plant.

Production:

Year	Ore, tons	Gold Yield, oz.
1921	154,000	101,592
1920	153,350	96,268
1919	154,050	90,435
1918	152,780	89,629
1917	155,080	90,688
1916	155,317	90,619
1915	153,266	86,643

This is the third largest mine in the Kolar field.

SOUTHERN SHAN STATES SYN. (1909), LTD. **INDIA**

Office: J. A. Henderson, 2 Broad St. Place, London, E. C. 2, England.

Directors: H. Greenwood, chm.; F. C. Baker, W. B. Dick and R. P. Hornby.

Inc. March 17, 1909. **Cap.** £150,000; par £1; 129,330 shares issued, fully paid. **Funded debt:** £34,340 (£45,000 authorized) 7% debentures due Jan. 1925, holders receiving up to 3% yearly additional when possible, until 100% additional has been received.

Financial statement Dec. 31, 1918, shows net profit, £4,801. P. & L. account showed a deficit, £18,342. Cash investments, accounts receivable, etc., were £140,933; accounts payable, £1,369.

Dividends: 7½% in 1912, none since.

Company has license to prospect along the Salween river in Burma for 25 miles. It developed tin and tungsten mines, now held by Mawchi Mines, Ltd., (q. v.) in which S. S. S. S. has a controlling stock interest.

TATA IRON & STEEL CO., LTD., THE **INDIA**

Officers: Navasari Bldgs., Fort, Bombay, India; Tata, Ltd., agts.; Capel House, New Broad St., London, E. C. 2, England; and Tata Sons & Co., 2 Rector St., New York. **Operating office:** Jamshedpur, via Tatanagar, B. N. Ry., Bengal, India.

Officers: Sir D. J. Tata, chm. of directors; T. W. Tutwiler, gen. mgr.; Gerald G. Dobbs, gen. supt. of mines and quarries, Gorumahisani, via Tatanagar, B. N. Ry.; F. G. Percival, supt. of prospecting.

Inc. 1907, in Bombay. **Cap.** Rs. 10,52,12,500.

Property: iron mines at Gorumahisani, Badampahar and Sulaipat, in State of Mayurbhanj, and the Jamda mine in Singhbhum district, under development, all in Bengal. Also, undeveloped iron ore deposits in these and neighboring states, and both iron and manganese mines in the Central Provinces. Coke is made from coal obtained from company's collieries at Jheria, 115 miles N. of the smeltery, with monthly output of 35,000 tons of coal.

Smelter: at Jamshedpur near Kalimati on Bengal-Nagpur Ry., 154

miles W. of Calcutta and 45 miles N. of the iron mines, includes three 175-ton blast furnaces, 300-ton mixing furnace, four 50-ton and three 70-ton basic open hearth furnaces, and rolling, bar and rail mills. Also, under construction, there are two 600-ton blast, one 1,200 ton mixing and one 200-ton tilting furnaces; two 25-ton Bessemer converters; and many shops for manufactured products. Company's employees number 25,000.

TAVOY TIN SYNDICATE **INDIA**

Address: Tavoy, India.

Property: alluvial tin-bearing ground in the Tavoy district of Burma, including one tract on the Pauktaing river, where drilling is reported to have found 0.75 lb. tin oxide per cu. yd. Also, 3 gold placer properties on the Taping, Mole and Namsang rivers, in Bhamo district, Burma, said to aggregate 30 million yards of terrace gravel with 34c. of gold per yd. and over 5,000 acres of dredging ground showing 25c. per yd.

UNITED STEEL CO'S, LTD. **INDIA**

Owns extensive manganese properties in Mysore province; see under Great Britain for description.

VIZIANAGRAM MINING CO., LTD. **INDIA**

Address: Vizianagram, Madras, India.

Property: the Kodur, Garbham and Perapi mines in the Vizagatum district, Madras Presidency, near Garividi on the Bengal-Nagpur Ry., 56 miles from the seaport Vizagapatum and some 500 miles S. W. of Calcutta. Manganese deposits are associated with calcareous gneisses in a granite-sedimentary contact. The Garbham, said to be the largest manganese ore-body in India, is 167' thick and 4,500' long, to a depth of 100'. The ore mineral is psilomelane; as mined the manganese content is from 35 to 50%. No recent figures available but from 1909 to 1913, the annual output averaged over 45,000 tons.

INDO-CHINA (FRENCH)

CHODIEN, MINES DE **TONKIN**

Address: M. G. Bault, owner, 180 Quai du Commerce, Hanoi, Tonkin, Indo-China.

Property: a concession, 27 kilometers in area, that contains fissure veins and replacement deposits of zinc and lead in limestone and schist. About 8,000,000 francs have been spent thus far in ore development and constructing a 35-kilometer railway. Production is normally about 18,000 tons of ore yearly, since 1914.

ETAIN DU HAUT TONKIN, SOC. DES MINES D' **TONKIN**

Address: Cao-bang via Hanoi, Tonkin, Indo-China.

Cap. Fr. 375,000.

Property: the Beau-Site alluvial tin concession in the Thein Tu'c valley, 35 miles W. of Cao-bang. The deposits consist of gravels composed of granulite pebbles embedded in clay and worked hydraulically. Employees number 300. Production in 1916 was 90 tons assaying 30 to 35% tungstic acid and 25 to 30% tin.

ETAINS & WOLFRAM DU TONKIN, SOC. DES **TONKIN**

Address: Cao-bang via Hanoi, Tonkin, Indo-China.

Cap. Fr. 3,500,000.

Property: the St. Alexandre concession on Pia-Uac Mtn., 35 miles W. of Cao-bang, embraces 20 tin-tungsten lodes in schist on or near its contact with granulite. The most important lode averages 1.75 ft. wide, and has been followed for 2,000' on the strike and over 300' deep. The ore is concentrated at mine, and treated by magnetic separator at Thien Tu'c. Hydro-electric power is used; 1,000 natives are employed. Production in 1916 was 245 tons of concentrate.

Company also has a concession in the Thien Tu'c valley, covering the Ste. Adele alluvial deposits, 65 to 165' deep, estimated to total 13,000,000 cu. yd. carrying from 4.5 to 45 lb. of mineral to the yd. The ore is cassiterite with 4 to 5% wolfram. Material is raised on incline planes by electric hoists and conveyed to a 4-unit washery, of which 2 are in operation, with capacity of 125 yd. per day. Block tin is to be made on the ground.

JAPAN

BESSHI MINE — **JAPAN**

See Sumitomo Goshi-Kaisha (Sumitomo Copper Co.)

FUJITA MINING & SMELTING CO., LTD. — **JAPAN**

Office: 20 Dojima-Kitamachi, Osaka, Japan. **Branch offices:** 6 Yamashiro-cho, Kyobashi-ku, Tokio; 27 2-Chrome, Asahi-machi, Korea.

Officers: Tokujiro Fujita, pres.; Nakasuke Saka, gen. mgr.; Baron Heitaro Fujita, Hikosaburo Fujita, Yotaro Takagi, Seiichi Saito, Kotaro Suzuki, mgrs.; Otojiro Sasano, Kennosuke Tsujimoto, inspectors.

Inc. in Japan, with capital of Y30,000,000 ($15,000,000) to operate the mining and smelting department of the Fujita Company (Gomei Kwaisha Fujitagumi), which see.

The company is also extensively engaged in forestry (Nam Heng rubber estate in Kota Tinggi, Johore State, Malay Peninsular, 6,000 acres; Kokkaido forest in northern island of Japan, 180,000 acres; Yawataya sawmill in Osaka, Nagakisawa sawmill near Kosaka mine, etc.), and agriculture including reclamation work at Kojima bay, near Okayama, Japan.

When metallic mining was started in Japan, the Fujita Company was among the first to take an active interest in it, and the company led the way in adopting the latest appliances then used in Europe and America. The total number of mining claims and mines owned by the Fujita Mng. & Sm. company, in Japan, Korea, and Formosa, are 181 and 70, respectively. Some of them are being explored while 32 are being successfully worked. The total value of the mineral products of the company for 1916 amounted to 10,500,000 yen, and 19,500,000 yen in 1918, including:

Metal and unit	1916	1918
Gold, ounces	27,000	32,000
Silver, ounces	1,169,000	831,000
Copper, pounds	22,640,000	33,502,000
Lead, tons	382	140
Zinc, tons	336	1,600
Other ores. tons		36,000

Of silver, the company produces about 30% of the total yield of Japan; of copper, about 17%; and gold, 13%. The company employs 12,509 miners, of whom 4,491 are underground and 8,018 on surface.

Kosaka Mine: situated at Kosaka-machi, Kazunogun, Rikuchu, in the extreme northern part of Hondo, the main island of Japan. The mine is about 10 miles from the Government railway. It was worked until 1897 as a silver mine, passing in 1881 to the present ownership. The Kosaka employed 6,500 hands in 1918.

Geology: country rock is brecciated porphyry tuff, ranging from a fine conglomerate to a coarse grit, of Tertiary age, with a covering of volcanic ash and with intrusions of liparite and andesite. The orebodies constitute a fine example of metasomatic replacement occurring along the contact zone between the tuff or liparite and andesite, and is surrounded by the clay with dissemination of pyrite, but are shading imperceptibly into the liparite. There are 5 of these orebodies, of immense size, ranging from 20 to 270' thick, and proved for a length of a half-mile, while drills have

shown the formation to continue to a depth of 1,700'. The area of deposit so far explored is 2,000' long, 800' wide, and 500' deep. There are three kinds of ores; a complex sulphide, pyrite both compact and loose, and siliceous. They carry much barite.

All ores are more or less argentiferous, and the product is divided into 3 grades. The first grade is the complex sulphide, averaging 2.43% copper, 2.28% lead, 9.80% zinc, and 15.64% iron, with 7 oz. silver per ton, and from a trace to $2 gold per ton, the gangue carrying 40 to 45% barium sulphate. The pyritic ore, second grade, averages 2.3% copper, 0.47% lead, 3.15% zinc, and 26.83% iron. The silicious ore, third grade, carries 1.27% copper, 0.26% lead, 1.48% zinc, and 19.4% iron.

Development: the Kosaka ore deposit is mined by tunnels. The slicing and filling system is used, but underground mining was practically abandoned in 1908 for open-cut workings, similar to those of the Utah Copper Co. From 1,000 to 1,800 cu. yd. of overburden is removed daily, the entire overburden being estimated at about 4,000,000 cu. yd. Stripping is partly by hand labor and partly with drills, and with electric trolleys to remove waste.

The open pit is of funnel shape, about 1,000'x2,000' in size, with the sides terraced. Owing to extraction of ore by tunnel and open-cut workings only about 500 h. p. is required at the mine.

Equipment: includes two 8-drill Leyner air compressors and one 12-drill compressor, and an electric pump on the 500' level.

The smelter: 1¾ miles from the mine, with electric rail connection, is of about 1,000 ton daily capacity. There are 6 pot roasters, 3 Bruck-Kretschel briquetting machines, and several stamps used for briquetting fine ores. The percentage of fines is 35% of the raw ore. There are 10 open-top water jacket blast-furnaces, 7 of which are 24' long, and 4' wide at tuyere level; the others are smaller. One 15' furnace is used for matte concentration. Semi-pyritic smelting is employed, coke charged from the furnace top is about 1.5%, and powdered coal inserted through the tuyeres about 3% of the crude ore. The blast pressure is about 1 lb. About 25% limestone and 10%, slag and matte to raw ore are used as fluxes. The average of all ores is only 2.5% copper, with small gold and silver contents. The grade of the first matte is 35%, and the second, 45%.

The converter plant has 2 stands, with 8 shells. There are 2 Brown-Boveri-Rateau blowers, a complete lining department, and 140-ton electric crane. Blister copper from the converter is refined electrolytically, the product being 99.95% copper. The slime from the electrolytic tanks is treated in two cupel furnaces. The monthly capacity of the electrolytic plant is 1,200 tons.

The electrolytic zinc refinery at the Kosaka mine was installed in 1915. There are 4 Herreshoff calcining furnaces, which were used before the matte calcining, one muffle furnace, and 5 Ding's magnetic separators. The daily production of electrolytic spelter is about one ton.

Power is all electric, the Kosaka installations aggregated 3,550 k. w. a.c. and also 220 k.w. d.c. for the mine, smelter shops, and rail lines. It is generated by 4 water plants on the river Oyu, near the mine, also by a locomobile steam plant.

The Kosaka mine operates an electric trolley, with 9 miles of main line and branch lines, equipped with 35 locomotives and 400 three-ton ore cars. The lines reach all principal points at the mine, smelter, and shops, and connect with the Kosaka railway at the Kosaka depot. The Kosaka railway, which is 15 miles between Kosaka and Odate, connects with the Government railway at Odate.

Production: the annual output of the Kosaka has been as follows: 12,761 long tons of copper, 335 tons of lead, 829,970 oz. silver, 20,000 oz. of gold, and 251 tons of zinc.

The Tokito dressing plant is 2 miles from the smelter, with aerial tram

connection. Mixed ores from the branch mines of the Kosaka mine are dressed, the capacity being 100 ton per day.

Hanaoka Mine.

This mine is in Kit-akita-gun, Akita Prefecture, Japan, and has been owned by the Fujita Co. since 1915.

The deposit is massive and the ore contains copper and iron pyrite, galena, zinc blende, and gypsum. After hand-picking, it is transported to the Kosaka smelter, 18 miles away.

Production: was 125,582 tons of ore in 1918, that averaged 0.000092% gold, 0.00513% silver, and 3.112% copper.

Omori Mine.

This mine is situated in a mountainous region in the province of Iwami (Omori-machi, Nima-gun, Shimane-ken), in the northwest of Hondo, near the coast of the Japan Sea. This mine is said to have been discovered some 600 years ago, and reopened in 1525. The mine discovered some 600 years ago, reopened in 1595 and highly productive, until closed by an earthquake, was reopened in 1884 by the present company and equipped with a modern plant.

Geology: the district is composed of Tertiary tuffs and sandstone, intruded by a great mass of andesite. There are five veins 10″ to 3′ wide, dipping 80° to 70° N., and opened for 2,000′ in length. The ore contains chalcopyrite, galena, and zincblende with gold and silver. Five of the veins—Sato, Honnakase, Nakase, Sanjio and Umanose—are worked. The ore averages 0.00148% gold, ($8.56) 0.05001% silver, 6.66674% copper and 0.58771% lead.

Development: the veins opened by shaft and long tunnels with very extensive drifts and stopes. The ore, after being cobbed and picked, is concentrated in a mill containing rolls, trommels, jigs, etc. The crude ore and concentrate are smelted in an ordinary circular jacketed furnace. The matte formed from this semi-pyritic smelting is once more smelted, forming blister copper (98%Cu), containing 2.3% gold, 77% silver and lead. This last operation is carried out according to the Japanese Mabuki process.

Production: the output was 1,071,100 lb. of blister copper in 1916; 854,679 lb. in 1917, and 729,366 lb. in 1918. All blister copper from this mine is shipped to the Kosaka electrolytic refinery.

Oarasawa Mine.

This mine is 17 miles W. of Kurosawajiri station on the Government railway, to which a tramway has been constructed from the mine, is situated at Yuda-mura, Waga-gun, Iwateken (east district of Akita-ken, not far from the Kosaka mine).

Geology: granite, tuff, and rhyolite of Tertiary age are cut by nearly parallel veins 3″ to 6′ wide, with steep dips. The ores consist of quartz containing chalcopyrite and iron pyrite.

At the nearby Unekura mine fissure veins in rhyolite and tuff contain chalcopyrite and some pyrite in a quartz gangue. The veins are opened shafts and tunnels and worked by overhand stoping, ore being mechanically dressed to 7.5% grade.

Production: is about 151,000 long tons of dressed ore yearly. The blast furnace plant is similar to that at the Omori. Annual production of 1650 long tons blister copper that averages 98% copper, 0.0005% gold, 0.05% silver. This is sent to the Kosaka refinery. About 1,000 men are employed.

Matsuoka Mine.

The mine is situated in Kume-gun Okayamaken, about 10 miles from rail with Yuzawa station on the Government railway.

Geology: country rocks are liparite and tuff of Tertiary age cut by a network of veins only a few of which persist downward to the deeper workings. The ore consists of chalcopyrite, galena, and zinc blende, and assays 0.003% Au, 0.0085% Ag, and 0.95% Cu. This is dressed to 0.006% Au,

0.15% Ag, and 2.3% Cu, and is transported by railway to Kosaka. Production was 15,000 tons of dressed ore in 1916.

Yanhara Mine.

The mine is situated in Kume-gun Okayamaken, about 10 miles from the Tsuyama railway station of the Chugoku line, near the River Yoshii, and the mine output is carried by boat to Kuban on the Island Sea, at the river mouth, 35 miles below.

Geology: a Mesozoic clay slate is intruded at several places by a basic rock of the gabbro family. The deposit is a magmatic segregation, in the gabbro near the contact, there being several orebodies largest measuring 400′ by 500′ by 250′. The ore is iron pyrite, containing only 0.4% copper and 46% sulphur, and is used mostly for making sulphuric acid.

Production: 420,000 tons of pyrite and 30 tons of copper ore yearly.

Hirota Steel and Ferro-Alloy Works.

Address: Aizu, in Fukushima Prefecture. During the World War, Japan suffered from lack of all ferroalloys. The Fujita company taking advantage of this opportunity, started to produce these alloys and special steels. The works are operated by hydro-electric power, and now produce ferro-silicon, ferro-manganese, ferro-chromium, ferro-tungsten, ferro-molybdenum, ferro-titanium, ferro-vanadium, silico-spiegel of every description, and special kinds of high-speed steel, etc.

Most of the products are used in Japan by the navy and army arsenals, also by various engineering works, while some alloys are exported to foreign countries.

FURUKAWA GOMEI KAISHA **JAPAN**

(Furukawa Copper Co.)

Address: as below.

Directors: Baron Toranosuke Furukawa, pres.; Rokusaburo Kondo, chief director; Masayuki Otagawa, Koji Inoue, Bunjiro Kondo.

In 1875 the late Ichibei Furukawa established the Furukawa Copper Firm in Tokyo. He was very energetic, and devoted himself to developing and equipping, the mines, he had proven worth while, by previous prospect work.

In 1903 the late Junkichi Furukawa, the son of the founder, succeeded his father and became president of the firm. In the same year the concern was reorganized into a company under the Japanese law. On his death, in 1906, Toranosuke Furukawa, his brother, succeeded him, and since then he has been president of the company. **Cap.** 20,000,000 yen.

The company has 11 offices, 4 copper works, and 25 mines, whose total area of concession is about 70,000 acres; 1,200 officials and 25,000 men are employed; the annual production is 35,000 tons of copper, 20,000 tons of copper wire and plate, 220,000 tons of copper ore, 2,000,000 tons of coal, and quantities of bullion, pig lead, silver ore, zinc ore, etc.

Head office: Marunouchi, Tokyo, Japan.

Branches:	Address:
Osaka Branch Office.....	Ajikawa kamidori, Kita-ku, Osaka.
Moji Branch Office.....	Hamamachi, Moji.
Wakamatsu Branch Office...	Kaigan dori, Wakamatsu, Fukuoka-ken.
Hakata Branch Office.....	Hakata Kaigan dori, Fukuoka.
Keijo Branch Office.....	Nandaimon-dori, Ni-chome, Keijo, Chosen.
Shanghai Branch Office.....	Pekin Road, British Concession, Shanghai, China.
Hankow Branch Office.....	French Concession, Hankow, China.
Tairen Branch Office.....	Yamagata-dori, Tairen, Manchuria.
Hongkong, in China; Branch Office.....	Des Vouex Road, Central Hongkong.
London Branch Office.....	K. Shimada, agt., 28 Austin Friars, London, E. C. 2.
American Office.....	120 Broadway, New York.

Principal Mines:	Address:
Ashio Copper Mines	Ashio Kamitsuga-gori, Tochigi-ken.
Ani Copper Mines	Ani, Kita-akita-gori, Akitaken.
Nagamatsu Copper Mines	Shiraiwa, Nishimurayama-gori, Yamagataken.
Mizusawa Copper Mines	Jwakimura, Waga-gori, Iwateken.
Otori Copper Mines	Oizumimura, Higashi-tagawa-gori, Yamagataken.
Kawaiyama Copper Mines	Ikumo-mura, Abu-gori, Yamaguchi-ken.
Kune Copper Mines	Sakuma-mura, Iwata-gori, Shizuoka-ken.
Furokura Copper Mines	Oyu-mura, Kazuno-gori, Akita-ken.
Kijo Gold Mines	Todo, Kijo-gun, Heinanhoku-do, Chosen.
Innai Silver Mines	Innai, Ogachi-gori, Akitaken.
Daira Lead Mines	Fujikoto-mura, Yamamoto-gori, Akitaken.
Shakanoo, Shiogashira and Diani-Shakanoo Collieries	Otani-mura, Kano-gori, Fukuoka-ken.
Shinshakanoo Colleries	Nishiawa-mura, Kurate-gori, Fukuoka-ken.
Shimoyamada Collerier	Kumada-mura, Kaho-gori, Fukuoka-Ken
Yoshima Collieries	Yoshima-mura, Ishiki-gori, Fukushima-ken.
Works:	
Mizushima Smelter	Mizushima Is., near Tamashima, Kojima-gori, Okayama-ken.
Amagasaki Refinery	Amagasaki, near Osaka.
Nikko Copper Works	Nikko, Tochigi-ken.
Honjo Copper Works	Yanagiwara-cho, Honjo-ku, Tokyo.

Ashio Mines.

These mines are in Ashio, Kamitsuga-gori, in Tochigi-ken, about 100 miles from Tokyo, connected by the Imperial government railroad and the Ashio railroad. They are 11 miles W of famous Nikko. Area of the concession is 4,000 acres.

Geology: the district consists mainly of Paleozoic sediments and Tertiary liparite (rhyolite). The liparite forms a volcanic neck 2 miles in diameter, intrusive in Paleozoic sedimentary rocks. The Ashio veins, most of which traverse the liparite, run either N. 60° E. or N. 80° W. The veins of the first named direction are called the 60° lodes or Yokomabu series, and the others the 100° lodes, or Shinsei series. The mines have more than 200 veins, half of which are being worked. The veins intersect each other, are 1 to 16′ thick, 400 to 6,000′ long, and generally have steep dips. The chief minerals are chalcopyrite and pyrite, with accessory amounts to zinc blende, arsenopyrite, galena and pyrrhotite. Bornite and chalcocite occur, while cuprite, malachite, pisanite and sometimes azurite and native copper are found in the oxidized zone. The gangue minerals found in small amount include clay, chlorite and quartz; calcite is found in the deeper workings. Native bismuth, bismuthinite, wolframite, fluorite, crystallized vivanite, ludlamite and apatite are occasionally found.

Development: the mines are opened by 3 main tunnels or adits; the Ariki, Kotaki and Isudo, which are three miles apart.

The 8,000′ Ariki adit driven along the Yokamabu vein, is the transportation and drainage level. The Kotaki adit, driven on the Kosei and Tengu veins, is connected with the Ariki tunnel. Both the tunnels are used as trunk haulage ways for underground transportation. The 6 levels below and the 12 levels above are reached through the Tsudo adit.

Tsudo which is the main haulage tunnel is 475′ lower than the Ariki. This level driven northward for 12,000′, cut more than 50 veins, most of them being profitably worked. The Tsudo tunnel is 11′ high and 13′ wide. There are 12 mine levels below it, the lowest one 1,500′ beneath the tunnel.

Besides these tunnels, there are seven deep shafts, one extending over 1,500′ below the lowest tunnel.

The vertical depth of the underground workings from the highest out-

crop to the lowest level is as follows: Outcrop on Bizendate peak to Tsudo adit, 2,200'; below Tsudo adit, 1,500'; a total of 3,700'.

The aggregate length of drifts amounts to about 1,200,000', or 190 miles.

Overhand stoping is generally used, but also square set work. Each stope is 6' high, and more than 2½' wide, varying according to the thickness of the vein.

General features: waste water from the precipitating tank for cement copper and the slimy water from the dressing plants are treated with milk-of-lime, after passing through slime settling ponds.

The smoke from all furnaces passes through Cottrell treaters. Ashio being in a very mountainous region, aerial tramways are widely used for transportation of timber, etc.; their total length is 25 miles. The Tanamura system is adopted in all lines.

Power is supplied from the Hosoo hydro-electric power plant (12 miles from Ashio), developing 20,000-h. p.

Production: has increased gradually during the past 10 years as follows: 6,315 long tons in 1907; 7,191 in 1908; 7,526 in 1909; 7,453 in 1910; 7,932 in 1911; 8,470 in 1912; 10,428 in 1913; 12,204 in 1914; 11,624 in 1915; 14,816 (33,187,840 lb.) in 1916.

Cost of Ashio copper is probably a little less than 10c per lb. finished.

Ani Copper Mines.

(Annual production, 1,500 tons of copper.)

The Ani Copper Mines are at Ani, Kitaakita-gori, on the western side of the Moriyoshi Mountain, in Akita-ken. The concession covers 4,600 acres, and is over 5 miles long.

Geology: rocks include Tertiary tuff, tuffaceous shale, rhyolite, and andesite. There are two sets of veins, one running N.-S. and the other E.-W. The dip is generally steep,though a few of the N. S. lodes have a dip less than 40°. The E.-W. lodes are cut by the N.-S. lodes, which are sometime brecciated veins, and occasionally have a clay filling. The E.-W. lodes are numerous, though neither thick nor long; while the N.-S. lodes are big though few in number.

The principal metallic minerals are chalcopyrite, associated with pyrite, some galena and zinc blende. The gangue or vein stuff is mainly quartz, but sometimes calcite and barite are found. The oxidized zone is deep, and contains bornite, chalcocite, native copper, etc.

Transportation is by electric haulage. The total length of electrically equipped trackage is 10 miles. All shafts are equipped with electric hoists. Total electric power used is 1,200 h. p.

All the machinery of the mines is driven by electricity, transmitted at 22,000 volts from the Hosso hydro-electric power plant to five substations, where it is transformed down to 2,200 volts, again stepped down to 500 volts at underground substations.

Ore dressing: there are three concentrators, one at the portal of each tunnel. Crude ore is sorted into two grades underground, one averages 12% copper, the other 0.8%. The three mills treat 250 tons of 1st and 1,500 tons of 2nd grade. Concentrates from these mills amount to 300 tons of 12.5% grade daily.

Cement copper is recovered from stope fills and weathered rubbish. The daily production is 2½ tons of 66% copper, which is sent direct to the smelter.

The Honzan Smelter

Smelter: at Honzan, the eastern part of Ashio handles about 105,000 tons of 12.5% material annually, indicating a production of 13,000 tons fine copper.

The lump ore is charged raw to the blast-furnace, the fines are smelted in reverberatory furnaces after roasting in 5 McDougall furnaces. The matte is bessemerized.

There are four blast-furnaces, 160x42" at the tuyere level; the height

from the center of the tuyeres to feed floor is 8½'. Blast is supplied by a Root No. 8 blower, also by turbo-blower. Matte averages 40% copper. Slag assays silica, 39%; iron, 25%; lime, 19%; alumina, 9%, and copper, 9.2%.

The reverberatory furnace is 19'x110' and waste heat is utilized in steam boilers. Matte is ladled into converters by an electric traveling crane.

There are 7 converters of the barrel type, 72" diam. and 100" in length. The tuyeres have Dyblie ball valves. Blast for the converters is produced by two turbo-compressors. Lining for converters is a decomposed rhyolite porphyry (liparite).

Gases from the roasters, blast and reverberatory furnaces, and converters, pass through two Cottrell treaters to eliminate the fumes and dust. Arsenic is also saved. The dust carries 1.37% copper, 19.72% sulphur, and 31.83% arsenic.

Analysis of the converter copper is as follows: copper, 99.077%; gold, 0.0003%; silver, 0.1065%; arsenic, 0.029%; bismuth, 0.006%; iron, 0.052%; sulphur, 0.028%, and selenium and tellurium, 0.038%.

Mining: there are many levels and shafts, including the Manaita 10' wide, 7' high, and 8,000' long, the most important transportation and drainage level. Below this there are four levels at present. The Kanbun is 7' high, 4' wide, and 4,500' long. There are ten other levels above the Kanbun tunnel with intervals of 60' to 80', the lower five now being used. The Kosawa main shaft, 4'x4', is one of the blind shafts, which is sunk down to Maehi vein in Manaita level, and is 400' deep. It is equipped with hoists and pumps. The Chomatsu crosscut opens nearly all of the chief veins in this mine. It is 7' high, 10' wide, and 1,000' long and is the most important transportation level. There are seven levels above and six below it.

The Sosuido level is the third below the Chomatsu, and is 4' wide, 6' high, and 1,700' long. It is used for drainage only. The Kayakusa, 4'x14', is one of the blind shafts sunk to the Shinsei vein on the Chomatsu level, and is 800' deep at present. The Koganehira level is the lowest for transportation and drainage, and is 7' high, 4' wide, and 1,500' long. The Motosawa level is 50' above the former, and is 6' high, 4' wide, and 3,000' long. There are 10 levels above the Koganehira, connected by winzes. The Amaike tunnel is cut through at the foot of the mountain range between the Kayakusa and Sammai valleys. It is the lowest level in the mine, and is 7' high, 8' wide and 9,000' long, with double tracks. During the driving the chief veins in Kosawa and Sammai were found. The Suidoko adit is driven first as a crosscut; then, after proceeding along the Shogorohi vein, it cuts several other veins. It is 7' high, 8' wide and 6,600' long, and is the most important transportation and drainage level. There are 10 levels above it connected by winzes.

Treatment: the main concentration mill is at the Kosawa mine, and contains Hancock jigs, tables, and flotation plant. The 1% crude ore feed is concentrated to 10% Cu.

Ores: the dressed ore treated contains 40% silica and 10% copper. About 16,000 tons of ore are treated annually, yielding 1,500 tons of copper.

The fines and sands are briquetted or roasted in pots. The briquets, roasted ores, and raw material are reduced in 2 blast furnaces with limestone. Matte is blown to blister copper by the Japanese Mabuki hearth (7).

Blister copper, containing 98% copper and 0.11% silver, is sent to the Nikko Copper Works and electrolytically refined.

Power is chiefly supplied from the Hitachhinai hydro-electric power station, which generates 1,000 h. p. There are also two small auxiliary plants. Another plant for supplying 2,000 h. p. is under construction.

Nagamatsu Copper Mines.

(Annual production averages 2,000,000 lb. of copper.)

These extend over Shiraiwa-machi, Nishimurayama-gori, and Okura-

mura Mogami-gori, in Yamagate-ken, and are situated on the south of Mt. Gassan. The area of the concession is 1,300 acres.

Geology: the district consists of Tertiary shale, tuff, and sandstone, with intrusives of rhyolite and andesite. The ore occurs in veins which traverse all the rocks and consist of chalcopyrite and pyrite in a clay gangue, zinc blende and galena frequently occur, quartz and barite are found occasionally.

Development: by the 5,000′ Ogiri and 2,500′ Chugiri tunnels.

Treatment: crude 1% copper ore is hand picked, the reject being milled. The concentrate averages 8.5% copper. The fines are roasted in pots; raw lumps and roasted products are smelted into matte in blast furnaces. Matte is blown into blister at Mabuki. The blister contains 97% copper and 0.18% silver, and is sent to Nikko Copper Works for refining.

Power: a hydro-electric power plant of 200 h. p. is at work.

Mizusawa Copper Mines.

(Annual production about 1,000,000 lbs of copper.)

These mines are at the village of Iwasaki-mura, Wago-gori, in Iwate-ken. The area of concession is about 1,882 acres.

Geology: granite, Tertiary tuff, and rhyolite are cut by fissure veins the most important being the Machi, Okuhi, and Uwabanhi, mainly in the granite; the vein filling is quartz, containing chalcopyrite and pyrite; galena and zinc blende are found in small quantities. The crude ore contains 1.2% copper, and concentrates 7.4%.

Development: by the 500′ Tsudo adit level, and No. 6, 1,400′ long.

Smelting: the dressed ore and concentrate averaged 7.4% copper and is siliceous. The fines are roasted, briquetted and smelted with lump ore in a blast-furnace, the resulting matte blown to blister copper by the Japanese Mabuki process. The blast furnace is 33″x66″ at the tuyeres, and 10′ 6″ high.

Otori Copper Mines.

(Annual production 1,000,000 lb. copper.)

The concession covers 296 acres, at the village of Oizumi-mura, Higashitagawa-gori, in Yamagata-ken.

Geology: the ore occurs in veins in Tertiary agglomeratic tuff and liparite. The main lode is 1′ to 6′ wide, 2,500′ long and nearly vertical. The ore contains chalcopyrite and pyrite, in quartz and rhodochrosite, both in small quantity.

Development: by the 1,600′ Tsudo tunnel and 1,200 Ogiri level, 420′ higher.

Treatment: crude ore carries 3.6% and the concentrates 8% copper.

Kawaiyama Mines.

(Annual production, 1,000,000 lb. copper.)

The mines cover 400 acres in Ikumo-mura, Abu-gori, in Yanaguchi ken, 20 miles N. W. of Yanaguchi.

Geology: the ore occurs in a contact metamorphic deposit alongside a quartz porphyry dyke cutting Paleozoic limestone. The orebody is 1′ to 20′ thick, and consists of a mosaic of garnet, hedenbergite, quartz, chalcopyrite, and occasionally zinc blende and galena.

Development: by five levels, the longest, 2,500′ long, and a 350′ shaft.

Treatment: the crude ore is sorted by hand. The dressed ore is 85% of the mine run.

Smelting: is done by blast furnaces and Mabuki hearths. The blister copper from the blast-furnace carries 95% copper and 0.6 to 0.7% silver.

Kune Copper Mines.

(Annual production, 170,000 tons of ore).

The concession covers about 3,000 acres in and near the village of Saguma-mura, Iwata-gori in Shizuoka-ken, situated on the eastern bank of the River Tenryu. The mines have no concentrating mill and no reduction works, the pyritic ore being sold.

Geology: graphitic schist and chlorite schist of the Algonkian system contain epigenetic deposits of pyritic ores (copper 3-8%), which strike N. 35° E., and dip 30° to 60° N. W. There are six orebodies mostly 6′ to 8′ thick, with one 45′ to 100′ wide and 1,500′ long and 1,500′ deep. The ore consists of a compact granular aggregate pyrite and chalcopyrite with some pyrrhotite and quartz and occasionally magnetite.

Development: by 14 levels. The 1,500′ Ogiri, crosscut, is the transportation level. The Tsudo adit, 400′ below is 9′ wide, 8′ high, and 3,000′ long at present. A 500′ shaft on the Tsudo adit is used for deep work.

Ore extraction is by overhead stoping.

The mines produce both basic copper ore, and siliceous ore, and a small output of cement copper. Annual production of pyritic ore amounts to 170,000 tons, averaging 4% copper.

Transportation: the ores are carried by a ropeway to bins built on the bank of the River Tenryu, and then are loaded on boats and carried to the Tenryu station of the Imperial Government Railway.

Power: 2,500 h. p. is generated by water at Toyone, 5 miles N. W. of the mines.

Furokura Copper Mines.

(Annual production, 50,000 tons of copper ore.)

The property covers 2,322 acres, at the village of Oyu-mura, Kazunogori, in Akitaken.

Geology: Tertiary tuff, shale, and andesite are cut by quartz veins that traverse all of the rocks The Hompi varies from 1′ to 12′ and the known length is 5,000′. The ore carries chalcopyrite and pyrite, in quartz. Micaceous hematite also occurs, and sometimes calcite is found.

Development: on the Hompi vein; the Ogiri tunnel is 5′ wide, 7′ high, and 5,000′ long, and is the most important transportation and drainage level The Kyushichi tunnel, 260′ above the former, also is driven on the Hompi vein for a distance of 5,000′: The Hosoji tunnel is 530′ above the lowest or Ogiri level. All levels are connected by shafts and winzes. Stoping is practiced. Excavation is by hand-drilling and by Leyner rock drill and Ingersoll stopers.

Treatment: high-grade ore is mostly screened and picked, and the low-grade ore is concentrated mechanically. The dressed ores treated are silicious, containing 5.5% copper. They are divided into lumps, grains, and sands, and are sent to the smelter of the Kosaka mines owned by Fujita & Co.

Power: gas engines of 600 h. p. are used, and a hydro-electric power plant of 1,300 h. p. is under construction.

An aerial tram connects the mines and the Kosaka plant.

Kijo Gold Mine, Korea.

(Annual production, 2,000 tons of lead containing gold.)

This property covering 20,000 acres is in Todo, Kijo-gun, Heianhoku-do, in Chosen (Korea.) It is 27 miles N. E. from Sensen station of Chosen railway.

Geology: the tract contains 15 quartz veins in gneiss, that vary from 1′ to 20′ in width. The principal minerals are native gold and galena, with some zinc blende and a litte argentite. Iron pyrite, arsenopyrite, and chalcopyrite occur as accessory minerals.

Exploitation of the deposits begun in 1912, disclosed numerous commercial gold veins and gold-lead veins. Work is proceeding on a large scale.

Smelting: the mines have a small concentrating mill. Blast furnaces for experimental work produce lead ingots, containing much gold, which are sent to the Amagasaki refinery.

Innai Silver Mines.

(Production about 400,000 ounces of silver annually.)

The concession covers 2,613 acres at the town of Innai, Ogachi-gori, in Akita-ken, within 3 miles of Innai station of the Imperial Government Railway.

Geology: Tertiary tuff tuffaceous shale and tuffaceous sandstone cut by intrusions of rhyolite and andesite, contain quartz veins.

Development: includes the 7,800′ Sosuido adit and the Yamaichi shaft, 1,370′ deep.

Ore treatment: crude ore is crushed by gravity stamps and concentrated on Wilfley tables. Concentrates and old tailings are treated by cyanidation. The former contains 1.09% (355 oz.) silver, and the latter 0.02% (6.5 oz.) silver. The cyanide plant completed in 1917, produces 400,000 oz of silver annually.

Daira Lead Mines.

(Annual production 600 tons of lead, and 5,000 tons of zinc ore)

The mines are at the village of Fujikoto, in Yamaoto-gori, Akita-ken, 17 miles from the Futatsui station of the Ou line of the Imperial Government Railway.

Geology: Tertiary tuff, andesite, and rhyolite are cut by a quartz vein that carries argentiferous galena, and zinc blende.

The concentrator has a flotation unit, and an electro-magnetic separation plant. The lead ore is roasted in pots with limestone, reduced by charcoal in Mabuki hearths, and made into base bullion. The zinc ore is sold

The mine has a 400-h. p. hydro-electric power plant.

Coal Mines.

Name	Coal	Tons per Annum
Shiogashira, Shakanoo, Daini-Shakano	Bituminous	380,000
Shimoyamada	Anthracite	160,000
Shinshakanoo		60,000
Yoshima		500,000

Mizushima Smelter

This customs smelting plant is situated on the islet Mizushima, 5 miles S. E. of the Havour Tamashime, near Okayama City. It contains pot roasters, blast furnaces, and Mabuki hearths making blister copper which is sent to Nikko Copper Works.

Production is 3,500 tons of copper per annum.

Amagasaki Refinery

This refinery, in the town of Amagasaki, near Osaka, treats the copper from various sources, refining it in reverberatory furnaces. Lead ingots and silver bullion are also produced.

Annual production is 5,000 tons of refined copper 2,000 tons of lead, and 10,000 oz. of silver bullion.

Nikko Copper Works.

The Nikko works are at Kiyotaki, near Nikko, and make electrolytic copper, copper wire, alloy wire, copper plates, etc.

Copper from Ashio and other mines is refined here. The plant consists of a tank house using the series system, and another with the multiple system, a blue vitrol plant, refining furnaces, and slime house.

The wiring plant has rolling rods and plates, wire drawing mills, and brass foundry.

A Cottrell treater removes sulphur and arsenic from the gases of two cupellation and two reduction furnaces.

A hydro-electric power plant at Hosoo develops 10,000 h. p.

Annual production is 30,000 tons of electrolytic copper and copper wire; 1,500,000 oz. of bullion, etc.

Honjo Copper Works.

These works at Yanagiwara-cho, Honjo-ku, Tokyo, produce copper and brass sheets.

Annual production is 500 tons of copper and brass sheet.

HIDAIRA DOZAN JAPAN

Address: Miyazakiken, Higashi, Usukigori, Kitakatamura, Japan

Viscount S. Naito, owner; Y. Kasahara, chief engr.

Property: a copper mine with annual production of 6,000,000 lb.

HIKOSHIMA MINE JAPAN

This mine situated in Yamaguchi prefecture is the largest zinc mine of Japan, the output in 1918 being 27,672,960 lb. of zinc and 230,720 lb. of lead. No later information is available.

HOMANZAN MINE JAPAN

Address: T. Hori, owner, Shimaneken, Katarugori, Hatsa-komura. **Mine address:** O. Kuwabara, chief engr., Shimaneken, Yatsukagori, Iwasa-kamura, Japan.

Property: 2 copper mines near the villages of Hatsako and Iwasaka.

KINOSHIMA REFINERY JAPAN

Head office: Osaka, Japan. **Mine address:** M. Matsui, gen. mgr.; M. Tsugaki, mgr., Kinoshima, Japan.

This copper refinery produces 3,000,000 lb. per year, at Hiroshimaken, Takeharakogai, Kinoshima.

KUHARA MINING CO., LTD. JAPAN

Head office: Tokyo, Japan. **London agt.,** C. Kamiya, 60 Mark Lane, E. C. 3.

Officers: F. Kuhara, pres.; with K. Saito, K. Takenouchi, E. Nakayama and H. Tsumura, directors.

Cap. 75,000,000 Yen ($37,500,000); par 50 yen. Report for half year ended November, 1918, shows credit balance of 6,955,777 Yen after paying dividend. Reserve funds total over 30,000,000 Yen.

Property: includes the Hitachi, the largest copper mine in Japan, Kapsan copper mine in Korea, and 63 others.

Company operates the Hitachi, Saganoseki, and three other refineries. At the second named a chimney 570′ high, was built in 1918; it is 26′ inside diameter at the top, and located 1,000′ above the smelter.

Engineering works: at Hitachi and Tsukudajima.

Products: copper, gold, silver, spelter, and other metals. Company's electrolytic copper—Hitachi Brand—is well-known in the London market).

Kuhara Trading Co., Ltd.

Sole agent for the Kuhara Mining Co., Ltd.

U. S. offices: 26 Cortlandt St., New York City, and 309 Kohl Bldg., San Francisco.

Head office: Kobe, Japan, Branch offices are at Tokio, Osaka, London, Paris, Lyon, Rome, Berne, Port Said, Calcutta, Bombay, Singapore, Bankok, Batavia, Hongkong, Shanghai, Tientsin, and Vladivostock.

MITSUBISHI KOGYO KAISHA, LTD. (MITSUBISHI MNG. CO., LTD.) JAPAN

Head office: Maru-no-uchi, Tokyo, Japan.

Officers: Baron K. Iwasaki, chairman; Managing Directors; Y. Shigematsu, Dr. A. Nomi, I. Mitani; **Directors:** K. Kimura, S. Eguchi, K. Schimanura, S. Miyoshi; **Auditors:** M. Kushida, K. Aoki, S. Moroto, K. Sato.

Established April 10, 1918, as the successor of the Metal Mining Department and the Coal Mining Department of Mitsubishi Co.

Cap. 100,000,000 Yen; paid up 62,500,000 Yen. Company is an important producer of gold, silver, copper, tin, tungsten ore, coal, and coke, possess-

ing 26 metal mines, 12 coal mines, a smelter, a refinery, metal works, coke works, and a laboratory. Chief products are as follows:

Year	Gold, oz.	Silver, oz.	Electro. copper, lb.	Coal, long tons
1920..	19,600	522,972	19,554,194	3,345,161
1919..	21,300	519,884	17,322,428	3,411,898
1918..	21,675	428,400	16,139,811	3,272,045
1917..	26,280	582,435	21,208,179	3,199,940
1916..	30,997	679,556	18,661,316	2,985,873

Mitsubishi copper is marketed as electrolytic ingots branded with three diamonds, to insure identification, as it is considered to be unsurpassed in purity and electric conductivity. The larger part of the output is sold in the London market through the London Branch of Mitsubishi Shoji Kaisha, Ltd. Principal metal mines and recent production thereof per annum are as follows:

Name of Mine	Location	Metal	Output
Osaruzawa	Osaruzawa, Kazuno, Akita	Copper	6,300,000 lb.
Arakawa	Arakawa, Sempoku, Akita	Copper	2,891,000 lb.
Sado	Aikawa, Sado, Niigata	Bullion	4,618 lb.
Omodani	Kamianame, Ono, Fukui	Matte	722,000 lb.
Ikuno	Ikuno, Asago, Hyogo	Copper	5,653,000 lb.
Akenobe	Minamitani, Yubu, Hyogo	Tin	145,000 lb.
Yoshioka	Fukuya, Kawakami, Okayama	Copper	1,264,000 lb.
Makimine	Kitakata, Higashi-usuku, Miyazaki	Copper	2,086,000 lb.
Okuyama	Nanjo, Kamo, Shizuoka	Cop. ore	2,515 M. t.
Tsunatori	Yokokawame, Waka, Iwate	Cop. ore	3,451 M. t.
Togi	Togi, Hakui, Ishikawa	Bullion	957 kg.
Takara	Takara, Minami-tsuru, Yamanashi	Pyrite	19,239 M. t.
Takatori	Iwafune, Higashi-ibaraki, Ibaraki	Tungsten	94 M. t.
Kanayama	Izumi, Kita, Ehime	Cop. ore	2,581 M. t.

Of the coal mines, the 8 most important produce annually from 200,000 to nearly 600,000 long tons each.

Metalllurgical Works, etc.

Osaka Refinery.	Shinkawasaki, Kitaki, Osaka City.
Fushimi Metal Works	Fushimi, Kyoto Pref.
Naoshima Smelter	Naoshima, Kagawa, Kagawa Pref.
Makiyama Coke Works	Edamitsuko, Yahata City, Fukuoka Pref.
Mining and Metallurgical Laboratory,	Minami-shinagawa, Shinagawa, Tokyo Pref.

Metallurgical Works, etc.

Osaruzawa Mine: about 22,321 acres, near Odate-machi, 420 miles N. of Tokyo by railroad. The mine has been operated since 1650, producing large quantities of gold, silver and copper.

Geology: country rock consists of shale, tuff, pyroxene-andesite, propylite, and liparite. Ore deposits which form simple fissure veins are found in these rocks, and are divided into 3 series, Motoyama, Tagori and Akazawa, their number reaching several hundreds. The strike of Motoyama series is approximately N.-S, while those of Tagori and Akazawa series are E.-W. The veins range from 1′ to over 10′ averaging 3′ wide. The workable part averages 500′ in length, and has a dip of 60° to 80°. Ores contain chalcopyrite, chalcocite and bornite, associated with pyrite and small quantities of sphalerite, galena and hematite.

Development: by 3 working shafts and 7 main levels at 100′ intervals, with 20 miles of workings.

Equipment: electrical installations aggregate 3,300 h. p. Working forces average 2,400 persons. The 1,000 ton dressing plant has modern equipment. The reduction plant has two 150 ton blast furnaces, turning out blister copper of 98% tenor, which is sent to Osaka Refinery.

Arakawa Mine.

About 5,176 acres, 80 miles S.-W. by railroad from the Osaruzawa mine, and 7 miles from Sakai station.

Geology: shale, tuff, pyroxene andesite, and rhyolite are cut by 5 groups of veins that run N.-E. to S.-W, and 70° dip to N. W. The ore shoots vary from 1,000 to 4,000′ in length and carry chalcopyrite ore containing small quantities of pyrite, galena and sphalerite in quartz gangue.

Development: by 5 shafts, 300′ to 700′ deep and by numerous tunnels, the deepest workings being 800′ below drainage level.

Equipment: includes 4 power houses, with aggregate of 4,000 h. p. About 1,200 person are employed.

Hisaichi Branch Mine: is 5 miles E. of Arakawa mine. Its 200 ton concentrator has the latest equipment. Concentrate is sent to the Arakawa mine by tramway, to be smelted; and the ingots go to the Osaka Refinery.

Sado Mine

This mine is on the west coast of Sado island, 32 miles from the city of Niigata, on the mainland.

Geology: shale, tuff, pyroxene-andesite, are cut by five quartz veins, 2 to 120′ thick, that run E.-W., and dip 60° to 80° S. Ores contain native gold, argentite, and chalcopyrite, associated with pyrite, galena, sphalerite, etc., in quartz gangue.

Development: includes 2 working shafts and 4 main tunnels; with about 16 miles of underground work, opening veins for a distance of 1,500′ to 8,000′ on the strike.

Equipment: includes a 600 k. v. a. hydro-power plant and a 5.000 k. v. a. electric plant. Low grade ores are amalgamated in mill of 110 stamps and 3 tube-mills. Taiing and slime are treated with cyanide, and copper and rich gold ores by blast furnace. Bullion and ingots are sent to Osaka Refinery.

Takachi Branch Mine: 15 miles N. from Sado mine; deposits are fissure veins in liparite and propylite with strike E.-W. and dip of about 70° to 80°, and 7′ to 8′ wide. Dressed ore is sent by single rope tramway to shore, and carried to Sado mine by boat.

Ikuno Mine

This mine with 6,213 acres, is not far from Osaka City, and connected with it by railroads.

Geology: ore occurs in fissure veins in rhyolite, altered andesite and tuff. The two main lodes, Kanagase and Tasei, lie east of Ikuno town. The veins are dislocated by several basalt dikes. The Kanagase vein is 10,000′ long, runs N-S, and dips 60° to 80°. The ores contain native copper, bornite, chalcopyrite and tetrahedrite, associated with much sphalerite, galena, and less cassiterite, native bismuth, and a very little wolframite, scheelite and argentite. The Tasei lode has a 14′ main vein with numerous branches. The mine, as "Ikuno Silver Mine" which has been noted for centuries, owes its reputation to the rich silver content of the Tasei ores.

Development: 3 working shafts with 15 miles of workings.

Equipment: includes a hydro-power plant and a steam-power plant; Also a concentrator and a smelting plant where copper and tin ores are treated. Blister copper and crude tin are sent to Osaka Refinery.

Akenobe Mine

This tract of 6,800 acres, lies 20 miles west of the Ikuno mine.

Geology: Paleozoic slates, tuff and quartz schist with beds of altered Mesozoic sandstone, slate, conglomerate and limestone. The rocks are cut by veins that are sometimes intersected by later dikes of diorite. The ore occurs in simple fissure veins, those at the east end of the property producing silver ores and those on the west, copper and tin ores. Equipment includes the Mikobata concentrator where copper and tin ores are treated by modern methods. Dressed ore and concentrate are sent to Ikuno mine by trucks.

Yoshioka Mine

This property of 3,137 acres, is 33 miles from Tatai, on railroad.

Geology: phyllitic slate and sandstone are cut by porphyrite and quartz porphyry cut by fissure veins, in the sedimentary beds, decrease in richness with depth. The mine also contains workable orebodies of contact origin, mostly in sedimentary rocks near an igneous contact. The veins are of erratic widths, and form a stockwork. The ore contains chalcopyrite, with some pyrrhotite, pyrite, arsenopyrite, galena and sphalerite in a quartz gangue. The ores average 1.3 to 1.5% copper.

Development: by a shaft with 9 levels with over 28 miles of workings.

Equipment: includes several hydro-power plants, concentrators, dressing plants and a smelting plant.

Makimine Mine

This property covering 1,388 acres is far from railroad transportation.

Geology: district shows Paleozoic phyllite and graphite slates, in part covered by lava flows from the Aso volcano. The ore deposits in schist are pyritiferous and average 4% copper. There are 3 groups in which there are more than 20 orebodies, from 10′ to 20′ wide, though sometime for several hundred feet the width is from 4′ to 8′ only. The orebodies are about 1,500′ long.

Equipment: complete and includes hydro-power plants and a smelter.

The Naoshime Smelter

This plant on Naoshima islet, an hour and a half from Okayama City by train and boat, is divided into two departments, one for copper and one for lead ore. The **copper department** has MacDougall roasters, a large reverberatory furnace, and convertors. The lead department contains roasting furnaces, pots, a blast furnace, a softening reverberatory furnace, Park's pans, a refining reverberatory furnace, distillation and cupellation furnaces. Furnace gases are treated by 5 units of electric precipitation apparatus. Blister copper, lead and bullion are sent to Osaka refinery. Production for 1920 was 4,454,000 lb. copper, 9,000 lb. lead and 829 kg. bullion.

The Osaka Refinery

This refinery which adjoins the Imperial Mint at Osaka covers 12 acres and employs about 300 persons. It contains 15 reverberatory furnaces which turn out anodes of 97 to 99% purity, which are treated in the electrolytic plant yielding cathodes that assay 99.96% copper, 0.0037% silver, 0.014 lead, 0.01% arsenic, and a trace of sulphur. The gold and silver of the electrolytic slime is recovered by roasting in a small muffle furnace, leaching with the waste solution of the refinery to take up the small copper content and the residue mixed with lead and cupelled. The resultant bullion is refined by electrolysis with the bullion produced at the mines. Blister copper from all the Mitsubishi mines is refined here. Lead of 99.99% and tin of over 99.9% are also produced by electrolysis at the refinery. Output is as follows.

Year	Gold, oz.	Silver, oz.	Electro copper, lb.
1920	19,799	651,040	21,376,324
1919	23,849	667,138	20,218,448
1918	26,301	690,451	23,976,397
1917	44,907	985,481	38,003,388
1916	60,500	1,009,960	42,574,255
1915	83,900	975,360	38,347,366
1914	71,190	982,630	36,327,107
1913	87,830	985,440	35,972,521

Fushimin Metal Works: produce copper plates, copper and brass wire, etc., and several kinds of alloys.

The Mitsubishi Mining Company is one of the five large mining com-

panies operating in Japan, and like the others, is exceptionally progressive. Success has not been due to the possession of mines of exceptional value, though the company has some excellent properties, but rather by the utilization of the most modern methods and appliances in mining and metallurgy, directed by the best technical skill available.

MITSUI MINING CO., LTD. **JAPAN**

Head office: No. 1 Surugacho, Nihombashiku, Tokyo, Japan. **New York office:** 65 Broadway, New York.

Directors: Gennosuke Mitsui, pres.; with Genyemon Mitsui, Dr. Naoya Yamada, Dr. Tamaki Makita, Dr. Buntaro Yamada, Dr. Heinojo Ueki, Kenzaburo Iwata, Dr. Takuma Dan, Kikusaburo Fukui, and Kwan-ichi Okamoto. **Auditors:** Jutaro Mitsui, Shogoro Hatano, and Tomojiro Ono.

Cap. 50,000,000 yen paid up.

Property: the Miike, Tagawa, Yamamo, Hondo, Noborikawa, Sunagawa, Kushiro, and Kawakami coal mines; the Kamioka, Kushikino, and Kongo metal mines; the Iwaonobori sulphur mine; zinc refinery, by-product coke and gas power plant and dye manufactory. The Kamioka smelter is in the heart of a sericulture district and in order to prevent fumes and dust from damaging the mulberry trees and silkworms, a 3-unit Cottrell treater handles gases from the furnaces. Dust from the precipitator carries 1.13% free sulphur and 19.65% arsenic.

Production: in 1918 was 3,696,000 tons coal, 31,000 oz. gold, 657,000 oz. silver, 41,000 lb. copper, 5,750 tons lead, 10,400 tons zinc, 15,700 lb. arsenic, 94 tons tungsten ore, 7,000 tons sulphur; also 114,000 tons coke, 1,300 tons sulphate of ammonia, several kinds of oil, intermediates, dye-stuffs, and chemicals.

NARUKIYO MINING CO., LTD. **JAPAN**

Head office: Hiji-machi, Oita-ken, Japan. Address of **iron works:** Ikushi, Oita-ken, Japan.

Officers: Nobuye Narukiyo, pres. and Seigo Yeguchi, v. p.

Organized in 1917. **Cap.** 2,000,000 yen, fully paid.

Property: the Bajo mine, 2,934 acres, in Oita prefecture, on Kyushu island, one mile from Tateishi on the Hoshu railway, 60 miles S. of Moji; also the Takamine mine, 681 acres, at Kamo, Kagoshima prefecture, province of Satsuma, in southern part of Kyushu island.

At the Bajo mine, 6 principal fissure veins, from 2 to 20′ wide, which occur in andesite and granite, have been opened for 1,000′ in length. The ore is quartz, carrying gold and many silver and copper minerals; the values are 1.75 to 3.5 oz. gold and 7 to 14 oz. silver per ton. The Takamine mine shows quartz veins in andesite, carrying gold and argentite associated with pyrite.

Development: at Bajo, by 2 vertical and 1 inclined shaft, to depth of 592′ with levels at 50 to 100′ intervals. The Takamine is being prospected by tunnels; power is supplied by a gas engine and 60 men are employed.

Equipment: at Bajo, includes 5 boilers totalling 540 h. p.; 60 and 35 h. p. hoists; 75 h. p. 10-drill compressor. Mill uses thirty 100 lb. stamps for high grade and ten 1,050 lb. stamps for low grade ore, both followed Wilfleys etc. About ⅓ of mine output is shipped direct to the Saganoseki copper smelter. Employees number 600.

Production: at Bajo, 36,841 oz. gold and 332,039 oz. silver in 1919; 41,713 oz. gold and 427,947 oz. silver in 1920.

Company has also iron works with annual casting capacity of 3,500 tons on Oita harbor.

SUMITOMO GOSHI-KAISHA (LIMITED PARTNERSHIP) **JAPAN**

Head office: Kitahama 5 Chome, Higashiku, Osaka, Japan.

Officers: Baron K. Sumitomo, pres. **Directors:** M. Suzuki, chairman; K. Nakada, K. Yukawa, C. Kusaka, Y. Yamashita, M. Ogura, T. Sumitomo, K. Odaira and J. Matsumoto.

The company owns and operates various mines, metallurgical and technical works, besides extensive forests and farming lands.

The Besshi Copper Mine

Office: Niihama, Iyo, Japan.

Officials: K. Odaira, gen. mgr.; U. Okada, mgr.

Property: the Besshi mine is situated near Kiota at Niihama on the southern shore of the Inland Sea, in the Province of Iyo, on Shikoku island. It has been operated since 1691 and has been owned and continuously operated by the Sumitomo family two hundred and thirty years. According to the records the annual production of copper was 3,300,000 lb. for 8 years after its discovery. It was worked successfully by the old Japanese methods and processes until 1883 when modern European methods were introduced. It is now the second largest copper producer in Japan. The district is one of chloritic and graphitic schists, which near the mines contain bands of piedmontite schist, the whole enveloped in quartz-schist. A serpentinized rock, intrudes the hanging wall country near the orebody.

The deposit, an immense mass 6,000 ft. long, 4 to 30 ft. thick, and averaging 7'-8' and over 1,750 ft. deep, is intercalated in crystalline schist, and is often called a bedded deposit. The course of the orebody is north 30 deg. east and it has been worked for 6,000 ft. in length. It is usually 10 to 20 ft. thick, and not over 60 ft. The bed dips 45 deg. northeast, and is worked by an inclined shaft. The vein is faulted by east to west-faults at 45 deg. to the strike, that dislocate the orebody 10 to 20 ft., but never over 60 ft. The production was 10,425,800 lb. in 1902.

The ore consists of chalcopyrite streaks in massive crystalline pyrite with bands and curved and broken slivers of blackish schist. The ore averages between 3 and 4 per cent copper.

It is singularly free from impurities and when the blister is refined simply in reverberatory furnaces, the copper produced, is sold at Lake Copper or Electrolytic copper prices.

Development: by an 1,800' incline shaft sunk on the ore with 8 levels opened. An adit called "The Third", 6,000' long, was driven on the 8th level, for drainage and transportation. The 16,000' main or "The Fourth" adit, or 14th level finished recently, is the lowest and is only 500' above sea level. Between the 3rd and 4th adits, there is a brick lined blind shaft, (with a 17' diameter and 2,000' depth) from which six levels have been driven to block out the ore. Fourteen levels are now in use between the outcrop and the main adit.

Ore extraction is by ordinary overhand stoping, and an electric tramway transports the ore to the dressing works at the portal of the 3rd adit. The works will probably be transferred shortly to the portal of the 4th adit or Niihama. The mine is electrically lighted, the main levels timbered with wood and steel, and ventilation by natural methods.

The water from this old mine is very strongly acidulated and richly charged with copper and iron. The copper content is recovered by a precipitation plant first on scrap iron and then on a mixture of iron and coke; the annual output amounting to 400,000 lb. To prevent pollution of the river water used for irrigation purposes, the mine water is carried for 10 miles to the sea through a slag-lined ditch.

Dressing works: the ore is transported to the dressing works at Tonaru, where chunks are crushed by hand spalling and machine crushers followed by hand picking and jigs. Experiments have proved that low grade ores, especially the chloritic ores, can be concentrated by flotation, and this process will be adopted in the near future. Ore and concentrate are transported by a 3,600 meter aerial tramway to bins at Kuroishi, then taken by the company's railroad to Niihama on the coast, and carried by boat to the smelting works at the Island of Shisaka-jima about ten miles distant.

Metallurgical Works: the smelting plant formerly at Besshi and afterwards at Niihama, was transferred to the Shisaka-jima on account of

farmers' complaints against the smelter fumes. The plant is thoroughly modern in design and equipment. Lump ore is treated by pyritic smelting in 3 blast furnaces each 24′ x 4′ at tuyere level. A special feature of these furnaces is that the cross section is similar to that of the iron blast furnace, designed by K. Nakamura. The pyritic cinder from the company's acid and fertilizer works at Niihama as well as some from outside works are added to the smelting charge. The fine ore was formerly nodularized with fluxing siliceous sand and water in a patented revolving apparatus and roasted in pots specially designed by K. Nakamura, but now all fines as well as flue-dust are sent as flux to the reverberatory furnace of the Mitsubishi Mng. Co.'s Naoshima smelting works, and then returned as blister copper to the electro-refining works at Niihama (owned by the Sumitomo Goshi-Kaisha).

The first matte from the blast furnaces at Shisaka-jima is concentrated pyritically, in a blast furnace 24′x4′, and the second matte is converted into blister in three 10′ converters of vertical type and with basic linings; the resultant blister copper goes to the Niihama electro-refining works. The use of coal making the cost of steam power high, a hydro-electric plant will be installed in 1922 at Hateba near the portal of the 4th adit. This will be run by water from the streams on Besshi Mtn. which are collected and conducted through the mine by a special ditch, to the opposite or northern side of the mountain. A head of 2,000′ is obtained and 6,000 k. w. developed, this being the highest head of this kind in Japan. A 10-mile submarine cable will conduct current to the metallurgical works. Power will be utilized also for some purposes other than that of the mining enterprise.

Refineries: the Besshi copper is peculiarly free from impurities. Formerly, all blister was refined in reverberatory furnaces, producing the famous K. S. Copper of 99.8% fine. This is especially suited for rolling and alloying, being sold at rather higher prices than electro-refined copper, just as in the case of Lake Superior copper. As, however, the company owns large wire and sheet mills at Osaka, some electric copper is required, and for this reason the company established its electrical refinery.

Production: of the Besshi mine in recent years follows: 1918, 22,503,000 lb.; 1919, 23,592,000 lb.; 1920, 21,312,000 lb.; 1921, 22,029,000 lb. For 1922, it is estimated production will be 28,077,000 lb. The total output from the very beginning of operations (about 230 years ago) up to 1921, amounts to 663,610,000 lb.

TANAKA KOGYO CO. — **JAPAN**

Address: Hokkaida, Shiribeshi, Iwanaigori, Ozawamura, Japan. **Chief of mine:** K. Tamura; Y. Takahashi, mining engr.

Property: the Kunitomi mine, has an output of 3,000,000 lb. copper per annum.

KOREA

CHOSEN GOLD MINES, LTD. — **KOREA**

Operations ceased at end of 1916. See Vol. XIII of Mines Handbook for details of organization, etc.

HUCHANG MINING CO. — **KOREA**

Address: Koshagun, Heianhokudo, Japan.

Inc. 1917, in Japan. **Cap.** 4,000,000 Yen.

Property: in northern part of Chosen, not far from the Yabu river contains a large deposit of copper ore on which mining operations were started late in 1918.

ORIENTAL CONSOLIDATED MINING CO. — **KOREA**

Office: 15 Broad St., New York. **Mine and works:** Unsan district, Korea, Asia.

Officers: H. C. Perkins, pres.; Leigh Hunt, v. p.; Frederic Bull, 2nd

v. p.-treas.; L. T. Haggin, 3rd v. p.; with Ogden Mills, J. S. Fassett, Wm. P. Palmer and H. F. Meserve directors George Kennaby, sec.

Officers in Korea: Alf. Welhaven, gen. mgr.; Thos. W. Van Ess, asst. gen. mgr.; C. A. Crispin, auditor; A. B. Palmer, cashier; E. S. Barstow, supt of transportation; H. A. Cobb, supt. of Tabowie, etc.; J. A. Vernon, asst. supt. of Chintui, etc.; E. H. Emerson, elec. engr.; W. H. Aldridge, mech. engr.; K. F. Hoefle, supt. of fuel and timber railway; M. O. Robertson medical officer; S. E. Iijima, sec. to gen. mgr.; Townsend & Co., agts., Chemulpo.

Inc. Sept. 29, 1897, in West Virginia, to operate mining concessions in Korea. **Cap.** $5,000,000; outstanding $4,293,900, and the balance is owned by the company; shares $10 par. No bonded debt. Stock transferred and dividends paid at 15 Broad St., New York. Listed on London Stock Exchange.

Comparative General Balance Sheet, years ended June 30:

Assets

	Mines & Prop.	Cash	Supplies	Misc.	Total
1920....	$6,019,617	$351,602	$353,115	$182,087	$6,906,421
1919....	5,085,147	431,480	477,752	180,711	6,175,090
1918....	3,569,234	531,114	453,514	233,115	4,786,977
1917....	3,743,900	432,534	398,938	10,826	4,586,198
1916....	3,893,900	401,490	381,922	13,774	4,691,088
1915....	4,043,900	463,410	266,688	19,109	4,793,107
1914....	4,043,900	512,781	356,085	69,301	4,982,067

Liabilities.

	Capital Stock	Reserves	Sundry Creditors	Surplus Profit on Hand	Total
1920....	$4,293,000	$2,052,281	$39,547	$520,693	$6,906,421
1919....	4,293,900	.....	51,570	83,950	6,175,090
1918....	4,293,900	.....	83,624	409,453	4,786,977
1917....	4,293,900	.....	61,615	230,684	4,586,198
1916....	4,293,900	.....	66,435	330,753	4,691,088
1915....	4,293,900	.....	52,189	447,018	4,793,107
1914....	4,293,900	.....	42,465	645,702	4,982,067

Comparative Income Account:

Year	Total Income	Costs—Mine	Costs—Mill	Conc't. Exp's.	Other Exp's.	Total Exp's.	Divid's.	Surplus for year
1920.....	$1,188,629	$490,002	$154,443	$58,801	$460,331†	$1,163,577	$322,043	$296,991*
1919.....	1,282,086	496,064	154,375	53,813	448,994†	842,978	.....	128,841
1918.....	1,528 525	555,657	153,615	63.868	361,922**	1,135,060	214,695	393,464
1917.....	1,602,597	547,338	139,995	61,669	126,378	875,380	644,085	83,131
1916.....	1,636,299	554,535	144,670	60,082	141,831	901,118	644,085	677 820
1915.....	1,672,487	569,872	143,603	62,474	236.442	1,012,391	858,780	198,684*
1914.....	1,731,473	596,189	167.219	96,845	248.439	1,108,692	644,085	21,304*
1913.....	1,661,476	610,212	168,657	107,392	203,831	1,090,091	429,390	141,994
1912.....	1,562,110	520,136	161,825	65,500	162,122	909,583	429,390	223,137

* Deficit. ** Includes $174,666 for depreciation and depletion. † Includes $310,267 for depreciation and depletion in 1919, and $306,610 in 1920.

Dividends: 1903, $1.25; 1904, 1905 and 1906, $1 each; 1907, 60c.; 1908, $1.50; 1909, $1.15; 1910, $1; 1911, $1.50; 1912, $1; 1913 and 1914, $1.50; 1915, $2; 1916, $1.50; 1917, 50c.; 1918, 25c.; 25c. in 1919; 50c. in 1920; making a total of $19.50 per share, or 195%, or $8,367,435.

Property: a concession covering 400 sq. miles, including a number of gold mines in the Unsan district in the northwestern part of Korea, described by Evans and Hoeffe in "Min. & Sci. Press" of March 29, 1919.

Geology: the region shows granite rocks eroded into a high and rugged mountainous area. The lodes are typical fissure veins varying from 20′ to 140′ wide, and of unusual persistence downward, but are broken by intense

crushing and faulting. The vein quartz contains pyrite, galena, sphalerite, gold, and a little silver. A predominance of galena is generally accompanied by an increase in gold, but free gold is rarely seen. Graphite is distributed in small quantity through the ore.

Development: the following tables summarize operations at the principal mines:

Tabowie Mine.

	1920	1919	1918
Deepest shaft, feet	2,600	2,600	2,600
New work, feet	6,574	10,488	11,510
General results	Unsatisfactory	Discouraging	Unsatisfactory
Ore reserves, tons	384,000	441,000	485,000
Value per ton	$5.43	$5.44	$5.70
Ore mined in year, tons	128,405	127,122	122,106
Value per ton	$6.40	$6.57	$6.56
Cost of mining per ton	$1.91	$2.08	$1.86

Taracol Mine.

Deepest shaft, feet	1,992	1,942	1,942
New work, feet	10,453	12,672	13,156
Ore reserves, tons	345,000	260,000	238,000
General results	Good	Good	Encouraging
Value per ton	$4.60	$4.54	$4.54
Ore mined in year, tons	97,647	107,401	101,617
Value per ton	$4.72	$4.53	$4.73
Cost of mining, per ton	2.05	1.70	1.67

Tongkol Mine.

Deepest shaft, feet	....	....	....
New work, feet	3,313	2,394	5,489
General results	Fair	Fair	Fair
Ore reserves, tons	6,250	5,500	7,000
Value per ton	$9.67	$10.18	$8.00
Ore mined in year, tons	2,460	4,443	8,040
Value per ton	$20.69	$16.50	$10.62
Cost of mining per ton	$11.93	$5.61	$4.00

Chintui Mine.

Deepest shaft, feet	1,085	1,085	1,085
General results	....	....	Satisfactory
New work, feet	1,310	1,856	4,532
Ore reserves, tons	32,500	32,500	35,000
Value per ton	$4.33	$4.33	$4.17
Ore mined in year, tons	4,811	11,902	23,881
Value per ton	$4.78	$4.03	$4.63
Cost of mining per ton	$3.25	$1.96	$2.01

Reserves in all the mines are 795,066 tons, worth $5.24 per ton.

Extensive prospecting is carried on continuously on the concession. 1,443′ of work being done in 1917; 1,226′ and 3,323′ of ditching in 1918, and 9,354′ in 1919. In 1920, development amounted to 3,891′, and trenching 3,435′.

Mining methods vary somewhat, but overhead stoping, with or without timber, is the general practice. Large stoping widths, soft walls, and slipping of backs along graphitic seams in the quartz requires square-sets. As waste and dike matter are mixed with the ore, sorting is necessary.

Equipment: includes 20-mile narrow-gauge timber tramway, 22½-mile transmission line; sawmill and wood-working shop; 2 hydro-electric power plants of about 2,500-h. p., the second one (the Suribong), finished in No-

vember, 1919, at cost of over $550,000; mine fans, pumps, compressors, and hoists; tool-shop; machine-shop and foundry; 3 stamp mills, containing 80, 80, and 40 head, respectively, also amalgamating plates and amalgamators, vanners, classifiers, and canvas tables; concentrate treatment plant; refinery; assay-office; living quarters, medical and surgical department; and an afforestation department, which has planted 935,855 trees (mostly larch, acacia, and red pine) since 1913.

Production, years ending June 30:

Year	Tons Crushed	—Per Ton— Yield	Costs	Year	Tons Crushed	—Per Ton— Yield	Costs
1909.....	296,417	$4.80	$2.72	1915.....	297,889	$5.45	$3.40
1910.....	320,707	4.40	2.43	1916.....	309,730	6.04	2.90
1911.....	344,097	4.37	2.45	1917.....	317,601	5.94	2.76
1912.....	323,703	4.76	2.68	1918.....	303,672	5.90	3.06
1913.....	313,701	5.19	3.25	1919.....	250,868	5.84	3.36
1914.....	301,162	5.60	3.68	1920.....	233,323	4.85	3.67

Production of last 9 months of fiscal year ended 1921 was 154,951 tons, operating receipts were $888,557 and net profit $112,904. For first 7 months of fiscal year ended 1922, output was 125,721 tons, with gross receipts $619,883 and net profit $2,715.

Total production to June 30, 1920 was 250,461 tons of ore valued at $32-245,102 gross.

Scarcity of water is of frequent occurence and is a serious handicap. In year 1920-21, fire in the Tabowie mine lasting for about 6 months decreased production materially.

Company's operations are extensive and ably conducted. Geological conditions are carefully studied, and while one of the mines is almost exhausted, the others maintain ore reserves. The native labor problem has been solved without serious perplexities, mainly by a close study of Korean adaptability and industry. Altogether a highly profitable concern, operating on low-grade ore at low cost. Results are given with commendable detail and frankness.

SEOUL MINING CO. KOREA

Offices: 709 Equitable Bldg., Denver, Colo.; 57 Post St., San Francisco; E. P. Triana, asst. sec., 49 St. James St., London, S. W. 1 England; and Seoul, Korea. **Corporate office:** Deep River, Conn. **Mine office:** Tul Mi Chung, Whang Hai, Korea.

Officers: H. Collbran, pres.; H. R. Bostwick, v. p.; S. L. Selden, 2nd v. p. and gen. counsel; H. E. Collbran, sec.-treas., with J. S. Collbran, F. B. Lawson and A. H. Collbran, directors.

Staff: A. R. Weigall, cons. eng. and gen. mgr.; B. V. Barton, acting supt. Suan mine and supt. of general development on the Concession; James Williams, Suan mine foreman; H. B. Fields, Suan mill foreman; Alex McFarlane, Tul Mi Chung mine foreman; E. L. Blackwell, Tul Mi Chung mill foreman; W. G. B. Boydell, supt. of the ore estimation and surveying; J. H. Woolf, asst. to foreman; K. I. Yun, in charge of Tong Ahm; H. T. Matson, in charge of Kung Kol and Peh Jai; W. W. Barnett, chemist and assayer; C. S. Crowe, millwright and mechanical foreman; Baron H. Maki, cons. elect. eng.; S. Ishikuma, supt. of elect. power; F. A. Smith, in charge of Nau Chauri, W. H. Minford, medical officer; G. C. Cranor, accountant, F. A. Oldis, auditor.

Inc. April 27, 1908, in Connecticut. **Cap.** $1,000,000; $25 par; issued 22,641 shares. **Notes:** coupon and supplementary note issues $581,855 bearing 8%. Bankers' Trust Co. of New York, registrar. H. C. Ellis, Denver, transfer agent. Annual meeting, third Monday in October.

Balance Sheet, years ending December 31:

Assets.

Year	Property	Ore reserves	Stores	Concentrates	Cash	Total
1918.....	$1,516,658	$347,109	$241,533	$422,078	$628,458	$3,155,837
1917.....	1,571,654	717,487	297,719	149,188	876,973	3,613,021

Liabilities.

Year	Capital	Notes	Reserves	P. & L. account	Surplus from ore reserves	Creditors	Total
1918.....	$563,625	$624,625	$1,154,500	$190,914	$347,109	$275,063	$3,155,837
1917.....	522,000	890,000	988.000	293,257	717.487	.....	3,613,021

Income Account.

Year	Sale of Products, etc.	Operating Charges	Interest, Royalties, Depreciation	Profit	Dividends
1920.....	$887,750	$996,108	$64,931	*$173,289	nil
1919.....	952,561	824,520	.....	.....	nil
1918.....	1,404,685	787,436	1,231,672	173,013	$140,906
1917.....	1,698,418	1,029,624	338,268	330.526	255,500

*Loss.

Dividends: have been 25% in 1910; 50% yearly from 1911 to 1918, inclusive; none since.

Property: a lease on the Suan concession in Wang Hai province, granted 1908, to the Korean Syndicate, comprising 166,000 acres, about 55 miles E. from Pyeng Yang. The concession carries full rights to examine, develop and operate all mines and deposits contained within the area covered by the grant. Company also has permission to cut timber and to use all the water required for mining, milling and other purposes from sources within, or adjacent to, the district. These privileges are given for a royalty of 1% on the gross value of the output of the mines. There is an additional annual tax of about 30 cents per acre (50 sen for each 1,000 tsubo), on all land actually selected for mining operations, such selections being made by December, 1916.

The rights in this concession are secured to the Seoul Mining Co. by an agreement made with the Korean Syndicate which provides for the payment of 8% royalty of the actual profits derived from the concession, clear of all depreciation charges. (Royalties and taxes paid in 1918 amounted to $70,884.)

Geology: property shows both granite and limestone, the principal orebody, known as the Collbran Contact, lying between limestone and a batholith of granitoid rock. Ores carry gold, copper, tungsten and bismuth, the gold seldom being visible and rarely in coarse condition. Silver is also present, alloyed with the gold to an appreciable amount. The copper ores contain chalcopyrite, bornite and tetrahedrite, with a high gold content, a fair average probably being about 1.2% copper and $10 gold. The orebodies are irregular and in general parallel with the limestone-granite contact, connected more or less by generally well-defined fissures. The gangue is a highly silicious crystalline limestone, altered by contact action and containing a considerable amount of magnesia and alumina.

Development: there are 3 principal and several subsidiary mines being worked, the former being the Tong Ahm and Tul Mi Chung. In 1918, 38,209' of new work was done, and total is now over 200.000'. Development was much curtailed in 1920.

The **Suan** mine is about exhausted. It has been an interesting mine, as the ore contained $9.20 gold, 1.15% copper, and 1.7 lb. bismuth per ton. Mining is conducted through shafts and tunnels.

Tul Mi Chung is the largest mine. The main work has been done on orebodies occurring at the junction of limestone and schist. Good ore was found at the limestone-granite contact, and possibilities in that formation

are encouraging. Ore carries gold, silver and copper, and has averaged about $10 per ton.

Tong Ahm is a new mine, and has every indication of developing into an important producer. Value of ore is about $9 per ton.

Peh Jai is a new and promising prospect. The ore, which is extremely complex, containing gold, silver, copper, bismuth, and tungsten, runs between 6 and $7 per ton. The gangue is a heavy magnetite and garnet.

Reserves at all mines are as follows:

	Tons	Value per ton	Total Value
1920	440,601	$8.26	$3,6[illegible]
1919	729,784	8.14	5,945,677
1918	771,575	8.09	6,242,833
1917	816,957	8.57	7,005,625
1916	1,206,136	....	15,014,376
1915	1,221,331	....	.....
1914	1,208,600	12.42	15,015,000
1913	633,300	12.07	7,[illegible]000
1912	421,000	14.44	6,080,000
1911	211,400	16.55	3,479,000

The **Soctarie** deposit consists of an extensive band of quartzite, interbedded with limestone, of an average thickness of 25'. This band carries 0.3% tungsten as scheelite, 40 cents gold, and 0.4% copper. Reserves are estimated at 267,717 tons, worth $4.93 per ton. A great deal of experimental work has been done on this ore, locally and abroad, especially in making marketable products.

Equipment: includes steam and hydro-electric power plants, 56-mile transmission-line, complete mining machinery, 40-stamp mill at Suan mine to be enlarged to treat ore from the Soctarie mine, and 480-ton mill at the Tul Mi Chung, including regrinding, flotation, and cyanidation plants.

Production:

	Tons Ore	Rec'y p. t.	Cost p. t.	Profit p. t.	Total Output
1920	*151,300	$8.84	....	....	.....
1919	*164,005	8.03	....	....	.....
1918	201,151	9.64	$4.00	$5.64	$1,343,234
1917	215,039	7.61	3.47	4.14	1,63[illegible]23
1916	176,518	10.63	3.98	6.42	1,823,768
1915	108,078	9.35	3.94	5.11	978,383
1914	74,550	9.44	3.90	5.54	.....
1913	71,535	9.39	4.13	5.26	.....
1912	74,432	8.25	3.52	4.73	.....
1911	70,229	7.83	3.01	4.92	.....
1910	32.793	9.86	4.35	5.81	.....

*Tul Mi Chung and Suan mines only.

This is a highly profitable company, directed by able technical men who have many problems to solve, not the least being the separation of gold, copper, and tungsten, upon which experiments have been under way for the past four years. Flotation is expected to make a good recovery. The Tul Mi Chung mill is now treating 488 tons daily of gold-copper ore and a 1,000-ton mill is planned. If 80% of the gold, copper and tungsten can be extracted from the Soctarie ore, a 1,000-ton mill will also be erected there. Company conducts extensive prospecting on its concession, following geologic examinations.

Technical operations on the Suan Concession are described by A. R. Weigall and J. F. Mitchell-Roberts in the "Min. & Sci. Press", October 11, 1919.

PHILIPPINE ISLANDS

There has been but little change in the metal production for several years. Production for 1917 was valued at 2,668,615 pesos (P1 = 50 cents), for 1918, P2,618,259; for 1919, P2,766,231; for 1920, P2,484,058. Gold accounts for 98% of the total. Iron is the only other metal for which production figures are obtainable, but, except in 1919, the output has been the result of Filipino companies who by crude methods and on a small scale, are exploiting the rich iron ore deposits in the Angat district in Bulcan Province.

ACUPAN MINING CO. — PHILIPPINES

Address: Wm. M. Haube, 827 R. Hidalgo, Manila, P. I. T. Philips, supt.

Property: on Batwaan creek, Benguet, Luzon, has been operated in a small way for several years. A 3-stamp mill worked for a year or so. Mine is opened by tunnels, which are said to show that the vein persists. Developing 1919-20.

ANTAMOK VALLEY MNG. ASSOC. — PHILIPPINES

Address: c/o Wolfson and Wolfson, 65 Plaza Cervantes, Manila, P. I.

Property: a gold mine whose output supplies a 6-stamp mill with high-ing developed.

ARGUS MINING CO. — PHILIPPINES

Address: Napuangan, Aroroy, Masbate, P. I.

Property: a gold mine at Napuangan, Aroroy district. Was being developed up to mid-1921; no later information.

BALETE MINING SYNDICATE — PHILIPPINES

Address: Balete, Aroroy, Masbate, P. I.

Property: a gold mine whose output supplies a 6 stamp mill with high-grade ore. Idle 1919-20.

BENGUET CONSOLIDATED MNG. CO. — PHILIPPINES

Offices: Kneedler Bldg., or Box 817, Manila; and Antamok, Benguet, P. I.

Officers: A. W. Beam, pres.-gen. mgr.; S. McKee, sec.-treas., with H. D. Cranston, Delmar Smith-Clinton and Henry Uy Cho Yee. J. W. Haussermann, v. p.; O. L. Kettenbach, supt., Baguio, P. I.

Inc. 1903, in Phillipine Islands. **Cap.** 700,000 pesos, 0.70 pesos par; reduced in 1921 from 1,000,000 pesos, 1 pesos par; all outstanding. Shares were quoted at P. 2.00 ($1.00) in Manila in April 1921.

Assets.

Year	Mines and Property	Equipment	Supplies	Bullion in Transit	Cash, Bonds Accounts, etc.	Total
1920.....	P968,556	P469,660	P163,161	P47,000	P238,852	P1,887,229
1919.....	959,483	P443,117	96,006	122,037	140,837	1,761,780

Liabilities.

Year	Capital Stock	Reserve for Ore Depletion	Creditors, Taxes, etc.	Profit and Loss, Net	Total
1920.....	P1,000,000	P700,000	P45,033	P142,196	P1,887,229
1919.....	1,000,000	600,000	53,419	108,361	1,761,780

Operating Account.

Year	Oper. Profit	Other Income	Prev. Bal.	Depr. & Depl.	Dividends	Surplus
1920..	P499,316	P41,149	P108,361	P206,630	P300,000	P142,196
1919*.	234,465	6,815	220 216	153,135	200,000	108,361

* Six months.

Receipts for half year ended June 30, 1921, were P398,217, gross profit P359,432 and net profit P283,984.

Dividends: initial dividend declared September, 1916, in which year 12½% was paid; 22½% in 1917; 25% in 1918; 35% in 1919, 30% in 1920, 10% in 1921 to June. Now that construction expenses are over, larger distributions may be expected.

Property: 26 claims (420 acres), of which 17 (285 acres) are patented in the Antamok valley, 7 miles from Baguio, covering 8,000' along strike of main Benquet lode.

Geology: the main vein is formed by 2 principal fault fissures and a third series of adjustment cracks. In these fissures were deposited the main hanging wall and foot wall veins. The fault planes are not parallel, and the mineralized solutions working along each fissure produced, first, a zone of enriched ore in close proximity to the fault planes, and, secondly, penetrated the brecciated mass lying between the two and mineralized it in a ratio varying directly with the distance separating the two fissures. The walls are approximately 160' feet apart. The main pay shoot is on the hanging wall; another is on the foot wall, and a third and smaller one lies intermediate between them; there are also two cross veins. The hanging wall on one level is more than 1,400' feet long. Ore is a mixture of quartz, iron oxide and sulphide, altered diorite and clay; quartz predominates over the other gangue minerals. There is some free gold, but none is visible; ore averages $20 per ton in gold.

Development: by tunnel, with a shaft sunk below it reaching a depth of 600'. A 3,500' drainage tunnel is being driven along the hanging wall which will also permit a thorough examination of the lode. Ore reserves are estimated to be 27,100 tons (of a value of P860,000) positive, 38,810 tons (P1,417,840) probable and 132,910 tons of (P2,370,000) possible, on Jan. 4, 1921.

Equipment: includes 10-stamp mill, and cyanide plant of 110 tons daily capacity, ½-mile aerial tram and 2 hydro-electric plants. The mill is fully described by C. M. Eye and M. F. Dodd in Min. Sci. Press of Dec. 4, and 11, 1920.

Production (1 peso-50 cents):

	Ore treated, Tons	Value per ton	Total Value	Extraction	All Costs
1921*	18,904	P31.01	P586,140	....	....
1920	35,565	33.24	1,068,892	90.5	P14.04
1919	23,719	40.38	853,410	8.91	17.16
1918	23,539	41.32	972,631	89.0	15.36
1917	20,427	35.60	727,201	87.1	14.34

*Six months. Total production to Jan. 1, 1921, is 143,793 tons with yield of P4,983,750.

So little data is obtainable from the Philippines that this report is noteworthy, as it shows that the Benguet is a good mine paying a large return on the capital invested.

COLORADO MINING CO. PHILIPPINES

Address: Uy Chaco Bldg., Manila, P. I.

Mine address: Aroroy, Masbate, P. I.

Property: in the Aroroy district, of Masbate, contains 15 quartz veins, of which 7 are being developed.

The ore is in a brecciated zone, containing several quartz veins, with clay and manganese, between. No. 5 lode has been traced on surface for 1,500'. One vein is stoped for a width of 36'.

Development: by tunnels is the most extensive of any mine in the Philippines. Underground work, extended 1920 toward Keystone ground to open claims acquired in 1919.

Equipment: includes mill with 20 stamps, ball mill, tube mill, cyanide plant, and power plant, employing a 500-h. p. Diesel engine.

This company has been a consistent producer since 1912, but apparently dislikes publicity and does not reply to our requests for information.

DEMONSTRATION, LTD. **PHILIPPINES**

Address: H. P. Whitmarsh, Baguio, Mountain Province, P. I.

Property: one of the mines of the Copper King group at Tuba, Benguet, Luzon. The vein, on which most work has been done, is composed of calcite, quartz and manganese; the other vein yields a refractory ore, carrying gold, silver and sulphides of copper, lead and zinc.

Development: by 4 tunnels, said to have blocked out 100,000 tons of good ore.

Equipment: 5 stamps and amalgamating plates. A 150-ton cyanide mill is contemplated.

Property was being developed in 1919-20, and in latter year, Hongkong capital was said to be considering the property, and may finance it, as a result of an examination recently made.

HEADWATERS MINING CO. **PHILIPPINES**

Address: Mr. Hagen, Baguio, Mountain Province, P. I.

Property: the Headwaters gold mine on Antamok river, Benguet, Luzon, under lease to Mr. Hagen. A small mill extracted gold to the value of 27,000 pesos during 1917 and 1918. Hongkong capital is interested. Being developed 1919-20.

KEYSTONE MINING CO. **PHILIPPINES**

Address: care G. M. Willy, Aroroy, Masbate, P. I.

Property: an old, formerly profitable gold mine in the Aroroy district; recently restaked, has a stamp mill and cyanide plant. Part of property sold to Colorado Mng. Co. about 1918.

Mine was being developed 1919-20.

KURUON MINING CO. **PHILIPPINES**

Address: Zamboanga, Mindanao, P. I.

Property: a gold mine at Zamboanga on the island of Mindanao. Was being developed up to mid-1921, no later report.

LIANGA MINES, LTD. **PHILIPPINES**

Address: Lianga, Mindanao, P. I.

Property: placer ground near Lianga on Mindanao island. At last account (Aug. 1921) a dredge was being installed.

MAGMA GROUP **PHLIPPINES**

Address: H. P. Whitmarsh, Baguio, Mountain Province, P. I.

Property: a gold mine at Itogon, Dunglan Creek, Benguet, Luzon, 15 miles S. of Baguio. Ore is quartz carrying silver and gold in ratio of 4 to 1 by weight; one sample across 15′ is said to assay $23.60. Developed by tunnels, with a possible back of 1,500′. While no ore is as yet available, indications are reported to be favorable, and development is being continued.

MALIIT MINE **PHILIPPINES**

Address: Moisan and Muller, Maliit, Mambulao, Ambos Camarines, P. I.

Property: a gold mine developed by open cuts and tunnels. A mill consists of chain crusher, 10 stamps and amalgamating slates. Mine and mill were operating up to Aug. 1921.

MAMBULAO PLACER CO. **PHILIPPINES**

Address: 107 Escolta, Manila, P. I.

Property: placer ground in Bulalacao bay, Mambulao, Ambos Camarines. The dredge was formerly on Mambulao bay. Operated in 1918, no information since. Idle or dead.

MANCAYAN COPPER MINES **PHILIPPINES**

Address: V. E. Lednicky, Mancayan, Mountain Province, P. I.

Property: shows a low grade copper deposit, containing enargite. The

orebody of fair extent, is now being developed. Reported that a concentrating plant is soon to be erected.

MANILA IRON & STEEL CO. PHILIPPINES

Address: O. P. Rhudie, Manila, P. I.

Company owns a small blast furnace in Bataan, which treated iron ore brought from the Calamabayanga deposits and magnetite sand found in concentrated form on the beaches of Mariveles and Limay, Bataan. Has been idle since the armistice.

MARINDUQUE MINING CO. PHILIPPINES

Address: E. E. Elser, Kneedler Bldg., Manila, P. I. E. E. Calvin, sec.-treas.

Property: 15 claims on east side of Marinduque island, 3 kilometers from Salamaga bay, located in 1916.

Geology: fissure veins, 4 to 10' wide, in andesite, carrying an average of 6% lead and 6% zinc, also up to 3% copper.

Development: by tunneling. About 20,000 pesos were spent during 1917 and 1918. Concentration tests made in 1918, gave a 60% lead concentrate and 45% zinc concentrate. Idle in 1920-21.

MENTZER MINE PHILIPPINES

Address: Geo. Mentzer, Binalonan, Pangasinan, P. I.

Property: a gold mine at Lubang, Mountain province. Is equipped with mill which was operating at last account, August, 1921.

NATIONAL IRON CO. PHILIPPINES

A company organized by the Territorial Government at Manila to work the deposit of lateritic iron ore on Dahikan bay, Surigao province, Mindanao island. Deposit is estimated to contain 500,000,000 tons and was reserved by the Government in 1915. Reported that Cebu island with its seams of coking coal will be the logical smelting point.

PARACALE BUCKET DREDGING, LTD. PHILIPPINES

Controlled by **Philippine Dredges, Ltd.**, through ownership of 97,075 £1 shares out of 150,000.

Company's 2 dredges, operated by **Philippine Dredges, Ltd.**, in Paracale river, were shut down and dismantled in 1918.

PARACALE VENTURE CORPORATION PHILIPPINES

Address: B. A. Green, 34 Escolta, Manila, P. I.

Property: placer deposits that underlie a cocoanut grove in the Paracale district of Ambos Camarines. In 1920, work consisted of driving along bedrock. The ground is supposedly an old river channel 20 meters deep.

PHILIPPINE DREDGES, LIMITED PHILIPPINES

Officers: 31 Queen St., Melbourne, Australia; Paracale, Ambos Camarines, P. I.; and Palmerston House, London, E. C. 2, England.

J. McWhae, chairman of board of directors; A. F. Showers, sec. in Melbourne; E. Habben, sec. in London; W. Telford, mgr.

Inc. Nov. 12, 1912, in Victoria, Australia. **Cap.** £200,000; £1 par; 174,600 issued. Debentures: £41,400 at 7%, due 1919. Company controls the **Paracale Bucket Dredging, Ltd.** Dividends: 5% in 1917; 5% in 1918; none since.

There was a debit of £6,989 for year ended Oct. 31, 1920, with debit balance forward of £30,951. Current liabilities amounted to nearly £7,000.

Property: 1,103 acres of placer ground along the Paracale.

Production: 21,230 oz. gold from 2,027,888 cu. yd. in 1916; 17,825 oz. from 2,198,253 yd. in 1917; and 12,372 oz. from 1,832,642 in 1918; 5,817 oz. in 1919; 3,936 oz. in 1920.

PHILIPPINE EXPLORATION CO. PHILIPPINES

Address: Uy Chaco Bld., Manila, P. I.

Property: in Manbulao district, Ambos Camarines. Physical condition of mine is poor, as the shaft and tunnels are caved, but work was resumed in 1920.

PHILIPPINE MINING & INDUSTRIAL CO. PHILIPPINES

Address: Kneedler Bldg., Manila, P. I.

Property: an iron mine owned by Japanese on Calambayanga island, Mambulao, Ambos Camarines.

Development: by bench-quarrying methods. Intensive exploitation was underway in 1920.

Equipment: ore-cars, 40-meter loading pier, scows, etc.

Production: beginning 1918, was 100 to 150 tons of iron ore daily with a total output in 1919 of about 18,000 tons. Ore was smelted in Japan.

Idle since end of 1919.

SYNDICATE MINING CO. PHILIPPINES

Address: 101 Lara, Manila, P. I. **Mine office:** Aroroy, Masbate, P. I.

Officers: J. T. Pickett, pres.; W. J. Shaw, v.-p. treas.; Jay Parsons, sec. F. M. Evans, mgr.; W. G. Carpenter, gen. supt.

Inc. in Philippines. **Cap.** $500,000; $50 par. Annual meeting January 15.

Property: a mile S. of the Colorado mine, and 8 kilometers S. W. of Aroroy, at north end of Masbate island. Deposit is a fissure in andesite and diorite. Ore consists of quartz and calcite, and at times is charged heavily with manganese. The average value is $11 per ton in gold and silver.

Development: by 1,400 and 2,800' tunnels, opening ground to depth of 500'. Reserves are equal to 2 years.

Equipment: includes 1,000' gravity tram, compressor and 140-ton all-sliming cyanide mill, driven by Diesel type engines.

Production: averaged 100 tons daily during past 3 years; increased since June, 1919, to 130 tons daily.

This is one of the 3 principal gold mines of the Islands, but company does not give out information.

VAMENTA CHAVES MINING CO. PHILIPPINES

Address: Cagayan, Misamis, P. I.

Property: a recently discovered iron (magnetite) deposit in Bukidnon, Mindanao, said to be of large dimensions. There had been no production up to mid-1921.

SIAM

ALORSTAR TIN PROSPECTING CO. SIAM

Address: Melbourne.

Company was organized early in 1920 to acquire tin-bearing areas in Malaya or Siam. Prospecting has been underway at Koh Painam and Bandon, Siam. The property at Bandon is reported to have been taken over late in 1921. On April 30, 1921, company had a £1,866 cash balance.

BANGNON VALLEY TIN, N. L. SIAM

Address: Bangnon Valley, Renong, Siam. Controlled by Australian capital.

Property: tin-bearing land in **Bangnon Valley**, Renong, Siam, on which a dredge is operating. During year ended May 31, 1919, 275 tons of black tin was recovered from 605,147 cu. yd. of alluvium, or 15.99d per yard as compared with a cost of 5.57d. Regular dividends are being paid; in 1918-19, 4s per share were paid from net profit of £26,269.

In February 1919, company's plant was transferred to **North Taiping Tin Dredging Co., Ltd.**, (q. v.), and corporation has presumably gone out of business.

BANGRIN TIN DREDGING CO., LTD. SIAM

Controlled by Siamese Tin Syndicate.

Address: Capel House, New Broad St., London, E. C. 2, England. Organized March, 1920. **Cap.** £170,000; £1 par; of which Siamese Tin owns 40,000 shares.

Property: the Bangrin tin-bearing ground in Renong district, 5 miles

N. of Ngow, taken over from Siamese Tin. A dredge was expected to begin work early in 1922.

DEEBOOK DREDGING, N. L. SIAM

Office: J. W. Barrett, mgr., Renong Chambers, Ringwood, Victoria, Australia. E. T. Miles, chairman of board of directors; T. A. Miles, Ronpibon, Siam; E. Habben, sec., at Palmerston House, London, E. C. 2 England.

Inc. May, 1913, in Victoria, Australia. **Cap.** £100,000; £1 par; all issued.

During year ended May 31, 1920, there was a loss of £3,735 decreasing previous balance to £11,277; balance forward after dividends was £1,277. Assets included £4,456 cash; £24,450 Ronpibon Ex. shares and £M,8[illegible], accounts payable.

Dividends: 5% in 1914; none from 1915 to 1917; 15% in 1918; 15% in 1919; 10% in 1920. Also, 20% as return of capital between 1920 and 1922.

Property: 375 acres of alluvial tin ground at north end of Bangnon Valley, Renong, of which 90 acres was sold in 1917 to **Ronpibon Extended** (q. v.), controlled jointly by Deebook and Ronpibon Tin. Mineral holdings proving unsatisfactory and no other being found, company's 2 dredges were sold, one to Ronpibon Ex. and one to Taiping Tin Dredging Co., Ltd.

Production: 230 tons of black tin in 1917 and 235 tons in 1918.

RATRUT BASIN TIN DREDGING CO. SIAM

Address: G. M. Yetts, Bangnon Valley, Renong, Siam.

Financial statement showed net profit of £4,223 for fiscal year ending with 1921. After deducting £10,000 for dividends, surplus was £14,827.

Property: tin-bearing ground in Siamese Malaya, worked by a dredge, which in year ended May 31, 1921, treated 752,000 cu. yd. recovering 265 tons of black tin, equal in value to 11.03d per yd, against an operating cost of 8.92d.

Company has acquired an adioining 220 acres from the **Siamese Tin Syn.**, reported to contain 9,000,000 cu. yd. of alluvium carrying 0.9 lb. of black tin per yd. A second dredge is to be installed in 1922.

RENONG TIN DREDGING CO., LTD. SIAM

Office: Guthrie & Co., Ltd., secs., 5 Whittington Ave., London, E. C. 3, England. F. B. Lawson chairman of board of directors; F. Nicholls, mgr.; F. W. and R. Payne, cons. engrs. S. C. W. Sage, mgr. at Renong, Siam, and W. Cock, mgr. at Rasa, Federated Malay States.

Inc. July 1, 1913, in Great Britain. **Cap.** £200,000 in 25,000 cum. 15% pfce, (all issued), and 175,000 ord. shares (119,267 issued) of £1 par. Capital increased from £125,000 in March, 1920.

Operating profit for 1920-21 was £6,211, other income, £2,734 and previous balance, £24,494; total, £33,439 with balance of £9,182 after dividends and other deductions. Excess of current assets June 30, 1921, was £8,430.

Dividends: preference shares paid in full; while common received 12½% in 1915; 30% in 1916; 30% in 1917; 25% in 1918-19; 15% in 1919-20, none since.

Property: 460 acres of tin-bearing gravel land on the Renong and Pak Chan rivers, Siam, on which 2 dredges are working; also 1,000 acres at Rasa in Selangor, Malaya, acquired in 1920 for 32,000 Renong shares, of which 650 acres contain 18 to 24' of ground averaging 1.2 to 1.6 lb. black tin per yard, on which one dredge has been working since March, 1921.

Production years ended June 30:

Year	Yardage	Black Tin	Cost per yd.
1921	1,277,944	846	.....
1920	1,508,983	578	12d to 17d
1919	1,577,374	759	11d (22¢)
1918	2,033,357	842	10d (20¢)
1917	2,170,177	970	8d (16¢)

The Siamese properties are becoming exhausted and company's future depends on its Malayan holdings.

RONPIBON EXTENDED **SIAM**

Address: J. W. Barrett, Ringwood ,Victoria, Australia.

Inc. November, 1917, in Victoria, Australia. **Cap.** £40,000. Controlled by Deebook Dredging and Ronpibon Tin.

Property: 90 acres of tin-bearing gravel in Bangnon Valley, Renong, which with one dredge were purchased with stock from Deebook in 1917. For year ended May 31, 1920, recovered 282 tons of tin concentrate from 678,000 cu. yd. of material.

RONPIBON TIN. N. L. **SIAM**

Address: R. W. Stringer, 31 Queen St., Melbourne, Australia.

Property: tin-bearing ground in Rawnpibun, Southern Siam. With the Deebook Dredging, Ronpibon is interested in Ronpibon Extended. Erection of a dredge was to have been completed early in 1922.

SIAMESE TIN SYNDICATE, LTD. **SIAM**

Office: Capel House, New Broad St., London, E. C. 2, England.

W. H. P. Stevens, chairman of board of directors; C. A. Underwood, sec.; H. G. Scott, gen. mgr. in Siam; A. N. Wakefield, res. mgr.

Inc. Nov. 22, 1906, in Great Britain. **Cap.** £200,000; £1 par; 120,000 issued.

Operating receipts for 1920 were £198,285 and profit, £45,271. Excess of current assets was £3,540; surplus, £6,660; reserves, £20,000.

Dividends: 30% in 1913; 20% in 1915; 25% in 1916; 25% in 1917; 25% in 1918; 25% in 1919; 30% in 1920; 10% in 1921.

Property: 1,730 acres of tin-bearing land at Ngow, Renong district Siam. The new areas acquired contain over 30,000,000 cubic yards, carrying from 0.8 to 4lb. of tin per yard, include the 125 acre Bandon tract on Peck and Plai Wah rivers. A cocoanut plantation is also being cultivated. A part of the mineral holdings, the Ratroot area, was sold to an Australian company in 1921.

Equipment: includes 3 dredges.

Production: 798 tons of black tin in 1917; 777 tons in 1918; 938 tons in 1920; 1,298 tons in 1921.

In March, 1920, a subsidiary, the Bangrin T. D. Co. (q. v.), was formed to work the Bangrin property 5 miles N. of Ngow.

TONGKAH HARBOR TIN DREDGING CO. **SIAM**

Office: A. M. P. Chambers, Elizabeth St., Hobart, Tasmania. Hy. J. Wise, of Wise & Inglis, mgr.

Malcolm Kennedy, chairman of board of directors; E. T. Lewis, gen. mgr.; G. H. Symons, asst. mgr. J. C. Masterton, sec. in Siam.

Inc. 1906, in Tasmania. **Cap.** £250,000; shares £1 par; 150,000 issued.

Net profit was £40,336 in 1915; £40,808 in 1916; £67,923 in 1917; £118,920 in 1918; £75,548 in 1919; £90,664 in 1920; in 1921 there was a loss of £22,525, after depreciation, etc. Current assets at end of September, 1920, totaled £118,235 and liabilities, £4,798. Surplus Sept. 30, 1921, was £61,085.

Dividends: to September, 1921 total £615,000.

Property: 5,350 acres in Tongkah harbor, Siam, of which over 720 acres have been dredged. The dredgable material averages 1 lb. tin oxide per yard. Five boats are at work. Holdings of **Bang Tao Co.** are to be worked on royalty basis.

Production:

Years	Yardage	Tin Oxide 73% metal (tons)	Value	Cost per yard, cents
1913-14..	.....	1,126	£108,053	....
1914-15..	2,968,600	1,262	123,260	10.19
1915-16..	3,363,750	1,077	115,000	9.27
1916-17..	3,682,550	1,188	144,845	8.80

Years	Yardage	Tin Oxide 73% metal (tons)	Value	Cost per yard, cents
1917-18..	3,383,250	1,314	£221,651	10.04
1918-19..	3,208,350	1,149	170,796	11.90
1919-20..	3,654,550	1,125	206,049	11.94
1920-21..	3,319,480	873	97,496	14.28

This is one of the most profitable mining companies in the Orient, and its annual reports give full data concerning dredging operations and costs.

SIBERIA

AYAN CORPORATION, LTD. SIBERIA

Office: A. E. Ford, sec., 428 Salisbury House, London, E. C. 2, England. J. J. Agnew, chm. of directors; C. W. Purington and J. C. McNaught, joint managers.

Inc. July 8, 1921, to acquire from the **Syndicat Minier du Pacifique** and certain individuals, alluvial gold properties in the Okhotsk region, Kamchatka district, eastern Siberia, N. of Nicolaivsk. **Cap.** £300,000; par £1, all issued fully paid. **Debentures:** £92,500 7s of which 30% has been paid. The National Mng. Corp. and 3 other companies are sponsors for this new corporation.

LENA GOLDFIELDS, LDT. SIBERIA

Head office: H. Richards, 341 Salisbury House, London, E. C.2, England. **Agency:** Russian Mining Corporation, Ltd., Nevsky 19, Petrograd, Russia.

Directors: Lord Harris, chairman; F. W. Baker, G. Benenson, Herbert Guedalla, Sir Leigh Hoskyns and J. R. Mason, C. W. Purington, consulting engr.

Inc. July 10, 1908, in England. **Cap.** £1,405,000; shares £1 par; all issued. Company holds 19,474 shares of the **Lena Gold Mining Co.** (Lenskoie), which see below, the operating company in Russia. In 1920 company purchased 45,000 shares (45% interest) of **Altai Mines, Ltd.** Ruble exchange and shareholdings make the financial situation complicated.

Balance sheet of Sept. 19, 1920, showed:

Assets: shares Lenskoie Co. stock (19,474), £572,808; Altai Mines Co. shares, £1,122,616; sundry invest., £157,290; Lenskoie Co., £25,521; loans and interest, £45,547; debtors £8,904; War loan, war bonds, Victory Loan, plus interest, £373,296; Cash, £122,178; balance, £441,091; total, £2,868,254.

Liabilities: Capital stock £1,405,000; premiums, £187,626; dividends unclaimed, £7,185; creditors, £175,180; loans, £26,970; reserve account £1,066,291.

Dividends: 20% in 1909-10; 30% in 1910-11; 20% in 1911-12; nil in 1912-13; 5% in 1913-14; 1¼ rubles per share in 1914-15, paid in April, 1916.

Property: gold placers worked since 1863, yielding over $200,000,000. There are four groups totaling 90,376 acres in the Irkutsk province of Siberia.

Development: for many years operations were on somewhat primitive lines, but modern methods are gradually being introduced, including prospecting by drilling, underground drift mining, hydraulicking, dredging and winter washing of gravel; also improved sluices, riffles, jigs, and clean-up accessories. Over 5,000 men and 800 horses are employed under normal conditions.

Proved reserves of pay gravel are as follows:

Class	Yards	Recoverable value per yd.	Gross profits	Years life
Drifting	711,200	39/10 ($9.46)	£ 456,363	1½
Dredging	58,984,000	1/7½ ($0.40)	£2,577,800	16

The calculated life of the mine is based on the old rate of extraction for drift mining, and the use of two 17 cu. ft. dredges for the other ground.

Production from drift mining years ending September 30:

Year	Yardage	Yield per yd.	Value	Cost per yard
1916-17	570,529	46/1 ($11.05)	£1,318,445	....
1915-16	788,942	39/10 ($ 9.56)	1,503,010	27/6 ($6.54)
1914-15	974,234	38/11 ($ 9.23)	1,791,944	26/7 (6.31)
1913-14	873,635	29/4 ($ 6.80)	1,277,609	26/10 (6.44)

Winter washing operations were not begun until 1913; 25% of the total yardage mined was washed in the winter of 1914; 36½% in 1915, and 52½% in 1916.

This is an immense property formerly worked by primitive methods but now equippel and worked with up to date machinery. The transformation has been handicapped by prejudices, complex finance, inefficient labor, a severe winter climate, and long distance from sources of supplies. All operations have been at a standstill in recent years owing to revolutionary disturbances.

Lena (Lenskoie) Gold Mining Co.

Address: H. Richards, 341 Salisbury House, London, E. C. 2, England. A. Gernet, chairman in Russia; M. Malozemoff, mine manager.

Inc. in Russia. **Cap.** 33,000,000 rubles, increased from 11,100,000 R. in 1917 by issuing 110,000 shares of 150 R. (par value) at 355 R. each. Lena Goldfields, Ltd., holds 19,474 shares of the Lenskoie's capital stock.

No accounts for 1916-17 were available up to June, 1919; but for that year the gold output was valued at £1,445,014.

In November, 1917, the Bolshevik regime brought serious trouble to the Lenskoie Co. The exorbitant demands of workmen and dealers increased to 500% above pre-war prices, while labor efficiency, never satisfactory, dropped 50%. The selling price of gold was raised six times by the Government, but this was still insufficient to meet expenses. The Soviet-Government then agreed to meet the loss provided the company yielded to all demands. In October, 1918, the mines were nationalized and the offices in Petrograd confiscated by the Soviet party. In June, 1918, this Government was expelled from Bodaibo, the region in which the mines are situated, and since then little news has been received. In March, 1919, only 3 drift-mines were being worked, yet these are capable of yielding 237,000 oz. of gold annually for at least 6 years.

For further particulars see **Lena Goldfields, Ltd.**, above.

ORSK GOLDFIELDS, LTD. SIBERIA

Office: 65 Broad St. Ave., London, E. C. 2, England. Thos. Mallinson, sec.

G. S. Dyer, gen. mgr.; Hooper, Speak & Co., cons. engrs.

Inc. March 1, 1906, in Great Britain. **Cap.** £920,000 in 531,000 ordinary £1 shares (530,007 issued), 876,000 preference shares 5s. (318,000 issued), and 170,000 priority shares, £1 (80,000 issued). The **Russian Mng. Corp.** owns 30,000 ordinary shares and a large interest is held by the **Siberian Proprietary Mines.**

Financial Statement, years ending January 13, converted from rubles into sterling.

Year	Revenue	Expense in Siberia	Expense in London	Profit or loss	Dividends
1918....	£ 53,010	£21,609	£37,573	—£ 6,171	.....
1917....	55,421	31,439	37,701	—11,719	.....
1916....	105,611	51,323	24,460	+26,944	16,827

London charges include difference in exchange and loss on remittances and depreciation.

Dividends: about £10,312 in 1915, and £10,312 in 1916; none since.

Property: a lease on the Kolchan area, 27 claims, 6,700 acres, in the Okhotsk region, eastern Siberia, 50 miles N. W. of Nikolaievsk, obtained from the Russian Mng. Corp. on a royalty basis. About ¼ is alluvial gold-bearing ground.

Production, years ended January 13:

Year	Yardage	Gold yield including rubbaters
1919	723,687	£ 31,552
1918	893,386	51,42[illegible]
1917	864,052	53,565
1916	784,552	102,728

The mines were nationalized by the 'Reds' in 1920 and all equipment and account books destroyed. The property has not been worked by the company since Nov. 1919.

SIBERIAN PROPRIETARY MINES, LTD. **SIBERIA**

Office: T. Mallinson, sec., 65 Broad St. Ave., London, E. C. 2, England. E. Hooper, chairman of broad of directors.

Inc. Aug. 8, 1905, in Great Britain. **Cap.** £135,000; shares £1 par; 116,000 shares issued, fully paid.

Report for year ended Dec. 31, 1920, shows gross receipts, £4,254; profit, £1,171; depreciation on investments, £28,743; debit balance, £27,572.

Company has an interest in Orsk Goldfields, Ltd., **Keeley Silver Mines, Ltd.,** Ontario, **Oroya Links, Ltd.,** Australia, **Foldal Copper & Sulphur Co.,** Norway, and in oil companies in Europe and California.

SIBERIAN SYNDICATE, LTD. **SIBERIA**

Office: J. A. Clark, Finsbury House, Blomfield St., London, E. C. 2, England.

Sir A. Fell, chairman of board of directors.

Inc. June 3, 1902, in Great Britain, but reconstructed three times, last in July, 1913. **Cap.** £100,000; shares £1 par; 52,062 issued.

As of Sept. 30, 1921, excess liquid assets were £11,065; balance forward was £2,352.

Company has large interest in Russian Anthracite Collieries, Ltd.; in a copper mine in Asia Minor; copper, lead, and zinc areas in eastern Siberia, and in an oil-shale deposit.

SISSERT COMPANY, LTD. (THE) **SIBERIA**

Office: Gen. Agency & Trust Co., Ltd., secs., 1 Broad Street Place, London, E. C. 2, England.

Sir J. B. Dale, chairman of board of directors; I. I. Chikantseff, gen. mgr. of Russian company.

Inc. June 26, 1912. **Cap.** £1,000,000; £1 par; 755,000 fully paid, shares issued and listed on the London Stock Exchange. An option expiring two years after peace, on 166,000 shares treasury stock has been granted. Title to property is held through the Sissert Mining District Co., Ltd., registered in Russia, which the company controls through ownership of entire share capital.

Profit in 1916 was £2,544, and surplus £4,951.

Dividends: 5% in 1913 and 1914; none since.

Property: about 340,000 acres, held under a perpetual lease, in the Urals, 30 miles S. of Ekaterinburg, on the Ekaterinburg-Cheliabinsk railway. The property includes many old copper, gold, and iron mines, and extensive forests. The principal copper properties are the **Degtiarsky, Polefskoy,** and **Gumeshevsky** mines, which have been worked since 1727, and the **Sysselsky,** opened in 1906. There are also about 100 iron mines, yielding limonite of 40 to 53% iron content, with other mines yielding chrome and manganese. Iron ore reserves are estimated at 6,000,000 tons. The annual output of iron ore was 40,000 tons.

Development: the Sysselsky copper mine is opened by 3 shafts, deepest

245', showing ore of about 5% copper tenor. Mine has a plant with a productive capacity of 1,500 tons per annum. Reserves are estimated at 70,000 tons of 4¼% ore.

The **Gumesheysky** and **Polefskoy** mines, discovered in 1716 have been operated almost continuously since 1727. These mines are about 500' deep, and up to 1870 produced a total of about 63,500,000 lb. fine copper, though only oxidized ore was mined. The orebody is a contact deposit, genetically related to augitic rocks, and lying between limestone and augitic biotite syenites, the oxidized ore occurring in a decomposed irony and calcareous clay belt, fully 2 miles in length and about 1,000' wide. The sulphide ores carry chalcopyrite in lenses of garnet-magnetite rock. The old ore dumps at the Gumeshevsky, consisting of clay material with fine ore that escaped hand-picking in earlier operations, were worked with excellent results. They still contain 400,000 tons. The ore has been leached at the rate of 80,000 tons yearly.

Old slag dumps at Polefskoy are also to be reworked. These dumps, estimated at 640,000 tons, are said to contain 1% copper, about 75% of which is thought to be recoverable by pyritic smelting.

Fifty drill-holes at the Degtiarsky mine showed 3,530,000 tons of 2.77% copper ore, with 3s. (72c.) gold and silver. The orebody is about 10,000' long, 5,800' being fully proved. Over 5,000,000 tons is ultimately expected. Two shafts to 150', with laterals, confirm drilling results.

At the Staro Podnefskoy and Kadnakofsky iron mines the surface is a true gossan and the underlying sulphide is certain to be copper bearing and of commercial value.

In the Krilatofsky mine, 6 miles from the Degtiarsky, are gold quartz veins in granitic schist. Reserves to 280' are estimated at 371,000 tons of 13s. 3d. ($3.18), and 227,000 tons of 10s. 6d. ($2.52) per ton ore. In the Blagoveshensky, near Sissert, is considerable 20s. ($4.80) gold ore. These ores will be used as a flux in reducing the copper ores.

The Degtiarsky and Sysselsky mines also contain several million tons of iron pyrite.

From the Bgorshinsky and Isyhks mines a large quantity of coal is available.

Annual production was normally 40,000 tons of iron ore, 17,500 tons of pig iron, 10,000 tons of pyrite and some coal.

In 1912 the mines produced 3,280,200 lb. of copper; 2,895,200 lb. in 1913; 2,140,600 lb. in 1914; 506,000 lb. in 1916. In recent years operations have been intermittent owing to revolutionary disturbances.

SPASSKY COPPER MINE, LTD. **SIBERIA**

Office: J. A. Clark, London manager and sec., Finsbury House, Blomfield St., London, E. C. 2, England.

Sir A. Fell chairman of board of directors; Ernest Carnot v. c.; H. C. Bayldon gen. mgr. at Spassky Zavod, Akmolinsk, Siberia; H. C. Robson, smelter supt.; D. G. Smith, supt. at Yuspenssky; E. T. McCarthy, cons. eng. Henry Puzev, mgr., Miasnitzskaia 17, Moscow, Russia.

Inc. July 9, 1904, in Great Britain . **Cap.,** £1,250,000; shares £1 par; 1,069,070 issued.

Statement for 1915 published November 1916 showed a net profit of £126,453 earned in Siberia. The remittance of funds from Russia is not permitted, so money will accumulate there. Assets included cash, £162,316; supplies, £159,256; and metals, etc., £163,039. Creditors, etc., amounted to £100,202. No financial statement is available since.

Dividends: 15% in 1910, 17½% in 1911, 25% in 1912, 10% interim on account of 1914, declared in October, 1915. Further dividends postponed on account of revolution.

Property: in the Kirghiz Steppes, in 2 main groups, about 300 miles apart, 250 and 500 miles, respectively, from the nearest points on the Tash-

kent and Trans-Siberian railways. After the revolution the government is to construct a line that will pass near the mines.

The **Spassky group,** comprising about 100 sq. miles, in the Akmolinsk district, includes the Yuspenssky copper mine and the Karagandy and Saran coal mines; also lands carrying iron and limestone.

Geology: the Yuspenssky mine has a network of veins at and near the contact of slate and arcose sandstone, in sedimentaries, of Permian age. The 2 veins, known as the Annensky and Vladimir, or Yuspenssky, are about 200′ apart and substantially parallel, and it is thought they may join at depth. Principal development is on the Annensky vein, which is 10 to 60′ in width, carrying a hanging-wall paystreak of massive chalcocite, succeeded by bornite, largely massive, with silicious gangue followed by small quantities of chalcopyrite and occasional tetrahedrite, the vein growing gradually leaner in copper toward the footwall, which is imperfectly defined and carries low-grade copper impregnations. The gangue is mainly quartz and barite, and the ore is estimated by the company to average 12 to 20% copper. The upper workings show some native copper, cuprite, azurite and malachite. The mine was gouged for rich ore by the former owners, who left a large amount of low-grade material unstoped.

Development: the Yuspenssky mine is opened by 3 shafts, the Annesky being 700′ deep. Chalcopyrite is taking the place of bornite in the enrichment zone, while the mineral content is becoming more evenly distributed. Reserves at the end of 1915 were 10,000 tons of 19% and 429,475 tons of 7.8% ore. Considerable diamond drilling was done in 1915 and 1916, with fair results.

Equipment: includes 900-h. p. steam plant, hoists, compressors, pumps, 150-ton concentrator and smelter, 26-mile railway and quarters for employees.

The Karagandy coal mine, 24 miles by rail from the Spassky smelter, produced 90,215 tons in 1913; 80,901 in 1914, and 63,984 in 1915. It contains about 400,000,000 tons of coal.

The **Atbasar group,** 28½ sq. miles, 250 miles N. E. of Djousalie, the nearest station on the Orenburg-Tashkent railway, includes the Kresto, Pokrofsky, Annensky and Nadiozhdenski mines, and a coal area of about 9 sq. miles, 65 miles from the mines.

Geology: the Atbasar shows sedimentary sandstones, shales and conglomerates, on a plateau of about 20 sq. miles, lying about 70′ above the level of the district, carrying numerous outcrops of malachite, and at depths of 50 to 70′ from surface, are found sandstone beds mainly 18″ to 8′ thick and of 3′ estimated average thickness, carrying bornite, claimed to average about 13% copper. Reserves were estimated at 543,900 tons of 10.7% ore.

Equipment: includes mining machinery, buildings and smelter of 6,000-ton capacity of copper per annum, this being erected between the coal and copper mines.

Production at Spassky:

Year	Ore, tons	Copper, pounds
1906	.....	1,824,480
1907	.....	1,573,650
1908	.....	2,961,280
1909	15,551	3,675,840
1910	19,647	5,343,520
1911	31,302	6,401,920
1912	28,315	8,955,520
1913 (15 months)	43,591	11,215,680
1914	20,697	10,489,920
1915	20,847	7,728,000

Operations at the Spassky have been seriously hampered by war and revolution. In April, 1918, the Bolshevik faction nationalized the property,

but it was handed back within a short time, and late in 1918 operations were resumed on a reduced scale. Since early in 1919, the property has been in the hands of the Bolshevik, but has presumably not been seriously damaged.

TIU-TIU-HE MINE **SIBERIA**

Address: Aaron Hirsch & Co., Halberstadt, Saxony, Germany, or Jules Bryner, Vladivostok, Siberian Russia.

Property: 2,000 acres of mineral land on Tiu-Tiu-He creek, 24 miles inland from the Sea of Japan, E. coast of Siberia, 180 miles N. E. of Vladivostok. In 1909, a large calamine (zinc carbonate) deposit was mined by open cut. The ore is in part a replacement of limestone along quartz porphyry contact. Besides zinc, the ore carries lead and silver. A tunnel started in 1914 was driven at depth of 275'. This tunnel with other development is said to expose 500,000 tons of sulphide ore averaging 18% zinc, 12% lead and 8 oz. of silver per ton. Equipment: includes a 1½ mile aerial tram, a 2' gauge railway to the coast and 175-ton concentrator.

Production: probably $5,000,000 to $6,000,000 gross of shipping ore assaying 50% zinc up to 1914.

AUSTRALASIA

Includes the Commonwealth of Australia and Dominion of New Zealand. The mines are described alphabetically by States.

NEW SOUTH WALES

The metal output of the state for 1920, comprised 48,907 ounces gold valued at £207,746; 1,290 tons copper valued at £127,928; silver valued at £36,942; silver-lead concentrates, £76,634; lead £9,905 and zinc concentrate £249,454; tin and tin ore £413,794. This diminished output compared with that of previous years is due to labor troubles particularly in the Broken Hill district. The mining industry employed 29,163 men in 1920.

ABERCROMBIE COPPER MINES, LTD. **N. S. W.**

No recent information. See Vol. XIII for details.

ADELONG CREEK DREDGING CO. **NEW SOUTH WALES**

Address: Tumblong, N. S. W.

Operations for half year ended Nov. 30, 1921 showed a loss of £221 (after depreciation), compared with a loss of £1,681 for previous six months.

Company operates two dredges; No. 1 treated 277,800 cu. yd. and recovered 4.09d per c. yd. at a cost of 4.40d; No. 2 dredge treated 334,100 cu. yds. and recovered 3.30d per cu. yd at a cost of 3.39d.

ADELONG GOLD ESTATES, LTD. **NEW SOUTH WALES**

Address: W. George, gen. mgr., Grahamtown, N. S. W.

Report for year ended April 30, 1921, showed receipts from gold sales, £16,481; net operating profit, £2,187; dividend (No. 16—1s), £3,750. Liquid assets exceed liabilities by £13,601.

Company operates two dredges. In half year ending April 30, 1921, No. 1 dredge treated 333,495 cu. yd. in 2,397 hrs. and recovered 2,091 oz. gold or 3.01 gr. per cu. yd. at a cost of £6,339 (4.56d) and valued at £8,270 or 5.95d per cu. yd. No. 2 dredge treated 269,344 cu. yd. in 2,613 hrs., and recovered 1,047 oz. gold or 1.86 gr. per cu. yd., at a cost of £5,975 (5.3d) and valued at £4,171.

AMALGAMATED ZINC (DE BAVAY'S), LTD. **N. S. W.**

Office: E. H. Shackell, sec., Collins St., Melbourne, Australia; and C. Lloyd, 1 London Wall Bldgs., London, E. C. 2, England.

Directors: Hon. W. L. Baillieu, chairman; M. Cohen, A. J. F. de Bavay London Board: H. W. P. Clinton, F. A. Govett, G. W. W. Mackinnon, W.

S. Robinson and J. L. Wharton, A. J. F. de Bavay, cons. chemist and metallurgist; A. D. Greenlees, works mgr.

Inc. 1909, in Australia. **Cap.**, £500,000; shares £1 par: all issued and fully paid.

Accounts are submitted semi-annually. Report for 1st half of 1921 showed receipts, £150,934 and balance to profit and loss account, £127, loss for previous half year (Dec. 31, 1920) was £16,651.

Dividends: 5% in 1910; 20% in 1911; 27½% in 1912; 32½% in 1913; 10% in 1914; 45% in 1916; 20% in 1917; 20% in 1918. A dividend of 1s was paid in April, 1919, and in 1921.

Company acquired the entire assets of the De Bavay Treatment Co., Ltd., and the patents of the Potter's Sulphide Ore Treatment, Ltd. To avoid litigation with the Minerals Separation, Ltd., the companies were merged into the Minerals Separation and De Bavays Processes Australia Proprietary, Ltd., capitalized at £300,000, shares £1 par, of which 101,750 shares were issued the Minerals Separation Ltd., and 83,250 the Amalgamated Zinc. The Amalgamated Zinc has the right to use all the Minerals Separation patents, but must pay the usual royalties.

Company also owns the following share interests: 119,250 shares Minerals Separation & De Bavay's Processes, Astralia Pty., Ltd.; 960 shares Zinc Producers Association Pty., Ltd., and 200,000 shares in Electrolytic Zinc Co. of Australia.

Amalgamated Zinc has no mines, but buys zinc-lead-silver tailings from the Broken Hill South, Broken Hill Proprietary Block 10, and North Broken Hill mines at Broken Hill, N. S. W. Material is treated in a flotation plant capable of handling 40,000 tons per month.

Production: for first half of 1921, 128,646 tons of tailing treated, yielded 37,201 tons zinc concentrate, assaying 46.4% zinc, 7.9% lead, 13.8 oz. silver, and 815 tons lead concentrate, assaying 49% lead, 39.2 oz. silver and 18.1% zinc.

During previous half year, work was resumed in November, (after the strike) and 14,852 tons treated yielded 3,403 tons zinc concentrate, averaging 47.7% zinc, 6.7% lead and 13.4 oz. silver per ton and 32 tons lead slime concentrate, averaging 48.6% lead, 15.7% zinc and 76.6 oz. silver.

BRITISH BROKEN HILL PROPRIETARY CO., LTD. (THE) N. S. W.

Offices: E. E. Garner, sec., Salisbury House, London, E. C. 2, England; F. H. Clark, Australian sec., Steamship Buildings, Adelaide, South Australia.

Directors: W. H. Woodhead, chm.; F. S. Saunders, A. Stewart, G. W. W. Mackinnon, M. G. Anderson, F. V. Sanderson, J. K. Samuel (last three form the Australian board), C. I. Emery, gen. mgr.; G. C. Klug, cons. engr., R. Beal, mill supt.

Inc. Nov. 11, 1887, in England. **Cap.** £339,000, in 315,000 £1 ordinary shares, and 60,000 8s. privileged shares; all issued and fully paid.

The first half of 1919 resulted in a profit of £65,582, which was carried forward: the second half in a profit of £21,125; the year 1920 showed a loss of £47,758, leaving a credit of £122,903 to P. & L. account. Liquid assets exceed liabilities by £218,303.

Dividends: since 1897 total £821,280, but have been irregular; 4 in 1917 and 6 in 1918.

Property: Blocks 15 and 16 at Broken Hill, N. S. W., held under lease from the N. S. W. government.

Development: by shafts and extensive workings. No development work was done in 1920. Ore reserves in 1920 amounted to 1,095,015 tons, assaying 6.9 oz. silver, 13.3% lead, and 11.3% zinc. **Equipment:** complete for mining, also concentrating plant, using jigs and flotation (Minerals Separation and Lyster selective).

Production: for first half of 1919, 63,099 tons of ore milled made 9,903 tons concentrate carrying 60.7% lead, 7.3% zinc, and 26.4 oz. silver; the flotation plant made 8,040 tons of concentrate, carrying 45% zinc, 9.1% lead,

and 10.1 oz. silver; 1,953 tons carbonate ore running 23.6% lead was also mined.

The mine was closed from May, 1919 to Nov., 1920, owing to a general miners' strike for higher wages and shorter hours. From Nov., 1920 to Jan. 1, 1921, 600 tons of carbonate ore and 13,756 tons sulphide ore was mined. The lead mill treated 14,279 tons yielding 2,330 tons lead concentrate; the zinc mill treated 10,636 tons lead mill residue, yielding 2,120 tons zinc concentrate that averaged 10.8 oz. Ag.; 9% Pb.; 45% zinc. Normal output is about 300,000 tons of ore annually.

BROKEN HILL JUNCTION LEAD MINING CO. **N. S. W.**

Office: A. D. Young, Brookman's Bldg., Adelaide, South Australia.

Directors: J. G. North, chairman; J Bembrick, R. T. Edwards, W. A. Freeman, and C. H. Smith, W. Queale, mgr.

Inc. 1914 in South Australia. **Cap.,** £150,000; shares 10s. par; 272,567 issued and fully paid. Report for six months ended March 31, 1920, showed a loss of £4,835 and debit balance, £7,649.

Property: 51 acres of mining ground at Broken Hill, N. S. W., developed by shafts and extensive workings.

Equipment: includes complete mine and mill equipment with concentrating plant and air-compressor. The ore will be treated by the Block 10 Co.

BROKEN HILL PROPRIETARY BLOCK 14 CO., LTD. **N. S. W.**

Office: J. Brandon, 31 Queen St., Melbourne, Victoria, Australia.

Directors. Alex. Campbell; B. A. Moulden, V. J. Saddler, Clive Baillieu, and J. L. Wharton. F. V. Smith, mgr.

Inc. Feb. 19, 1887 in Victoria. **Cap.,** £155,000, in 100,000 10% cum. pfd. 6s. shares and 100,000 ord. 25s shares; all issued.

Reports are issued half-yearly, and in the period ended March 31, 1921, the operating loss was £17,671. Excess of liquid assets over liabilities was £37,760.

Dividends: 19s per share from 1896 to 1901, after which 37s 6d on pfd. and 26s on ord. shares, to Sept., 1919; 6s paid in 1920.

Property: at Broken Hill, N. S. W. Though the company has a mill, the carbonate ore is all sold to smelters and the sulphide ore is treated at the Block 10 mill. Recent exploration work developed much new ore, but the old stopes are still productive. Company also has an interest in the King Island Scheelite Co. (39,450 shares), which see.

Production: for November and December, 1920 was 405 tons carbonate ore, averaging 24.3% lead and 13.8 oz. silver and 1,201 tons sulphide ore.

The mine was closed down to November, 1920, because of the miners' strike, but operations were short lived, mine work being again suspended in December.

BROKEN HILL PROPRIETARY BLOCK 10 CO., LTD. **N. S. W.**

Office: J. Brandon, 31 Queen St., Melbourne, Victoria, Australia.

Directors: A. Campbell, chairman. Clive Baillieu, William Jardine, V. J. Saddler, and B. A. Moulden. A. W. Wincey, gen. mgr.

Inc. March 14, 1888, in Victoria. **Cap.,** £1,000,000; shares £10 par; all issued and £9 13s paid.

Reports are issued half-yearly, and during the period ended March 31, 1921, showed a loss of £18,800. Surplus of liquid assets over liabilities was £60,138.

Dividends: from 1890, total £14. 3s per share; including 3s in 1918-'19.

Two dividends were paid in 1920, No. 117 of 1/6 per share and No. 118 of 1/ per share, a total of £12,500.

Property: mines at Broken Hill, N. S. W. ,and an interest in the Block 10 Misima Gold Mines, operating on St. Aignan Island, near New Guinea. The Broken Hill mine contains estimated reserves of 228,900 tons to a depth of 1840'.

Equipment: includes concentrator with flotation plant, which also treats ore from Block 14 mine.

Production: during 1920 the mine was worked only from November to December, and the mill was in operation until January 21, 1921. Costs for the half year to March 31, were 60/8.36 as compared with 47/6.76 for previous six months. Shipments amounted to 1,228 tons lead concentrate, assaying 36.53 oz. silver, 61.12% lead and 6.35% zinc and 756 tons zinc concentrate, assaying 12.19 oz. silver, 5.30% lead and 47.69% zinc, in addition there were 16,833 tons de Bavay tailings and 6,907 tons slimes.

BROKEN HILL PROPRIETARY CO., LTD. N. S. W.

Head office: F. M. Dickenson, 320 Collins St., Melbourne, Victoria, Australia. **Mine office:** Broken Hill, N. S. W. **Steel works:** Newcastle, N. S. W.

Directors: Bowes Kelly, chairman; with R. O. Blackwood, H. G. Darling, W. Jamieson, H. V. McKay and D. W. H. Patterson. Essington Lewis gen. mgr.; E. J. Horwood, works mgr. at Broken Hill; R. T. Slee, mine mgr.; D. Baker, steel works mgr. at Newcastle; J. A. Lindsay, chief engr.

Inc. Aug. 13, 1885, in Victoria, Australia. **Cap.** originally £320,000; shares £20 par; increased to £3,000,000, shares £1, of which 2,520,000 are issued. Debentures: £1,000,000 of 6% A's authorized; £747,400 outstanding; £1,500,000 of 7% B's, all outstanding.

Dividends:

Year	Net Profits, £	Dividends, £
1914	294,488	203,050
1915	321,839	177,150
1916	486,529	236,201
1917	426,199	177,151
1918	650,587	236,201
1919	652,343	302,634
1920	517,663	315,000
1921	351,331	341,108

Surplus of liquid assets over liabilities, May 31, 1921, was £1,739,048.

Property: the Broken Hill, one of the world's largest and most famous silver-lead-zinc mines is now past the zenith of its career. Company also owns iron mines at Iron Knob, S. Australia. It holds 200,000 shares in Broken Hill Associated Smelters Proprietary.

Development: by shafts down to 1,300', huge open-cuts and many miles of workings. The mine still has fairly large ore reserves which contain 14% lead, 8 oz. silver, and 12% zinc. Tailings on hand are also in large quantity.

Equipment: at Broken Hill; power plant, hoists, compressors, tramways, crushing plant, 1,000-ton ore concentrator, flotation plant, etc. At Port Pirie, S. Australia, up to June, 1915, company operated a large smelter with roasters, Huntington-Herberlein and Dwight-Lloyd sintering machines, briquetting plant, blast-furnaces and complete lead-silver refinery. This plant was transferred to the Broken Hill Associated Smelters Proprietary (which see) in June, 1915. At Iron Knob, Spencer's Gulf, S. Australia, company has mining plant for extraction of twenty-one million tons of 68% iron ore, which is shipped by rail to Whyalla, 33½ miles, then by boat to Newcastle, N. S. W. Normally 220 men are employed at the iron mine.

At Bellambi, N. S. W., company has 66 coke ovens. At Port Waratah, near Newcastle, N. S. W., company owns 2 blast furnaces making 800 tons of pig iron daily; also a small blast furnace for making ferro-manganese, 7 basic open-hearth steel furnaces making 1,200 tons per week, and has a rolling mill of 90,000 tons per annum capacity, producing rods, rails, ship plates; a by-product plant is to be erected.

Production: in 1920 (last 6 weeks) the mill treated 4,420 tons producing 801-ton lead concentrate. In same period 17,028 tons of tailing produced 557

tons lead concentrate and 16,558 tons of slimes yielded 1,487 tons of lead and 4,257 tons of zinc concentrate. Pig iron output was 155,172 tons in 1919 and 226,760 tons in 1920.

Since 1918, labor troubles have interfered seriously with the mine the whole field being closed down from May, 1919, to Oct., 1920.

BROKEN HILL SOUTH, LTD. **N. S. W.**

Head office: J. R. Edwards, sec., Collins House, 360 Collins St., Melbourne, Victoria, Australia. R. N. Kirk, agent in Sydney; C. S. Stokes, agent in Adelaide; E. E. Garner, sec. in London.

Directors: B. A. Moulden, chairman; W. M. Hyndman, Colin Fraser, L. K. S. MacKinnon and Hon. D. J. Gordon, G. W. W. MacKinnon, director in London. W. E Wainwright, gen mgr.

Inc. Oct. 11, 1893, in Victoria. **Cap.** £800,000; shares £1 par; all issued and paid up otherwise than in money; increased from £200,000 in September, 1918. Debentures: £200,000 of 6%, issued in bonds of £100; £171,500 outstanding at June 30, 1920.

The company owns an interest in the following companies; Broken Hill Associated Smelters Pty., Ltd., 200,000 £1 shares; Zinc Producers Association Pty., Ltd., 720 £1 shares; Barrier Roaster Co. Pty., Ltd., 10,000 £1 shares; and Electrolytic Zinc Co. of Australasia Pty., Ltd., 120,000 £1 shares; Globe Pty. Ltd., 11,250 £1 shares British Australian Lead Mfg. Pty., Ltd. 20,000 £1 shares; a total of £361,970 at cost.

Statement for the year ended June 30, 1919, showed that the value of the production was £709,392, of which £384,999 was operating profit, less £40,886 for general charges, interest, taxes, and depreciation. Dividends paid amounted to £120,000. The appropriation for income taxes, new plant development, etc., was £160,000 and £64,113 was carried forward. Investments, supplies, metals and concentrates, cash on hand and on deposit, totaled £984,325; while current liabilities, exclusive of debentures, were £31,386.

Operations during year ended June 30, 1920, were entirely suspended, but receipts from previous production and income from investments totaled £164,531; expenses, £98,645; profit and loss items, £52,286; net profit, £13,600. Investments and current assets, £907,593; current liabilities, £29,763.

Financial report for year ended June 30, 1921, showed a loss of £56,701; receipts from ore sales were £24,881, and expenses, £49,809. Investments and current assets, £783,662; current liabilities, £36,633.

Dividends: since 1902 total £12 1c. 6d p. share, on 200,000 shares (old company) and 3s. per share on 800,000 shares (new company). Last distribution in March, 1919, of 1s 6d per share.

Property: 69 acres of mineral ground at Broken Hill, N. S. W.

Development: to 1,500′ depth by six shafts and extensive workings. On the lowest stoping level, 1,270′ below the surface the ore averages 15.2% lead, 8.4 oz. silver, and 14.7% zinc. In 1918-19, company did 3,349′ of diamond-drilling, and 3,595′ of new underground work. All underground work is by contract, and during 1918-19 miners averaged 21/3 ($5.07) and truckers 18/11 ($4.43) per 8-hour shift. There are 639 men normally employed in the mine. Reserves total 3,500,000 tons.

Equipment: includes modern chain grate coal-fired-boilers superheating to 550° F. with automatic induced draft and coal supply, two 3,000 k. w. high pressure steam turbo alternators, 1,000 B. h. p. turbo geared reciprocating air compressor, all of above sets complete with condensing plant and kinetic air pumps and water cooling plant. Also two 440 B. h. p. motor-driven reciprocating air compressors, main shaft hoist, three 300 B. h. p. motor-driven geared hoists on 3 shafts, 1,000′ per min. hauling speed. Concentrating plant capacity 1,100 long tons crude ore daily. Slime flotation plant capacity 500 long tons slimes daily. Sandy zinc tailing is treated

by the Amalgamated Zinc (De Bavay's) Ltd. on joint account at the rate of 200,000 long tons per annum when at full capacity.

The old tailings dumps sold to Zinc Corporation are being removed at the rate of 250,000 tons per annum. Sand on hand totals 701,500 tons; slime 406,787 tons and deleaded slime residues (13.7% zinc) 121,083 tons.

All the lead concentrate produced is sent to Broken Hill Associated Smelters Pty. Ltd., Port Pirie, South Australia, for smelting. About 185 men are normally employed on surface work.

Production, years ending June 30:

Year	Ore treated tons	Old slime, tons	Concentrates, tons	Lead saved, %	Lead tons	Metals in products Silver, Oz.	Zinc tons
1921	37,923	54,864	14,307	79.8	7,801	510,560	1,730
1920	.....	.....	.....	...	.....	.....	.....
1919	164,560	36,145	36,074	83.6	22,671	1,081,440	3,272
1918	197,790	.....	32,717	83.3	.....	.....	.....
1917	279,700	24,867	.....	...	38,695	1,880,792	.....
1916	244,990	.....	44,635	...	.....	.....	.....

Costs have risen from 20/9 ($4.89) in 1915 to 31/4 ($7.48) in 1918, and to 37/6 ($8.94) in 1919. Broken Hill South is not only the premier lead silver-zinc mine of Australia, but one of the greatest in the world.

Owing to a strike productive operations were entirely suspended from April, 1919 to November, 1920.

The mill was reconstructed 1920 at a cost of £76,794, beginning work at the end of January, 1921 and by June had treated about 1,700 tons of crude ore weekly.

BROKEN HILL SOUTH SILVER MINING CO. **N. S. W.**

Reorganized in 1918 as Broken Hill South Ltd., which see.

COBAR-GLADSTONE MINING CO. **N. S. W.**

Mine office: Wrightville, Robinson county, N. S. W., Australia.

No recent returns received; probably idle. See Vol. XIV.

C. S. A. MINES, LTD. **N. S. W.**

Address: Cobar, N. S. W.

Financial report for year ended June 30, 1921 showed a loss of £8,717; total debit balance, £15,711.

The mine was closed down in 1920 owing to a fire in the workings and will not be reopened until the copper market improves.

DUMBRELL BYGOO TIN MINING CO. **N. S. W.**

Address: Ardlethan, N. S. W.

Inc. in 1920.

Property: a tin mine in Ardlethan district, equipped with 10-stamp mill. The mill was operated from March 9 to April 19, 1920, treating 352 tons of ore for 6 tons of concentrate at a loss of £1,297.

ELECTROLYTIC REF. & SM. CO. OF AUSTRALIA, LTD., THE

Office: 118 Pitt St., Sydney. **Works office:** Port Kembla (50 miles south of Sydney), County of Camden, New South Wales, Australia.

Directors: R. G. Casey, chairman; Kelso King, P. V. McCulloch, J. M. Niall, W. L. Baillieu, and J. L. Wharton. S. W. Thornton, sec.; E. A. White, mgr.

The plant covers an area of approximately 53 acres and contains a sampling mill, blast furnaces and converter plant, anode furnaces, electrolytic tank house, refining furnace, etc., etc. 33,950 tons ore were treated in 1918, and 24,700 tons blister copper handled.

Production: 21,300 tons of electrolytic copper (registered brand "E S A"); 8,969 tons of fire-refined copper, (registered brand "ESA F. R"); and 371 tons of bluestone (registered brand "ESA Bluestone").

These works are an important adjunct to the copper industry of Australia.

No recent information.

ELSMORE TIN SLUICING CO. **N. S. W.**

Address: Elsmore, N. S. W.

Report for first half of 1921 shows No. 1 plant treated 15,350 cu. yd. of material for 6 tons 12 cwt. tin oxide, at a cost of 16.881 d., and resulting in an operating loss of £1,254. No. 2 plant was sold for £4,050, of which £2,400 was distributed to shareholders as a return of capital.

GREAT COBAR, LIMITED **N. S. W.**

Head office: 4b Fredericks Place, Old Jewry, London, E. C., England. **Mine office:** Cobar, N. S. W., Australia.

Officers: Sir John Taverner, chairman; C. H. Wayte, Sir E. V. Evans, directors; E. Hogan Taylor, mgr.

Inc. May 22, 1906, in England. **Cap.** £1,000,000, in 200,000 shares of £5 each; 186,542 issued. Also 6% first mortgage debentures totaling £750,000, of which £667,300 are outstanding.

Property: copper mines, smelters, coal mines, coke works and refining plant, at Cobar and other parts of New South Wales. The price paid the Great Cobar Copper Mining Syndicate, which had operated profitably for years, was £800,000 cash, £55,000 in paid-up shares, and £151,000 in cash, shares, or debentures. Several well-known engineers examined the Cobar mine, including C. M. Rolker, J. D. Kendall, W. J. Barnett, and Pellew-Harvey.

A new shaft was sunk to 1,540', and new 1,200-ton smelter erected. In 1913 reserves were estimated at 2,705,161 tons, 2,081,735 tons of which contained 2.5% copper.

Many troubles arose in the mine and plant, and in April, 1914, operations ceased and receivers (A. F. Whinney in England and W. H. Fletcher in Australia) were appointed. An independent report was made, which gave 3 years ore opened. At £65 per ton for copper, the profit would be £88,800, and if no more ore were found, the plant might realize £63,700. The total profit of £152,500 would yield debenture-holders 23%. To enable the new scheme to be worked out, £62,000 was borrowed from debenture-holders, and £40,000 from the New South Wales Government. Net proceeds in 1916, 1917, and 1918 went to certificate-holders on certain terms.

Mining and smelting were resumed during 1917 under the new arrangement.

Production: from 1876 to 1906, inclusive, the Great Cobar mine yielded 1,592,895 long tons of ore, returning 138,593,280 lb. fine copper. Production under the former ownership, was 7,000,000 to 9,000,000 lb. copper yearly, having been 9,027,200 lb. fine copper in 1906; and production by present company was about 10,000,000 lb. in 1907; 10,586,240 lb. copper, 64,949 oz. silver, and 13,002 oz. gold in 1908; 12,762,080 lb. copper 83,208 oz. silver, and 14,452 oz. gold in 1909; 13,847,680 lb. copper, 107,932 oz. silver and 21,524 oz. gold in 1910. Production for the year ending June 30, 1912, was 339,494 tons of ore from the company's own mines and 88,924 tons of custom ore, producing 15,089,760 lb. copper, 178,760 oz. silver and 37,696 oz. gold; in 1913, 13,016,640 lb. copper, 27,136 oz. gold and 127,542 oz. silver. The 1919 output was 1,147 tons of copper.

From the results it is evident an error was made in original estimates of the mine, the new smelter was unsuitable, and the capitalization was too heavy.

In November, 1918, debenture-holders decided to continue operations until September, 1920, when the mine was finally closed. Assets are to be liquidated.

JUNCTION NORTH BROKEN HILL MINE **N. S. W.**

Office: E. V. Nixon, 360 Collins St., Melbourne, Victoria, Australia.

Directors: J. S. Palmer, chairman; K. G. Brooks, F. H. Reynolds, W.

Clarke, H. B. Ludlow, and A. Rigby. H. V. Seale, act. gen. mgr. T. H. Palmer, cons. engr.

Inc. August, 1912, in Victoria. **Cap.** £375,000; shares £1 10/- par; 225,000 issued.

Accounts are presented half-yearly, and for the period ending Sept. 30, 1920, there was a loss of £5,720. Current assets exceed liabilities by £161,714. For period ending March 31, 1921, there was a loss of £[illegible]; current assets exceeding liabilities by £124,841. Loss for half year ending Sept. 30, 1921, was £6,427.

Dividends: 1/- in 1917; 3/6 in 1918; 1/9 in 1919; 9d in 1920.

Property: 45 acres at Broken Hill, N. S. W. The mine which is fully developed and equipped, contains 192,000 tons of ore that averages 12.5% lead, 8.9 oz. silver, and 6% zinc.

Production: 8,989 tons of 60% lead and 10,435 tons of 50% zinc concentrates, in 1917-18; 17,215 tons of 60% lead and 20,094 tons of 47% zinc concentrates in 1918-19; 637 tons of 53% lead and 461 tons of 40% zinc concentrates in 1920-21 (to March). There was no production during half year ended Sept. 30, 1921. Owing to strikes, production was practically suspended in 1920.

KINGSGATE MOLYBDENITE, N. L. N. S. W.

Address: J. A. Hulme, gen. mgr., Kingsgate, N. S. W.

Cap. £50,000; in 100,000 shares, 10s par.

Report for year ended Feb. 29, 1920, total receipts were £9,494; working expenses, £9,052; loss, £2,741; creditors, £4,822; liquid assets, £2,059.

Property: at Kingsgate, N. S. W.

Equipment: includes 35-ton mill making a recovery of 53.8% molybdenite and 83.6% bismuth. The mill treated 3,765 tons to March, 1920.

MAMMOTH MOLYBDENITE CO., LTD. N. S. W.

Address: Yetholme, New South Wales, Australia. See Volume XIV for last information available.

MT. BOORALONG MOLYBDENITE MINES N. S. W.

Address: James Rankin, 97 Elizabeth St., Melbourne, Victoria, Australia. H. T. Wardle, supt.

Inc. May 31, 1916, in Victoria. **Cap.** £150,000.

Property: 110 acres in New England district of N. S. W., containing a deposit of molybdenite ore in pegmatite granite; the ore averages 1.9% molybdenum sulphide. Ore is mined by open-cut.

Equipment: includes an elevator, aerial tram, and 160-ton mill using flotation (the Rankin System). Concentrates carry 96% MoS_2.

No information received since 1919.

MT. BOPPY, LTD. N. S. W.

A reconstruction (1919) of Mt. Boppy Gold Mines Co., Ltd.

Office: W. F. Garland, sec., 5 and 6 Queen St. Place, London, E. C. 4, England.

Mine office: J. Negus, supt., Boppy Mount, N. S. W., Australia.

Officers: S. F. Hoffnung-Goldsmid, chairman; with B. J. Leverson, V. H. Smith, E. Taylor, and R. Taylor, directors. John Taylor & Sons, cons. engrs.

Inc. Nov. 24, 1899, in England. **Cap.** £125,000, in 30,000 pfd. and 220,000 ord. shares at 10/ par, all issued. Preferred shares are entitled to first cumulative dividend of 10% per annum, plus 10% in ordinary profits; after 100% has been paid they rank as common.

Report for year ended June 30, 1920, showed a debit balance of £13,520; cash assets exceeded liabilities by £2,208.

Dividends: were 5% in 1901, 6¼% in 1902, 35% in 1903, 40% in 1904, 47½% in 1905; 45% in 1906; 47½% in 1907; 47½% in 1908; 27½% in 1909; 35% in 1910; 20% in 1911; nil in 1912 and 1913; 7½% in 1914; 5% in 1915; none since; total, £446,000.

Property: 200 acres mineral land and 230 acres for water supply in Co-

bar district of New South Wales. Company also has an option on the Occidental mine, which is nearby.

Development: by shafts. Ore reserves estimated at 165,714 tons, June 30, 1920.

Equipment: includes mill with sixty stamps 4 tube-mills, and cyanide plants.

Production: in 1918, 61,176 tons, yielding 15,511 oz. gold compared with 79,526 tons yielding £119,508 in 1916. Operations have been intermittent since 1917, owing to shaft sinking, remodelling the mill, and a shortage of water.

Operations were finally stopped in 1920, because of high costs of labor and supplies and exhaustion of reserves, the mine having a total production to its credit of 420,965 oz. gold, valued at £1,756,138.

MT. BOPPY GOLD MINING CO., LTD. **N. S. W.**

Now Mt. Boppy, Ltd., which see.

NORTH BROKEN HILL, LTD. **N. S. W.**

Offices: G. Weir, gen. mgr., 360 Collins House, Melbourne, Victoria; Broken Hill, New South Wales; and E. Habben, Palmerston House, London, E. C. 2, England.

Directors: W. M. Hyndman, chairman; M. H. Baillieu, W. L. Baillieu, T. B. Birbeck, A. Campbell and H. Sheppard.

Inc. Dec. 4, 1912, in Victoria, Australia. **Cap.** £600,000, shares £1 par; all issued. Debentures: £250,000 of 6% authorized; £141,000 outstanding.

Company has interests in Broken Hill Associated Smelters. 200,000 shares; Zinc Producers Association, 750 shares; Electrolytic Zinc Co., 150,000 shares; British Australian Lead Mfgs. Pty., 20,000 shares; Globe Proprietary, Ltd., 5,000 shares; Barrier Roasters, 10,000 shares; and Zinc Investigation, 2,000 shares.

Report for year ended June 30, 1920, showed a profit of £25,728, with surplus of assets over liabilities, £469,777. In 1921 there was an operating loss of £62,242, changed to a profit of £8,128 after sale of concentrates produced before the strike.

Dividends: 30% in 1913; 25% in 1914; 25% in 1915; 40% in 1916, 1917, and 1918, and 10% in 1919, to March.

Property: 452 acres at Broken Hill, New South Wales, developed by 3 shafts, deepest 1,770′, and extensive underground work which has blocked out 2,600,000 tons of ore mostly above the 950′, 1,100′, 1,250′, and 1,400′ levels.

Equipment: includes a concentrating plant whose tailings are sold to Amalgamated Zinc (De Bavay's) for treatment by flotation.

Owing to the strike, the mine was closed from May 8, 1919 to November 10, 1920.

Production: for year ended June 30, 1921, 32,300 tons treated yielded 6,461 tons lead concentrate averaging 65.5% lead, 7.3% zinc and 28.4 oz. silver and 6,010 tons zinc concentrate, averaging 48.1% zinc, 7.4% lead and 9.6 oz. silver.

OCCIDENTAL CONSOLIDATED, N. L. **N. S. W.**

Property: a gold mine in Cobar district, developed under option by Mt. Boppy, Ltd.

SULPHIDE CORPORATION, LTD. **N. S. W.**

Office: C. R. Fisher, sec., Finsbury House, London, E. C. 2, England. **Mine office:** Broken Hill, N. S. W., Australia.

Officers: Earl of Kintore, chairman; Hon. V. Gibbs, F. A. Keating, and A. Williamson, directors. C. F. Courtney, gen. mgr.; J. Hebbard, mine mgr.; F. H. Evans, mgr of smelter at Cockle Creek, N. S. W.; J. C. Moulden, mgr of zinc works at Seaton Carew, Durham, England.

Inc. Oct. 29, 1895, in England. **Cap.** £1,050,000; 600,000 pfd. shares at £1 par, and 600,000 ordinary at 15s. par all issued.

Accounts are issued yearly and for period ended June 30, 1921, the profit was £30,009. Reserve fund was £230,000, accumulative profit account, £439,880. Investments, £92,055; cash, £230,400.

Dividends: since 1898 total 297% on pfd. and 240% on ord. shares; in 1917-18, 25% was paid on each class of shares and in 1918-19, 15%; none in 1919-20.

Property: a large lead-silver-zinc mine at Broken Hill, N. S. W.

Development: by shafts and extensive openings. Work during year ended June 30, 1921 totaled 1,614½'. Reserves amount to 1,506,950 tons.

Equipment: complete mining and 1,000-ton milling plants employing flotation at the mine, lead smelter at Cockle Creek, N. S. W., and zinc works at Seaton Carew, Durham, England. Company is a pioneer in flotation processes, and is said to have developed the frothing process prior to or simultaneously with Minerals Separation.

Production was suspended, owing to strike at Broken Hill, May, 1919-November, 1920. Smelting works ran on restricted basis, May 1919 to December, 1919; restarted, December, 1920.

Production: for seven months ended June 30, 1921, output was 62,419 tons. The mill treated 74,763 tons ore and old slimes yielding 13,571 tons lead concentrates, assaying 43.7 oz. Ag., 63.3% Pb. and 10.4% Zn., and 21,538 tons zinc concentrates, assaying 13.9 oz. Ag., 6.7% Pb. and 47.4% Zn. The refinery treated 15,102 tons of bullion, yielding 6,189 oz. gold, 1,298,985 oz. silver, 12,649 tons soft lead and 35 tons antimonial lead.

TUNGSTEN MINES, LTD. N. S. W.

Inc. 1915, in Sydney.

Property: two miles from Frogmore, which is 17 miles N. of Boorowa, the nearest railway station. Tract shows Silurian slates near a granite intrusion, cut by lodes carrying short lenses, up to 12' long and 20" to 42" wide, consisting of quartz containing tungsten, as scheelite and wolframite, averaging 2% tungstic oxide.

Development: 180' shaft and 280' second level and by 1,200' of surface work with stopes 600' long.

Equipment: includes hoist and mill.

Production: 6,580 tons of ore that yielded 101 tons concentrate and in 1920, 577 tons gave 22,900 lb. concentrate.

VEGETABLE CREEK TIN MNG. CO. N. S. W.

Address: Emmaville N. S. W.

Operations for year ended April 20, 1921, showed a net profit of £5,183 before payment of 1/ dividend, absorbing £6,750. Tin production for period was valued at £32,337. The mine is reported nearing exhaustion.

Y—WATER (EMMAVILLE) TIN CO. N. S. W.

Office: E. H. Shackell, 360 Collins St., Melbourne, Victoria, Australia.

Directors: J. L. Wharton, chairman, Clive Ballieu, C. G. Lyon, and W. H. Hyndman. F. G. Wilson, gen. mgr.

Inc. in Victoria. **Cap** £90,000; shares £1 10/- par; £76,088 issued.

The half year ended July 31, 1921, showed a loss of £6,300, compared with a loss of £10,709 for previous half year.

Property: alluvial tin areas at Emmaville, N. S. W., equipped with hydraulicking apparatus.

Production, for half-years:

Year	Yardage	Yield per yard. lb. black tin	Total yield tons
1921	311,469	0.899	125
1920-21	173,400	0.888	69
1920	268,750	0.940	113
1919-20	295,800	0.983	130
1918-19	284,700	0.701	89
1918	296,300	0.663	88
1917-18	346,875	0.681	105
1917	261,825	0.837	98

The "Black tin" carries 71.8% metallic tin.

Sluicing operations were finally suspended, April 13, 1921.

ZINC CORPORATION, LTD. **N. S. W.**

Office: F. A. Crew, 20 Copthall Ave., London, E. C. 2, England; Collins House, Melbourne, Victoria, Australia. Broken Hill, N. S. W., Australia. Bewick, Moreing & Co., gen. mgrs.; C. G. Hylton, supt.

Directors: F. A. Govett, chairman and managing director; J. A. Agnew, W. S. Robinson, H. W. Pelham Clinton, W. C. C. Romaine, R. W. Skipwith, T. White, P. L. Gell, (T. B. Birkbeck and W. M. Hyndman local).

Inc. July 8, 1911, in Great Britain. **Cap.** £575,000, in 245,792 pfd. £1, and 658,616 com. 10s., shares, all issued. Company is interested in the Broken Hill Associated Smelters Proprietary, Zinc Producers Association Proprietary, Electrolytic Zinc Co., and Barrier South, Ltd.

Report for 1920 shows an income of £109,132, and profit of £31,910, out of which a preferential dividend (£24,569) was distributed. Balance forward, £9,840. Operations were suspended from May, 1919 to November, 1920.

Dividends: 15% on pfd. and 10% on ord. in 1911; 37½% and 35% in 1912; 35% and 30% in 1913; 20% and nil in 1914; 25% and 10% in 1915; 37½% and 35% in 1916; 40% on each in 1917; 35% and 30% in 1918; 20% on pfd. in 1919; 10% on pfd. in 1920.

Property: the South Blocks mine and claims, a total of 160 acres at Broken Hill.

Development: to depth of 1,590′ by two vertical shafts (one 1,210′ deep), and extensive underground workings. Reserves given as 2,115,700 tons, containing 14.6% lead, 2.6 oz. silver and 9.4% zinc.

Equipment: includes a complete and modern mill using rolls, tables, and flotation plant with Minerals Separation, and the Lyster and Horwood selective processes, (described in Mining Magazine (London), of November, 1918).

Company buys tailings from other Broken Hill mines besides treating its own ores.

Summary of operations:

Year	Zinc plant tailings, tons	Lead plant, ore, tons	Zinc concentrate, tons	Lead concentrate, tons
1920.....	28,110	6,908	7,670	1,620
1919.....	98,910	51,141	15,954	10,735
1918.....	257,300	135,580	61,470	33,581
1917.....	257,590	134,618	63,700	31,993
1916.....	200,510	136,901	45,464	37,376

Galena concentrate carries 66% lead, and blende concentrate 48% zinc. Costs are about 33/- ($7.92) per ton.

ZINC PRODUCERS' ASSOCIATION PROPRIETARY, LTD. **N. S. W.**

Offices: E. H. Shackell, Collins House, Melbourne, Victoria, Australia, and A. J. M. Sharpe, Pinners Hall, London, E. C. 2, England.

Directors: W. L. Baillieu, chairman; A. Campbell, M. Cohen, W. Jamieson, C. Fraser, C. J. McArthur, J. S. Palmer, F. A. Govett, W. M. Hynaman, F. A. Keating, Bowers Kelly, B. G. Moulden, J. L. Wharton, and W. H. Woodhead. J. M. Higgins represents the Federal Government.

Inc. May 20, 1916, in Victoria, to market all zinc concentrate or ore produced in Australia, the various companies contracting to deliver their output to the Association for a period of 50 years. An agreement was also made with the British Government to purchase 300,000 tons zinc concentrate yearly with an option over the balance of production, for a period of nine years from January, 1921.

Cap. £100,000; shares £1 par; all held by the Broken Hill companies, the Broken Hill Associated Smelters, and the Mt. Lyell companies.

PAPUA (New Guinea)

BLOCK 10 MISIMA GOLD MINES, LTD. PAPUA

Controlled by Broken Hill Proprietary Block 10 Co.

Office: 31 Queen St., Melbourne, Australia.

Officers: J. Brandon, sec.; R. Williamson, mgr.

Inc. December, 1916, in Victoria, Australia. **Cap.** £250,000; shares £1 par; increased in 1918 to £350,000; £1 15s. par; all issued.

Operations for 1921 showed a loss of £6,735 and for first half of 1921, a further loss of £9,879, making an accumulated debit of £36,192.

Property: a group of gold-bearing claims on the island of St. Aignan, Papua, is equipped with a stamp-mill and cyanide plant of 50 tons daily capacity, which is to be enlarged to treat 200 tons daily. The first six months' run produced 7,045 tons of 30/10 ($7.40) ore. Extraction by cyanidation was 88.7% in the 6 months of 1919; 5,580 tons of 26/1 ($6.25) ore were mined, and the ore reserve increased. For five months ended June 30, 1920, 5,019 tons of ore yielded £5,350. During 2nd half of 1920 plant treated 2,553 tons. In first half of 1921, 8,909 tons yielded £12,976. Reserves estimated Dec. 31, 1920, at 262,401 tons, averaging 33.51/.

LALOKI (PAPUA) COPPER MINES PAPUA

Now New Guinea Copper Mines, Ltd., which see.

NEW GUINEA COPPER MINES, LTD. PAPUA

Address: Erle Huntley, gen. mgr., Port Moresby, Papua.

Inc. 1920 as successor to Laloki (Papua) Copper Mines, N. L.

Property: the Laloki and Dubuna mines, 18 miles from Port Moresby and connected with railway at Bootless Inlet. Opened to depth of 150'.

Company reported to have spent £200,000 in development work and equipment, and reserves estimated, December, 1921, at 200,000 tons in Laloki and 25,000 tons in Dubuna, averaging 5% copper 40% sulphur and 12s gold per ton.

Ore is to be shipped to the plant of the Electrolytic R. & S. Co. at Port Kembla, at the rate of 1,500 tons per month in 1922.

QUEENSLAND

CHILLAGOE, LIMITED QUEENSLAND

Property sold to the Queensland Government. Fully described in Copper Handbook, Volume XI.

See Chillagoe State Smelters.

CHILLAGOE STATE SMELTERS QUEENSLAND

P. L. Goddard, gen. mgr., Chillagoe, Queensland.

Property: in 1919 the copper holdings of **Chillagoe, Ltd.** were acquired; early in 1921 the Lady Jane and Girofla mines of **Mungana Mines Ltd.**, were acquired and in June the Muldiva mines. The Einasleigh copper and Girofla lead mines are the main producers. During 1920-21 the lead furnace worked 187 days treating 19,309 tons and the copper furnace 165 days, treating 29,621 tons.

Production, year ended June 30, 1921:

	Tons	Gold, oz.	Silver, oz.	Copper, tons	Lead, tons
Lead Bullion.....	1,248	383	95,835	....	1,196
Blister copper.....	1,122	353	56,218	1,109	....

CLARK'S GOLD MINES, LTD. QUEENSLAND

Paid 3 dividends in 1920, amounting to £6,750 with total dividends of 8s 6d per share, to end of 1921.

Property: on Charters Towers, developed to depth of 900' vertical. New work at rate of 100' per month.

Equipment: 10-stamp mill and cyanide plant.

Production: in 1920, 2,445 tons crushed yielded 6,020 oz. gold, and 1,930 tons sand cyanided yielded £5,025.

CORELLA COPPER CO. **QUEENSLAND**

Operations ceased in 1917. Stock valueless. See Vol. XIII.

DEREK'S TIN MINES, LTD. **QUEENSLAND**

Address: Bright & Galbraith, Ltd., 7 Martin's Lane, Cannon St., London, E. C., England.

J. Campbell, mine engr.

Inc. 1920. **Cap.** £115,000; £1 par; 100,000 shares issued. Debentures 1st mortgage, £4,500. First report for 16 months ended June 30, 1921, showed development expenditures, £8,343; London expenses, £2,546; preliminary expenses, £5,344; debtors, £597; stores, £3,291; cash £242; creditors, £10,589.

Property: tin mines, covering 128 acres at Stannary Hills, Herberton Tin Field formerly owned by Lass Gowrie, Ltd. Reserves estimated at 40,000 tons containing 1,140 tons tin concentrate. A 10-stamp mill was operated for six weeks from May, 1921, making a recovery of 70.5%.

FINNEY HILL UNITED SILVER MINES, LTD. **QUEENSLAND**

Inc. 1920. **Cap.** £100,000; £1 par.

Property: a silver-lead group at Indooroopilly, near Brisbane. Ore deposits consist of schist breccia with interstitial sulphides, oxidized above ground water level to carbonates and sulphates.

Development: by 175' shaft and crosscuts. Developing and shipping about 30 tons per month to the Cockle Creek (N. S. W.) plant. Sixteen men employed.

GREAT FITZROY MINES, LTD. **QUEENSLAND**

Liquidated. See Vol. XIII for organization and former operations. The **New Guinea Copper Mines, Ltd.**, now owns the property in Papua, formerly held by the Fitzroy.

HAMPDEN-CLONCURRY COPPER MINES, LTD. **QUEENSLAND**

Officers: E. H. Shackell, Collins House, Melbourne, Australia; and E. Haben, sec., Palmerston House, London, E. C. 2, England.

Directors: J. L. Wharton, chairman; W. L. Baillieu, F. G. Hughes. W. Orr, H. H. Schlapp, and R. M. Turner. **London directors:** W. D. Reid, G. W. W. Mackinnon, and G. W. Staples. Erle Huntley, gen. mgr., Friezland, via Cloncurry, North Queensland.

Inc. July 31, 1909, in Australia, as a reorganization of a company of same name. **Cap.** £400,000; shares £1 par; 350,000 issued.

Profit for 6 months ended Aug. 31, 1921, was £1,283; current assets exceed liabilities by £88,676. There was an operating loss of £6,694 for previous half year (Feb. 28, 1921), compared with a loss of £49,031 for six months ending Aug. 31, 1920.

Dividends: in 1913, 40%; 1914, nil; 1915, 20%; 1916, 40%; 1917, 15%; 1918, 10%.

Company owns 5,263 shares of the Electrolytic Ref. & Sm. Co. of Australia, Ltd., and 39,248 shares of Metal Manufacturers stock; both having works at Port Kembla, New South Wales; and 1,000 shares in the Copper Producers' Association.

Property: about a dozen mines, with 450 acres mineral claims, in the Cloncurry mining district, North Queensland, include the Hampden, Duchess, Trekelano and Macgregor mines. Mines are connected by 2' gauge railway with the Cloncurry Copper Mines, Ltd. The mines contain auriferous copper ores, the combined reserves being 172,100 tons of smelting ore containing 9,050 tons of copper plus over 60,000 tons of low grade fluxing ore.

Equipment: includes railways, complete mining plant, mill and flotation plant, and 375-ton smelter with converters.

Production, half-years to August 31 and Feb. 28:

Period	smelted, tons Ore	Copper, tons	Silver, Oz.	Gold, Oz.
1921	36,698	1,882	7,256	1,149
1920	35,927	2,070	12,473	1,152
1920	46,710	3,314	23,137	1,455
1919*	30,135	1,736	4,194	1,314

*To February; smelting suspended Dec. 1918 to Sept. 17, 1919.

IRVINEBANK MINING CO., LTD. **QUEENSLAND**

Office: J. H. Reid, managing director, 18 Bridge St., Sydney, N. S. W.

Property: company owns tin mines and tin concentrating works at Irvinebank, and Watsonville; copper mines at Watsonville and wolfram mines and mill at Mt. Carbine, all in North Queensland. The tin smelter includes a reverberatory furnace.

Production: in 1920 (when operated by the government) was 35 tons tin, valued at £11,770.

KOORBOORA MINES, N. L. **QUEENSLAND**

Acquired former holdings of Irvinebank Mining Co. at Koorboora in 1920. New equipment installed and old workings unwatered, but no work done.

MANY PEAKS COPPER MINING CO., LTD. **QUEENSLAND**

Office: J. D. Murray, sec., East St., Mt. Morgan, Queensland. James Hill, mgr.

Inc. 1906, in Queensland. **Cap.** 81,640 shares, 6d. (12c) par, originally 2,041 shares £1 par, changed in 1911 to present amount.

Company owns a cupriferous pyrite deposit from which the **Mt. Morgan** G. M. Co., formerly drew its supply of fluxing material at a royalty of 2s. 6d. (60c.) per ton.

Receipts for year ending June 30, 1917, amounted to £6,222, plus credits of £2,535, making £8,757. Of this £6,803 was distributed in dividends. Cash on hand was £1,165. For 1918, revenue was £4,156; of which £3,742 was distributed.

Dividends: total £56,383 or 13/6 ($3,18) per share to June, 1918.

Property: 320 acres, well timbered, on terminus of Boyne Valley railway. The property shows promising vein up to 90′ in width, having no secondary sulphides, the zone of oxidation being succeeded by chalcopyrite ore of about 3.5% copper tenor. Development is exclusively by tunnels, the main tunnel being on the 470′ level, with 3 levels above, at 100′ intervals. A winze opens the deposit to 570′ depth. The ore is very pyritic and is used by the Mt. Morgan company as a flux. Its copper content is about 1½%.

Production: 33,245 tons in the year ended June 30, 1918, making 497,927 tons to date, on which royalties totalled £62,241. No productive work is being done, but 6,495 tons of ore were sold to Mount Morgan in 1920.

MOUNT COOLON GOLD MINING CO. **QUEENSLAND**

Property: the Reward claims, in Mount Coolon district, under development in 1920 and 10-stamp mill erected.

MOUNT CUTHBERT, N. L. **QUEENSLAND**

Offices: W. B. Arnold, sec. 39 Queen St., Melbourne, Australia; Edwin Habben, sec., Palmerston House, London, E. C. 2, England; and Mount Cuthbert, Queensland.

Officers: P. Pigott, chairman; Robert Philip, T. P. Power, F. E. Power, John G. Robertson and J. Forsyth, directors. Stephen Harris, gen. mgr.

Inc. Feb. 21, 1907, in Victoria, Australia. **Cap.** £240,000; shares £1 par. Reorganized October, 1909, and August, 1916, in Victoria. Capital increased in Feb., 1919 to £419,394; shares £1 10s. par; 26s 3d paid. Original 7% debentures outstanding, £55,500. At the reconstruction in August, 1916,

£50,000 7% prior lien debentures were created to secure creditors; £35,000 issued.

Call (assessments) made in 1919, totaled 4s. per share, a total of £55,-918; 1s. Aug. 1920.

Report for six months ending Aug. 31, 1921, shows a loss of £10,263; debit balance, £159,686. Previous half year (Feb. 28, 1921), showed a loss of £4,998.

Property: 575 acres at Mount Cuthbert in the Cloncurry district, 70 miles from Cloncurry, Queensland.

Geology: the orebodies occur both in veins cutting the schist and limestone and as intimately disseminated sulphides in the schists. In the dolomitic limestone the veins carry good ore. Reserves amount to 193,500 tons of 6.8% ore.

The ore contains glance, chalcopyrite, pyrite, and bornite at depth. Deepest workings are 484'. Considerable chalcotrichite (a hair-like form of cuprite) occurs in places. In 1919 company had opened an orebody in the Kalkadoon mine, varying from 15 to 40' wide.

Equipment: includes 200-ton smelter, started in March, 1917. The Cuthbert and Kalkadoon mines have equipment to mine at a depth of 2,000'. The Government railway from Cloncurry runs to Mount Cuthbert, and sidings have been built to connect with several of company's mines.

Production: to Aug. 31, 1921, a total of 136,192 tons of ore had been smelted, yielding 7.878 tons of blister copper. Of this, 13,099 tons were treated at Mount Elliott, the remainder at Mount Cuthbert.

The mines and smelter have been closed down since Dec. 18, 1920, owing to high costs, and only limited development work has been done at the Orphan and Little Wonder mines.

MOUNT ELLIOTT, LTD. — **QUEENSLAND**

Offices: E. Habben, Palmerston House, Old Broad St., London, E. C. 2, England; F. G. Hughes, Collins House, Melbourne, Victoria, and Mt. Elliott, Selwyn, via Townsville, Queensland, Australia.

H. J. Hill, chairman of board in London. General representative in Australia and cons. engr., W. H. Corbould.

Inc. June 14, 1907, in Great Britain. **Cap.** £1,250,000; shares £5 par; 240,518 issued; 82,000 shares owned by Mt. Oxide Mines, Ltd.

An option on stockholdings held by Hayden Stone & Co., in 1920-'21, was not taken up.

Operations for the year ended June 30, 1918, showed a loss of £56,890; in 1918-19, loss was £41,034; in 1919-20, £8,940; in 1920-21, £22,178.

Dividends: 10% in 1910-'11; 15% in 1911-'12; 27½% in 1912-'13; and 5% in 1913-'14; none since; a total of £425,000.

Property: a group of copper mines situated in the Cloncurry copper district of Queensland, covering approximately 4,600 acres, about half of which can be classed as good and probable copper area. The holdings include those of **Mt. Oxide Mines Ltd.** (£450,000 in £5 shares), acquired in 1915, and the Dobbin and Cloncurry Mines, Ltd., transferred to Mount Elliott in 1916. The vendors of the original Dobbin & Cloncurry Mines, Ltd., receive a proportion of profits equal to 120,259 fully paid £5 shares.

Development: is not deep nor very extensive, including shafts of various depths, at the different mines. The Mt. Oxide workings include a 300' shaft with 5 levels and an 840' adit level.

Reserves, (June 30, 1921):

Mine	Reserves in tons	Copper, %
Mount Elliott (oxide and sulphide)	600,000	3.0
Mount Elliott (sulphide)	4,000	10.0
Consols (sulphide)	450,000	4.0
Great Australia (oxide)	93,000	4.0

Great Australia (sulphide)..	110,000	2.5
Dobbin (sulphide)	41,000	5.0
Mount Oxide (oxide and sulphide)	300.000	10.0
Argylla (oxide)	200,000	4.0
Lady leases (oxide)	28,000	5.0
Great Australian (sulphide)	110,000	2.5
Total and average content	1,876,000	4.3

Equipment: a 300-ton plant treating 5% ore and actually recovering 4½%. Company needs a large modern plant to place the project on a profitable basis.

Production: to date 327,175 tons of ore yielding 28,264 tons or 63,311,360 lb. copper. The output for 1917-'18 was 5,201,280 lb. copper recovered from 51,952 tons of ore. In 1918-'19 (7½ months) the yield was 6,460,160 lb. from 61,975 tons of ore.

Management states the 10% are treated in former years gave good profits, but the grade of present reserves is too low to warrant operations, as the output is too small to carry the overhead charges. Mine and smelter remained idle, 1920-1921, pending re-financing, but the Mt. Oxide deposit contains a large body of rich ore and a very large amount of low grade ore, according to the State Geologist.

MOUNT MORGAN GOLD MINING CO., LTD. QUEENSLAND

Offices: E. W. Moran, sec., Mt. Morgan, Queensland; R. T. Thompson, sec., 14 Martin Place, Sydney, New South Wales; T. H. Williams, sec., 125 William St., Melbourne, Victoria; E. Habben, sec., Palmerston House, Old Broad St., London, E. C. 2, England.

Directors: (Australia) J. M. Niall, chairman; Kelso King, J. L. Wharton, R. G. Casey, H. Perrier, W. L. Baillieu, K. de L. Cudmore, R. S. Archer, W. G .Thompson. (England): E. V. Reid and A J. Pugh, H. W. Hall. A. A. Boyd, gen. mgr.; J. Horsburgh, asst. gen. mgr.

Inc. Oct. 1, 1886, in Queensland. **Cap.** £1,000,000; shares £1 par; fully paid.

Financial Statement:

Period	Revenue	Profit	Dividends	Balance	Excess of current assets
1919 (to June 1)..	£974,950	£111,640	£100,000	£110.376	£490,826
1920 (to May 30)..	1,013,760	131,815	150,000	92,192	487,933
1921 (to May 29)...	1,038,682*	120,158	.....	212,350	514,146

*Includes receipts from sale of 2,528 tons of copper on hand at end of year.

Dividends: paid quarterly, have ranged from a minimum of 8d., at the beginning, 1886, to a maximum £1 2s., in 1889. To end of 1916 the company had paid about 825% in dividends, which were 6s. yearly, 1892-97; 6s. 6d. in 1898; 7s. yearly 1899-1900; 5s. 10d. in 1901; 5s 9d. in 1902; 3s. yearly 1903-06; 4s. 3d. yearly 1907-08; 4s. yearly 1909-13; 3s. in 1914; 4s. in 1915; 5s. in 1916; 5s. in 1917; 3s. in 1918; 3s. in 1919; 1s. in 1920. The total is £9,379,166.

Property: 140 acres under perpetual leasehold, and 530 acres freehold at Mount Morgan; also flux quarries, and magnetite deposits, and a coal mine at Baralaba.

Company has a large interest in the Electrolytic Refining & Smelting Co. of Australia, Ltd., (which refines Mt. Morgan and custom copper) and in the Metal Manufacturers, Ltd., (which makes copper products from Australian metal) and in the Australian Fertilizer Pty. Ltd., (which pro-

duces superphosphates). Mt. Morgan is about 25 miles west of Rockhampton, and was one of the greatest gold producers of the world.

Geology: the Mount Morgan gold deposit proved to be the leached siliceous outcrop of a great deposit of gold and copper bearing ore. As the ore showed increased copper content at depth the company began extensive diamond-drilling in 1903, and this proved an immense tonnage of copper ore. The orginal opencut workings, from which rich oxidized gold ore was obtained, have been carried down to the 363′ level, but the oxidized ores were exhausted in 1910, and only sulphide ores are now mined. The greater part of the copper ore lies N. W. of and deeper than the siliceous gold ore that lies beneath the great gossan ore body. This copper ore is a mixture of chalcopyrite and copper bearing pyrites.

Development: includes 2 principal shafts, one the 1,050′ Main depth, and in the other the 1,500′ Linda incline shaft. The ore now mined comes mainly from the 650′ to 950′ levels. Depleted stopes are filled with concentration-mill tailings.

Ore reserves have been estimated as follows:

Date	Tons	Copper, %	Gold, Dwt.
May, 1921	3,257,28	2.57	6.04
Dec., 1920	3,318,134	2.58	6.04
June, 1920	3,347,000	2.59	6.11
Dec. 1919	3,538,000	2.59	6.12
June, 1919	3,622,000	2.58	613

This includes both concentrating and smelting ore.

Equipment: is very complete and up-to-date, having been remodelled in recent years. It includes a concentration mill, sintering plant, smelter and large power plant. The smelter has blast furnaces.

Experiments are being made in leaching, as an auxiliary step in the treatment of the leaner ore.

The district being arid, extensive dams have been built for water storage, there being 8 dams, of which 5, in commission, have an aggregate capacity of 282,000,000 gal., No. 7 holding 230,000,000 gal.

Production: the total from 1883 to Dec. 1920, was 5.054,772 oz. of gold and 120,670 tons of copper. Recent returns were:

	Ore concentrated, tons	Ore smelted, tons	Copper tons	Gold, Oz.
1921 (year May 30)....	167,802	148,574	5,149	76,463
1920 (½ yr. June 1)...	91,818	87,580	3,130	39,387
1919 (½ yr. Dec. 1)...	83,840	90,475	2,749	41,191
1919 (½ yr. June 1)...	75,138	90,687	2,688	50,042
1918 ½ yr. Dec. 1)....	115,466	105,264	3,580	42,942
1918 (½ yr. June 1)...	123,854	102,872	3,505	38,138
1917 (year May 27)...	141,430	278,380	8,042	98,950

During the last 13 years, the ore mined has yielded £3,619,105. This has been used in the following proportions; wages, 44.9%; Government, 10.7%; royalties, etc, 7%; stores, 14.1%; dividends, 18.6%; and balance, (reserves) 4.7%.

Mount Morgan is still one of the great mines of the world. though it has passed the zenith of its profit earning capacity and production. It must now be regarded as a low grade copper-gold proposition.

MOUNT QUAMBY GOLD MINING CO., N. L. **QUEENSLAND**

M. Sheard. gen. mgr.

Inc. 1920. **Cap.** £100,000.

Property: gold leases on Mount Quamby, 7 miles W. of Quamby on the Mt. Cuthbert branch, 28 miles N. of Cloncurry.

Development: by 235′ tunnel and 50′ shaft, said to prove 6,000 tons of ore averaging 25 dwt., and 20,000 tons averaging 10 dwt. per ton. (Sept. 1921).

MUDLO MINING SYNDICATE, LTD. **QUEENSLAND**

Address: Bundaberg, Queensland, Australia.

C. H. Powell,mgr., Mudlo Copper Mine, Kilkivan, Queensland.

Directors: C. P. Christoe, managing; Geo. A. Buss, chairman, with C. H. Buss.

Inc. December, 1917. **Cap.** £50,000; £1 par.

Property: 2 patented claims, 80 acres, in Marodian Mineral field, 7½ miles from Kilkivan, Gympie district, Queensland. Ore occurs in a fissure vein in granite, that averages 3′ in width and carries chalcopyrite, tetrahedrite and bornite.

Development: by 565′ main tunnel. Equipped with 5-stamp concentrating mill. **Reserves:** estimated at 17,600 tons averaging 10.2% copper. Developing.

MUNGANA MINING CO., LTD. **QUEENSLAND**

Company out of existence. See Vol. XIII. Property now owned by Chillagoe State Smelters.

RAVENSWOOD GOLD MINES, LTD. **QUEENSLAND**

Company reorganized and capital increased in 1921.

Property: in Ravenswood goldfield. Under development, 1920-21.

Production: in 1920, 91 tons yielded £259 in bullion; 59 tons treated at Charters Towers yielded £184. Ore and concentrate sales for year totaled £2,614.

SARDINE TIN MINES, N. L. **QUEENSLAND**

Address: J. H. Pryor, mgr.; J. Lennox, managing director; Daniel McCallum, sec., Ewan, or Charters Towers, Queensland, Australia.

Property: a 21 year mineral lease on 20 acres, in Kangaroo Hills Tin Fields, 4 miles from Ewan and 15 miles N.-N. W. from Charters Towers. The veins occur in quartzite and slate.

Development: by 173′ shaft with levels at 40′, 80′, 135′ and 173′. An internal shaft is being sunk to 273′ depth. Reported on by A. Lawrence Wilson, who estimated reserves at 5,609 tons containing 1,401 tons concentrate and valued at £127,090.

During half year ended July 2, 1921, 340′ of work was done, and 147 tons ore crushed yielded 34 tons of tin. The ore is treated in the mill of the Tin Syndicate, at Ewan.

SCOTTISH GYMPIE GOLD MINES, LTD. **QUEENSLAND**

Head office: Dunlop & Murray, secs., 188 St. Vincent St., Glasgow, Scotland. **Mine office:** Mary St., Gympie, Queensland, Australia.

Officers: G. B. Hoggan, chairman; R. G. Campbell, J. B. Hilliard, and W. Walker, directors. D. E. Reid, gen. mgr.; T. Jobling, mine mgr.; H. Walker, surveyor.

Inc. June 11, 1902, in Scotland. **Cap.** £700,000; shares £1 par; 600,000 issued.

The year ended May 31, 1920, resulted in a loss of £7,423. A debit balance of £11,798 was carried forward. The year ended May 31, 1921, showed a loss of £4,742, increasing debit balance to £17,040.

Dividends: since 1898, total about £6 2s. per share; £5 8s. to 1902, since when profits have been small. The total to July, 1917, was £597,742.

Property: 126 acres, at Gympie, Queensland. Opened to depth of 2,413′. Results from development on 1,265′ level of No. 1 shaft, said to be promising in 1920.

Equipment: complete for treatment of about 9,000 tons per month.

Production: in year 1915-16, 83,800 tons of ore and 27,950 tons of tail-

ing cyanided for $6.44 per ton. In 1917-18, 72,300 tons of ore and 29,100 tons of tailing yielded 20,285 oz. of gold, at a cost of 22/- ($5.28) per ton; in 1918-19, 7,020 tons crushed and 10,600 tons cyanided yielded 7,291 oz. gold; in 1919-20 (4 months) 6,000 tons crushed yielded 2,271 oz. gold; 1920-21 (18 months to May 31), 6,950 tons crushed yielded 2,096 oz. gold.

Property has been a large producer, but the mine is near depletion.

SILVER SPUR, LIMITED **QUEENSLAND**

Office: Parbury House, Eagle St., Brisbane, Queensland, Australia.

Alexander Corrie, chairman of board of directors; Edgar Hall (mgr.), Silverspur, Q.; M. A. Corrie, sec.; H. I. Stey, supt.

Inc. November, 1917, in Queensland, as reorganization of the Silver Spur Mining Co. **Cap.** £75,000; shares 10s. par. **Dividends:** paid by old company totaled £25,000.

Property: 49 acres at Silverspur, Stanthorpe district, 3½ miles from the border of New South Wales. A 44-mile railroad to the mine has been authorized by the Government. Examined by Lionel C. Ball, Government Geologist, in 1918. Ore contains galena, sphalerite, and chalcopyrite, averaging 12% lead, 25% zinc, 1% copper, $1 gold, and 26 oz. silver per ton. A promising new lode, opened in 1919-20, containing 90 oz. silver ore, is under development.

Development: by 520′ shaft and extensive workings. Dumps were reported to have a recoverable value of £500,000.

Equipment: includes hoist, compressor, crushing plant, roasters, and reverberatory and blast furnaces.

Production: total to May 31, 1921, 2,031,987 oz. silver; 4,797 oz. gold; 1,049 tons copper; 1,438 tons lead, valued at £324,349. Regular shipments made to N. S. W., for refining.

THE OAKS, N. L. **QUEENSLAND**

J. J. Tully, mgr.

Property: in Oakfield, equipped with 15-stamp mill.

Production: in 1920, 9,720 tons yielded 1,002 oz. gold, valued at £3,508.

TOWERS TIN MINING CO. **QUEENSLAND**

Address: Herbert Poole, sec., Charters Towers, Queensland.

Inc. 1921. **Cap.** £40,000; 10/ par.

Property: Shrimp tin group, covers 20 acres on Oakey creek, in Kangaroo Hills tin field, about 5 miles N. W. of Ewan and 93 miles from Charters Towers. Developed by several shallow shafts. Formation consists of altered clay slates and schists, with occasional bands of quartzite, intruded by belts of granite and felsite. The ore so far opened in the workings, appears to average 10-15% metallic tin.

A 10-stamp mill started operating, Dec. 1920.

2 NORTH COLUMBIA & SMITHFIELD GOLD MNG. CO., LTD **Q.**

Reorganized 1920. **Cap.** £18,000; in 48,000 shares 7s. 6d; 5s paid.

Production: 1920, 55 tons 12 cwt. yielded 73 oz. 15 dwt. gold.

WONBAH MOLYBDENITE MINING CO., LTD. **QUEENSLAND**

Address: Mt. Perry, Queensland, Australia.

Property: a molybdenite mine at Wonbah on the R. R.

Is largest molybdenum producer of Australia.

Geology: ore occurs in a nearly vertical pipe of white quartz, 42′ to 60′ in diameter, enclosed in granite near a slate contact. The payable ore forms the outer part of the "pipe" and consists of milky quartz with flakes of molybdenite, the output as milled averaging 0.8% molybdenum sulphide. Scanty amounts of pyrite, chalcopyrite and galena, occur in small segregations.

The mill handling 30-40 tons ore per 24 hours, contains ten 1,000 lb. stamps, with 12 units Minerals Separation plant (De Bavay's patent), Callow settlers, Dorr thickners, etc.

Production: 2,435 tons of crude ore and 13.95 tons concentrate valued at £6,052 in 1919, compared with 6,026 tons crude ore yielding 41.75 tons concentrate valued at £18,100 in 1920.

SOUTH AUSTRALIA

BROKEN HILL ASSOCIATED SMELTERS PROP., LTD. **S. A.**

Office: T. H. Sears, sec., 360 Collins St., Melbourne, Victoria, Australia.

Directors: W. L. Baillieu, chairman, C. Fraser, W. S. Robinson, Bowes Kelly, F. A. Govett, B. A. Moulden and H. G. Darling. H. L. Shackell, mgr.

Staff: Gilbert Riggs, chief met. eng.; H. St. J. Somerset, gen. supt.; W. Robertson, cons. engr.

Inc. May 7, 1915, in Victoria. **Cap.** £1,000,000; shares £1 par; 730,000 issued and held by the Broken Hill Proprietary (£200,000), Broken Hill South (£200,000), North Broken Hill (£200,000), Zinc Corporation (£100,000); and British Broken Hill (£30,000).

Works: the largest lead smelting plant in the world, formerly owned by the Broken Hill Proprietary Co. at Port Pirie. S. Australia. The plant includes railroads, blast-furnaces of 6,000-ton per week capacity on 60% lead concentrate, roasting furnaces, Dwight-Lloyd and H. H. sintering machines, a 3,000-ton per week lead refinery, and 200-ton per week spelter works, limestone quarries in S. Australia and coke works at Bellambi, N. S. W. The ore supply for these works comes from 9 Broken Hill companies, also from outside sources. The smelter can produce 165,000 tons of lead, 5,000 ton spelter, and 6,500,000 oz. silver per year. The coke plant makes 100,000 tons yearly. Antimonial lead, assay lead, litharge, zinc dust, lino metal, and bar and granulated silver are made. The brand is B. H. A. S. in a diamond.

MT. LYELL CONSOLS WALLAROO COPPER MINES, N. L. **S. A.**

Dead. Reorganized as New Lyell Consols Copper Mine, also defunct.

NEW LYELL CONSOLS. COPPER MINE **S. A.**

(Formerly Mt. Lyell Consols. Wallaroo Copper Mines).

In liquidation. Fully described in Volume XIV.

WALLAROO & MOONTA MINING & SMELTING CO. **S. A.**

Head office: Steamship Bldg., Currie St., Adelaide, S. A. **Mine offices:** Wallaroo mines and Moonta mines, S. A. **Works office:** Port Wallaroo, South Australia.

Sir J. L. Stirling, chairman of board of directors; C. B. Jennings, sec.; H. Lipson Hancock, gen. mgr.

Inc. 1889, in South Australia. **Cap.** £400,000; shares £2 par; 160,000 issued.

Financial Statement, years ending December 31:

Year	Revenue	Net profit	Dividends	Surplus cash assets
1920-21.....	£283,088	£ 71,863x	.....	£198,905
1919-20.....	288,751	38,914x	24,000	267,201
1919*.....	166,800	53,265**	.....	330,218
1918.....	755,918	69,907	80,000	381,144
1917.....	855,189	126,736	100,000	421,945
1916.....	852,670	231,505	120,000	250,851

*Half year. **Loss. xLoss after paying £29,083 for taxes.

During the periods 1919 and 1919-20, productive operations were suspended for 15 and 21½ weeks respectively, owing to labor strikes affecting shipping.

The financial period for the company's accounts, has been altered and now covers July to June.

Dividends: to end of June, 1920, totaled £2,638,000, of which £1,040,-

000 have been paid by the present company, the remainder by the old Moonta and Wallaroo companies.

Property: the famous Wallaroo mines at Kadina and the Moonta mines, at Moonta, S. A., which have yielded 723,118,400 lb. copper valued at £19,765,000 up to June 30, 1920.

The Wallaroo lodes traverse highly indurated schistose rocks of sedimentary origin, while the Moonta lodes are found in a mass of hard and brittle feldspar-porphyry. Minerals at Wallaroo are chalcopyrite, pyrite, pyrrhotite, with a little galena, blende, and gold; at Moonta, chalcopyrite, bornite, chalcopyrite, pyrite, a little gold and silver, etc. During the past 11 years copper content averaged 3.8%.

Development: at Wallaroo the main lode has been opened for a length of over 3,400′ and a depth of nearly 3,000′; at Moonta the main lode is opened for 3,840′ and to a depth of 2,500′. During 1918 new openings, including 464′ of diamond-drilling, totaled 4,455′, less than half of that in 1916. Since 1918 the development work has been greatly restricted, owing to shipping and labor strikes. Total openings in the Wallaroo mines amount to over 39 miles, and in the Moonta mines to 40 miles. At Wallaroo, there are 2 main and 3 ventilating shafts. Owing to swelling ground, part of shafts is lined with cement concrete, which is also used in underground storage-bins.

Equipment: includes electric power plant, steam plants, complete mining and pumping plants, ore sorting and concentrating works, tailing leaching plant, smelter, sulphuric acid works, electrolytic refinery, etc.

Production:

Year	Ore mined, tons	Dressed Ore Smelted, tons	Copper, lb.	Gold, oz.	Silver, oz.	Sulphuric acid, tons
1920-21**	86,045	30,144	7,066,024	1,600	1,400	2,851
1919-20	77,901	22,613	5,156,480	301	....	2,430
1919*	39,285	13,210	3,888,640	835	440	1,289
1918	204,530	63,418	21,033,600	2,992	1,608	6,745
1917	208,836	66,064	19,185,600	2,970	1,675	6,190
1916	216,369	67,754	19,248,320	3,100	3,014	6,930

*Half year. **Operations suspended during 2nd half.

Costs from 1909 to 1915 varied between 11 and 12 cents per lb., rising from 17 to 22 cents from 1916 to 1920, due to high cost of wages, material, and fuel. About 1,500 men are employed.

TASMANIA

BRISELS TIN & GENERAL MINING CO., LTD. TASMANIA

Office: T. P. Husband, Royal Bank Chambers, Collins St., Melbourne, Victoria, Australia.

Directors: (in London) F. S. E. Drury, chairman; W. Clarke, D. Currie, cons. engr., and H. W. Lake in Melbourne; Sir A. J. Peacock and F. G. Hughes. L. C. Clark, gen. mgr.

Inc. Nov. 25, 1899, in England. **Cap.** £600,000; shares £1 par; all issued.

Operating profit for year ended Dec. 31, 1920, was £15,467; compared with £3,198 in 1919. Cash assets, £15,702; reserve fund, £25,559.

Dividends: 17/3 per share, or £517,500, from 1906 to 1920, inclusive, 1s being paid in 1918 and 6d, July, 1919.

Property: 180 acres alluvial tin claims at Derby, Dorset county, Tas-

mania; also 2,112 acres alluvial gold claims on Yackandandah and Sandy creeks, in N. E. Victoria.

Equipment: includes ditch lines and full hydraulic plants at the tin mine and 4 gold dredges at the Victoria property.

Production: 243 tons metallic tin in 1918; 180 tons in 1919; 244 tons in 1920.

Reserves amount to about 5,000,000 cu. yd. of gravel containing 4,000 tons of black tin; the Victoria area is nearly exhausted, but new properties have been acquired in New South Wales.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA PROPRIETARY, LTD. TASMANIA

Now Electrolytic Zinc Co. of Australasia, Ltd., which see.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA, LTD TASMANIA

Office: Edward H. Shackell, sec., 360 Collins St., Melbourne, Victoria. H. W. Gepp, gen. mgr.; D. Meredith, asst. gen. mgr.; Gilbert Rigg, cons. engineer.

Inc. Proprietary Company, May 16, 1916, in Victoria. Inc. Limited Company, Oct. 5, 1920. **Cap.** £3,000,000; £1 par; 2,200,000 issued; 900,000 shares distributed to Proprietary share holders; 1,100,000 shares owned as follows: Amal. Zinc (de Bavay's), 300,000; No. Broken Hill, Ltd., 150,000; Broken Hill South, 150,000; Zinc Corporation, 150,000; Mt. Read & Rosebery and Mt. Lyell, 350,000. Debentures: £400,000, 8% 1st mortgage, issued January, 1922.

Dividends: 2s. in 1918; 1s. in 1919.

Report for year ended June 30, 1921, showed deposits and accrued interest, £20,320; debtors, £31,673; products and by-products on hand, £75,711; concentrates and calcines on hand at cost, £84,754; stores, £259,962; shares in other companies, £48,859; creditors, £38,604; deposits, loan and accrued interest, £177,150; owing to bankers, £158,079; depreciation reserve, £62,574.

Works have been erected at Risbon, near Hobart, in Tasmania, for the electrolytic treatment of zinc concentrate from Broken Hill, and production of high-grade spelter. The plant has a capacity of 25 tons daily. A 100-ton plant is in course of construction. Hydro-electric power is used. During 1920 the plant treated 17,243 tons of concentrate from Broken Hill, yielding 5,838 tons of spelter, valued at £93,577.

In 1920 company acquired holdings of Mt. Read and Rosebery Mines, Ltd., from Mt. Lyell M. & R. Co.

Mt. Read & Rosebery Mines, Ltd.,

In liquidation. Subsidiary of **Elec. Zinc Co. of Australasia, Ltd.**

Offices: D. G. Lumsden, sec.; W. G. Moss, asst. sec., Collins House, Melbourne, Victoria, Australia; and E. Habben, sec., Palmerston House, London, E. C. 2, England.

Bowes Kelly, chairman of board of directors; R. C. Sticht, gen. mgr.; E. R. Crucher, metallurgist.

Inc. Sept. 21, 1916, in Victoria. **Cap.** £1,000,000; £1 par; 256,503 issued and 97,500 shares to be issued to the Tasmanian Copper Co., Ltd. Mt. Lyell will receive 30,000 def. ord. shares of Elec. Zinc for its interest in Mt. Read & Rosebery (100,000 sh.) and 180,000 shares for money advanced, (£180,000), with a right to apply for 90,000 participating cumul. pfce. shares.

Property: 2,066 acres, being a consolidation of the leaseholds held by the Hercules Gold & Silver Mining Co. Tasmanian Copper Co., and Primrose Mining Co., near the town of Rosebery, in West Coast region of Tasmania. The Hercules North Blocks were acquired in 1919 for 6,500 fully-paid shares.

Development: in recent years mainly by diamond-drilling, while the ol workings were reconditioned. Openings are entirely by adits.

Ore reserves:

Mine	Tons	Zinc, %	Lead, %	Silver, oz.	Gold oz.
Hercules	411,836	30.26	7.25	8.12	0.14
Rosebery	652,351	25.60	7.34	10.48	0.11
Total	1,064,187	27.40	7.30	9.57	0.12

The ore is complex being a dense intimate mixture of blende, galena and iron pyrite, and the former owners had great difficulty in treating an in marketing it. Trial lots were sent to Broken Hill for flotation, and t Great Falls, Montana, for electroylytic treatment.

Electric power will be obtained from the Mt. Lyell plant, and fron a 15,000-h. p. plant to be erected at Lake Rolleston, near Zeehan. Late i 1919 it was proposed to erect electrolytic works at Zeehan, with an initia capacity of 50 tons of zinc daily.

Production: total prior to 1916 was 280,000 tons of ore for £354,000.

FEDERATION TIN MINE, N. L. TASMANIA

Address: South Heemskirk District, Tasmania.

Inc. 1919. **Cap.** £120,000; £1 par.

Property: an old tin mine in the Western Mining Division of Tasmania idle for several years. In Oct., 1919, preparatory work was commenced wit 17 men. During 1920, new work amounted to 3,000′ of prospect trenches 626′ of levels, and 228′ of shafts and winzes said to prove 57,700 tons of 1% ore and 450,000 tons probable ore.

Equipment: 40-head battery. A tramway from the mine to Zeehan 11½ miles, is being constructed.

KING ISLAND SCHEELITE CO. TASMANIA

A subsidiary of Broken Hill Block 14 Co.

Office: John Brandon, sec., 31 Queen St., Melbourne, Victoria, Australia Alex Campbell, chairman of board of directors. J. Venn-Brown, mgr.

Inc. March, 1917, in Victoria. **Cap.** £50,000; 10/- par; all issued; 6 paid; 39,450 shares owned by Broken Hill.

Report for half year ended March 31, 1921, showed a loss of £4,039 credit from reserve, £5,000; credit balance forward, £5,692; liquid assets £10,276; liabilities, £1,382.

Report for half year ended Sept. 30, 1920, showed a loss of £1,902 credit balance, £4,731. Previous half year showed a net profit of £5,911 credit balance, £8,526.

Dividends: No. 5 1/ paid Dec. 16, 1920.

Property: 153 acres at Grassy, King Island, Bass Strait, between Vic toria and Tasmania, Australia. The orebody consists of scheelite wit garnet in a metamorphosed limestone and schist, and is somewhat simila to that near Bishop, Invo county, Calif. The ore as mined averages fron 0.8 to 1.1% tungstic acid.

Development: by 300′ tunnel, with a 190′ back at the face. Mining i by open-cut work, using a 2½-yard steam-shovel. Reserves are estimate at 780,000 tons. Overburden is moved at cost of 1/11 (46c.) per cubic yard

Equipment: includes a 100-ton gravity concentrating plant; cottages school, etc.

Production: in 1919-20, 27,832 tons of ore yielded 199 tons of concen trate scheelite worth £43,181; in 1920; 20,705 tons, yielded 172 tons concen trate. During first half of year costs were 14s. 6d per ton of crude ore

nd during second half, 20s. 4d per ton, with a recovery of 79.5% and 90.5% espectively. The mill was closed down July, 1920.

MAGNET SILVER MINING CO. TASMANIA

Address: R. G. Hales, mgr., Waratah, Tasmania.

Property: a large silver-lead mine in northwestern part of Tasmania.

Geology: the Magnet lode is the hanging-wall portion of a dike of ultra-basic igneous rock which is known as websterite-porphyry. The dike runs N. E.-S. W. and dips N. W. The lode is made up of a number of parallel bands of galena, alternating with siderite and dolomite, forming a lode or belt that averages 40′ in width with a maximum width of 100′. The mine workings have three parallel drifts on each level, in order to mine the three baystreaks or veins. The galena contains some blende. The precious metal content was high in the upper part o the lode—averaging $2 gold p. ton, and 4 oz. of silver for each unit of lead. This zone of enrichment persisted downward to considerable depth, fading into leaner primary ore, with an increasd amount of blende. Siderite, dolomite, and calcite compose the gangue, quartz being absent. The ore carries some of the rarer lead and antimony minerals.

Development: by 1,200′ main shaft with 14 levels. Shaft sinking was continued during 1919, a depth of 220′ below No. 12 level being reached. The lode was cut on No. 13 at 330′ from the shaft. Good ore was opened.

Equipment: 650-h. p. hydro-electric power plant, two 75-h. p. motor-driven centrifugal pumps of 12,500 gal. per hour capacity on No. 13 level, one 155-h. p. hoist, and concentrator. About 80 men employed in 1920.

Production:

	1918	1919	1920*
Ore treated, tons	10,455	11,615	3,741
Concentrates, tons	2,099	1,371	197.5
Lead, long tons	700	528	26.3
Silver, ounces	136,166	98,625	44,447
Gross value	£49,436	£32,777	.....
Men employed	150	138	.....

*Half year.

MT. BISCHOFF EXTENDED TIN MINING CO. TASMANIA

Offices: John Ditchburn, sec., 17 Queen St., Melbourne, Victoria, Australia; and Box 4, Waratah, Tasmania. H. B. Schell, mgr.

Directors: H. W. C. Smith, chairman; A. T. Robb, D. McRorie, M. J. Sheehan, and J. H. Gillies.

Inc. April 20, 1905, in Tasmania and Victoria. **Cap.** £16,000; shares 10/-par; all issued.

Half year ended March 31, 1921, showed a loss of £4,133; debit balance, £2,723.

Dividends: total 4/- per share, equal to £6,400.

Property: 433 acres at Waratah, Tasmania, containing a tin-bearing fissure vein cutting through slate, quartzite, and porphyry. Ore carries 1% of tin, and occurs in a 12″ streak.

Development: by 3 crosscut tunnels, 1,600, 1,200 and 720′ long, the lowest with a 1,000′ back. Total work aggregates about 30,000′. Reserves total 31,000 tons of ore blocked out, plus 24,000 tons probable ore, assaying 0.96% tin.

Equipment: includes steam power plant, two 450 cu. ft. compressors, 3 centrifugal pumps, 1,900′ incline haulage tram, a 20-stamp mill, with 4 concentrating tables treating 100 tons of ore daily, with a recovery of 69-72% of the tin content.

Production:

Year	Ore, tons	Tin oxide,* ton
1920-21**	2,723	30
1919	23,677	210
1918	14,690	165
1917	13,723	182
Total to date	145,458	1,807

**Six months to March 31.
*The oxide contains 70.63% tin.

The mine was closed down, February, 1921.

MT. BISCHOFF TIN MINING CO. TASMANIA

Offices: H. Ritchie, mgr., 51 George St., Launceston; and Waratah, Tasmania.

Officers: L. G. Thompson, chairman; A. Evans, F. P. Hart, J. L. Craw, J. B. Waldron, Jr., directors. C. W. Gudegon, gen. mine mgr.; F. B. Jackson, smelter mgr.

Inc. 1872, in Tasmania. **Cap.** £60,000; shares £5 par; all issued; 4,400 fully paid, and £7,600 £1 paid-up, making paid-up capital £29,600.

Balance sheet for half year ended Dec. 31, 1920, shows operating profit, £3,414; dividends, £4,500; total assets, £104,816; credit balance, £71,017.

Dividends: to June 30, 1921, £211 15s per share.

Property: a tract of tin-bearing lands at Waratah, West Coast region of Tasmania, which shows an orebody surrounded by a semi-circular dike of barren eruptive rock cutting through pyritized slate.

Mining in this wet region, in which the rainfall is 80 inches a year, is by opencut work. Ore reserves: (Jan. 1, 1921) 253,850 tons positive ore and 259,900 tons probable; average grade, 0.353%.

Equipment: includes a complete mining plant, aerial trams, electric railway, power-plant, concentrating mill, shops, sawmill, and reverberatory smelter at Launceston, which treats both company and custom ore.

An average of 250 men employed

Production: to end of 1919, 75,968 tons of tin oxide valued at £5,224,608.

	1919	1920
Ore treated, tons	102,187	108,218*
Aver. recovery, %	0.257	0.259
Concentrates, tons	415.3	434
Value of output	£74,692	.....

*4,921 tons from tributers.

The mine was closed down, October, 1921.

MOUNT LYELL MINING & RAILWAY CO., LTD. TASMANIA

Head office: Collins House, Melbourne, Australia. **London office:** Palmerston House, Old Broad St., London, E. C. 2, England. **Operating and works office:** Queenstown, Tasmania. **Mine office:** Gormanston, Tasmania. **Chemical works:** Melbourne, Victoria; Fremantle, Western Australia.

Bowes Kelly, chairman of board of directors; A. Williamson, chairman of London board: D. G. Lumsden, sec.; W. G. Moss, asst. sec., Melbourne office. Edwin Habben, London, sec. **Staff:** Robt. C. Sticht, gen. mgr.; Robt. P. Roberts, chief metallurgist; R. M. Murray, mine supt.; G. F. Jakins, asst, mine engr.; G. W. Wright, mech. engr.; H. J. Clark, engr. for supplies; Thos. W. Haynes, business mgr. of chemical works.

Inc. August 11, 1903, in Victoria, as a merger of a former company of the same name, (formed in 1893), with the North Mount Lyell Copper Co., Ltd. **Cap.**, £1,300,000; shares £1 par; 1,289,195 issued. Annual meeting in December.

Financial Statement, years ending September 30:

Year	Net profit	Dividends	Current assets	Current liabilities
1921	£51,830	.....	£980,884	£472,455
1920	76,008	193,379	1,095,023	561,160
1919	130,233	80,575	1,070,553	367,673
1918	247,229	209,494	1,066,514	442,660
1917	268,611	161,149	1,176,182	633,186

Dividends: began in 1904. In recent years were: £64,460 in 1914; £145,034 in 1915; £209,494 in 1916; £209,494 in 1917; £161,150 in 1918; £128,919 in 1919; £64,460 in 1920. Total £2,833,433. The old company paid dividends of £996,574, making total dividends, to end of 1920, £3,830,007.

Operations of the company include mining and smelting copper ore in Tasmania, and the manufacture of acid and superphosphates in the States of Victoria and Western Australia, also the manufacture of coke in New South Wales. The operations of the company are of a high technical order.

The Electrolytic Zinc Co. has acquired the holdings of the Mt. Read & Rosebery Co.; upon liquidation of the latter company. Mt. Lyell will own 216,470 dfd shares of Elec. Z. and 102,149 cum. pfce. shares.

Property: 2,124 acres, inclusive of 5 consolidated claims, leased for 21 and 30-year periods, and 565 acres of mill and smelter sites, in the Mt. Lyell district. The principal mining operations at Gormanston, in the Mt. Lyell district, on the west coast of Tasmania, 14 miles in an air line from the post of Strahan, on Macquarie harbor.

The Mt. Lyell pyritic orebody was discovered 1882, but its value for copper was not then recognized. Other mines in the same district were unsuccessful, though the value of the North Mt. Lyell mine was recognized in 1897, but it was not profitable until it was merged in the present company in 1903. Owing to the silicious nature of the North Lyell ore, neither concentration nor smelting was succesful and the undertaking was a failure financially after the expenditure of about £800.000. The amalgamation of the 2 mines, effected 1903, gave a single magnificent property, the pyritic ore of the Mt. Lyell and the silicious ore of the North Mt. Lyell being natural smelting complements.

Geology: rocks of the Mt. Lyell mine are hydromica schist conglomerate quartzite and sandstone, with mineralization occurring along a schist-conglomerate contact that is a crush-zone formed by an overthrust fault. The orebody is a huge lenticular mass. measuring 270′ wide by 660′ long, on the 4th level, with a vertical depth of 800′. This lens originally contained 6.500,000 long tons of ore, but about two-thirds of it has been extracted. The ore as now mined average 0.54% copper, 1.96 oz. silver and 0.04 oz. gold per ton; it is an ordinary pyrite, carrying up to 12% silica, 2% alumina, and 2.5% barium sulphate, with a very little zinc and a trace of lead.

The copper content occurs as chalcopyrite and tetrahedrite, disseminated through the pyrite. On the southern end of the orebody there was an enrichment, consisting of chalcopyrite and bornite, with some chalcocite, in a silicious gangue, which commenced 350′ below the surface and persisted to within 150′ of the bottom of the lens. In about the center of the footwall side a second enrichment was found, commencing 100′ below the surface, and extending downward for 75′. In 1894 this high-grade ore streak yielded 850 tons of this ore, which was enriched by stromeyerite, and ran 21% copper, 1.010 oz. silver and 0.1 oz. gold per long ton. This bonanza oreshoot netted the old company £105,000.

Development: the orebody is opened by shafts with 10 levels, in 8 of which crosscuts and contour drifts encircle it. The 5 upper levels are obliterated by an enormous open-cut, from which the ore is extracted in a

series of benches with simultaneous removal of overlying or underlying country rock, the ultimate bottom of the quarry being the fifth level, 450' below the surface. Only underground extraction is feasible below the fifth level. A vertical 400' shaft sunk underground from the fifth level and an incline shaft open up the lower levels. Depleted stopes are filled with waste from the schist and conglomerate overburden.

The South Lyell orebody, though smaller and without outcrop, and lower in metal content is similar to that of Mt. Lyell. It lies 300' S. of the Mt. Lyell, not connected. Its top is 350' below the surface and it is proven for 500' downward, or 150' below the lowest level in the Mt. Lyell mine; its further extension is being explored. The orebody has been developed from the Mt. Lyell workings on each of the 5 lower levels, and it is now worked as a part of that mine.

Combined reserves in the Mt. Lyell and South Lyell mines are:

Year	Tons	Copper, %	Silver, oz.	Gold, oz.
1921	1,711,088	0.50	1.50	0.04
1920	1,802,509	0.50	1.50	0.04
1919	1,910,388	0.50	1.50	0.04
1918	2,028,747	0.49	1.48	0.04
1917	2,013,439	0.50	1.60	0.04
1916	1,815,505	0.53	1.96	0.04

The daily production during 1920 was 400 tons, compared with 1,000 tons in previous years; South Lyell contributed 200 tons.

During the year ended Sept. 30, 1920, the mines produced 107,685 tons of ore, principally from underground workings, the lower benches of the open-cut supplying only a minor amount. In 1921 the Mt. Lyell output was 91,421 tons, all from underground work, averaging 0.40% copper; 0.91 oz. silver and 0.040 oz. gold.

Equipment: all machinery is electrically operated, with current from the company's Lake Margaret hydroelectric power station, 7 miles distant. The incline shaft raises all ore from the mine by an electric hoist geared to a 200-h. p. induction motor, current 550 volts, having capacity of 600 tons in 8 hours. Self-dumping skips containing 3 tons of ore are used. Compressed air is supplied by 3 high-speed compressors with an aggregate capacity of 3,600 cu. ft. of air per minute at 90-lb. pressure, direct coupled to 300-h. p. synchronous motors taking current at 3,000 volts. The air supply is diverted, when required, to the North Lyell mine by means of a 6,000' pipe-line. Mine water is lifted by 3-throw electrically-driven pumps, capacity 100 g. p. m. There are 2 units in the station, though one is sufficient to handle the normal flow of water. The drill shop is equipped with machine sharpeners and there is a complete machine shop.

North Mt. Lyell Mine.

Geology: the North Lyell ore contains bornite and chalcopyrite with some chalcocite and occasional tetrahedrite, all associated with a small amount of pyrite. The ore lies on the contact between schist and conglomerate, which are intensely silicified and pyritized on each side of the contact plane. Very rich ore, carrying up to 60% copper, as bornite and chalcocite frequently occurs. Only one of many closely-associated orebodies—more properly called enrichments in the mineralized coutact zone—outcropped at surface. The other and more important bodies, are first seen on the 500' level, where the dip of the conglomerate is reversed. The oreshoots follow the hanging wall, lengthening rapidly with depth, until in the lower levels, they form an almost continuous orebody some 1,500' long,

and varying in width up to 100′. The character remains unchanged down to the 1,200′ level, except that the amount of chalcocite is increasing. The North Lyell ore as broken, averages 6% copper and 1.33 oz. silver per long ton, with a trace of gold. The gangue averages 66% silica, 7% iron, and 7.5 to 11% alumina.

Development: this mine opened by both tunnels and shafts. The upper tunnel, or 200′ level, is the main entry. The lower tunnel is the 300′ level. There are 9 other levels, opened from the shaft, the lowest being the 1,200′. Filling for depleted stopes is brought from surface by means of 3 main waste pass systems.

Ore reserves:

Year	Tons	Copper, %	Silver, oz.	Gold, oz.
1921	1,095,981	6.0	1.33	0.05
1920	1,013,518	6.0	1.33	0.05
1919	960,242	6.0	1.33	0.005
1918	1,036,300	6.0	1.33	0.005
1917	997,900	6.0	1.33	0.005
1916	1,140,340	6.0	1.33	0.005

The North Lyell has excellent prospects of finding further orebodies, and the ore is not only persistent to the greatest depth yet reached, but is high in copper; although too siliceous for straight smelting, it blends with the pyritic ore of the Mt. Lyell to make an ideal smelter charge.

Equipment: the main North Lyell shaft has a 400-h. p. electric hoist, good for 1,500′ depth; the other shafts have air-driven hoists, at 90-lb. pressure. The mine water is very corrosive, and is lifted by 3-throw plunger pumps of 100 g. p. m. capacity, in 2 lifts of 400′ each.

Output for year ended Sept. 30, 1920, North Lyell produced 73,781 tons of ore averaging 6.45% copper, 1.11 oz. silver, and 0.01 oz. gold. In 1921, the output was 98,556 tons of ore averaging 6.66% copper, 1.24 oz. silver and 0.012 oz. gold.

The Lyell Tharsis mine, contiguous to the North Lyell, contains a large quantity of low-grade cholritic schist, carrying disseminated chalcopyrite and pyrite; it is not being worked.

The South Tharsis and Royal Tharsis mines are idle. These properties carry chalcopyrite and pyrite, disseminated sparingly in schist. The Mt. Lyell Comstock property, 339 acres, is contiguous to the North Lyell, and contains the northern extension of its orebodies as well as a separate deposit of ore. The ore is chalcopyrite in schist, the mine producing 50 tons daily, averaging 2.17% copper.

A new property recently acquired, is the Mt. Lyell Blocks mine, contiguous to the North Lyell on the E., though without commercial orebodies, has a 1,300′ shaft useful to the North Lyell. The 1921 output was 6,452 tons assaying 3.27% copper; 0.34 oz. silver and 0.031 oz. gold.

Reduction Works and Accessories.

A 1½ mile aerial ropeway can transport 1,000 tons ore daily from the Mt. Lyell mine to the smelter. There also is a 4,500′ incline surface tram, connecting with a ¾ mile 2′ gauge steam railway to the smelter, also serving for the delivery of North Lyell ore, and for general traffic.

The company owns a 22-mile railway that connects the Queenstown reduction works with the seaport of Strahan, giving rail connections with all parts of the State. A second line connects Gormanston with Kelly basin, near the head of Macquarie harbor, 25 miles from Strahan.

Power-plant: a model hydroelectric station at Lake Margaret is connected with the reduction works by 6 miles of 2' tramway.

Smelter: the reduction works are at Queenstown on the Queen river, 1½ and 2½ miles from the Mt. Lyell and North Lyell mines, respectively. The first permanently sucessful pyrite smelting ever accomplished was done here in 1896, under the direction of Robert Sticht.

The smelter has four 54 and 210" blast-furnaces, 29¾' high from tapping floor to feed floor, with box type cast-iron water-jackets, and of solid construction, suitable for pyrite smelting. The furnaces have special mechanical feeders and lifts, hydraulically operated.

The charge, averaging 6% copper, is brought to a matte containing 35-40% in one operation. Slags average 0.40% copper, 35 to 38% silica, 42 to 48% iron protoxide, 6.5% to 7.5% alumina, 1.5 to 2% barium oxide, and 4% calcium oxide.

The amount of coke used was formerly as low as 1% or less, but is now from 3 to 5% as the charge contains less pyrites than formerly.

Owing to much increased mining costs at the Mount Lyell the use of pyrite from that mine is restricted to a minimum. To permit this, the North Lyell ore is hand picked so as to secure a richer direct smelting product, and the fine and reject are concentrated (by jigging and flotation) for the elimination of silica.

Flotation concentrate and flue-dust are either sintered or treated in a nodluizing plant, preparatory to blast furnace smelting.

The furnaces have a stationary oval, sheet steel, chrome-brick lined forehearth, 19' long, cooled by water sprays. This is followed by the older rectangular, uncooled cast-iron forehearths, from the last of which the slag flows into a stream of water for granulation, and is lifted to the dump by means of centrifugal pumps.

A new converter plant, erected in 1918, contains 2 Great Falls upright type vessels, 10' in diameter and 11' 7" high, electrically operated.

The final product, blister copper carrying 99% copper, 36.7 oz. silver, and 1.13 oz. gold per long ton, is refined by the Electrolytic Smelting & Refining Co. at Port Kembla, New South Wales.

The flotation plant is treating about 300 tons daily of 4% copper ore, recovering 90% of this metal and making a 15% concentrate.

Company owns acid and fertilizer plants, all having Herreshoff calciners, sulphur burners, and the ordinary chamber process for making sulphuric acid. Crude phosphate rock from Ocean and Christmas Island is made into a variety of superphosphates and commercial fertilizers, the demand for which is rapidly increasing in Australia. The raw material for acid is furnished by Spanish pyrite, and sulphur from Japan and Italy. Unfortunately, it is as yet commercially impracticable to utilize the sulphurous acid fumes from the Mt. Lyell smelter, because of the high freight rates, either in carrying the acid away from Mt. Lyell, or bringing in the crude phosphate rock. The superhosphate works are in Victoria and Western Australia.

The company employs about 1,700 men in Tasmania; about 850 men at the mines, 150 on the railways, and 700 at the reduction works.

Costs: average cost of mining, smelting, and converting, from 1896 to 1903, was 22/10 ($5.48) per ton, and by this company for 6 years ending 1909 the total mining and smelting cost per ton was 14/10 ($3.56).

The past few years show the following cost per ton of ore:

Year	Mining	Smelting	Converting	Total
1920.....	12/2	22/1	2/1	45/4
1919.....	16/4 ($3.88)	17/3 ($4.10)	1/8 ($0.40)	35/3 ($8.39)
1918.....	13/1 (3.14)	14/1 (3.38)	2/-- (0.48)	29/2 (7.00)
1917.....	12/3 (2.94)	12/3 (2.94)	2/--(0.48)	26/6 (6.36)
1916.....	10/5 (2.50)	11/6 (2.76)	1/7 (0.38)	23/6 (5.64)

Recent advances are due to increased underground work, high cost of supplies, higher wages and scarcity of labor.

Production: the present output is less than the normal tonnage treated. The total production from 1896 to September, 1920, was 7,336,021 tons of ore, yielding 167,135 tons of copper, 12,742,385 oz. silver and 370,462 oz. of gold. Of this ore tonnage, Mt. Lyell contributed 5,189,241; North Lyell, 1,763,126; Lyell Comstock, 13,032; concentrates, 31,642; purchased ores, 168,504, and metal-bearing fluxes, 170,476 tons. The total production in 1921 was 196,429 tons of ore, compared with 192,925 tons in 1920.

Recent returns are as under:

	Ore Smelted, tons	Copper, tons	Silver, oz.	Gold, oz.
1921.....	152,732	5,786	178,380	4,744
1920.....	169,649	4,536	168,109	5,164
1919.....	185,177	5,314	266,864	5,538
1918.....	240,947	5,705	320,344	7,042
1917.....	239,940	5,766	295,126	7,455
1916.....	158,663	6,505	371,170	8,865

The Mt. Lyell enterprise has had to contend with a series of grave financial, mining and metallurgical problems, all solved with skill and success. The geographical isolation has always been a great drawback. A serious handicap is the heavy rainfull, averaging 110" yearly, hampering surface operations. Of late years the lowgrade porphyry mines have deprived Mt. Lyell of the distinction of handling the lowest average grade of copper ore in the world, but for combined mining and smelting concerns it probably still enjoys this unenviable, but highly creditable record. The management is excellent, in all departments, and the success of the company is due to an effective combination of financial ability with high technical skill.

MT. READ & ROSEBERY MINES, LTD. **TASMANIA**

Company in liquidation. Assets sold to **Electrolytic Zinc Co. of Australasia, Ltd.**, which see.

MOUNT ZEEHAN (TASMANIA) SILVER-LEAD MINES, LTD. **TASMANIA**

Address: T. H. Vincent, mgr., Mount Zeehan, Tasmania.
A. D. Foggio, sec., 5 Bucklersbury, London, E. C.

Inc. 1889. **Cap.** £275,000; £1 par; 41,982 pfce. and 151,140 ord. shares issued. Report for year ending June 30, 1921, showed a loss of £18,217; debit balance, £31,227.

Property: 584 acres, silver-lead claims operated by tributers. Company also owns shares in Dundas Cuni (10,600) and Zeehan Queen (21,000).

NORTH MOUNT FARRELL MINING CO. **TASMANIA**

Address: O. B. Williams, gen. mgr., Tullah, Tasmania.

Report for half year ended June 30, 1921, showed an operating loss of £3,674; debit balance, £2,163.

Property: a lead-silver mine in West Coast district of Tasmania, opened by shaft and 5 levels. On No. 4 level the north drift, out 580', opened an average of 11' of good ore.

Equipment: includes a concentrating plant.

Reserves estimated at 20,270 tons developed and 5,580 tons probable ore.

Production: in 1919, 5,462 tons yielded 929 tons of concentrate, containing 49,572 oz. silver and 1,142,400 lb. lead, valued at £12,453.

The total to Dec. 31, 1919, is 46,384 tons of ore, 2,375,884 oz. silver, and 53,804,800 lb. lead, worth £436,843 net.

PIONEER TIN MINING CO. TASMANIA

Address: C. G. Ryan, Bradshaw's Creek, Tasmania.

Property: the Argonaut and Pioneer mines, working alluvial tin ground by blasting and hydraulicking. Company has an hydro-electric plant, which generates power at 0.05 pence (0.1 cent) per unit. To bring in more water for sluicing company laid a 28" wood pipe 2,750' long.

Profit for year ended June 30, 1920 was £34,219, of which £28,217 was distributed.

Pioneer Mine.

Production:

Year ended June 30—	Yardage	Cost per yard	Stream tin recovered tons	Per yard
1920	481,200	4.855d.	302	.965lb.
1919	534,800	6.162d.	272	1,240lb.
1918	702,600	6.974d.	266	1,240lb.
1917	894,700	4.487d.	471	1.179lb.
1916	996,000	3.846d.	444	0.999lb.
1900-20	10,395,500	5.915d.	7,288	1.570lb.

Argonaut Mine.

1920	76,300	9.073d.	27.00	.792 lb.
1919	127,700	7.703d.	43.437	.815 lb.
1918	114,200	7.373d.	41.763	.864 lb.
1917	142,000	6.074d.	51.998	0.893 lb.
1916	101,000	8.061d.	47.748	1.051 lb.
1913-1920	849,600	6.623d.	325.448	8.58lb.

ROYAL GEORGE TIN MINING CO. TASMANIA

Address: A. R. Fowler, mgr., Avoca, or Launceston, Tasmania.

Property: a lode tin mine in the Eastern Mining Division, 12 miles from Avoca. Ore is concentrated in a plant driven by a 220-h. p. suction gas producer engine. In 3 months to April, 1919, 3,223 tons of ore yielded 34½ tons of tin oxide worth £4,726. Output in 1920 from 18,667 tons was 89 tons tin oxide worth £14,808.

TASMAN & CROWN LYELL EXTENDED MINES TASMANIA

Office: W. B. Arnold, sec., 39 Queen St., Melbourne, Victoria, Australia. F. S. Fitchett, chairman of board of directors; D. W. Welch, supt.

Inc. in Victoria. **Cap.**, £150,000; shares 10/-par; all issued.

Revenue from ore sales for 9 months, ending June 1, 1919, was £1,334, and expenses £3,690.

Property: in Mt. Lyell district, Tasmania, contains lenticular contact deposit in schist, the ore being a sulphide that assays 30% lead, 20 oz. silver, 20% zinc, with some iron.

Development: by 1,800' of tunnels, reaching depth of 240'. Reserves are 20,000 tons above the 120' level.

Equipment: includes a concentrating plant, to which flotation is to be added.

Mine was practically closed in April, 1919, due to unsuitability of the mill, and a desire to do more exploration below the 120' level.

TASMANIA GOLD MINE, LTD. **TASMANIA**

After producing gold of a total value of £3,610,180, and paying £772,671 in dividends, this property at Beaconsfield, near Launceston, has been cleaned up and the company liquidated.

VICTORIA

BENDIGO AMALGAMATED GOLDFIELDS, LTD. **VICTORIA**

Succeeds Bendigo Amal. Goldfields, N. L.

Office: Commonwealth Chambers, Bendigo, Victoria, Australia. A. H. P. Moline, gen. mgr.; J. G. Stanfield, mgr.; B. V. Barton, asst. mgr.

Company was re-constructed May, 1921 as a Limited company. Stockholders receiving pro rata amount of new shares and 1s. per share return of capital. **Cap.** £750,000; 7s 6d par; 1,519,038 shares paid up to 5/2, reduced to £350,000; 10/ par; 607,615 shares issued as fully paid.

Financial Statement: for 11 months ending May 31, 1921, operations showed a profit of £52,929; surplus of liquid assets over liabilities, £127,665; (£75,951 has since been paid to old stockholders as return of capital). The previous year to June 30, 1920, showed a net profit of £110,881; dividend, £44,226; surplus liquid assets, £76,178.

Property: this company was organized in 1917 to consolidate about 40 old producers in the center of the Bendigo Goldfield (which has yielded over 18,000,000 oz. since 1850), explore them systematically by new openings and diamond-drilling, and equip them, if warranted, with modern plant. Operations are concentrated at a number of central points. Eight lines of "reef" are included in the area, ranging from 4,500 to 22,000 ft. in length, totaling 93,900 ft. Most of the shafts are over 2,000 ft. deep, some being over 3,000 ft.

Development: new work in 1921 (to June) totaled 16,260'. Continuous geologic examination is made, as the structure of the field is complex. A number of minor discoveries were made, bu no high-grade shoots of any extent were found. Tributers are at work in certain parts of the mines.

Equipment: includes 30 hoists, 3 compressor stations capable of generating enough air for 150 to 180 drills, and stamp-mills of 566 tons daily capacity.

Production: for year ended May 31, 1921, was 81,852 tons company ore yielding 43, 853 oz. gold, and 13,586 tons tributers yielding 4,666 oz. gold, an average of 10.09 dwt. per ton. Output for previous year was 102,194 tons, averaging 12 dwt.

BRISEIS TIN & GENERAL MINING CO., LTD. **VICTORIA**

See same title under Tasmania for office, etc.

COCK'S PIONEER GOLD & TIN MINES, N. L. **VICTORIA**

Office: E. H. Shackell, Collins House, Melbourne, Victoria, Australia.

J. L. Wharton, chairman of board of directors. H. Falconer, gen. mgr., Eldorado, Victoria.

Inc. May 14, 1913, in Victoria. **Cap.** £150,000; £1 par; 100,000 issued.

Financial report for half year ended Nov. 30, 1921, showed an operating loss of £6,500; dividend No. 12, £5,000; surplus liquid assets over liabilities, £6,753.

Dividends: 5% in 1915; nil in 1916; 15% in 1917, 1918, and 1919; 10% in 1920; 5% in 1921. Total to date is £60,000.

Property: 752 acres of alluvial ground on Eldorado creek, 13 miles from Wangaratta, Victoria. Equipped with hydraulicking plant, capable of handling 880,000 cu. yd. per annum.

Production:, in recent half-years:

Period	Yardage	Gold, oz.	Tin, tons	Cost per yd.
1921 (Nov. 30)	247,300	1,658	21	.....
1921 (May 31)	432,000	3,896	41	.....
1920 (Nov. 30)	503,000	3,422	44	6.53d
1920 (May 31)	254,000	2,256	29	8.52
1919 (Nov. 30)	443,000	4,023	49	8.71
1919 (May 31)	462,000	3,786	52	.....

Management estimated (Nov. 30, 1921) the life of the mine at 12 years, including the south side section, 68¾ acres, which contains 8,250,000 cu. yd.

MINERALS SEPARATION & DE BAVAY'S PROCESS. VICTORIA AUSTRALIA PROPRIETARY, LTD.

Office: E. H. Shackell, sec., Collins House, Melbourne, Victoria, Australia.

Directors: W. L. Baillieu, chairman; A. E. Bright, M. Cohen, C. F. Courtney, and J. L. Wharton.

Inc. June 27, 1912, in Victoria, to acquire the Australian and New Zealand rights to the Minerals Separation, Ltd., De Bavay's Sulphide Process Co., Ltd., Potter's Sulphide Ore Treatment, Ltd., and Amalgamated Zinc (De Bavay's), Ltd., patents.

Cap. £300,000; shares £1 par; 265,000 issued.

The year ending June 30, 1920, showed a loss of £6,303, as a result of the industrial dispute at Broken Hill.

Dividends: 10% in 1912; 13¾% in 1913; 5% in 1914; 7½% in 1915; 10% in 1916; 10% in 1917; 6¼% in 1918; 10% in 1919.

Company grants licenses to use its process on royalty basis.

SOUTH NEW MOON GOLD MINING CO., N. L. VICTORIA

Office: G. H. Green, High St., Eaglehawk, Bendigo, Victoria, Australia.

H. R. Williams, chairman board of directors. Wm. Williams, supt.

Inc. in Victoria. **Cap.** £32,000; shares £1 par; all issued; 17/7 paid. **Dividends:** £16 8/6 per share.

Property: a gold mine in Bendigo field.

Development: by vertical shaft 2,010' deep, and extensive workings.

Equipment: steam power, hoist, 20-drill compressor, and 40 stamp-mill.

Production: totals 447,585 tons, yielding 245,030 oz. gold. The mine is operated by tributers, 1921.

WESTERN AUSTRALIA

ASSOCIATED GOLD MINES OF WESTERN AUSTRALIA, LTD.

Office: R. Davidson, sec., 20 Copthall Ave., London, E. C., England. **Mine office:** Kalgoorlie, W. A.

Directors: E. Hooper, chairman; D. F. McAulay, gen. mgr.

Inc. Dec. 19, 1894, in England. **Cap.** £500,000; shares £1 par; 495,364 issued. Company is heavily interested in the **Porcupine V. N. T. Gold Mines, Ltd.**, and **Keeley Silver Mines, Ltd.**, (681,603 shares). See descriptions of these companies in the Ontario Canada section of this book.

Revenue for the year ended March 31, 1918, was £103,660, but there was an operating loss of £746, and debit balance is now £8,577. In 1919 the loss was £9,991. Cash assets were £43,893 at the end of 1919, and liabilities, £8,426; £36,602 was spent on the Keeley mine in Ontario. For 1920, profit was £9,704; debit balance, £8,964. For 1921 there was a net profit of £25,624; credit balance, £16,760.

Dividends: from 1898 to 1909 totaled 150%. In 1913 and 1914 2½% each; nothing since. The total is £703,833.

Property: 54 acres on the "Golden Mile," Kalgoorlie, W. A. which has

produced a large amount of gold, especially from 1898 to 1914. Ore is a sulpho-telluride.

Development: by 2,200′ vertical shaft and extensive workings.

Equipment: complete mining, hoists, compressors, electric power. Mill is a 350-ton plant using crushers, ball-mills, roasters, pans, cyaniding equipment and filter-presses.

Production: for the year ended March 31, 1917, was £124,611 from 93,430 tons, compared with £103,579 from 81,528 tons in 1918; £101,510 from 71,603 tons in 1919; in 1920, 54,484 tons realizing £95,940; 64,462 tons in 1921, valued at 28/4 per ton and realizing £121,614.

BLOCK 50 COMPANY, LTD. **WESTERN AUSTRALIA**

Successor to **Celebration Syndicate.**

Address: Wm. Thomas, sec., Kalgoorlie, W. A.

The Syndicate is composed of P. Fitzgerald, A Francis, Richard Hamilton, John McDermott and J. W. Sutherland, mining engineers of Kalgoolie.

Property: an option on a mine on Block 50 of Hampton Properties, Ltd., which see for full description. Gold deposit was discovered about mid-1919, and by November the reserve was estimated at £100,000. The lease was acquired by Lionel Robinson, Clark & Co., who floated a company in London called Hampton Celebration (W. A.), Ltd., which see. The purchase price was £25,000 cash and £75,000 in shares.

BULLFINCH PROPRIETARY (1919), LTD. **W. A.**

A reorganization of Bullfinch Proprietary (W. A.), Ltd.

Office: C. Hay, 20 Copthall Ave., London, E. C. 2, England.

Sir G. P. Doolette, chairman of board of directors. A. L. Hay, mgr.; Bewick, Moreing & Co., gen. mgrs.

Inc. December, 1919, in Great Britain. **Cap.** £175,000; 5/ par; 507,094 shares issued.

Property: 162 acres in the Bullfinch field, near Southern Cross; and 4 leases at Wombola on Hampton Plains, 10 miles S. E. of the Celebration Lease on Block 50, acquired late in 1919. Also, an option on 2 sq. miles of gold placers at Jebba, Northern provinces of Nigeria. Reported early in 1922 that prospects were not encouraging.

Development: at Bullfinch by shaft to 510′. Reserves were estimated to be 80,000 tons, averaging 21/- ($5.04) per ton.

Equipment: hoist, compressor, shops, 20 stamps, 2 tube-mills, cyanide plant.

Production, years ended Sept. 30:

Year	Tonnage	Gold yield	Profit	Cost per ton
1921.....	27,430	£ 25,882	£ 8,843*	21/5 .....
1920.....	70,250	67,314	5,806	20/1 .....
1919.....	40,904	40,683	.....	19/4 .....
1918.....	57,609	60,412	4,638	.....
1917.....	62,004	61,266	3,468	17/- ($4.08)
1916.....	71,360	76,863	8,300	16/5 (3.94)
1915.....	76,886	100,035	40,000	15/7 (3.67)
1914.....	74,398	109,478	49,000	16/2 (3.81)
1913.....	52,679	143,809	94,700	18/8 (4.40)

*Deficit.

Operations suspended, March, 1921, owing to increased wages and cost of supplies.

BULLFINCH PROPRIETARY (W. A.), LTD. **W. A.**

Reorganized December, 1919, as the Bullfinch Proprietary (1919), Ltd., which see.

CELEBRATION SYNDICATE **WESTERN AUSTRALIA**

Now **Block 50 Company, Ltd.,** which see.

EDNA MAY CENTRAL G. MINES, N. L. **W. A.**

Address: Westonia, W. A.

Mine was flooded in 1921, pumps handling 60,000 gallon per hour, being unable to hold the inflow. On Nov. 28, 1921, company's shareholders decided to ask the State government for assistance as £13,000 was needed to install additional plant etc., and, if no help was given, to wind up the company.

EDNA MAY GOLD MINING CO. WESTERN AUSTRALIA

Address: Hugh Williams, gen. mgr., Westonia, near Southern Cross, Western Australia.

Inc. in Victoria. **Cap.** 42,850 shares of 10s. each.

Dividends: regular of 1/- (25 cents) per month were paid, the total to April, 1919, being £325,660, equal to £7 12/- per share.

Property: a gold mine at Westonia, in the Kunanalling district, Western Australia.

Development: by vertical shaft to depth of 480'. Water has been very troublesome, and up to 60,000 gal. per hour has been pumped.

Equipment: steam power, pumps, hoist, compressor, turbo-generator, shops, 10 stamps and cyanide plant.

Production: for 1918 was 20,022 oz.; for 1919 10,197 oz. and for 1920, 240 oz.

In October, 1919, operations ceased, owing to exhaustion of reserves.

FREMANTLE TRADING CO., LTD. WESTERN AUSTRALIA

Formed to acquire the business of the Fremantle Smelter, Ltd.

Office: E. H. Woolcott, sec., Salisbury House, London, E. C. 2, England.

Directors: E. P. Jones, chairman; A. E. Lund, and J. A. Morris. **Mine address:** W. G. Sutherland, gen. mgr., Freemantle, W. A.

Inc. July 28, 1909, in Great Britain. **Cap.** £75,000 in 45,000 pfce. and 30,000 ord. shares, £1 par, of which 26,100 pfd. and all ord. shares are issued and fully paid.

Accounts for year ending July 31, 1921 showed, receipts from pig lead sold, etc. £47,959 and operating expenses of £45,581. A loss of £6,367, deducting credit balance of £239, left debit balance of £6,128. Assets include, cash, £1,156; debtors, £4,140; stock on hand, £18,092; creditors, £5,702; bank overdraft, £7,478; mortgage debentures, £5,500.

Dividends: from 1909 to 1918, a total of 108% on pfce. and 48% on ord.; 10% on each in 1917-18; 1918-19, 15%; 1919-20, 10% on pfce. only; 1920-21, nil.

Property: 1,115 acres, near Northampton, W. A., including the Baddera Consol. lead mine, McGuire, Narra Tarra, and Wheal Ellen lead mine, and the Fremantle Smelting Works.

Geology: the mines are in a region of garnetiferous granitic schist, cut by dolerite and later pegmatite dikes, which contain nearly vertical quartz lodes, with orebodies a few feet to 30' wide. The Baddera lode carries galena only, the Wheal Ellen, galena and zinc blende. The ores are primary and expected to continue to much greater depth, than any existing workings.

Equipment: includes a concentrator at the mines, and a smelter at Fremantle.

Owing to slump in price of lead, the mines were closed from February to March, 1920 and smelting temporarily suspended April 29, 1921.

Production: in 1919, 25,139 tons mined contained 3,057 tons metallic lead. In 1920, 11,594 tons smelted, contained 852 tons lead. In 1921, 1,072 tons ore, etc., yielded 579 tons lead. Average price received was £29 10s. 9d in 1919 and £40 16s. in 1920. Production in 1920 was 14,804 tons from the Narra Tarra; 4,401 tons from the Baddera and 208 tons from the Wheal Ellen, containing 1,744 tons of lead. Total production to date is 9,469 tons lead from Narra Tarra, 13,888 from Baddera and 647 from Wheal Ellen.

The Baddera is practically exhausted.

GOLDEN HORSE SHOE ESTATES CO., LTD. W. A.

Office: A. Swanne, Salisbury House, London, E. C. 2, England.

Sir J. S. Purcell, chairman of board of directors. J. W. Sutherland, gen. mgr., Boulder, W. A.; V. H. R. Murray, mine supt.; C. E. Blacket, metallurgist.

Inc. Feb. 28, 1899, in England. **Cap.** £1,500,000; shares £5 par; all issued. **Debentures:** £5,400 of 6% outstanding.

Income Account for year ended Dec. 31, 1920, showed a profit of £65,489; dividends, £75,000; surplus, £22,082.

Dividends: since 1899 total £3,517,500.

Property: 109 acres on the Golden Mile, Kalgoorlie, W. A.

Development: by over 31 miles of workings.

Equipment: is complete and modern, including compressors, hoists, crushing plants, a 170-stamp mill with 5 tube-mills, concentrators and cyanide plants.

Ore reserves: estimated at 637,330 tons, containing 278,983 oz. gold (Dec. 31, 1920).

Production:

Year	Tons treated	Gold, oz.
1920	125,340	54,574
1919	105,588	47,584
1918	146,664	77,096
1917	176,028	95,660
1916	162,316	89,025

Total production to end of 1920, 4,253,635 tons, containing 2,688,840 oz. gold.

GREAT BOULDER PERSEVERANCE G. MNG. CO., LTD. W. A.

Mine being worked by tributers. Output to date is £6,737,614 from 3,466,930 tons, and £1,531,250 paid in dividends. Company is being liquidated. See Vol. XIII.

GREAT BOULDER PROPRIETARY GOLD MINES, LTD. W. A.

Office: J. Gregory, 80 Bishopsgate, London, E. C. 2, England.

Sir G. P. Doolette, chairman of board of directors. Richard Hamilton, gen. mgr.

Inc. June 20, 1894, in England. **Cap.** £175,000; shares 2s par; all issued.

Report for 1920 showed; total revenue, £428,713; operating cost, £215,712; depreciation, £25,000; taxes, £47,468; dividends, £131,250; surplus, £9,283.

Dividends: 112½% or £196,875 in 1918; 75% or £131,250 in 1919; 75% or £131,250 in 1920; a total sum of £5,794,300.

Property: 85 acres on the "Golden Mile," Kalgoorlie, W. A. In 1920 company acquired the O. K. mine at Norseman and work on the 200' level is reported to show satisfactory conditions.

Development: by vertical shafts, about 2,844, 2,879, and 2,000' deep, with extensive workings. Ore is a sulpho-telluride. Reserves at end of 1920 were placed at 245,187 tons, of 14¾ dwt. ore. Deep exploration was not successful, as the main lode passed into the adjacent Golden Horseshoe mine between 2,650 and 2,800' in depth.

Production: to end of 1919, totals £11,962,756 from 3,169,835 tons of ore containing 3,357,304 oz. gold.

Year	Ore, tons	Gold yield
1920	100,756	£428,713*
1919	106,952	312,786
1918	152,196	478,480
1917	182,265	528,049
1916	175,787	519,247
1915	195,524	579,774
1914	190,117	559,289

*Includes premium of £123,500.

Cost were 35/8 per ton in 1919, and 41/9 in 1920.

This is a regular gold producer and dividend-payer, and is ably directed.

HAMPTON CELEBRATION (W. A.), LTD. **W. A.**

Office: T. C. Hancock, sec., Finsbury House, London. E. C., England. **Mine address:** Civiall Hawkins, gen. mgr., 23 Macdonald St., Kalgoorlie, W. A.

Inc. December, 1919, in Great Britain. **Cap.** £250,000 all issued and fully paid. Company acquired the Celebration gold lease from the Celebration Syndicate (which see), for £50,000 cash and £100,000 in shares. The promoters got £25,000 in shares, and £75,000 is available for working capital.

Property: the Celebration lease on Block 50 of the Hampton Properties Ltd., 20 miles south of Kalgoorlie.

By a new system of prospecting, called 'loaming', by which the gold in the soil and surficial material is traced to its source a gold vein was uncovered in June, 1919, which proved to be 20′ wide. Samples for a length of 200′, averaged £5 ($24) per ton. A shaft 100′ deep in November, proved that the value persisted downward. The lode is traceable for 1,400′ on the surface, and estimates based on a length of 1,400′, a width of 20′, a depth of 100′ and value of £5 per ton, at 20 cu. ft. per ton for this class of ore, give a total value of £700,000.

Geologic conditions at the Celebration are said to prove it to be a continuation of "The Golden Mile" of Kalgoorlie, which has yielded over $360,000,000 in gold. If the lode is in quartz-dolerite it should prove persistently rich, but if it is encased in calc-schist the outlook is not so good, judged by past experience at Kalgoorlie.

Development: by 2,856′ of workings. The main shaft (200′) is being sunk to 300′ depth. Reserves estimated by management at 35,000 tons averaging 42/6, above the 100′ level. A 10-stamp mill being installed, 1921-22.

HAMPTON CONSOLIDATED, LTD. **W. A.**

Address: H. S. Blake, sec., Throgmorton House, 15 Copthall Ave., London, E. C. 2, England. **Mine office:** Leonora, W. A.

Inc. 1920 as an amalgamation of **Chaffers Gold Mng.** and **Gwalia Central Gold Mng.** companies. **Cap.** £200,000, in 666,000 non-cumulative 8% participating pfce. and 1,334,000 ord. shares; 2/ par; 641,882 pfce. and 719,434 ord. shares issued.

Property: in Leonora district, Mount Margaret goldfield and in Hampton Plains district.

HAMPTON GOLD MINING AREAS, LTD. **WESTERN AUSTRALIA**

Succeeds **Hampton Uruguay, Ltd.**

Office: T .C. Hancock, sec., Finsbury House, London, E. C. 2, England. Sir Newton J. Moore, chairman.

Inc. March, 1920, in England. **Cap.** £500,000; £1 par; all issued.

Property: 190,000 acres on Hampton Plains, in the East and Northeast Coolgardie goldfields, operated by prospectors. Alluvial gold has been found on Block 41.

HAMPTON PROPERTIES, LIMITED **WESTERN AUSTRALIA**

Offices: 71 George St., Edinburgh; 7 Great Winchester St., London, E. C., England. A. Francis, mgr., Macdonald St., Kalgoorlie, Western Australia.

Directors: Wm. W. Slater, chairman, Wm. Clark. H. J. Daly, Arthur Francis, J. Galloway, R. S. L. Hardie; A. J. Walkley, local.

Inc. Dec. 31, 1898, in Great Britain **Cap.** £500,000; £1 par; increased from £400,000 in October, 1919; 435,792 shares issued; 64,000 shares under option at par.

Report for year ended Dec. 31, 1919, showed investments, £5,000 (Hampton Celebration); loan, £15,000; cash, £54,514; creditors, £740.

Property: 27,000 acres (freehold) on Hampton Plains, Western Australia, south of the Mutooroo mine. The ground is under development by company and leasing companies and promising results reported.

HAMPTON URUGUAY, LIMITED WESTERN AUSTRALIA

Succeeded in 1920 by Hampton Gold Mining Areas, Ltd., which see.

IVANHOE GOLD CORPORATION, LTD. WESTERN AUSTRALIA

Head office: C. Lloyd, sec., London Wall Bldgs., London, E. C. 2, England. **Mine office:** 6 Mine Chambers, Boulder Rd., Kalgoorlie, W. A. J. McDermott, gen. mgr., Boulder, W. A.

Registered: Oct. 14, 1897, in London. **Cap.** £1,000,000; shares £5 par; all issued; fully paid.

Report for year ended Dec. 31, 1920, showed total income, £353,182; oper. expenses, £251,858; office expenses, £4,098; tax reserve, £15,000; depreciation of invest., £15,000; P. & L. balance, £65,725; surplus, £9,411.

Dividends: 6/6 per share paid in 1920; total, £3,885,000.

Property: 95 acres in the "Golden Mile," Kalgoorlie, W. A., includes the best producing mine of the district. Ore is silicious sulphide, 4 to 25' wide, 4 veins averaging 12' being worked.

Development: by a 3,620' main vertical shaft with levels opened to this depth. Exploration by drilling and sinking is kept well ahead of ore extraction. Ore reserves are estimated at 1,000,200 tons, averaging 34/- ($8.16) per ton.

Equipment: includes steam and electric power, hoists, compressors, drills, shops, foundry, a 100-stamp concentrator with sand, slime, and concentrate cyanidation plants, capable of treating 700 tons daily.

Reserves: estimated Dec. 31, 1919 at 972,387 tons valued at 33/ per ton, and Dec. 31, 1920, at 861,786 tons averaging 34/4.

Production: to September, 1919, totaled £9,678,514 derived from 4,100,041 tons of ore. Recent yields have been.

Year	Tons	Gold	Cost per ton
1920.....	154,920	£346,293(a)	33/7 .....
1919.....	146,228	291,219(b)	30/ .....
1918.....	208,428	349,108	25/8 .....
1917.....	233,719	391,249	22/10 ($5.38)
1916.....	238,514	381,984	21/9 (5.22)

(a) Includes £98,849 premium; (b) includes £41,220 premium.

Property has a profitable future for several years, and is managed with excellent technical ability.

KALGURLI GOLD MINES, LTD. WESTERN AUSTRALIA

Office: F. H. Carlton, sec., 39 Lombard St., London, E. C. 3, England. S. R. Black, gen. mgr., Kalgoorlie, W. A.

Inc. June 14, 1895, in England. **Cap.** £120,000; shares £1 par; all issued.

Report for year ended July 31, 1921, showed total income, £103,660; expenditures, £82,086; operating profit, £21,574, compared with £30,270 in 1920 and £17,262 in 1919.

Dividends: total £1,681,500 to April, 1921.

Property: 18 acres on the "Golden Mile," Kalgoorlie, W. A.

Development: by 1,900' shaft. The lode is of peculiar shape, being a "chimney" which is wider than it is long, and has no defined walls, as values fade out; below the 1,800' level the vein passed from quartz-diorite into calc-schist in which the ore became low-grade. A total of 24,180' of diamond drilling failed to reveal any other shoots of sulpho-telluride ore

Equipment: complete with 350-ton dry crushing and a roasting plant.

Production: for year ended July 31, 1921:—49,320 tons treated, of which 15,493 tons were purchased, realizing £99,377; compared with 60,803 tons

(25,624 tons purchased) in 1920, realizing £102,440. Total to July 31, 1921, 1,880,000 tons yielding £4,580,000.

The mine is considered worked out and was definitely closed down in 1921. Kalgurli Gold Mines is to be liquidated and assets distributed. Mine and equipment sold to the Oroya Links, Ltd., in 1921 for £20,000.

LAKE VIEW & OROYA EXPLORATION, LTD. **W. A.**

Liquidated 1919. See Vol. XIV.

LAKE VIEW & STAR LTD. **W. A.**

Address: T. C. Hancock, sec., Finsbury House, Blomfield St., London, E. C. H. E. Vail, mgr., Fimiston, W. A.

Inc. 1910. **Cap.** £200,000; 4/ par; all issued.

Report for year ended Feb. 28, 1921, showed total receipts, £170,134; operating profit, £27,495; surplus, £8,289.

Dividends: 16% in 1912, 1913 and 1914; 15% in 1915; 11½% in 1920-21.

Property: 300 acres in East Coolgardie goldfields, Kalgoorlie district, W. A., includes the Lake View, Hannan's Star and Chaffers mines.

Development: recent work concentrated on deepening Lake View shaft to 2,300' level.

Equipment: includes 75-stamp mill and cyanide plant. **Reserves:** estimated at 242,442 tons (1921) of 26/8 ore.

Production: in 1919, 75,320 tons yielding, £87,401; in 1920, 95,157 tons yielding £108,881 (25,541 oz.).

MENZIES CONSOL. GOLD MINES, LTD. **W. A.**

Address: T. H. Everett, sec., 1 London Wall Bldg., London, E. C. 2, England. R. Goninon, supt., Menzies, W. A.

Inc. 1898. **Cap.** £225,000; £1 par; 224,015 shares issued.

Year ending July 31, 1921, gave an operating profit of £6,339; balance forward, £4,878.

Dividends: 2½% annually from 1913 to 1917; 2½%, Nov., 1921.

Property: 193 acres near Menzies, W. A., developed to depth of 1,896'. Reserves estimated (July, 1921) at 43,829 tons and averaging 32s 6d per ton.

Equipment: includes 20-stamp mill and cyanide plant.

Production: 1919-20, 19,909 tons yielded 10,080 oz. gold, £39,406; 1920-21, 18,130 tons yielded 9,601, oz. gold, £37,356.

MOUNT LUCKY DEVELOPMENT CO., LTD. **W. A.**

Office: A. T. Newman, sec., 26 Glencoe Ave., Seven Kings, Essex, Eng. **Works:** Laverton, W. A.

J. M. Morgan, mgr., 492 Newcastle St., Perth, W. A.

Inc. 1920, in England. **Cap.** £2,000; £1 par.

Property: 2 gold claims in Mount Margaret goldfield, near Laverton, under development. Ore occurs in quartz vein, said to average 15 dwts to the ton.

MUTOOROO COPPER CO. **W. A.**

Address: J. C. H. Truscott, Chamber of Mines, Kalgoorlie, W. A.

Inc. in Adelaide. **Cap.** £200,000; £1 par.

Property: a lease on Block 50, Hampton Plains, developed by 4 shafts and 300' of drifting. The mine was adversely reported on in 1920 by C. F. de Jersey Grut of Kalgoorlie, and operations presumably suspended.

OROYA LINKS, LTD. **W. A.**

Address: H. E. G. Dawson, sec., 5 Copthall Bldgs., London, E. C. 2, England. Bewick, Moreing & Co., gen. mgrs.

Inc. 1907. **Cap.** £312,500; shares 5/ par.

Dividends: 5% in Nov. 1920.

Report for 1921 (July 12) showed a profit of £9,538; dividend, £14,375; reserve, £7,000; balance, £302. Assets: cash, £8,458; loan £12,000; debtors, £7,640; supplies, £4,417; investments, £135,214; reserve, £17,000; creditors, £6,855.

Property: 392 acres at Kalgoorlie, East Coolgardie goldfield In 1921

company acquired the holdings and equipment of the Kalgurlie Gold Mines, Ltd.

Company has done little work since 1916. The mines are worked by tributers. In 1920 ore mined came from leasehold in Boulder district.

Equipment: includes 50-stamp mill and cyanide plant.

Production: in 1919, 12,176 tons yielding £106,979; in 1920, 16,714 tons yielding £117,878, (17,892 oz. gold and 937 oz. silver), or a total to 1921 of 860,622 tons yielding 336,894 oz. gold and 28,462 oz. silver. Costs were 44/ in 1919 and 46/5 in 1920.

PARINGA MNG. & EXPLORATION CO., LTD. **W .A.**

Address: S. A. Lancaster, sec., 87 Bishopsgate, London, E. C., Engo.

Inc. 1909 as Paringa Mines (1909) Ltd., name changed in 1920. **Cap.** £200,000; shares 5/ par.

Report for year ended Oct. 31, 1921, showed an operating loss of £1,096; debit balance, £14,141.

Property: Paringa lease 392 E, 24 acres, in East Coolgardie goldfield, developed by 1,325′ shaft.

No production 1920. Total to date 26,890 tons ore giving 15,599 oz. gold. The mine was worked by tributers, 1921.

Company with Paringa Celebration Mng. Synd., has an interest in the Cactus gold group in Southern Rhodesia.

PILBARA COPPER FIELDS, LTD. **W. A.**

Succeeds **Whim Well Copper Mines, Ltd.**

Address: British & Continental Investment Trust, Ltd., sec., 62 London Wall, London, E. C., England. H. R. Sleeman, mgr.

Inc. Jan. 21, 1917. **Cap.** £60,000; shares 5/ par; 100,000 issued. **Debentures:** 7% first, £20,000; 7% second, £42,760.

Report for year ended June 30, 1920, showed an operating loss of £2,143; debit balance forward, £5,749.

Property: the old Whim Well and Mons Cupri copper mines, 100 acres, freehold and 200 acres leasehold at Whim creek, in West Pilbara goldfield, W. A., 13 miles S. of Balla Balla, first worked in 1888. At the Whim Well the country rock is a "corrugated chloritic siliceous slate." Copper sulphide ore occurs associated with iron pyrites, zinc blende and a little galena, in an orebody 10-50′ wide. Developed to depth of 1,000′.

The Mons Cupri is developed by two adits and opencuts, proving about 6,000 tons of 4½% copper ore. The mine is credited with past production of 2,009 tons, containing 166 tons copper valued at £12,036.

Equipment: includes an experimental leaching plant (Pechey process). Milling operations have been hampered by lack of water. A narrow gauge tram line connects the mine with Balla Balla.

Production: of copper in 1920 was 893 tons ore yielding 160.53 tons copper valued at £15,783; total to date 1,223 tons ore yielding 219.53 tons copper valued at £21,683. The Whim Well mine yielded a total to September, 1920 of 72,562 tons of ore averaging 12.95%, giving 9,343 tons of copper worth £604,492.

SONS OF GWALIA, LTD. **WESTERN AUSTRALIA**

Office: E. Pears, sec., 20 Copthall Ave., London, E. C. 2, England.

D. Richards, chairman and managing director. Bewick, Moreing & Co., gen. mgrs. J. Adam, supt., Gwalia, W. A.

Inc. Jan. 7, 1898, in England. **Cap.** £350,000; shares £1 par; 325,000 issued.

Report for year ended Dec. 31, 1920, showed an operating profit of £60,257; balance forward £10,837.

Dividends: 59 payments to end of 1920, including 5% in 1919; 5% in 1920.

Property: 863 acres, near Leonora, Western Australia, 500 miles by rail from Perth. Lenticular orebodies, averaging 9′ wide consists of free milling ore, mined by rill stopes.

Development: by incline shaft 3,991′ deep with extensive workings. Ore reserves approximate 600,000 tons. Recent prospecting has not been as successful as formerly, and the grade of ore has fallen off.

Equipment: complete mining and milling plants were destroyed by fire in 1921. Mill had 50 stamps, concentrators, pans, tube-mills and cyanide plant.

Production, years ending December 31:

Year	Ore, tons	Gold yield
1920	135,230	£255,235*
1919	147,652	239,478
1918	148,394	190,100
1917	159,397	232,550
1916	158,956	232,924

*Includes £77,353 premium.

Mine in Peak Hill Goldfield yielded 10 tons copper ore in 1920 giving 4 tons metallic copper.

Company has acquired an interest in the California Exploration Co., Ltd. and Cornish Kaolin, Ltd.

SOUTH KALGURLI CONSOLIDATED, LTD. **W. A.**

Office: W. Bramall, sec., 529 Salisbury House, London, E. C. 2, England. **Mine office:** Kalgoorlie, Western Australia. F. G. Brinsden, gen. manager.

Inc. March 11, 1913, in England, as a consolidation of the South Kalgurli Gold Mines and Hainault Gold Mine companies. **Cap.** £150,000; shares 10s. par; 250,007 issued.

Financial report for year ended March 31, 1921, showed an operating profit of £36,372.

Dividends: 5% in 1913-14; 7½% in 1914-15; 10% in 1915-16; 2½% in 1916-17; 7½% in 1918-19; 7½% in 1919-20; 25% in 1920-21; 7½% in 1921-22.

Property: 36 acres in the "Golden Mile," of Kalgoorlie, Western Australia, productive since 1896, contains the Perseverance, Nos. 1 and 2 East, Middle and Lake View lodes, each averaging 5′ to 6′ in width, and opened to 1,800′ level.

Development: by vertical shafts 1,000′ and 1,800′ deep.

Reserves: estimated (Sept. 30, 1921) at 125,000 tons of 8 dwts. per ton ore and 58,000 of 6 dwts. per ton ore blocked out and 16,000 tons of 8½ dwts. and 70,000 tons of 5½ dwts. per ton probable ore.

Equipment: complete mining and milling plants electrically driven, the latter including crushers, 4 ball-mills, 10 roasting furnaces, grinding pans, cyaniding apparatus and filter-presses, also 40-stamp mill and cyanide plant.

Production: during 21 months ended Dec. 21, 1916, 199,640 tons of ore yielded gold worth £243,710. In 1918, 12 months ended March 31, returns were £119,736 from 108,236 tons; in 1919, £128,556 from 96,239 tons; in 1920, £115,775 from 71,309 tons; in 1921, £182,277 from 80,270 tons.

WHIM WELL COPPER MINES, LTD. **W. A.**

Dead. Property now owned by **Pilbara Copper Fields Ltd.,** which see.

YUANMI GOLD MINES, LTD. **WESTERN AUSTRALIA**

Office: W. Weir, sec., 1 London Wall Bldgs., London, E. C. 2, England. **Mine office:** L. B. Williams, mgr., Yuanmi, Western Australia.

Inc. April 27, 1911, in England. **Cap.** £356,250, shares £1 par; in 500,000 pfce, shares of 2 /and 350,000 ord. shares, 17/6; 220,000 pfce, and all ord. shares issued.

Report for year ended June 30, 1921, showed an operating loss of £13,802; debit balance, £14,232.

Dividends: were 12½% in 1912-13; 5% in 1913-14; and none since.

Property: 218 acres at Yuanmi in the East Murchison goldfield, W. A. Ore is a sulphide. Vein is 4′ to 5′ wide.

Development: 680′ vertical shaft, and extensive drift and crosscut work. In 1920, 5′ of 102s ($24.48) ore was cut by a drill, this orebody has been met with in upper level.

Equipment: 80-ton per day plant, including ball-mill, roasters and cyanide plant. To treat the oxide ore, company originally had a 20-stamp mill and cyanide plant.

Production: totalled £730,109 from 690,286 tons to Aug. 1, 1920; for year ended June 30, 1921, 18,677 tons yielded £61,074. Costs were 65/4 in 1920 and 69/ in 1921.

NEW ZEALAND

BLACKWATER MINES, LTD. NEW ZEALAND

Office: O. M. Panton, sec., Finsbury House, Blomfield St., London, E. C. 2, England. **Mine address:** G. E. Stephenson, gen. mgr., Alta, Reefton, N. Z.

For officers and directorate, see **Consolidated Gold Fields,** of New Zealand.

Reg. Dec. 19, 1906, in Great Britain. **Cap.** £250,000; shares £1 par; 249,992 issued.

For year ended Dec. 31, 1920, operations showed a net loss of £2,876, after writing off £5,062 for depreciation and £6,169 on development. Assets include gold £11,651, cash £87, concentrates, £2,049, stores, £11,421; investments £4,818. Creditors £26,804.

Dividends: 70% from 1909 to 1918.

Property: a gold mine with 299 acres of mineral ground, water and timber rights near Reefton, South Island, N. Z.

Development: by main shaft 1,316′ deep. **Reserves** are given as 87,562 tons of 10.29 dwt. ore in 1918, and 82,704 tons of 11 dwt. ore in 1917.

Equipment: complete with 30 stamp-mill and cyanide plant.

Production, years ending December 31:

Year	Tons	Gold yield	Operating profit
1920	24,969	£52,612	£10,547*
1919	31,728	61,309	10,884
1918	31,528	63,993	26,355
1917	34,417	67,206	28,000
1916	40,247	80,565	35,528

*Before deducting for depreciation, development and tax.

Costs are around $5.50 per ton.

CONSOLIDATED GOLD FIELDS OF NEW ZEALAND, LTD. N. Z.

Office: O. M. Panton, sec., Finsbury House, Blomfield St., London, E. C. 2., England.

Directors: Sir W. B. Perceval, chairman; L. Ehrlich, E. T. McCarthy, E. W. Spencer, L. Welstead, A. L. Foster, G. A. Jones, G. E. Stephenson, gen. mgr.; Alta Reefton, N. Z.; R. Burley, mine supt.; F. Campbell, adviser in New Zealand.

Inc. Feb. 22, 1896, in England. **Cap.** £300,000; shares £1 par; 250,000 issued. Company holds 91,325 shares in the **Blackwater Mines** and 160,000 in the **Progress Mines companies** of New Zealand, which see.

Report for year ended Dec. 31, 1920, showed a loss of £12,109; credit balance, £7,368; current assets, supplies, £4,839; debtors, £3,550; cash, £1,364; loans to subs, £30,166; investments, £2,452; Progress Mine debentures, £21,160; other shares and properties, £243,558; liabilities; creditors, £3,827; overdraft, £45,736.

Dividends: totalled 18/6 per share to 1911, since hen none has been paid.

Property: about 271 acres in the Inangahua valley, 3 miles from, Reefton, on the West coast of South Island, N. Z. The Wealth of Nations mine, in the same district as the Blackwater and Progress mines was shut down 1918, owing to a fire. Mine plant and concentration mill were rebuilt 1919-20, but operations have not been resumed.

NEW ZEALAND QUICKSILVER MINES, LTD. **N. Z.**

Succeeded **Whangarei Cinnabar Co.**

Address: H. C. Lewsley, Chamber of Commerce, Auckland, N. Z. **Mine address:** L. E. Antridge, mgr., Puhipuhi, Whakapara, N. Z. H. R. Cooke, chairman.

Inc. in New Zealand. **Cap.** £15,000; par 5s: 25,000 shares fully paid; 25,000, 3s paid, 10,000 in treasury. Earnings 1920, £1,067; ore sales, £2,184; operating expenses, £2,435.

Property: a cinnabar mine at Puhipuhi, 95 miles N. of Auckland, showing basalt flows underlaid by limestone quartzite, etc., that rest on andesite. Ore 78" wide and averaging 2% Hg., occurs in fractured chert, against a "12" band of iron oxide.

Development: 600' drift at depth of 85'. **Equipment:** includes a Novak shaft furnace. **Reserves:** 14,000 tons 2% ore including 5,000 blocked out.

Production: 33,375 lb. sold for £8,000.

PROGRESS MINES OF NEW ZEALAND, LTD. **N. Z.**

For office and directorate see Consolidated Gold Fields of New Zealand. F. W. Robinson, sec., Reefton, N. Z.; G. E. Stephenson, gen. mgr., Alta, Reefton, N. Z.

Inc. Dec. 8, 1896, in Great Britain. **Cap.** £275,000; shares £1 par; all issued. Debentures outstanding, £27,614, 6%. Company owns 74,920 shares of the Blackwater Mines, Ltd.

Report for year ended Dec. 31, 1920, showed a loss of £10,553; debit balance; £64,174; cash £37; bullion and concentrates. £2,933; invest. £12,842; debtors, £477; debenture interest unpaid, £3,706· loan £14,823; creditors, £3,875.

Dividends: 23/5 per share from 1899 to 1910; nothing since.

Property: 816 acres near Reefton, South Island, N. Z., including two alluvial areas and 48 acres of coal land. Ore reserves are reported to be 60,000 tons.

Equipment: complete with 65-stamp mill and cyanide plant.

Production, years ending December 31:

Year	Tons	Gold yield	Operating profit
1920	8,102	£12,620	£2,890 (loss)
1919	15,980	23,419	3,066 (loss)
1918	16,230	22,175	1,069
1917	19,840	31,480	6,000
1916	26,780	31,405	4,605

Mine practically worked out in 1920.

TALISMAN CONSOLIDATED, LTD. **N. Z.**

Head office: W. Wright, 116 Victoria Parade, Auckland, New Zealand.

Property: the Talisman mine worked out, and as diamond drill work was fruitless, mine was shut down and equipment removed at end of 1920. Company organization and record described in Vol. XIV. of this book.

WAIHI GOLD MINING CO., LTD. **N. Z.**

Offices: H. Akers, sec., Coronation House, 4 Lloyds Ave., London, E. C. 2, England. **Mine office:** Waihi, N. Z.

Directors: A. M. Mitchison, chairman; H. E. Beddington, Sir W. B. Perceval, W. Bristow, G. R. Mitchison, S. T. George, C. Rhodes. **Staff:**

E. G. Banks, supt., W. P. Gauvain, and R. E. Williams, cons. engrs.; J. L. Gilmour, mine mgr.

Inc. Dec. 7, 1887, in England. **Cap.** £500,000; shares £1 par; 495,907 issued.

In 1921, company reduced its capitalization returning £250,000 cash to its shareholders, and changing its shares from £1 par to 10s par.

Assets, include £212,000 N. Z. bonds, and as much more cash reserves after paying a capital return distribution.

Report for year ended Dec. 31, 1920, showed gross operating profit £146,811, with balance forward, £175,877; dividends, £99,181; depreciation, £14,907; tax, £47,630; balance forward, £14,159. Current assets—cash, £31,439, bullion, £17,418, treasury bills, £198,619; investments, £424,614; debtors, £6,075, creditors, £73,424.

Dividends: recent distributions, 20% annually 1913- 1918; 20% in 1919 and 1920; 15% in 1921.

Property: 518 acres of mining claims, 3 large millsites, extensive timber lands, power sites, etc., at Waihi and adjacent areas in New Zealand. Mine has had an interesting history, being one of the first in the world to use the cyanide process for gold extraction. It has produced over £12,980,000 in gold and silver. The quartz veins vary up to 50′ in width, and ore averages about 54s per ton.

In all, the mine has about twenty separate reefs, the principal being the Martha, Royal, Edward nd Empire. Extraction is maintained at a fairly regular level. In 1918 it was 91.7%, in 1919, 91.1% and in 1920, 91.9%.. Recent developments have not shown a high grade of ore, apart from some small rich vein strikes.

Development: by 4 shafts, deepest over 1,300′; two of them equipped with large electric and Cornish pumping plants, lifting over 1,100,000 gal. daily. A new pump was installed in 1921. **Reserves** are estimated at 523,828 tons averaging 31/1 with an additional 254,737 tons of 38/ ore in the pillars. Eighty-five rock-drills are employed.

Equipment: extensive mining plant, 6-mile railway, 50-mile transmission-line from power plant on Waikato river, 200-stamp Victoria mill driven by water and electricity; also sand, slime, and concentrate cyanide plants. The power-plant was sold for £212,500, to the New Zealand Government in 1919, under a working agreement.

Recent production:

Year	Tonnage	Bullion yield	Year	Tonnage	Bullion yield
1920.....	159,308	£341,432	1914.....	183,405	£332,165
1919.....	192,613	380,401	1913.....	184,768	336,652
1918.....	188,998	387,065	1912.....	147,828	332,886
1917.....	191,742	370,567	1911.....	350,699	679,116
1916.....	194,232	371,520	1910.....	442,020	926,100
1915.....	192,333	349,581	1909.....	416,813	959,594

In 1921 the output was 164,042 tons containing 365,634 oz. silver and 46,797 oz. gold.

Although the Waihi gold mine is not the great and valuable property it formerly was, it still apparently has several years' life ahead of it. In its early career the Waihi was regarded as one of the great investment mines of the world, and to date it has distributed over £5,000,000 in dividends and paid £646,000 in income tax, from gold and silver obtained of a value of £12,987,000.

WAIHI GRAND JUNCTION GOLD CO., LTD. NEW ZEALAND

Office: A. Stewart, 10 Throgmorton St., London, E. C. 2, England. **Mine address:** W. McConachie, mgr., Waihi, N. Z. P. R. Allen, cons. engr., Runcorn, Cheshire.

Directors: S. Lee, chairman, G. H. Earle, F. Gates, H. J. Rothwell, T. H. Harner, S. Leach, managing in N. Z.

Inc. Dec. 29, 1897, in England. **Cap.,** £400,000; shares £1 par; 384,375 issued.

Financial Statement, years ending December 31:

Year	Profit	Dividends	Current assets	Cur. liabilities
1920.....	£21,016*	£.....	£212,399	£77,782
1919.....	18,427*	.....	220,331	63,115
1918.....	9,383*	19,219	213,126	22,879
1917.....	54,901	38,437	239,184	22,938
1915.....	39,344	38,437	103,611	12,807

*Loss.

Dividends: total 70% from 1910 to 1918, 5% being paid in 1918; the grand total is £269,000.

Property: 280 acres of mining land, and a timber area, covering 2,220 acres, at Waihi, New Zealand. The Waihi Extended mine was acquired in 1919, and exploration started on the Mary lode, on the 3rd to 6th levels, exposing a large amount of high grade ore. In the main mine workings the Empire lode below the 8th level is showing strong values.

Development: has been carried on since 1893 in order to cut an extension of the Waihi company's lodes, which were found at a depth of over 500'.. The main shaft is 1,357' deep.

Reserves: estimated at 120,500 tons, December, 1920.

Equipment: complete power and mining plants, with 60-stamp mill, 10 tube-mills, and cyanide plant.

Production: in 1916 about 115,000 tons of ore yielded gold and silver valued at £194,461; 116,130 tons giving £220,090 in 1917; 80,210 tons for £141,755 in 1918; 66,483 tons for £97,898 in 1919; 57,450 tons for £109,506 in 1920.

NEW CALEDONIA

CHROME CO., LTD. — NEW CALEDONIA

Office: H. W. C. Dermer, 19 St. Swithin's Lane, London, E. C. 4, England.

Directors: E. Davis, chairman and managing, S. H. Boileau, asst., E. Chalas, Jr., A. A. Lavino, D. C. Haldeman.

Inc. Feb. 1, 1911, in England. **Cap.** £190,000; shares £1 par; all issued. **Debentures:** £29,340, 5% outstanding. Company owns the entire capital stock (100,000 francs) of the **Soc. Anon. de la Tiebaghi.**

Report for year ended Jan. 31, 1921, showed profit, £43,523; credit balance, £45,511. Current assets, £103,283; current liabilities, £21,035.

Dividends: 5% in 1913; 5% in 1914; 10% in 1915; 5% in 1916; 24¼% in 1917; 5% in 1918; 10% in 1919.

Property: Tiebaghi chrome mines, near Port Pagoumene, New Caledonia.

Production: (years ended January 31.) 61,416 tons in 1914; 65,585 tons in 1915; 35,303 tons in 1916; 42,437 tons in 1917; 28,560 tons in 1918; 27,382 tons in 1919; 30,303 tons in 1920; 64,314 tons in 1921.

AFRICA

Mines are arranged alphabetically under the name of each State or Country.

CAPE COLONY

CAPE COPPER CO. LTD, CAPE COLONY

Office: 9 Queen St. Place, London, E. C. 4, England. P. J. Franks, sec. **Mine office:** O'okiep, Little Namaqualand, Cape Province; James Crozier, gen. supt. **Works office:** Briton Ferry, Glamorganshire, Wales. T. Blair Reynolds, chairman of board of directors; John Taylor & Sons, general managers; Chas Olden, supt., Rakha Hills mine; H. Phillips, smelter supt.

Inc. April 30, 1888, as a reconstruction of Cape Copper Mining Co., Ltd., under the laws of Great Britain, capitalization £950,000, in 75,000 cumulative 6% preferred shares of which 45,000 are issued and fully paid, and 400,000 ordinary shares, par £2; issued 360,000. **Debentures:** 4,200 first mortgage 8s. of £100 each, due 1930; 1,200 were taken up by public and 3,000 issued as collateral vs. loans. Annual accounts are made up to April 30, at the Cape, and to August 31, in London and India, and are submitted in December.

Profits have been as follows, years ending August 31:

Year	Amount	Year	Amount
1921	£184,535*	1913	£ 83,500
1920	163,628*	1912	80,494
1919	171,007*	1911	60,862
1918	641,146*	1910	124,659
1917	147,842	1909	90,223
1916	131,248	1908	144,366
1915	33,212	1907	379,910
1914	17,244		

*Loss.

Profits since the beginning of operations amount to £4,057,356. Current assets at August 31, 1921, were £175,710, and liabilities, £357,584, largely loans. Surplus account shows a debit balance of £373,975. Reserve and sinking funds amount to £349,803.

Dividends: from 1864 to 1888 total £67 13s. 9d per share paid by the old company; from 1888 to 1918 inclusive, the preference shares received £8 19s. 3.8d; while the ordinary shares received £10 5s. 3d to January 1, 1918; none since. The grand total of dividends is £3,512,175.

Property: copper mines in Little Namaqualand, Cape Colony, lands including about 280 acres of freehold and a few lease-hold tracts. The first mines were opened, 1856, by Phillips & King, and were taken over, 1860, by the predecessor of this company. Also the Rakha Hills mines in India, the company's only active property.

Cape Colony Mines.

The Nababeep mine, 5 to 6 miles W. of O'okiep, opened 1890, including the Nababeep South, is developed by tunnels and a shaft. The Narrap mine, about a mile E. of the O'okiep East, with somewhat similar ore, has an aerial tram, electric hoist, and crusher. The Narrap South mine, opened to a depth of 120', is without important developments. The Spektakel, 28 miles W. of O'okiep, is an old mine with orebodies in both the granite and the basic intrusive rocks. The Carolusberg mine, 6 miles S. E. of O'okiep, opened by tunnel, and the Carolusberg East mine, about 2 miles further E.

Other properties include the Flat mine, 4 miles N. of Nababeep, which was reopened, 1907; the Koperberg mine, near the Carolusberg, 5 miles S. W. fo O'okiep; and the abandoned Coetzee mine.

Recent (1916-1919 incl.) operations resulted in production of 162,113 tons of about 4% copper ore from Nababeep and 39,412 tons of high grade (11%) ore from O'okiep. At suspension of operations, there were 90,000 tons in reserve at Nababeep.

Equipmnt: includes electric power supplied by a central power station at the O'okiep mine, having 2 suction gas engines with an old steam plant held in reserve. Both the O'okiep and Nababeep properties have smelters and mills, though the O'okiep plant has been idle since 1912. The smelter turned out 48 to 50% matte, which was shipped to the Briton Ferry works for re-smelting and refining.

The company owns a 99-mile railway, with 16 miles of sidings, running from O'okiep to Port Nolloth, where there are docks, wharves, cranes, tugs and lighters for handling freight . Company also owns 4 tugs at Port Nolloth. A tram line connects he principal mines with the smelters.

All operations in Africa, save prospecting, were suspended in May, 1919, and so continuel throughout 1920 and 1921. Drilling at Koperberg West and Carolusberg W. has indicated presence of ore of 4 to 5% copper content.

In addition to its mines in South Africa, company had a lease on the Terra Nova mine in Newfoundland, ore from which assayed 2.4% copper and 37% sulphur. Also, company has title to some claims in Alaska, which will be developed when a railway reaches the district. Work on 2 properties in Asia Minor has been suspended.

Rakha Hills Mine, India.

The Rakha Hills, or Rajaoka, property, at Surda, India, shows an extensive belt of cupriferous schist, with seams of copper ore of 2 to 6% tenor. Development aggregates 15,000′, including the main shaft which is 1,440′ deep. During 1910-12, a number of boreholes were drilled with a total of 9,700′, proving the copper belt for nearly 1¼ miles. Reserves in August, 1921, were 329,151 tons of 3.60% ore, compared with 354,688 tons in 1920, carrying 3.66% copper. The average width of the lode is 42″.

In February 1920, a working option on 20 sq. miles of company's Indian holdings was granted to the Cordoba Copper C., q. v.

Equipment: electric power, steel head-frame, hoists, compressors, shops, 300-ton flotation plant employing Minerals Separation units, blast-furnace, converter, refinery, assay office, and dwellings for staff and employees. Reduction plant has a monthly capacity of 250 tons of copper.

Production: from the mine was small in 1919-20. In 1920-21 it was 19.941 tons assaying 4.07% copper.

Briton Ferry Smelter.

The Briton Ferry smelter, which is the largest in Wales, in addition to treating the company's own ores, does a general custom business, smelting the ores of the Namaqua Copper Co., Ltd., under contract. The Briton Ferry works are on the Great Western and Rhondda railways, also having canal connection with Swansea, receiving ores mainly by rail. The works have revolving cylindrical calciners up to 80′ in length, heated by gas, and four 70-ton blast furnaces, making matte. Ores are smelted, without calcining, in reverberatries to a 76% white metal, which is refined by the Nichols direct method, by which some of the white metal is calcined and mixed with uncalcined white metal, the consequent reaction eliminating the remaining sulphur. Tilt Cove sulphide ores are burned in kilns for their sulphur content, fumes going to an acid plant, which makes 30,000 tons of chamber acid yearly. The works include an electrolytic refinery, constructed in 1912.

Production: of fine copper from the African mines has been as follows: 8,960,000 lb. in 1901; 6,061,000 lb. in 1902; 10,371,200 lb. in 1903; 12,264,000 lb. in 1904; 11,256,000 lb. in 1905; 8,825,600 lb. in 1906; 9,475,200 lb. in 1907; 10,035,200 lb. in 1908; 10,404,800 lb. in 1909; 9,867,200 lb. in 1910. Later metal figures are not obtainable.

The record of the Cape Copper Co., Ltd. as a steady dividend payer, for 40 years past, is a remarkable one and the company issues full monthly reports to stockholders that are models, and could be imitated by ther companies to the advantage of the investor.

With the practical abandonment of the African property it was hoped that the Rakha Hills mine in India would keep the company in the dividend-paying class, but delays in plant delivery, the unrest in India and the general business depression, have placed the company in an embarrassing financial position during the past few years.

DE BEERS CONSOLIDATED MINES, LTD. CAPE COLONY

Offices: E. F. Raynham, sec., Kimberley, Griqualand West, So. Africa; and 15 St. Swithin's Lane, London, E. C. 4, England. Sir C. Meyer, deputy chairman of board of directors; T. J. Ford, asst. sec.; J. Bruce and J. H. Bovenizer, secs., in London.

Officials: A. F. Williams, gen. mgr.; I. R. Grimmer, J. Harbottle and R. S. G. Stokes, asst. gen. mgrs.; J. Liddell, mech. engr.; R. W. Smith, elec. engr.; and D. W. Smith, diamond valuer and broker.

Inc. March 13, 1888, in Cape of Good Hope Province, with original capital of £100,000 to consolidate all of the diamond properties in the district.

Cap. £4,500,000; in 800,000 pfd. and 1,000,000 dfd; £2 10s. par; all issued. Transfer agt. for U. S. stockholders, Central-Union Trust Co.; registrar, Chase Natl. Bank; both New York. Listed on New York Stock Exchange.

Debentures: £1,750,000 at 4½%, redeemable January, 1930; £1,635,495 outstanding.

Financial statement for year ended June 30, 1921, shows a revenue of £2,940,029, of which £228,522 was profit. Reserves consist of £700,000 general, £746,475 for debentures redemption, £1,719,186 for blue ground, £2,476,900 for stabilization of the diamond trade, and £450,000 to cover investments in other companies. Excess current assets were £497,229 and surplus £110,350.

Dividends: total many millions sterling, the amount in 1917-18 being £1,990,000 and £2,740,000 in 1918-19, or at the rate of 40% on preference and 80% on deferred shares; £740,000 on pfd. and £3,000,000 on defd. in 1919-20; £740,000 and £500,000 in 1920-21.

Property: 5 diamond mines at Kimberley, the Cape Explosives Works at Somerset West (output of 370,760 cases of dynamite in 1920-21); controlling interest in the Premier (Transvaal) Diamond Mining Co., and Koffyfontein Mines, Ltd., also the pre-emptive right to any diamond deposits discovered in the territories of the British South Africa Co. (Rhodesia) and South-West Africa Co., operating in former German territory.

The mines are near together in an area of about 5 miles square, 3 only being producers at present. The diamonds occur as separate crystals in a rock altered to blue clay, from which they are separated by washing.

Development: by 10 main shafts, deepest being 3,600' at the Kimberley mine. Reserves total 74,000,000 loads of 1,600 lb. each. Stocks of "blue ground" on surface amount to over 9,000,000 loads. Mud outbursts, or rushes and heavy flows of water are troublesome.

Equipment: complete and far too extensive to enumerate, but sufficient for extraction, hoisting, tramming, and treatment of 6,000,000 loads per annum, or 22,000 loads per day for a 300-day year.

During 1920 it was decided to discontinue the weathering system for disintegrating the diamondiferous ground, and substitute the crushing method, as practised at the Premier mine in the Transvaal. Gyratory crushers of 40,000 loads per day capacity are now being erected, to be completed by mid-1922.

Production: in 1919 the quantity washed was 4,252,809 loads; 5,790,710 loads in 1919-20; and 2,333,773 loads in 1920-21 yielding from 0.16 to 0.35 carat per load, at a cost of 9s. 8d. to 11s. 10d. Value of diamonds found varied from 109 to 248s. per carat.

Operations were suspended Dec. 31, 1921, to await better market conditions.

NAMAQUA COPPER CO., LTD., THE **CAPE COLONY**

Head office: A. W. Outram, sec., 120 Fenchurch St., London E. C. 3, England. **Mine office:** James Garland, supt., Concordia, Namaqualand, Cape Province, South Africa.

Officers: William Rich, managing director; Thomas V. Anthony, Harry von Berg, H. Loeffler, directors.

Inc. April 23, 1888, in England. **Cap.** £200,000; £2 par; 94,331 issued and fully paid.

Financial Statement, years ending December 31:

Year	Revenue	Profit	Previous Balance	Dividends	Balance Forward
1920..	.....	£ 8,376*	£ 4,839	.....	£13,215+
1919..	£ 21,029	5,050*	211	.....	4,839+
1918..	50,399	6,671*	6,882	.....	211
1917..	173,242	13,055	16,241	.....	6,882
1916..	249,111	78,407	.....	£61,314	16,241

*Loss. +Debit balance.

Current assets at end of 1920 were £109,761, and liabilities, £37,596. Reserves were £90,000.

Dividends: since 1888 total 426% including 25% for 1916; none since.

Property: over 700 acres, at Concordia, Little Namaqualand, including the Tweefontein, Wheal Julia, Henderson's Jubilee, Homeep, and Hester Maria mines in which copper occurs as bornite and chalcopyrite in a fine-grained, dark quartz gangue.

Development: in 1919 totaled 1,666′, compared with 1,248′ in 1918. Recent exploration at the Tweefontein mine has been rather disappointing, for while the eastern section showed much mineralized ground, it was of no commercial value. In 1919, results in western section of the Homeep mine were very satisfactory, but were much less so in the Jubilee.

Reserves are as follows:

Year	Ore, tons	Copper content, lb.	Tailings, tons	Copper, %
1920.....	63,203	10,059,840	85,800	3 to 6
1919.....	50,004	7,580,160	46,000	3 to 6
1918.....	37,655	4,903,336	46,000	3 to 5.5
1917.....	40,563	5,304,320	49,500	3 to 5.5
1916.....	51,264	6,630,000	59,000	3 to 5.0

Equipment: includes complete mining and sorting plants, concentrator with flotation unit, briquetting plant, precipitating tanks, a railway and power-plant. At the smelter a converter plant was installed, 1921.

Production: was 3,763,200 lb. of copper from 32,958 tons of charge smelted in 1916; and 3,064,320 lb. from 21,355 tons in 1917. In 1918, 1,242,371 lb. of copper was produced in the form of regulus and precipitate; in 1919, 231,571 lb. as precipitate only; and in 1920, 235,200 lb. as precipitate.

Smelting operations were suspended in May, 1918, owing to abnormal conditions, but the precipitating plant is kept going and development continues.

CONGO

INTERNAT. FORESTIERE ET MINIERE DU CONGO, SOC. CONGO

(Commonly known as Forminiere).

Office: 66 Rue des Colonies, Brussels, Belgium.

Directors: E. Francqui, Goffinet, Carton de Wiart, J. G. Whiteley, E. de Groote, Wm. H. Page, Wm. Loeb, H. Vreeland and Baron Jacques.

Cap. Fr. 16,000,000 increased from Fr. 8,000,000 in 1919; divided into

16,000 pfd. shares, Fr. 500 par, and 16,000 common without par value; all issued, and one-half of each class owned by the Colonial Government.

Balance sheet of Dec. 31, 1919 shows total assets Fr. 28,322,276, of which Fr. 7,000,000 are fixed, Fr. 9,559,893 cash and Fr. 11,624,883 other current. Liabilities include reserves Fr. 93,895 and accounts payable Fr. 6,972,444. Surplus was Fr. 5,118,457, which after deductions, including Fr. 4,640,000 in dividends, left a balance forward of Fr. 72,265. Gross revenue was Fr. 8,153,683, of which Fr. 3,250,121 came from sale of diamonds, and general expense was Fr. 593,626.

Property: a concession in southwestern part of Belgian Congo cover- the Kasai diamond fields. The tract shows beds of sandstone, shales and conglomerates that overlie schists, granites and gneisses. The diamonds occur in the conglomerates and also as alluvial deposits. At present the latter only are being exploited, 10 different placers being worked by hand followed by sizing and jig concentration. The stones average about 0.10 carat, and the largest thus far found being 32 carats. At end of 1919, 37 whites and 7,242 natives were employed.

Production:

Year	Overburden Cu. meters	Gravel Cu. meters	Diamonds carats
1913-14.....	13,661	4,443	38,882
1915.....	38,694	4,950	48,934
1916.....	69,368	14,868	53,940
1917.....	110,130	43,340	99,997
1918.....	219,895	65,893	164,637
1919.....	312,011	113,181	215,489

TANGANYIKA CONCESSIONS, LTD. CONGO

Office: L. Scotland, mgr.-sec., Friars House, New Broad St., London, E. C. ,2 England. **Mine office:** Kambove, Katanga, Belgian Congo; and Kansanshi, Northwestern Rhodesia

Directors: Tyndale White, chm., Earl Grey, Theo. P. Heyvaert, Thos. Honey, G. C. Hutchinson, Sheffield Neave, Marquess of Ormonde, Chas. F. Rowsell and Sir C. L. Budd. Robt. Williams, mng. dir. Managers and engrs.; Robt. Williams & Co., F. E. Sudt, A. A. Thomson, and R. W. Yule. T. S. Carnahan, mining engineer.

Inc. Jan. 20, 1899, in Great Britain. **Cap.** £2,200,000; par £1: 2,189,870 shares issued. Original capitalization was £100,000, successively increased December, 1901, to £184,000, in 1902 to £194,000, in 1903 to £264,600, in April, 1905 to £450,000, in July, 1905, to £525,000, in November, 1906 to £1,000,000 and in December, 1919, to £2,200,000, to retire debentures, etc.

Debentures: redeemable Jan. 1, 1917, and extended as provided by Royal Proclamation until after the war, have been retired except for £514,805.

Tanganyika owns (Jan., 1921) a 47.12% share interest in the Union Miniere du Haut Katanga (amounting to 59,800 shares of 100 francs par and 58,000 dividend shares); 70% of the issued stock of the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd. (amounting to 494,814 ordinary £1 shares, 64,450 B 1s. shares), the Kansanshi copper mine having been sold to this compan;y 1,600 shares of 250 francs par in the Compagnie du Chemin de Fer du Katanga; £2,700,000 stock of Companhia do Caminho de Ferro de Benguella; 2,297 shares of £4 each of the Intertropical Anglo-Belgian Trading Co., and £5,000 of the 3% debentures of the Rhodesia Railways, Ltd. Late in 1920, company acquired 10,000 shares in the Nile-Congo Divide Syn. (q. v.) with option on 5,000 shares additional.

Tanganyika has an arrangement with the Zambesia Exploring Co., Ltd., by which the latter is ready to finance the former until it is indepen-

dent. The Zambesia Co. has practically the same officers as Tanganyika, and floated the latter, and owns 214,674 of its shares.

During 1918, revenue was £538,978, including £521,354 received as dividends paid by Union Miniere du Haut Katanga. Of this amount £352,800 was credited to profit and loss in 1917, so that 1918 is only credited with £168,554. After paying interest, etc., balance forward to 1919 was £10,683, making a surplus of £214,898.

For 18 months ended June 30, 1920, revenue was £135,744 including £86,726 received from Union Miniere as dividend. The balance was £89,667 and surplus £304,565. Excess current assets were £991,922.

Property: Tanganyika was formed to acquire from the British South Africa Co. a 2,000 sq. mile concession in Northern Rhodesia for a terminal and town-site of the Cape to Cario railway at the S. end of Lake Tanganyika; a 2-year exclusive right to prospect and locate for minerals in an area of 2,000 sq. miles N. of the Zambesi river, and to locate 1,000 claims in British South African territory. For these concessions the company gave £60,000 in fully paid shares, besides which the B. S. A. Co. retains a 35% interest in all mines. Having made important discoveries and located various mines in the borderland of the Belgian Congo. the Tanganyika sought and obtained another mineral concession, covering 60,000 sq. miles of the Belgian Congo region, known as the Katanga, and adjacent to the Rhodesian properties of the company. The Special Committee of Katanga reserved 60% of the net profits, and received £30,000 in fully paid shares. An extension of this concession and an interest in the Benguella railway later increased to 90%, was acquired in July, 1902, for £10,000 in fully paid shares.

The mineral discoveries in the Belgian Congo cover a copper belt 200 miles long with over 100 known copper deposits; also a tin belt, 100 miles long, with workable deposits, also gold and iron mines and diamondiferous areas.

Tanganyika has sold its holdings to subsidiary companies controlled by it, and thus becomes a parent holding company only. In the Belgian Congo, 72 large mining concessions were located, the company engineers estimating in 1908. that 5 of these claims showed 9,500,000 tons of 6.3 to 14% copper ore. most of which could be extracted by open-cut; while on another group the company estimated 1,600,000 tons of 13% copper tenor.

The copper interests of the Tanganyika Concessions, Ltd., consist at present of the holdings mentioned above in the Union Miniere du Haut Katanga (which see), the Rhodesia Katanga Junction Railway & Mineral Co., Ltd. (Kansanshi), and the Benguella Railway.

UNION MINIERE DU HAUT KATANGA — CONGO

Office: 3 Rue de la Chancellerie, Brussels, Belgium. **U. S. office:** care A. E. Wheeler, cons. engr., 25 Broadway, New York. Works at Elizabethville, Katanga, Belgian Congo, Africa.

Officers: Jean Jadot, pres.; Robt. Williams, v. p.; Baron de Moor, managing director; Geo. Velge, sec.; P. K. Horner, gen. mgr.; Edgar Sergier, technical mgr.

Inc. Oct. 28, 1906, in Congo Free State. **Cap.** Fr. 15,000,000; Fr. 100 par; all issued; increased from Fr. 12,500,000, Nov. 1920, to which it was increased May 1912, from Fr. 10,000,000. There are also 150,000 dividend shares without par value. **Debentures:** Fr. 20,000,000 at 4½% and Fr. 40,000,000 at 7% authorized Nov. 4, 1920. Holders of the 4½s. had right to exchange for 7s at par. Company is controlled by Tanganyika Concessions, Ltd. (47.12% holding), and Societe Generale de Belgique. Annual meeting, second Monday in July.

Balance sheet of Dec. 31, 1919, shows assets Fr. 203,208,693, including reliable assets Fr. 104,284,579 and cash Fr. 1,511,319. Liabilities include current Fr. 85,439,567, reserves Fr. 5,229,364, share premium Fr. 7,500,000.

and depreciation fund Fr. 59,161,321. Credit balance was Fr. 13,429,441, of which Fr. 392,264 was allotted to reserves.

Dividends: an initial one of 150 francs per share was paid Dec. 31, 1918, representing the accumulated profits of 5 years; and 50 francs per share on Dec. 15, 1920, for the year 1919.

Property: company has a mining concession covering a copper belt of about 200 miles long, containing upwards of 100 copper outcrops; and a tin belt nearly 100 miles long. Both concessions are situated in the southern part of the district of Katanga, Belgian Congo, bounded on the south and east by northern Rhodesia and on the west by Portuguese West Africa, over 1,500 miles from a seaport. The mines are widely separated, the Kambove and Star of the Congo being 100 miles apart. Company also owns valuable water-power rights and other mineral rights, including iron.

The copper deposits and mines owned by the Union Miniere were discovered by prospectors employed by Tanganyika Co., under terms of the concession from the Comite Special du Katanga. These deposits are scattered through a practically uninterrupted belt of country extending from the Rhodesian border in the S. E. corner of the Katanga region to the W. bank of the Lualalba river, a distance of 180 miles in a N. W. and S. E. direction.

Geology: the copper belt consists of a region of rounded hills and steep sided valleys, 4,000 to 5,000′ above sea level, the copper areas being bare, due to copper salts. The copper ores occur in sandstones and in schists, slates, and limestone, the beds running W.-N.W., and dipping steeply. The ores are oxidized, malachite being the most abundant mineral associated with chrysocolla and azurite, while melaconite is found mixed with wad. The orebodies are lenses that vary from small deposits up to mammoth ones such as Kambove No. 2, said to be 3,000′ long, 240 to 400′ wide.

Development: the principal mines, in the order of their present ore production, are the Kambove, Likasi, Star and Chituru. The Kambove mine is the largest and most important copper mine owned by the Union Miniere. A 2-compartment haulage tunnel has been driven from the surface through the deposit for 1,500′ half through pay ore. The tunnel is equipped with rope haulage and a double track. Ore is quarried and milled through the shafts, and hauled out through the tunnel. Management estimates 3,000,000 tons of 13.4% copper ore in sight above the tunnel-level and a similar quantity of probable ore 100′ below. The Kambove is situated 1,720 miles from the seaport of Beira, by rail.

The Star was the first to be developed. The deposit is mined by open-cuts the broken ore being milled through winzes to levels below and hauled through the main tunnel to the surface. The Luiswichi and Lunsha mines, 30 miles from the Star, have been developed and the Fungurume is being opened.

On all the other deposits forming the copper belt varying amounts of prospecting and development have formed the basis of estimates, some of which are as high as 300,000,000 tons of copper ore in sight, over the whole copper belt.

The Union Miniere company estimates 40,000,000 tons of 8% ore above water-level in all the Katanga mines.

The tin belt, 175 miles long., of the Miniere is an area in the Katanga, near Bukama on the navigable Lualaba-Congo route from the West Coast, and 210 miles from Kambove, with which place it is connected by rail.

The Busanga tin mine was reopened in 1916 and is now worked under contract. Reserves are 10,000 tons of 1% cassiterite. First shipment of 70% concentrate was made early in 1920. A special organization is to take over the tin holdings.

The Kansanshi mine, transferred in 1909 to the company's subsidiary the Rhodesia-Katanga Junction Railway and Mineral Co., Ltd., lies at an elevation of 5,000′, 12 miles S. of the Congo-Zambesi divide, which forms the boundary between Rhodesia and the Belgian Congo. The Property

shows extensive remains of ancient open-cut workings, there being trenches and pits for a distance of 6,000', which form 6 chains or lines of workings, in which the pits vary from 1 to 30' in width, 5 to 30' in depth and 300 to 1,300' in length.

The Kansanshi copper deposits consist of beds, 1 to 10' thick, of sandstone impregnated with copper and resting on limestone and schist. The sandstone is micaceous and fissile in places and more or less charged with malachite particles and flakes, the upper beds carrying malachite and chrysocolla, with occasional occurrences of azurite and melaconite, and some cuprite, with silicious gangue, and some manganese dioxide in the superficial portions. The gangue carries a little limonite, usually ochrous. Surface ores are said by John R. Farrell of San Francisco to show no evidence of having resulted from alteration of sulphides in place, the facts leading him to the opinion that the malachite was deposited from hot solutions, coursing in fissures. The ore is highly silicious.

The main ore bed, known as D reef, averages 8 to 10' thick, with 5 to 10' of sandstone impregnated with malachite on each wall of the vein; the ore as mined is said to average 18.7% copper with $2 gold per long ton. Sulphide ores, with bornite and chalcopyrite associated with pyrite, show in the deeper workings, but the depth of the oxidized zone has not as yet been determined.

Equipment: includes 7 blast furnaces of 1,000 tons daily charge capacity at Lubumbashi, near Elizabethville. A leaching plant to produce 110,000,000 lb. of copper annually from tailings, a 4,000 ton concentrator at Panda, and a 60,000-h. p. hydro-electric plant are being erected, total cost of which will be Fr. 135,000,000. Coke is supplied to the Wankie Colliery in Rhodesia, 725 miles distant by rail. There is a battery of 44 ovens capable of making 2,400 tons of coke monthly. White employees number 800, native 12,000.

Production, years ending December 31:

Year	Copper Long Tons	Year	Copper Long Tons
1920 (10 mos.).....	16,262	1915.....	14,054
1919.....	23,028	1914.....	10,722
1918.....	20,237	1913.....	7,407
1917.....	27,463	1912.....	2,492
1916.....	22,149	1911.....	997

The ultimate output anticipated is 40,000 tons (89,600,000 lbs.) per annum.

The Union Miniere is still in the transition stage. It is erecting enormous plants, and is saddled with a large debt, but it is producing a lot of copper, and making a good profit.

EGYPT

BARRAMIA MINING & EXPLOR., LTD., THE **EGYPT**

Dead. All work ceased Sept. 1919; entire plant was sold leaving net liabilities of £6,966, including £6,000 of 6% debentures. W. F. Garland, 5 Queen St. Place, London, E. C. 4, England, appointed liquidator on March 30, 1920.

NILE-CONGO DIVIDE SYN., LTD. **EGYPT**

Office: L. Scotland, sec., Friars House, New Broad St., London, E. C. 2, England. **Directors:** M. J. Holland, et al.

Inc. Nov. 18, 1920. **Cap.** £35,000; par £1; of which 10,000 shares are owned each by Tanganyika Concessions and Zambesia Exploring Co.

The syndicate has an 80% interest in certain mineral rights in the Sudan along the Nile-Congo watershed. A prospecting expedition in charge of Major Christy was underway in January, 1921.

SINAI MINING CO., LTD. **EGYPT**

Office: D. Rees, sec., Post office Bldg., Middlesbrough, England. J. Angus, chm. of directors.

Inc. April 13, 1913, in Great Britain. **Cap.** £310,000 in 60,000 pfd. and 250,000 ordinary shares, all issued; £1 par. **Debentures:** £50,000 7% first mortgage.

Financial statement Sept. 30, 1920, shows profit of £6,590, which added to previous balance, £8,484 total, was carried forward. Excess current liabilities were £17,095; and £12,500 secured by debentures. Reserves were £36,000. Dividends on preference shares issued 1916, have not been met.

Property: 510 acres of manganiferous-iron land, at Umbogma on Sinai Peninsula, 15 miles S. E. of Abu Zenima, and 80 miles S. E. of Suez on Gulf of Suez. Examined by J. F. Allan, H. H. Knox, and Dr. E. Esch. Reserves were estimated at 12,042,000 metric tons averaging 32.3% Mn. and 25% Fe.

Equipment: suitable for open-cut operations, aerial tram, railway, and accessories capable of handling 150,000 tons per annum. Shipments have been made, but production figures are not obtainable.

To September 30, 1917, about £235,000 had been spent on development, equipment, and general charges. The property contains a desirable ore.

STAR DEVELOPMENT MINES, LTD. **EGYPT**

Office: H. S. Blake, sec., Throgmorton House, 15 Copthall Ave., London, E. C. 2, England.

Directors: H. A. Stanhope, chm., A. E. Radford and W. M. Steward.

Inc. Nov. 18, 1911. **Cap.** £200,000; 4s. par; 554,576 issued, fully paid. Name changed in 1920 from **Star of Egypt, Ltd.**

Financial statement, Dec. 31, 1920, shows liquid assets £24,138, liabilities £4,968.

Property: a lease on the 200 acre Um Garaiart tract, in Upper Egypt, between the Nile river and the Red Sea, taken over in 1915 from Nile Valley Gold Mng. Co. Gold-bearing quartz veins, 8 to 30" wide, have been developed by 200' shaft; value is apparently from 0.25 to 0.75 oz. gold per ton. Mine is equipped with a 10-stamp mill. Company has interests also in other mining enterprises.

SUDAN GOLD FIELD CO., LTD. **EGYPT**

Office: 6 Queen St. Place, London, E. C. 4, England.

Directors: Lord Vaux of Harrowden, chm., Robt. and Edgar Taylor, and W. F. Garland. John Taylor & Sons, mgrs.

Inc. Dec. 2, 1908, in Great Britain. **Cap.** £150,000; 10s par; 127,749 issued.

Revenue account for 1919 shows a loss of £12,746, with debit balance of £40,781 after depreciation; in 1920 there was a loss of £1,418 making debit balance £42,199. Excess of current assets Jan. 1, 1920, was £22,704, including salvage value of plant; on Jan. 1, 1921, it was £21,729.

Dividends: 10% in 1914, 1915 and 1916; nothing since.

Property: the concession covering gold-bearing ground at Om Nabardi, in the Sudan, has been relinquished, operations being discontinued Sept. 1, 1919, and machinery, etc. sold.

Production: 33,300 tons, yielding 15,598 oz. gold in 1917, and 20,880 tons, giving 12,419 oz. in 1918. Value of 1919 output (8 mos.) was £22,445.

Company has acquired a prospecting license over auriferous country in Southern Sudan and one covering the Dul district, Abyssinia. Also, an interest has been taken in the Anatolia-Serdjiller Syn., of Asia Minor, which see.

WADY OYO (SUDAN) GOLD MNG. SYN., LTD. **EGYPT**

Office: A. C. Gibbons, sec., 32 Great St. Helen's, London, E. C. 3, England. Directors: J. E. H. Lomas and P. C. Tarbutt.

Inc. Jan. 27, 1920. **Cap.** £20,000; par 5s; 41,500 fully paid shares issued.

Property: a 415 acre concession in the Red Sea province, Sudan.

NIGERIA

AMALGAMATED TIN PROPERTIES OF NIGERIA, LTD. **NIGERIA**

Office: G. D. Cahill, sec., 8 Adam St., Adelphi, London, W. C. 2, England. **Directors:** C. Wallington, chm. and mng. director, and A. Purchase.

Inc. June 7, 1912. **Cap.** £200,000; par 10s; 301,220 shares issued. Current liabilities over assets were £300 on Oct. 31, 1919.

Property: prospecting licenses over tin placer ground in Northern Nigeria.

ANGLO-CONTINENTAL MINES CO., LTD. **NIGERIA**

Office: A. W. Berry, sec., 22 Austin Friars, London, E. C. 2, England. **Directors:** W. F. Turner, chm. et al.

Inc., Dec. 23, 1909. **Cap.** £155,000; 10s par; 310,000 fully paid shares issued. Company holds a controlling stock interest in the **Mongu Tin Mines.**

Financial statement, Dec. 31, 1920, shows: credit balance of £33,249, which after deductions gave a surplus of £13,835. Liquid assets were £191,321, and liabilities £3,572.

Dividends: from 1910 (initial) to 1913 were 55%; none in 1914; 1915 to 1918, 45%; 17½% in 1919; 10% in 1920, paid in May 1921.

Property: tin bearing placer ground in Nigeria. Beginning with 1919, company acquired, or had applied for, 6 different new areas on the Bauchi plateau in Northern Nigeria and have concentrated work on prospecting these properties. They include the Anglo—Jos area, 3 sq. miles which adjoin that of Jantar company, 3 miles from Jos; the West Areas near Northern Nigeria company's holdings; the Boguru embracing 7½ sq. miles; and the Moguna containing 5 distinct tracts aggregating 31 sq. miles, with 1,300 tons of recoverable tin concentrate, or 1 lb to the yd., and also available water power up to 5,500-h. p. During 1919-20, a 32-sq. mile group in the Ropp district was sold to the Mongu company.

Production: 271 tons of black tin in 1917; 207 tons in 1918; 148 tons in 1919; all from company's original holdings.

Considerable money was spent in exploring the new holdings during 1920, but because of the low price of tin, all work was stopped except at Anglo Jos, on which gravel containing 750 tons of tin concentrate has been proven.

ASSOCIATED NIGERIAN TIN MINES, LTD. **NIGERIA**

In liquidation, beginning June, 1921; holdings and other assets sold to **Keffi Cons. Tin Co.** (q. v.), on a share for share basis. G. E. Bance, liquidator, Capel House, New Broad St., E. C. 2, and A. H. Dwight, 32 Sackville St., London, W. I. England.

BALLARAT GOLD FIELDS, LTD. **NIGERIA**

Office: R. H. Purver, sec., 80 Coleman St., London, E. C. 2, England. **Directors:** A. F. W. Johnson, J. C. Kent and J. B. Prince.

Inc. Oct 5, 1895. **Cap.** £75,000; par 5s; 253,888 fully paid shares issued. On Oct. 31, 1921, current liabilities exceeded assets by £1,230.

Property: tin-bearing ground in Nigeria acquired in 1920. The Rosalind Gold Mines near Ballarat, Victoria, Australia, have been abandoned.

BENUE (NORTHERN NIGERIA) TIN MINES, LTD. **NIGERIA**

Office: H. St. J. Hodges, sec., 20 Copthall Ave., London, E. C. 2, England. C. E. Pearson, chm. of directors; Pawlet & Brelick, cons. engrs.

Inc. Aug. 4, 1915. **Cap.** £30,000; 10s par; all issued fully paid. For year ended July 31, 1920, there was a loss of £1,791. Current assets over liabilities were £25,115; tin on hand was £2,493 and inventory £1,313. Surplus was £4,965. Company owns an interest in **Premier Hydraulic Tin Mines** of Nigeria.

Dividends: 6d in 1915-16; 2s in 1916-17; 2s 6d in 1917-18; 1s in 1918-19; none since.

Property: 4 tin-bearing placer leases, 729 acres, in Zaria province, Northern Nigeria.

BERRIDA (NIGERIA) TIN FIELDS, LTD. **NIGERIA**

Office: A. J. Culley, act. sec., Friars House, 39 New Broad St., London, E. C. 2, England. Directors: A. Armitage, F. N. Best, and Sir G. C. Denton.

Inc. March 7, 1912. **Cap.** £185,000; par £1; 175,000 shares issued. The Champion Tin Fields and Lucky Chance Mines were responsible for organization of Berrida and have substantial stock interest in it. Debentures: £50,000, 7s due Jan. 1, 1927. Total expenditure in all undertakings was £48,496 up to June 30, 1919.

Property: alluvial tin-bearing ground in the Tokos and Wada district, and mining rights on the Delimi river (229 acres), in Nigeria. Also, the Poldice mine, 500 acres, near Redruth, Cornwall, England, which shows tin-wolfram-arsenic ore and is equipped with a 30-stamp mill. Treatment of dump ores was begun late in 1919. The Poldice was not operating 1921-22.

BISICHI TIN CO. (NIGERIA), LTD., THE **NIGERIA**

Office: W. W. Evans, sec., 33 Cornhill, London, E. C. 3, England. J. Gardiner, chairman of board of directors; A. W. Hooke, gen. mgr.

Inc. Oct. 13, 1910, in Great Britain. **Cap.** £500,000; par 10s; increased Dec. 1920, from £200,000, par £1; 744,078 shares issued.

Profit in 1919 was £20,139, and surplus £25,524. Excess of current assets was £17,444. Tin on hand was £28,212 and inventory £3,780. In 1920, there was a loss of £4,467; current assets including investments and tin on hand were £43,013, and liabilities £26,638. Surplus Dec. 31, 1920 was £1,057. **Dividends:** totaled 65½% to January 1920.

Property: 6,743 acres of leases, about 6 miles of mining rights and 7 sq. miles of prospecting licenses in Bauchi, Ninghi, Bukuru and other districts of Bauchi province, embracing tin-bearing ground. During 1921, development was most encouraging, 3,266,740 cu. yd. of alluvium having been proved to carry 3 lb. of tin per yd. Reserves as of Oct. 31, 1921, were 10,833 tons of concentrate. Company also owns certain mining rights on the Lancarrow mine in Cornwall, England. Equipped with pipe-lines, 7 monitors and 5 elevators.

Production: 278 tons of 70% tin concentrate in 1917; 275 tons in 1918; 200 tons in 1919; 251 in 1920; 412 in 1921.

In Dec. 1920, a consolidation was effected by which entire assets and liabilities of the Forum River Tin Co., Ninghi Tin Co., and The Northern Nigeria Trust were taken over by Bisichi, these companies receiving for distribution among their shareholders, 142,550, 110,928 and 90,600 Bisichi shares, respectively.

BONGWELLI (NIGERIA) TIN SYN., LTD. **NIGERIA**

Office: F. J. Wheeler, sec., 24 Coleman St., London, E. C. 2, England. **Directors:** Sir R. Pole-Carew, A. W. Kitson and T. L. Field, managing.

Inc. Feb. 12, 1913. **Cap.** £62,500; par 5s; all issued. Increased twice to this figure during 1918 to permit of acquisition of new properties.

Financial statement for 4 years ended July 31, 1918, showed a loss of £2,035 and debit balance £6,534. Liquid assets, including tin on hand were £4,418.

Property: tin lands at Bongwelli on Delimi river, Northern Nigeria, 40

miles from Naraguta. Holdings aggregate 25 sq. miles with additional area at Chow and Dadahowa under lease.

Production: 1918 to 1920 was 96 tons of concentrate.

BRITISH WEST AFRICAN TRADING CO., LTD. **NIGERIA**

In liquidation beginning Feb. 1921. Official Receiver, 33 Carey St., London, W. C. 2, England, liquidator. Formerly **Tin Areas of Nigeria, Ltd.,** name changed Aug. 1920.

CHAMPION (NIGERIA) TIN FIELDS, LTD. **NIGERIA**

Office: A. J. Culley, sec., Friars House, New Broad St., London, E. C. 2, England. Sir Geo. C. Denton, chm. of directors; R. W. Hannam, cons. engr., in Nigeria.

Inc. May 3, 1919. **Cap.** £50,000; 5s par; all issued. Company has been responsible for the promotion of other tin mining companies, including, Lucky Chance Mines in which it holds a ⅔ stock interest, and with which it acted jointly in forming Berrida Tin Fields. Report of June 30, 1921, shows a loss of £11,958; cash and accounts receivable was £15,944 and accounts payable £6,654. There was a debit balance of £6,292.

Property: 6 sq. miles of tin areas under license and several mining rights. Company controls also gold areas in Minna district, including the Shop reef, which is said to have promise. Operations on the tin-bearing ground was suspended Jan. 1921, but the gold holdings continue to be prospected.

DALOWEN NIGERIAN TIN SYN., LTD. **NIGERIA**

Office: J. O. Kettridge, sec., 10 New Broad, St., London, E. C. 2, England. W. Owen, director.

Inc. April 17, 1920. **Cap.** £20,000; £1 par; increased Nov. 1920, from £5,000; 5,000 shares issued.

Property: mineral holdings at Lymn, Tafa Belewa, and elsewhere in Northern Nigeria.

DAMO (NIGERIA) TIN CO., LTD. **NIGERIA**

Office: P. S. Fitzer, sec., Blomfield House, 85 London Wall, London, E. C. 2, England.

Directors: C. G. Lush, chm. and J. Waddington.

Inc. Feb. 20, 1912. **Cap.** £50,000; par £1; 45,007 shares issued. Net expenditures to Sept. 30, 1920, were £10,588; current liabilities exceeded assets by £1,581.

Property: the Upper and Lower Shirkatoo tin-bearing leases, 308 acres, and Atumba and Bumbatoo leases, 606 acres, in Kano district, Northern Nigeria. The Ida H. Mng. Co. has contracted to operate the ground, paying Damo ⅓ of net profit.

DOGONDAJI MNG. CO., LTD. **NIGERIA**

Office: E. Dovey, sec., 646 Salisbury House, London Wall, London, E C. 2, England. **Mine office:** W. A. Pope, mgr., Jos. Nigeria, Africa.

Directors: Sir J. D. Horsfall, chm., F. N. Mahony, Oscar Craven and R. Ellerton Binns. Bainbridge, Seymour & Co., Ltd., gen. mgrs., 645 Salisbury House, London.

Inc. March 2, 1920. **Cap.** £15,000; £1 par; 14,000 shares issued.

Property: the Dogondaji and Falama tin areas in Northern Nigeria, 26 miles S. of Jos.

DUA (NIGERIA) TIN FIELDS, LTD. **NIGERIA**

Office: T. C. Hancock, Finsbury House, Blomfield St., London, E. C. 2, England. J. H. Cordner-James, chm. of directors.

Inc. April 23, 1912. **Cap.** £110,000; 2s 6d par; 839,297 shares issued; was increased in 1918 from £75,000. Receipts for year ended June 30, 1921, were £2,318 and operating loss was £4,890, making debit balance of £12,272. Current liabilities exceeded assets by about £5,000.

Property: mining rights on a tin-bearing area in Bauchi province, Northern Nigeria, which the company is reported to have relinquished. Reorganization is contemplated.

EX-LANDS NIGERIA, LTD. NIGERIA

Office: 68 Basinghall St., London, E. C. 2, England..

Office: H. G. Latilla, chm. of directors; J. M. Mackay, sec.-mgr.; H. F. Hueston, mgr. in Nigeria.

Inc. July 20, 1912. **Cap.** £150,000; 2s par; 1,349,007 shares issued. At end of 1920, liquid assets over liabilities were £2,627; tin on hand was £18,318 and stock £5,812. Surplus was £1,146, net profit was £14,131. **Dividends:** 50% to 1918; 20% in 1919; 5% in 1920, to June.

Property: 4,949 acres of tin placer ground, in 2 parcels, the Nankarn and Dress. The former is on the Giae river in So. Bukuru district, Bauchi province, 3 miles N. W. of Dress. Operations are conducted by ground sluicing. Reserves are 2,000 tons of concentrate of 73% tin content.

Production: 360 tons of tin concentrate in 1919; 382 tons in 1920.

FILANI (NIGERIA) TIN MINING CO., LTD. NIGERIA

Office: J. Worley & Sons, secs., 37 Lime St., London, E. C. 3, England.

Directors: D. J. Mooney, H. L. Puckle and S. R. Worley. Lake & Currie, cons. engrs.

Inc. Feb. 3, 1911. **Cap.** £80,000; par 5s; 265,000 shares issued.

Property: a license over 16 sq. miles tin-bearing ground, leases over 1,354 acres and 3,000 yd. of mining rights, in Bauchi district, Northern Nigeria. Also, an interest in gold placers in Illorin and Remie districts. Production 1917-1921, 184 tons of tin concentrate.

FORUM RIVER (NIGERIA) TIN CO., LTD. NIGERIA

In liquidation; all assets and liabilities transferred to Bisichi Tin Co. (Nigeria), Ltd., which see. W. H. Stentiford, liquidator, 1 Broad St. Place, London, E. C. 2, England.

GOLD COAST CONS. LANDS, LTD. NIGERIA

Office: L. N. Billson, sec., 24 Broad St. House, New Broad St., London, E. C. 2, England.

Directors: J. A. Cooper, chm., and S. Bratchell. F. Dalby, mgr. in Nigeria.

Inc. March 16, 1921. **Cap.** £71,000; par 2s; 563,056 shares issued. Company owns a £46,000 stock interest in West African Gold Mines and Estates, Ltd., of the Gold Coast Colony.

Property: 16 miles of mining rights and 800 acres of leases in Bauchi province, Northern Nigeria, covering tin-bearing gravel ground. Contracts to operate ground have been made with **Tokatea Trust, Ltd., and Zungon Tin Syn.** under which 40% of the output is retained by the first and 10% by the second named company.

HAUSA (NIGERIA), LTD. NIGERIA

Office: G. H. Bridge, sec., London Wall Bldgs., London, E. C. 2, England. **Directors:** C. H. Villiers, chm., and A. Stewart.

Inc. March 27, 1912. **Cap.** £50,000; par 5s; 93,140 shares issued. Expenditures to June 30, 1921, are £21,242 net.

Property: in Nigeria. Work has been suspended.

IDA H. MINING CO., LTD. NIGERIA

Office: P. S. Fitzer, sec., Blomfield House, London Wall, London, E. C. 2, England.

Directors: Sir Geo. C. Denton, chm., et al. C. G. Lush, cons. engr.; R. B. Wham, mgr. in Nigeria.

Inc. April 27, 1920 as a reorganization of the Ida H. Gold Mng. Co., Ltd. (inc. 1900). **Cap.** £75,000; 5s par; 186,968 issued. Shares of old and new companies exchanged on an equal basis plus an assessment of 2s. Current assets exceeded liabilities by £12,940 on April 30, 1921. Expenditures in 1920-21 were £11,859.

Company conducts exploration work in Nigeria, and is now operating tin-bearing ground of **Damo Tin Co.** paying ⅓ of net profits. A similar arrangement was made with the Monguna Syn. Also, it controls about one

square mile of gold placer ground in the Jebba district which is being prospected. There seems to be some doubt as to the merit of the Damo property.

JANTAR NIGERIA CO., LTD. **NIGERIA**

Office: Wm. Pocock, sec., 18 St. Swithin's Lane, London, E. C. 4, England. **Directors:** G. T. Broadbridge, chm., et al.

Inc. May 24, 1912. **Cap.** £225,000, 5s par; 780,000 shares issued; was increased Dec., 1920, from £90,000, par £1. In 1920, profits were £838, increasing surplus to £3,406. Current assets (including £7,325 tin on hand) over liabilities were £825. An attempt to float debenture issue early in 1921 resulted in failure.

Dividends: 47½%, 1912 to 1917; 15% in 1917-18; none since.

In Dec. 1920, the Kuru Syn. was amalgamated with Jantar, upon payment of 240,000 Jantar shares. At same time properties of Kuru South, Ltd., (q. v.) were purchased for 120,000 Jantar shares.

Property: the consolidated holdings now owned cover 90 sq. miles of tin-bearing areas held under license, 1 mile N. W. of Jos. and 3 miles S. W. of Naraguta. Development thus far has shown 3,000 tons of recevorable black tin of 70% tenor.

Production: 166 tons black tin in 1917-18; 110 tons in 1918-19; 143 tons in 1919-20.

JEMAA (NIGERIA) MNG. CO., LTD. **NIGERIA**

Office: W. S. Griffin, 32 Sackville St., London, W. 1, England. J. G. England.

Inc. Oct. 29, 1920. **Cap.** £25,000; par 5s; 80,000 shares issued.

Property: 6.7 and 15 sq. miles of mining rights at Jemaa and Karawa, Northern Nigeria.

JOS TIN AREA (NIGERIA), LTD. **NIGERIA**

Office: W. S. Griffin, 32 Sackville St., London, W. C. 1, England. J. G. M. Brownjohn, chairman of board of directors; A. S. Williams, mgr.

Inc. May 3, 1910, in Great Britain. **Cap.** £110,000; 5s. par; 300,000 issued. There was a loss of £3,058 for year ended July 31, 1921. Surplus was £1,433.

Dividends: 60% from 1912 to 1918; 5% in 1918-19; none since.

Property: 6,536 acres of tin lands in the Jos and Ropp districts, Northern Nigeria, equipped with a bucket-dredge, and certain rights and licenses in Bukuru and Rukuba districts.

Production: 322 tons of black tin in 1917; 267 in 1918; 233 in 1919; 143 in 1920; 186 in 1921.

JUANITA MINES OF RHODESIA, LTD. **NIGERIA**

Office: L. N. Billson, 24 Broad St. House, London, E. C. 2, England. Directors: J. A. Cooper, chm., and J. E. Franck.

Inc. March 21, 1910. **Cap.** £40,000; par 5s; 160,000 shares issued. Current assets on Jan. 31, 1920, were £7,171 and liabilities £2,713.

Company was formed to operate mining property near Bulawayo, Rhodesia, but is now interested in the tin fields of Nigeria, where it holds rights and licenses on the Bilidi river, and between the Delini and Jarawa rivers, Bauchi province, Northern Nigeria.

KADUNA PROSPECTORS, LTD. **NIGERIA**

Office: F. Lee, 16 St. Helen's Pla., London, E. C. 3, England.

Officers: C. J. R. Livingstone-Learmonth, ch. of directors; J. W. Anderson, mng. dir.; J. E. Snelus, min. engr.

Inc. Nov. 10, 1913. **Cap.** £25,000, increased from £20,000 in Dec., 1920; par 5s; 63,000 shares issed, of which Kaduna Syn. owns nearly one-half. Company joined with Kaduna Syn. (q. v.) in a £30,000 note issue. There was a net loss in 1920 of £750, and debit balance of £327 written off from reserve. **Dividends:** 30% in 1918-19; no other.

Property: leases and rights on tin-bearing ground in Dress and

Monguna districts. Production for 2 years ended Oct. 31, 1921, was 208 tons of tin concentrate.

With Kaduna Syn. and Naraguta Tin Mines, company has taken an interest in a tin smelter at Falmouth.

KADUNA SYNDICATE, LTD. NIGERIA

Same address as Kaduna Prospectors, which see; and same officers, with Lake & Currie, cons. engrs., additional.

Inc. Aug. 5, 1910. **Cap.** £40,000 increased Dec. 1920, from £30,000; par 5s.; 111,200 shares issued. **Notes:** £30,000 10s. due Oct. 31, 1930, issued jointly with Kaduna Prospectors, each £50 note carrying a certificate entitling holder to 40 shares of each company at 12s. 6d per share. Company holds a 29,000 share interest in Kaduna Prospectors.

There was a loss of £483 for year ended Oct. 31, 1920; including investments, stocks and stores, realizable assets were £39,240; liabilities £5,204, with reserve of £7,500; and surplus £4,883.

Dividends: from 1912 to 1918 were 270%; 35% in 1919; 10% in 1920.

Property: 1,730 acres of alluvial tin ground, held under lease together with certain mining rights and licenses. Operations are conducted by sluicing.

Production: 180 tons tin concentrates in 1917-18; 205 in 1918-19; 169 in 1919-20; 170 in 1920-21.

Company joined Naraguta Tin Mines and Kaduna Prospectors in acquiring a tin smelter at Falmouth, in 1920-21.

KASSA MINING CO., LTD. NIGERIA

Controlled by Mawchi Mines, Ltd., of Burma.

Office: J. A. Henderson, 2 Broad St. Place, London, E. C. 2, England **Mine office:** Kassa, Jos, Nigeria. W. B. Dick, chm. of directors.

Inc. July 5, 1919. **Cap.** £80,000; par 5s.; 280,000 shares issued, of which Mawchi Mines owns 157,193 and Niger Co. 120,000, shares. On June 30, 1920, there was a debit balance of £3,126; excess current assets was £2,277.

Property: a license on 11 sq. miles of tin-bearing ground on North Ropp river, between Ropp and Bukuru, Northern Nigeria, adjoins the Kassa-Ropp holdings. Idle.

KASSA ROPP TIN CO., LTD. NIGERIA

Office: G. E. Bance, sec., Capel House, New Broad St., London, E. C 2, England. O. Wethered, chm. of directors.

Inc. April 25, 1917. **Cap.** £40,000; par 10s.; all issued. For year ended June 30, 1919, profit was £6,743. Cash and accounts receivable were £12,665 and accounts payable £7,070. The surplus was £8,607.

Dividends: 10% in 1917-18; 15% in 1918-19; 10% in 1919-20 to March, plus right to one Kuru Syn. share for each 8 Kassa-Ropp shares held. The former now forms a part of Jantar Nigeria Co.

Property: originally held, sold Aug., 1919, to Associated Nigerian Tin Mines, for 200,000 shares; latter in turn has transferred holdings to Keffi Cons. Tin Co., which see. Company is to acquire new areas.

KEFFI CONS. TIN CO., LTD. NIGERIA

Office: A. H. Dwight, sec., 32 Sackville St., London, W. 1, England. G. T. Broadbridge, chm. of directors.

Inc. Nov. 13, 1920, as a consolidation of the Keffi Tin with other companies; in 1921, the Associated Nigerian Tin Mines was also amalgamated. **Cap.** £775,000, increased May, 1921, from £500,000; par 5s; 2,667,004 shares issued, of which 15,356 are only one-fifth paid.

Property: alluvial tin deposits in Jemaa and South Ropp districts and on the Bauchi plateau, Northern Nigeria, consisting of 57 sq. miles under license and 2,705 acres under lease. Estimates of reserves give 3,400 tons of recoverable black tin on the Keffi area and 4,200 tons on the Kassa-Ropp area. Equipped with hydraulic plant.

Production: has been curtailed and averaged about 20 tons of concentrate per month in 1921.

KEFFI TIN CO., LTD. **NIGERIA**

Dead. Company consolidated with other companies to form **Keffi Cons. Tin Co.**

KURU SOUTH, LTD. **NIGERIA**

Office: W. Pocock, asst. sec., 18 St. Swithin's Lane, London, E. C. 4, England. **Directors:** F. Allen, F. P. Lousada and P. C. Tarbutt.

Inc. Oct. 23, 1919. **Cap.** £60,000; par 5s; 120,000 shares issued. Cash, investment and debtors were £19,588 on Dec. 31, 1920; creditors £356.

Because of low tin prices, company in Dec., 1920, sold its mineral holdings to the Jantar Nigeria Co. (q. v.) for 120,000 Jantar shares; later purchased 60,000 additional shares.

KURU SYNDICATE, LTD. **NIGERIA**

Dead. Amalgamated in Dec., 1920, with **Jantar Nigeria Co., Ltd.**, which see.

LAFON RIVER TIN AREAS (NIGERIA), LTD. **NIGERIA**

Office: W. W. Evans, sec., 33 Cornhill, London, E. C. 3, England.

Directors: J. Gardiner, chm. and A. H. Young. Laws, Rumbold & Co., mgrs.

Inc. Dec. 7, 1911. **Cap.** £50,000; £1 par; all issued. No financial statement since 1918 when current liabilities exceeded assets by £574.

Property: a license on 13 sq. miles of tin-bearing areas on Lafon river, Bauchi plateau, Northern Nigeria, 20 miles from Jos. Also leases on 427 acres and some 5 miles of rights.

LOWER BISICHI (NIGERIA) TIN MINES, LTD. **NIGERIA**

Office: W. S. Griffin, sec., 32 Sackville St., London, W. 1, England. **Mine office:** P. O. Naraguta, Bauchi, No. Nigeria.

H. T. Miller, chairman of board of directors; A. S. Williams, gen. mgr.; M. A. Bruce, mine mgr.

Inc. April 29, 1912, in Great Britain. **Cap.** £40,000; 5s. par; 145,667 issued. For year ended Sept. 30, 1920, there was a loss of £2,829. Including tin on hand, current assets were £6,329 and liabilities £6,076. Surplus was £542; reserve £3,000.

Dividends: 12½% each in 1916-17, 1917-18 and 1918-19; none since.

Property: tin-bearing ground in Bauchi province, Northern Nigeria, equipped with hydraulic plant. Additional territory, in the Rudos district, was acquired from the Tin Areas company in 1919, making total holdings 1,694 acres of leased areas.

Production: 72 tons of black tin in 1916; 64 in 1917; 87 in 1918; 80 in 1919; 69 tons in 1920.

LUCKY CHANCE MINES, LTD. **NIGERIA**

Office: A. J. Culley, sec., Friars House, 39 New Broad St., London, E. .S 2, England. F. N. Best, chm. of directors; C. G. Lush, cons. engr.

Inc. May 31, 1905. **Cap.** £75,000; par 5s.; all issued, of which Champion Tin Fields owns 200,000 shares. There was a loss of £2,449 for the year ended Dec. 31, 1920, which with previous debit balance and other deductions made a debit balance of £33,614 carried forward. Excess of liquid assets was £6,452. Company has a large interest in Berrida Tin Fields, Ltd.

Property: the Murgi lease, 114 acres, in the Bauchi province; also 1 sq. mile under license and 9 mining rights; all tin-bearing. A small tin production has been made. In 1918, company acquired the West Poldice tin-wolfran mine at Redruth, Cornwall, England, which is not now operated.

MINNA (NIGERIA) TIN CO. (1914), LTD. **NIGERIA**

Office: T. K. Lockington, 1 Broad St. Place, London, E. C. 2, England. C. G. Lush, chm. of directors; J. E. Day, mine mgr., care P. O., Jos, No. Nigeria.

Inc. Feb. 25, 1914. **Cap.** £90,000 increased from £65,000 in Sept., 1919;

5s. par; 272,659 shares issued. There was a net loss of £4,820 for year ended March 31, 1920, with a final debit balance of £7,294. Liquid assets totaled £9,938 and liabilities £3,216. **Dividends:** one of 7½% was paid in 1918.

Property: a license over 12 sq. miles of tin-bearing placer ground, certain leases and mining rights, in Bauchi district, S. W. of Ninghi. Is equipped with hydraulic plant.

Production: for 4 years ended March 31, 1921, was 175 tons black tin.

MONGU (NIGERIA) TIN MINES, LTD. **NIGERIA**

Controlled through stock ownership by Anglo-Continental Mines Co., Ltd.

Office: 22 Austin Friars, London, E. C. 2, England.

Officers: W. F. Turner, chm. of directors; A. W. Berry, sec.-dir.; E. C. Powis, mgr.

Inc. Jan. 30, 1914. **Cap.** £150,000; 10s. par; 265,307 shares issued, of which 190,000 are owned by Anglo-Continental. On Dec. 31, 1920, surplus was £10,770. Assets included cash £9,813, debtors £668, tin £14,916, stores £18,707. Creditors were £8,894.

Dividends: 50% from 1915-1917; 25% each in 1918 and 1919; 12½% in 1920.

Property: 32 sq. miles of mining rights in the Ropp district; also 3,992 acres of leases and 32 miles on the Mongu river and tributaries. Drilling has proven about 6,000 tons of concentrate with a 70% tin tenor. One bucket dredge is operating, but new work has been suspended.

Production: 557 tons tin concentrate in 1916; 571 in 1917; 476 in 1918; 449 in 1919; 531 in 1920; 568 in 1921.

NARAGUTA EXTENDED (NIGERIA) TIN MINES, LTD. NIGERIA

Office: Friars House, New Broad St., London, E. C. 2, England.

Officers: Sir Geo. C. Denton, chm. of directors; A. J. Culley, sec.; C. G. Lush & Son, and R. W. Hannam, cons engrs.

Inc. Dec. 8, 1911. **Cap.** £160,000; £1 par; 152,757 shares issued. For year ended Dec. 31, 1920, profit after depreciation was £360. Current assets were £23,417 and liabilities £11,969. Surplus was £17,179.

Dividends: 5% in 1916; 12½% each in 1917 and 1918; 10% in 1919.

Property: alluvial tin ground on the Bauchi plateau, totalling 2,223 acres under lease, 4 miles of rights and 2 sq. miles under license. Is equipped with hydraulic plant. Ground is now being worked by contract. Reserves on Dec. 31, 1919 estimated to be 1,700 tons black tin.

Production: 276 tons tin concentrate in 1919; 224 in 1920; 200 in 1921.

NARAGUTA (NIGERIA) TIN MINES, LTD. **NIGERIA**

Office: A. J. Culley, Friars House, 39 Broad St., London, E. C. 2, England.

F. N. Best, chairman of board of directors; F. O'D. Bourke, gen. mgr.; C. G. Lush, cons. engr.

Inc. January, 1910, in Great Britain. **Cap.** £175,000; £1 par; all issued.

In 1921, there was a loss of £17,563. On March 31, current assets, including £24,648 for tin on hand, were £28,359, and liabilities £27,775. By transferring £10,000 from reserve, surplus was £2,713. Reserve £10,000.

Dividends: 80% to November, 1920.

Property: 7 different areas in Bauchi province, Northern Nigeria, embracing 14,849 acres of leases, 46 sq. miles of licenses and 24 miles of mining rights. Except for the Birnin Gwari gold area, this acreage is tin-bearing. Equipped with hydraulic plant.

Production: 520 tons in 1916; 517 tons in 1917; 430 tons in 1918; 433 tons in 1919; 420 in 1920; 496 tons in 1921; 448 tons for 9 mos. in 1921-22.

In 1920-21, company joined Kaduna Syn. and Kaduna Prospectors in acquiring an interest in a small tin smelter at Falmouth.

NEW LAFON TIN FIELDS, LTD. **NIGERIA**

In liquidation; C. N. Radcliffe, liquidator, 7 Great Winchester St., London, E. C. 2, England.

Properties sold in 1919 to Associated Nigeria Tin Mines for 388,000 of latter's shares. In 1921, when Keffi Cons. Tin Co. took over the Assoc. Nigerian Tin Mines, New Lafon agreed to accept Keffi Cons. shares in exchange for those of Assoc. Nigerian, and furthermore decided to dissolve, its stockholders receiving additional stock in Keffi Cons. on a share for share basis.

NIGERIAN BASE METALS CORP., LTD. **NIGERIA**

Office: H. J. Holt, sec., Finsbury Pavement House, London, E. C. 2, England.

Inc. Jan. 14, 1920. **Cap.** £350,000; 5s. par; 400,691 shares issued, of which 2,000 are one-half paid only.

Property: 10 leases, 1,638 acres, on tin-bearing placers, plus 50 sq. miles under license and 27 miles mining rights, E. of Bukuru. Also 15 sq. miles, under license, near Cross river, in Ogoja province on which silver-lead deposits are now being drilled. Tin operations have been suspended.

NIGERIAN CONS. MINES, LTD. **NIGERIA**

Office: W. C. Gould, sec., Warnford Court, Throgmorton St., London, E. C. 2, England. **Mine office:** G. Bottoms, Jos, No. Nigeria.

Directors: F. M. Carleton, chm., H. W. Marley and W. H. Swift.

Inc. Jan. 21. 1920. **Cap.** £70,000; 5s. par; stock all issued. For year ended Feb. 28, 1921, there was a loss of £3,844. Current assets over liabilities were £1,668.

Property: tin-bearing deposits held under lease (303 acres) or license (14½ sq. miles) in Rayfield, Jemaa and Womba districts, on the Bauchi plateau, Northern Nigeria. Also, interests in the gold-bearing areas of Birnin Gwari and Kano districts. In 1920-21, the output was 233 tons of black tin. Operations have been suspended, save by leasers.

NIGERIAN TIN CORPORATION, LTD. **NIGERIA**

Office: E. J. Andrews, sec., Capel House, 54 New Broad St., London, E. C. 2, England.

O. Wethered, chm. of directors; R. T. Hancock, mgr., Jemaa, No. Nigeria.

Inc. Oct. 14, 1909, in Great Britain. **Cap.** £100,000; 5s. par reduced from £1 in Feb., 1920; all issued.

Profit for 21 months ended Dec. 31, 1920, was £4,672, of which £8,082 was distributed and £1,510 carried forward. Current liabilities exceeded assets by £18,216. Depreciation reserve was £35,878. Holdings in other companies £118,426. **Dividends:** 55% to October, 1918; 7½% in 1918-19; 10% in 1919-20 to Feb. 1.

Property: 619 acres and river leases in Bauchi and other districts of Northern Nigeria. Company has large interests in other companies in Nigeria, also in Cornwall and Malaya.

Output in recent years has been small, and was suspended altogether in 1920-21.

OFFIN RIVER GOLD ESTATES, LTD. **NIGERIA**

Office: W. N. Humphrey, Coventry House, South Place, Finsbury, London, E. C. 2, England. West African office: Dunkwa, via Secondee, Gold Coast.

F. N. Best, chairman of board of directors; T. J. Cullen, mgr., in Nigeria; J. H. Koens, mgr. in West Africa.

Inc. Dec. 27, 1900, in Great Britain. **Cap.** £300,000, in 45,000 cum. 7% pfd. and 255,000 ord. shares of £1 par; of which 30,000 and 252,920, respectively are issued. Debentures, £22,850 of 7% authorized; £19,600 outstanding.

No profits are being made or dividends paid.

Property: a concession for gold mining on 100 sq. miles, with the right

to dredge 158 miles along the Offin river, in the Gold Coast Colony, where company is equipped with 3 dredges. Also 587 acres of leases, licenses, etc., on tin-bearing land at Kwi in Northern Nigeria, 12 miles from Bukuru and 20 S. E. of Naraguta, from which the tin is recovered by sluicing and calabashing.

Production: £18,610 gold and 29 tons black tin in 1915; £14,253 gold and 164 tons tin in 1916; £8,464 gold and 165 tons tin in 1917; £408 gold and 119 tons tin in 1918; 63 tons of tin in 1919; 168 tons of tin in 1920.

Operations in the gold area ceased in 1919 and tin operations were suspended in early 1921 to await better prices.

RAYFIELD (NIGERIA) TIN FIELDS, LTD. **NIGERIA**

Office G. E. Bance, Capel House, New Broad St., London, E. C. 2, England. **Mine office:** Top Camp, Jos, No. Nigeria.

O. Wethered, chm. and managing director; J. M. Iles, gen. mgr.

Inc. May 9, 1912, in Great Britain. **Cap.** £500,007; £1 par; increased by addition of £100,000 10% pfd. stock October, 1919, from £400,007; all issued. Also £10,969 of 6% debenture stock outstanding.

There was a loss of £21,414, in 1920, and surplus of £3,449. Cash liabilities exceeded assets by £17,820. Profit in 1919 was £20,057.

Dividends: 25% to December, 1918; 5% in 1919; none since.

Property: 7,059 acres of leases, also licenses over 4,841 sq. miles, in Bauchi province, Northern Nigeria, equipped for hydraulicking. Company has an interest in Keffi Cons., of Nigeria and in mining companies of Cornwall, including the Killifreth Mine, Ltd., is installing a flotation unit to recover arsenic which is associated with the tin ore.

Production: 843 tons of black tin in 1916 (15 months); 679 in 1917; 679 in 1918; 623 in 1919; 462 in 1920; 414 in 1921.

ROPP TIN, LTD. **NIGERIA**

Office: H. St. J. Hodges, 20 Copthall Ave., London, E. C. 2, England.

E. Davis, chairman of board of directors; New Cons. Gold Fields, Ltd., cons. engrs. J. Cothay, mgr.

Inc. Dec. 14, 1911, in Great Britain. **Cap.** £168,000; par 4s.; all issued Debentures have been retired.

There was a loss of £7,595 in 1920. Cash and debtors totalled £15,862; creditors were £34,173 and advances vs. tin £16,039. Surplus was £14,212 and depreciation reserve £72,749.

Dividends: total 260% from 1913 to 1918, inclusive; 60% in 1919.

Property: 61 sq. miles in Bauchi province, Northern Nigeria, worked by two 2¾-cu. ft. dredges, hydraulic plant, and natives with calabashes. Exploration on the Dome and South rivers has been encouraging, and about 10,000 tons of tin concentrate proven.

Production: 670 tons of black tin in 1917; 837 in 1918; 1,028 in 1919; 1,017 in 1920; 1,365 in 1921.

Company is the largest tin producer operating on the Bauchi plateau.

RUKUBA (NIGERIA) TIN MINING CO., LTD. **NIGERIA**

Office: H. T. Skipp, act. sec., Friars House, 39 New Broad St., London, E. C. 2, England.

Directors: F. N. Best, Sir G. C. Denton and A. J. Culley. R. W. Hannam, cons. engr. in Nigeria

Inc. Jan. 30,1912, in Great Britain. **Cap.** £100,000; £1 par; all issued.

Report for 2 years ended June 30, 1921 shows a loss of £11,344, with a debit balance carried forward of £9,028. Excess of cash assets was £2,269. **Dividends:** 10% in 1918; none since.

Property: leases, mining rights and license over 14 sq. miles in Bauchi province, Northern Nigeria, all of which has been leased, lessees paying royalty on sliding scale. Company has an interest in the Cornwall (England) holdings of the Berrida Tin Fields, Ltd.

Production: was 122 tons of black tin in 1916; 101 tons in 1917; 132 tons in 1918; 61 tons in 1919; 47 tons in 1920; 48 tons in 1921.

TIN AREAS OF NIGERIA, LTD. **NIGERIA**

Succeeded by British West African Trading Co., Ltd., in mid-1920 Latter in liquidation.

TIN FIELDS OF NORTHERN NIGERIA, LTD., THE **NIGERIA**

Office: A. J. Culley, sec., Friars House, 39 New Broad St., London, E. C. 2, England.

Directors: S. R. Bastard, chm., F. N. Best and Chas. G. Lush. D. Clemens, mgr.; R. W. Hannam, cons. engr., Jos. Bauchi province, No. Nigeria.

Inc. Oct. 7, 1909, in Great Britain. **Cap.** £100,000; £1 par; 70,007 issued.

There was a loss of £6,143 for year ended March 31, 1921, and a debit balance of £5,588 carried forward. Cash and debtors totaled £12,953 and creditors and taxes £8,151. Profit in 1920 was £5,644.

Dividends: 15% in 1918-19; 7½% in 1919-20.

Property: 594 acres of leases, 12 sq. miles of mining rights at Dogan Dadji, and 4.5 sq. miles of exclusive prospecting licenses in Northern Nigeria, equipped with hydraulic plant.

Production: 113 tons of black tin in 1917; 108 tons in 1918; 118 tons in 1919; 116 tons in 1920; 76 tons in 1921 for 7 months.

Property reported to be under lease to company's manager.

PORTUGUESE EAST AFRICA

ANDRADA MINES, LTD. **PORTUGUESE EAST AFRICA**

Office: Downes, Munns & Co., secs., 286 Salisbury House, London, E. C. 2, England.

Directors: J. C. P. d'Andrada, J. L. Bergson, H. Bosquet, R. Burnay, and F. G. C. E. Robellaz (managing.)

Inc. Sept. 11, 1911, in Great Britain. **Cap.** £250,000 in 235,000 ord. shares of £1 and 150,000 dfd. shares of 2s. par, all issued. Profit for 1920 was £4,571, with a debit balance carried forward of %20,430. Current assets including mineral were £14,884 and liabilities £32,876. Reserves were £35,637.

Property: 614 lode and 75 alluvial claims in Manica district. The Braganza, a lode mine is closed down but a dredge operating on the placer ground recovered 19,698 oz. of gold from February, 1914, to December, 1915, making a profit of £45,234.

Production: in recent years was £19,591 gold from 338,757 cu. meters in 1919 (5 mos.); £40,107 gold in 1920.

MOZAMBIQUE CO. (COMPANHIA DE MOCAMBIQUE) **P. E. A.**

Office: M. Vinet, London sec., Thames House, Queen St. Place, E. C. England. **Head office:** 10 Largo da Biblioteca Publica, Lisbon, Portugal.

Inc. March 8, 1888, given Royal Charter, Feb. 11, 1891, and reconstituted May 5, 1892. **Cap.** £1,500,000; £1 par; all issued.

Dividends: 7½% in 1898; 5% in 1911; 5% in 1913; 5% in 1919.

The company, which possesses sovereign rights over an area of 65,000 sq. miles, is also the owner of all unalienated land and mining rights in this area, which embraces the central and richest portion of Portuguese East Africa.

The Manicaland goldfield or mining district lies within a radius of 16 miles around Macequece. Geologically speaking the field is part of the Umtali mining field of Rhodesia. It is a belt of schistse rocks traversed by gold-bearing quartz veins, the gold also being occasionally found in the schist wall rock. Dredging for alluvial gold is benig successfully carried on.

Copper ores also exist in the district, the Edmundian mine being in this locality.

Company issues for £1 a mining license that gives the holder a right to prospect for 12 months. Each license gives the right to peg-off (stake)

a block of 10 mineral claims, each 100 m. square for lode and placer deposits and 500 by 1,000 meters for non-metallic minerals.

Claim rents, corresponding to claim licenses in Rhodesia and the Transvaal, are 10 shillings per claim in the second year, increasing 50% yearly to a maximum of £3. Rent for a non-metallic claim is £5.11 the second year, doubling each year therafter up to £55.11 per claim annually. Royalties payable to Companhia de Mocambique for gold are on a sliding scale on the gross output, in the case of monthly outputs up to 800 oz. of fine gold, and vary from 1 to 4%. Above 800 oz. gold output the royalty is 10% of the net profits. For all other metals and non-metallic substances the royalty is 10% of the net profit.

Activities for year 1920 resulted in a profit of £15,710, and a surplus of £63,794 after deducting taxes and depreciation. Reserves were £28,816. Value of gold output was £40,031, compared with £20,610 in 1919. The Edmundian produced 132 tons of copper.

ZAMBESIA CO. (COMPANHIA DA ZAMBEZIA) PORTUGESE E. A.

Office: 53, Rua do Alecrim, Lisbon, Portugal.

Company was incorporated in 1892 and holds a long term concession on about 155,000 sq. miles on either side of Zambesi and Shire rivers. The mining rights are in the hands of the Zambesia Mng. Devel. Co., which see.

ZAMBESIA MNG. DEVEL., LTD. PORTUGUESE E. AFRICA

Offices: J. L. Alexander, sec., 2 Thames House, Queen St. Place, London, E. C. 4, England; 7, Rue Chauchat, Paris, France; 45, Rua do Alecrim, Lisbon, Portugal. Mine address: V. A. Rorbotham, Tete, Portuguese East Africa.

Sir Alfred Sharpe, chm., L. E. J. A. Oury, managing director, and 5 other directors.

Inc. Dec. 21, 1911 in England. **Cap.** £252,000, divided into 240,000 £1 ordinary and 240,000 1s. deferred shares; 132,000 ordinary and all deferred are issued.

Company has under concession the sole mining rights on about 35,000 sq. miles of territory, covering the Zambesi river and tributaries and adjoining holdings of Mozambique Co. on the N., taken over from the Zambesia Co., which received 36,200 Zambesia M. D. ordinary shares, some cash, and is to get 20% of annual receipts. Engineers were engaged in 1921 in a thorough examination of the mineral possibilities of the tract.

RHODESIA

ANTELOPE GOLD MINE (RHODESIA), LTD.

In liquidation from Jan. 6, 1920; W. F. Moore, liquidator, 8 Old Jewry, London. E. C. 2, England.

BRITISH SOUTH AFRICA CO., THE RHODESIA

Head office: A. P. Millar, sec., 2 London Wall Bldgs., London, E. C., England. Administrator of Southern and Northern Rhodesia: Sir D. Chaplin, Salisbury, Rhodesia, Africa; F. B. Philip, sec. at Cape Town, So. Africa.

Board of Directors: P. Lyttelton Gell, pres., R. Maguire, Hon. Sir L. Michell, Sir H. Birchenough, Marquess of Winchester, Otto Beit, H. W. Fox, Baron E. B. D'Erlanger, D. O. Malcolm, Br.-Gen. E. Baring, Duke of Abercorn and Major P. S. Inskipp.

Inc. Oct. 29, 1889. **Cap.** £9,000,000; par £1; having been increased at intervals from £1,000,000 in 1890; 8,937,533 shares are issued and fully paid. **Bonds:** £1,250,000 5% mortgage debentures due by extension, August, 1835.

For year ended March 31, 1920, revenue exceeded expenses by £166,899, with total credit of £949,819. Liquid assets one year later were £1,570,000.

Lands: about 440,000 sq. miles. The company was organized to acquire (a) the Rudd-Rhodes Concession from the Central Search Ass'n. This

concession covers the mining rights over the territory of the King of Matebeleland; the C. S. Ass'n being entitled to one-moiety of the net receipts rights over the territory of the chiefs Khama and Gungunhana; (c) admin- 1894 by the issue of 1,000,000 fully paid shares of the company; (b) mining rights over the territory of the chiefs Khama and Gungunhana; (c) administrative power over the whole British sphere north of Zambesi river and west of Nyasaland; (d) rights of the African Lakes Co. (acquired in 1894); and (e) through the Victoria Falls Power Co., in which this company holds a large interest, the right to develop electrical energy at Victoria Falls.

The company adopted the name "Rhodesia' to describe all the territories under its administration; the portion south of the Zambesi being described as Southern Rhodesia. Company controls Bwana M'Kubwa and several other important South African copper properties by ownership of a large stock interest. Company is a gigantic corporation and is the owner of the mineral rights not only throughout Rhodesia but also in the Nyasaland and Bechuanaland protectorates.

BWANA M'KUBWA COPPER MINING CO., LTD. RHODESIA

Was controlled by British So. Africa Co.

In liquidation; R. E. Bayliss, liquidator, 19 St. Swithin's Lane, London E. C. 4, England.

Current liabilities exceeded assets by £16,235 on June 30, 1920.

Property: 47,097 acres in Northern Rhodesia, containing the Bwana M'Kubwa mine, 1,450 miles by rail from Beira, Portuguese East Africa.

A new company with 1,600,000 5s shares capital is to be formed, stock to be exchanged on equal basis for old stock (925,035 10s shares) plus an assessment of 2/6 per share. This reorganization will yield £115,631 cash, and underwriting of additional shares will bring in £168,736. The additional capital is to be used to materially increase scale of operations. A recent report by A. B. Emery of the Messina mine estimated reserves to be 3,000,000 tons of 4% copper ore to 450' depth. Flotation will probably be adopted, as a 100 ton experimental plant is said to have shown a fair extraction from oxidized ore.

Production: during the year ended June 30, 1918, the mill treated 16,295 tons of ore, yielding 1,419 tons of 40% copper concentrates.

Mine has been a long time reaching the stage of profitable operation, but from now on should yield a satisfactory return despite its large capitalization.

CAM & MOTOR GOLD MINING CO., (1919), LTD. RHODESIA

Reorganized in 1919 to provide additional working capital; see Vol. XIV for old company.

Offices: The London & Rhodesian Mng. & Land. Co., Ltd., sec., Palmerston House, London, E. C. 2, England; and Salisbury, Rhodesia, Africa. **Mine office:** Eiffel Flats, Hartley district, Rhodesia, Africa.

Officers: L. E. B. Homan, chm. of directors; D. V. Burnett, cons. engr.; E H. Bulman, mine mgr.

Inc. July 17, 1919, in England. **Cap.** £617,500; £1 par; 604,235 fully paid shares issued in exchange for stock of old company on a 50-50 basis plus an assessment of 7s. 6d per share. London & Rhodesian company owns 203,988 shares.

For year ended June 30, 1921, there was an operating loss of £45,054. Current assets, including £23,979 for bullion, were £41,051; liabilities £166,943. Premium reserve was £15,566. Working profit during 1921-22 was from 3 to 6.4s per ton.

Property: 286 claims, 429 acres, in the Hartley district of Southern Rhodesia, includes he Cam and Motor mines, held under license from British So. Africa Co.

Development: by 1,100' steel-lined main shaft at the Motor mine. During 1917-18, 4,338' of new work was done.

Ore reserves: 653,800 tons of 37s ore in an average width of 21.7'.

Equipment: steam power, hoists, compressor, shops, and 500-ton mill employing 6 Krupp ball-mills and tube mills. Wet crushing and flotation have taken the place of roasting and cyaniding. Natives employed number 1,300. As ore contains antimony and arsenic, its treatment is difficult.

Production: 142,766 tons of ore, yielding £208.772 in 1917-18, with a loss of 3d per ton. In 1920-21 (7 mos., Dec.-June), 58,010 tons yielded £57,518; 1921-22, 5 mos. to November, 66,900 tons yielded £120.617. Mill was idle for 2 years ended Dec. 1920.

Before reorganization company's profits, if any, were small, and troubles incidental to a new treatment process have been a handicap, but the corner has (1921-22) apparently been turned.

CONNEMARA SYNDICATE **RHODESIA**

Address: Gwelo, Southern Rhodesia, Africa.

Property: the Connemara gold mine in Gwelo district, South Rhodesia. The ore is of the "banded ironstone" type with value in gold from 0.3 to 0.48 oz. per ton. The oxidized portions only, of the lode are now worked. Equipped with 20-stamps, 5' Chilean mill and cyanide plant; extraction was 68%. A "baking", or light roasting, process before cyanidation has been introduced, with resulting extraction of 86%, and Chilean mill has been discarded. Production in 1920, was 8,710 oz. gold from 27,207 tons of ore treated.

EILEEN ALANNAH MNG. CO., LTD. **RHODESIA**

Office: E. Poynder, 2 London Wall Bldgs., London, E. C. 2, England. Secretarial Agts., Willoughby's Cons. Co., Ltd.

Directors: G. S. Fort, A. W. Jarvis and G. R. Saunders. B. L. Gardiner, cons. engr.

Inc. Nov. 9, 1911. **Cap.** £500,000; par £1; 390,768 shares issued. Company controlled through stock ownership by Willoughby's Cons. and British So. Africa Co. **Dividends:** 5% in 1916; none since. There was a loss of £1,950 for year ended Dec. 31, 1920, with total debit balance of £25,817. Cash assets exceeded liabilities by £29.384.

Property: 246 claims in Gatooma section of Hartley district, Southern Rhodesia, 4½ miles from the railroad, shows reefs of refractory gold ore.

Reserves: reported to be 50,579 tons of ore assaying 0.47 oz. per ton. Equipped with 8 Nissen stamps, roasting and cyanide units. **Production:** in 1920 was 21,720 tons milled yielding 4,788 oz. gold. Property was drowned by heavy rainfall in early 1921.

ELDORADO BANKET GOLD MNG. CO., LTD., THE **RHODESIA**

In liquidation from Jan. 23, 1920; W. F. Moore, liquidator, 8 Old Jewry, London, E. C. 2, England. See Vol. XIV.

FALCON MINES, LTD. **RHODESIA**

Office: The Gold Fields Rhodesian Development Co., Ltd., secs.-cons. engrs., 8 Old Jewry, London, E. C. 2, England.

J. C. Prinsep, chairman of board of directors; H. T. Brett, gen. mgr. C. E. Parsons, cons. engr., Bulawayo. So. Rhodesia, Africa.

Inc. Feb. 26, 1910. **Cap.** £600,000; £1 par; 400,000 shares issued. Bonds, £250,000 authorized, 6%; £67,963 outstanding due July 31, 1922.

Working profit for year ended June 30, 1921, was £15.755, which after paying interest and taxes, became a debit balance of £15.800. Current liabilities exceeded assets by £28.278. Surplus was £180.867; debenture redemption reserve £180.000.

Dividends: 20% in 1916-1917; none since.

Property: 397 claims, 619 acres, includes Falcon and Athens mines in Blinkwater section of Gwelo district, Southern Rhodesia, 60 miles N. E. of Gwelo. Also 298 claims showing base metals, including iron ore, and a considerable acreage of farm lands.

The orebodies are large, varying from 17' in width on the 3rd level to

50′ on the 9th level. Metal contents also increase from 2.45% copper and $3.68 gold per ton on the 3rd to 2.3% copper and 6 dwt. gold on the 9th level.

Development: by a 1,100 (main) shaft, and two others 540 and 480′ deep; with a total of over 7 miles of workings. On No. 10 level the orebody is 180′ long, 70′ less than on No. 9, but the width and value are similar. Extensions in 1919-20 were 2,979′ and in 1920-21, 3,453′. On the 12th, or lowest level, the ore shoot is 33′ wide and 180′ long. For the sake of economy, development was suspended March 1921.

Reserves: (June 30, 1921) amount to 569,000 tons, averaging $4.70 gold and 1.92% copper, of which 195,000 tons are broken.

Equipment: crushing plant, equipped with 3 jaw-breakers and 4 trommels, separating the fine and coarse ores. Sorted ore of 5½% copper content and 9% of total output is sent to furnaces. The 500-ton mill, installed in 1915 has 26 Nissen stamps, 2 tube-mills, Dorr thickeners, vanners and a 9-cell Minerals Separation flotation plant. All concentrate is briquetted.

The smelter includes 12 hemispherical blast roasting pots, two blast-furnaces, each of 300-ton daily capacity, two 12,500 cu. ft. turbo-blowers, electric crane and 12 converters of 15-ton copper capacity. Copper is cast into bars of 360 lb., containing 10 oz. gold and 20 oz. silver. The plan of treatment is similar to that of the standard plants in the United States.

Production, years ended June 30, not including custom ores.

Year	Tons Ore treated,	Copper, lb.	Gold, oz.	Silver, oz.	All Costs
1922 (6 mos.)	94,233	3,103,184	18,163	33,921	39/9
1921	184,500	6,172,570	35,960	69,685	43/5
1920	168,675	5,412,600	30,942	61,313	41/1
1919	150,961	5,934,000	33,597	67,794	47/7
1918	170,074	7,064,000	37,701	80,529	46/8
1917	203,049	7,647,000	35,248	70,876	.....
1916	218,792	7,640,000	38,569	73,862	30/7
1915	.....	5,766,000	31,461	53,303	.....

GAIKA GOLD MINING CO., LTD. — RHODESIA

Office: 8 Old Jewry, London, E. C. 2, England.

Directors: Stanley J. Edwards, chm., R. Rawdon Johnson and H. W. Edney. Mine mgr; E. C. Daniels.

Inc. Dec. 19, 1902, in Great Britain. **Cap.** £300,000; £1 par; 273,495 issued.

The year ended June 30, 1921, showed a profit of £32,613. Cash assets were £101,105 (excluding stores) and liabilities £9,077. Surplus was £6,921; gold reserve £2,200.

Dividends: since 1911 total 65½%, including 5% in 1917-18, and 3% in 1918-19. In 1919-20, 7½%; in 1920-21, 12½%.

Property: 225 claims (1½ acres each) in the Sebakwe district of Matabeleland, Rhodesia.

Development: in 3 sections, Rubble, North and South, by 16 shafts to depth of 1,400′. Extensions in 1920-21 were 2,768′. Reserves on Dec. 31, 1921, were 64,000 tons of 0.65 oz. ore, compared with 73,000 tons on June 30, and 64,000 of 0.79 oz. ore on June 30, 1920.

Equipment: complete for mining, with 5 stamps, 1 tube-mill, 1 Chilean mill, and cyanide plant. Mine employs 470 natives.

Production:

Year	Ore treated, tons	Gold yield	Cost per ton
1922 (6 mos.)	23,778	£35,585	....
1921	40,127	82,580	25/4
1920	36,774	80,174	27/4
1919	36,789	66,860	....
1918	38,554	76,568	29/10
1917	38,320	84,007	29/6

The new directorate expects to greatly increase the output and in Jan. 1922, sent A. M. Mackilligin to investigate and report on conditions, and to suggest improvements.

GLOBE AND PHOENIX GOLD MINING CO., LTD. RHODESIA

Office: T. Priest, sec., 35 Old Jewry, London, E. C. 2, England. **Mine office:** Que Que, Rhodesia, Africa.

F. A. Macquisten, chairman of board of directors; T. Haddon, gen. mgr., D. P. McDonald, cons. geologist; J. H. MacArthur, mine, mgr.

Inc. Oct. 18, 1895, in England. **Cap.** £200,000; 5s par; all issued.

Revenue account for year ended Dec. 31, 1921, shows profit £182,144. Including stores and investments, current assets were £256,306, and liabilities £97,431. Surplus was £23,889 after dividends, taxes and depreciation. Reserves were £213,812.

Dividends: total 1,197½% from 1900 to 1918 inclusive; 20% in 1919; 80% in 1920; 40% in 1921; 20% in 1922 on May 11.

Property: 70 mining claims (1½ acres each) in Sebakwe district, Matabeleland, Rhodesia, 140 miles N. of Bulawayo, and 40 miles N. W. of Gwelo, includes the Globe and Phoenix mines, a half mile apart; as the first named shows low values below 5th level, work has been suspended. Company also has 119 claims which are being prospected and 44 acres for impounding tailing, etc.

Development: by 3,149′ incline and 2,300′ vertical shafts. Extensions in 1921 were 3,509′.

Reserves: at beginning of 1922 were 110,000 tons, averaging 1.27 oz. per ton, compared with 93,852 tons of 1.55 oz. ore the previous year.

In the apex suit, started by the Amalgamated Properties of Rhodesia, the Globe and Phoenix won in every court, the final decision being given in 1919.

Equipment: complete, with 40-stamp mill, roasting and cyaniding plant.

Production was 102,473 oz. of gold from 77,464 tons of ore in 1916; 96,471 from 75,465 tons in 1917; 81,244 from 66,383 tons in 1918; 87,880 oz. in 1919; 89,231 from 67,861 tons in 1920; 65,910 from 66,787 tons in 1921; 17,252 from 18,419 tons first quarter of 1922.

Apparently both the amount and grade of the reserves have been decreasing in very recent years, but at end of 1920 prospects throughout mine were reported as much improved.

GOLD FIELDS RHODESIAN DEVEL. CO., LTD., THE RHODESIA

Offices: New Cons. Gold Fields, Ltd., sec., 8 Old Jewry, London, E. C. 2, England; Box 4, Bulawayo, and Box 380, Salisbury, Rhodesia, Africa.

Officers: Lord Harris, chm. of directors; J. G. McDonald, gen. mgr. in Rhodesia; C. E. Parsons, cons. engr.; The Cons. Gold Fields of So Africa, Ltd., mgrs.

Inc. Jan. 31, 1912. **Cap.** £1,742,890; 10s par; 2,514,220 shares issued Profit for year ended May 31, 1921, was £114,064. Current assets exceeded liabilities by £323,724. Surplus £161,908.

Dividends: 5% in 1916-17; 10% each in 1917-18; 1918-19; 1919-20 and 1920-21.

Company's holdings consist of stock interests in mining companies, farms and other real estate, including majority interest in Planet-Arcturus Gold Mines, Ltd. and Shamva Mines, Ltd. Property holdings comprise 220 mining claims, part interest in 48 additional, and 514,426 acres of farms.

LONDON & RHODESIAN MNG. & LAND CO., LTD., THE RHODESIA

Offices: R. Roy Medrum, sec., Palmerston House, Old Broad St., London, E. C. 2, England; and Salisbury, Rhodesia, Africa.

L. E. B. Homan, chm. of directors; D. V. Burnett, gen. mgr.-cons. engr. at Salisbury.

Inc., May 13, 1919. **Cap.** £600,000; 5s par; 2,385,885 shares issued. Was increased from £500,000 in 1921 to absorb Rhodesia, Ltd.

Profit for 1920-21 ending June 30, was £718 which with previous balance made £22,849, all written off against depreciation of investments, etc. Cash and accounts receivable were £37,288, investments in other companies £245,119 and war loan £1,908; current liabilities were £36,950.

London & Rhodesian is largely a holding company with many and diverse interests. It owns about 1,800 mining claims covering deposits of asbestos and mica as well as gold and including over 500,000 acres of farm lands acquired through Rhodesia, Ltd. Either directly or through subsidiaries, it also owns 750 acres of oil lands on the island of Trinidad, West Indies. Company holdings of shares of other companies had a market value of over £250,000 on June 30, 1920, including a controlling interest in Cam & Motor Gold Mng. Co. (1919), Ltd.

LONELY REEF GOLD MINING CO., LTD., THE — RHODESIA

Office: A. D. Owen, sec., Threadneedle House, 23 Bishopsgate, London, E. C. 2, England. **Mine office:** Lonely P. O., Rhodesia, Africa; F. H. Davison, local sec.

Officers: C. F. Rowsell, chairman of board of directors; C. B. Kingston, cons. engr.

Inc. Jan. 13, 1910, in Rhodesia. **Cap.** £325,000; £1 par; 271,007 issued.

A profit of £178,597 was made in 1920. On Dec. 31, 1920 current assets exceeded liabilities by £57,554; surplus was £68,729.

Dividends: 10% in 1911; 30% in 1912; 30% in 1913; 20% in 1914; 15% in 1915; 20% in 1916; 30% in 1917; 25% in 1918; 75% in 1919; 50% in 1920; 30% in 1921.

Property: 263 claims and 12 mill sites in Bubi district, 40 miles N. of Bulawayo. The mine workings develop ore for a length of 425 to 1,075′ that averages 3′ in width and carries 0.85 to 1.5 oz. gold per ton. This is opened to the 23rd level.

Development: by 3,753′ incline to 23rd level, from which a new incline is now being sunk. New work in 1920 was 4,646′. Ore reserves Dec. 31, 1921, were 204,249 tons of 0.9 oz. ore.

Equipment: 20 stamps, 3 tube-mills, and cyanide plant. A gas producer plant and 4 engines were added in 1921. Natives employed were 1,336.

Production: 59,320 tons of ore yielding £174,857 gold in 1917; 57,870 yielding £221,299 in 1917; 54,320 yielding £208,396 in 1918; 55,420 yielding £301,970 in 1919; 59,270 yielding £319,634 in 1920; 58,970 yielding 56,623 oz. in 1921.

PLANET-ARCTURUS GOLD MINES, LTD. — RHODESIA

Office: The Gold Fields Rhodesian Devel. Co., Ltd., secs., 8 Old Jewry, London. E. C. 2, England; also cons. engrs. and agts. in Rhodesia.

J. C. Prinsep, chairman of directors; J. G. McDonald and L. Ludlow, directors in Rhodesia.

Inc. Oct. 30, 1911. **Cap.** £475,000; par £1; all issued, of which G. F. Rhodesian owns 274,755 shares. Loan with interest of £121,337, Dec. 31, 1920, from G. F. Rhodesian is secured by mortgage over the undertaking.

Property: 649 claims, including Slate, Arcturus and Planet mines, in the Enterprise district, 12 miles from Bromley on the Rhodesian railway. The 2 former are under lease since Oct., 1918, to G. F. Rhodesian company, which retains all profit until loan has been repaid. The Planet also operated by lessees was closed down in Sept., 1918.

Development: at the Arcturus by 335′ main shaft. Reserves as of Dec. 31, 1921, were 98,920 tons of 0.66 oz. ore.

Equipment: a plant erected by lessees in 1920, includes 20 stamp mill, 2 Chilean mills, 2 tube mills, concentrating and cyanide units.

Production: from June to Dec., 1920, 30,603 tons of ore yielded 12,968 oz. gold, realizing £73,400. The surplus was £24,557, applied by lessee in reduction of its expenditures. In 1921, 29,913 oz. gold were recovered from 65,120 tons of ore.

REZENDE MINES, LTD. RHODESIA

London office: Palmerston House, E. C. 2, England. **Rhodesia office:** Lonrho Bldgs., Salisbury, Africa. **Mine office:** Rezende, Umtali, Rhodesia, Africa.

Sir A. Bailey, chairman of board of directors; Sir P. B. S. Wrey, v. c.; London & Rhodesian Mng. & Land Co., Ltd., secs. and cons. engrs.; D. V. Burnett, cons. engr.; A. S. Rome, mine mgr.

Inc. Dec. 11, 1908. **Cap.** £120,000; £1 par; all issued; was to be increased to £150,000 early in 1922.

Profit for 1920 was £41,696 with credit balance, £34,519. Current assets on Dec. 31, exceeded liabilities by £46,036.

Dividends: 74% from 1912 to 1918, inclusive; 40% each in 1919, 1920 and 1921.

Property: 494 claims (1½ acres each) in Penhalonga valley, Umtali.

Development: by shafts, the deepest being 1 400′ on incline. A new circular shaft is being sunk. Reserves at end of 1920 were 140,268 tons averaging 0.50 oz. gold per ton; available ore in central section of mine being excluded because unpayable under present cost basis.

Equipment: complete at mines, and stamp mill and cyanide plants. About 1,000 natives are employed.

Production: 54,000 tons in 1918, yielding £125,528; 59,500 in 1917, yielding £94,532; 54,000 tons yielding £129,102 in 1918; 61,800 tons yielding £178,266 in 1919; 66,550 tons yielding £141,322 in 1920; 65,136 tons yielding £153,800 in 1921.

RHODESIA BROKEN HILL DEV. CO., LTD. RHODESIA

Office: R. E. Bayliss, sec., 19 St. Swithin's Lane, London, E. C. 4, England.

Officers: E. Davis, chm. and mng. dir.; Bechuanaland Expl. Co., Ltd., mgrs. in Africa; R. K. Macartney, mine mgr.; Hooper, Speak & Co., cons. engrs.

Inc. Aug. 19, 1910. **Cap.** £350,000; 5s par; all issued.

In 1920, there was a profit of £89,949. Current assets (including metal) on Dec. 31, exceeded liabilities by £111,339. Surplus was £69,089; depreciation account, £32,437.

Property: 1,690 claims (1½ acres each) 374 miles from Victoria Falls, N. W. Rhodesia. Fully described in "Mining Magazine," October, 1919.

Geology: the ground contains a number of hills locally "Kopjes", containing lead and zinc ores. The mining work has disclosed two lodes about 1,000′ apart. The one which passes through Kopjes Nos. 1, 3 and 4 carries lead-zinc ore, and the second which goes through Kopje No. 2 contains zinc ore. Drilling to end of 1920 indicated 200,000 tons of ore, averaging 24% zinc and 2½% lead; and 300,000 tons averaging 27% and 10%, respectively.

All ores carry a small amount of vanadium, and prospecting has disclosed 3,750 tons of 7-13% vanadic oxide ore, besides 6,000 tons ore of lower grade.

Development: by open quarry work which is hampered by a large inflow of water, as much as 170,000 gal. per hour being pumped 40′ to surface; and by 175′ shaft.

Equipment: mine pumps, tramways, 2 blast-furnaces for lead ore and 2 more to be erected. A plant for treating zinc ore is under consideration.

Production: 26,000 tons of lead to October, 1919; 14,602 tons of lead from 42,806 tons of ore in 1920; 19,122 in 1921.

Property is yet in its infancy, and is thought to have a prosperous future.

RHODESIA CHROME MINES, LTD. RHODESIA

Office: R. E. Bayliss, sec., 19 St. Swithin's Lane, London, E. C. 4, England.

Inc. June 27, 1908. **Cap.** £60,000; shares £1 par; 59,457 issued.

Dividends: 10% in 1911; 20% in 1912; 20% each in 1913 and 1914; nil in 1915; 45% in 1916; 20% in 1917; 20% in 1918.

Property: 885 acres, in the Gwelo and Selukwe districts, Southern Rhodesia.

Production of chromic-iron ore:

Year	Tons	Value	Year	Tons	Value
1920.....	60,269	£245,378	1915.....	60,581	£175,792
1919.....	35,282	142,541	1914.....	48,207	107,612
1918.....	31,285	134,857	1913.....	63,383	141,481
1917.....	72,962	327,347	1912.....	69,260	154,600
1916.....	88,871	333,170			

Company is a close corporation, and does not issue public statements of its operations.

RHODESIA COPPER & GEN. EX'N & F. CO., LTD. RHODESIA

Office: R. E. Bayliss, sec., 19 St. Swithin's Lane, London, E. C. 4, England.

Officers: E. Davis, chm. of directors; Bechuanaland Expl. Co., Ltd., mgrs. in So. Africa.

Inc. March 5, 1909, in England. **Cap.** £241,555 in 1,585,126 shares, 3s par; 16,828 shares of 4s 6d par; 1,173,405 of former are issued. Decreased in 1918 from £352,793.

For year ended March 31, 1920, profit was £20,559. Cash assets including investments were £231,785; liabilities, £16,980. Surplus was £4,803.

Dividends: were 5% in 1910-11; 3% in 1913-14; 3% in 1915-16; 2% in 1916-17; nil in 1917-18; 10% in 1918-19; 12½% in 1919-20; 12½% in 1920-21.

Property: 640 sq. miles near the Kafue river, including farm lands and 500 mining claims, 1½ acres each, also ½ interest in 130 and ⅓ interest in 150 claims, all in Northern Rhodesia. On some of the claims fair quantities of copper ore have already been opened. To develop some of the claims the Rhodesia Broken Hill Development (lead-zinc), Kafue Copper Development, and Bwana M'Kubwa Copper companies have been organized.

Reported that farm land concessions, aggregating 474,333 acres are to be sold.

RHODESIA, LTD. RHODESIA

In liquidation beginning Nov. 7, 1921; F. J. Lock, liquidator, Palmerston House, London, E. C. 2, England. Assets, etc., sold voluntarily to **London & Rhodesian Mng. & Land Co. (q. v.), Rhodesia, Ltd.** stockholders receiving 2 L. & R. for every 5 Rhodesia shares held.

SHAMVA MINES, LTD., THE RHODESIA

Offices: The Gold Fields Rhodesian Devel. Co., Ltd., secs. and cons. engr., 8 Old Jewry, London, E. C. 2, England, and Bulawayo, Rhodesia, Africa.

E. S. Bikenruth, chairman of board of directors; J. G. McDonald and L. Ludlow in Rhodesia. W. Wallace, mine mgr.

Inc. April 5, 1910, in England. **Cap.** £600,000; £1 par; all issued.

Profit in 1920 was £223,526. Cash assets over liabilities were £107,257. Surplus was £110,871; reserves; £66,948.

Dividends: 27½% in 1915; 30% in 1916; 26⅔% in 1917; 20% in 1918; 22½% in 1919; 30% each in 1920 and 1921.

Property: 505 claims, in Aberdorn district on the Blinkwater railway. **Development:** by tunnels and 316' shaft from 4th level. Reserves Dec. 31, 1921, were estimated at 2,801,000 tons averaging 0.175 oz. per ton. **Equipment;** includes 3 Gates crushers, 64 Nissen stamps, 12 tube-mills, and cyanide plant, with monthly capacity of 56,000 tons.

Production:

Year	Ore treated tons	Gold yield	Profit
1921	595,500	£446,845	£128,378
1920	609,509	538,889	223,526
1919	599,311	467,527	178,485
1918	556,891	388,424	101,436
1917	587,806	431,543	164,893
1916	582,980	448,723	183,481

Total costs at mine in 1920 were 10.4s per ton. This is the largest gold producer in Rhodesia. Reserves are large, but are low grade, and although the amount remains fairly constant it has been done by including lower grade ore, the value per ton of the total reserves being $1.90 per ton less than in 1916 estimates.

TORONTO (RHODESIA) SYN., LTD., THE — RHODESIA

Office: W. N. Humphrey, sec., Coventry House, South Pl., Finsbury, London, E. C. 2, England.

Officers: Lord Terrington, chm. of directors; J. H. Jeffreys, gen. mgr.

Inc. Feb. 16, 1912. **Cap.** £160,000 increased from £60,000 in 1919; par 5s.; 318,047 shares issued; other shares under firm option to Feb., 1922. Accounts for 2 years ended Dec. 31, 1920, show current liabilities exceeding assets by £6,499. Total mine expense, £20,922 and total administration, £15,102.

Property: 6 blocks of claims on the Toronto and Lucknow reefs in Umtali district, developed by 2 shafts on the former. Extensions in 14 months to March 1, 1921, were 2,619'. Reserves are 28,983 tons of ore valued at £45,268. Equipment includes 2 Nissen stamps with cyanide unit first operated June, 1921.

ZAMBESIA EXPLORING CO., LTD. — RHODESIA

Office: L. Scotland, sec., Friars House, New Broad St., London, E. C. 2, England.

Officers: Tyndale White, chm. of directors; R. Williams & Co., mgrs.; R. W. Yule, mgr.; A. A. Thomson, engr.; F. E. Studt, met. engr.

Inc. March 26,1891. **Cap.** £20,000, increased 1892, 1893, 1897, 1898, 1900, 1903, 1905, 1909 and 1911 to present figure of £870,000; £1 par; issued 865,316. Debentures have been retired. Profit for 18 months ended June 3, 1920 was £55,169. Cash resources were £197,962. Surplus was £145,093.

A dividend of 100% was paid February 7, 1896. Company floated the Tanganyika Concessions, Ltd., which see.

Property: consists of about 31,668 acres farm lands; 19 townsites; an interest in 20 mining claims; an 85% interest in 20 other mining claims, and a one-half interest in 19 mining claims. Company also owns 214,674 shares of Tanganyika Concession, Ltd.; £973,840 Benguella Railway bonds, 11,000 Union Miniere du Haut Katanga shares and £11,425 Rhodesia Railways bonds. Company has also taken an interest in the Nile-Congo Divide Syn.

SOUTHWEST AFRICA

OTAVI EXPLORING SYN., LTD. SOUTHWEST AFRICA

Office: C. Launspach, sec., 1 London Wall Bldgs., London, E. C. 2, England, E. Davis, chm. of directors.

Inc. Dec. 15, 1909; organized by Otavi M. & R. Co., which see. **Cap.** £63,000 in 60,000 ordinary £1 and 60,000 deferred 1s. shares; all issued, in part to The South West Africa Co., Ltd. At end of Dec. 31, 1920, net development expenses was £25,977 and general, £7,151. Excess of current assets was £25,430.

Property: the right to explore for mineral in 1,000 sq. miles until Nov. 17, 1923, acquired from Otavi M. & R. Co., which receives 35% of net profits. Company is exploiting a mottramite (vanadium ore) deposit; 700 tons of high grade concentrate shipped to end of 1920.

OTAVI MINES & RAILWAY CO. SOUTHWEST AFRICA

(Otavi Minen & Eisenbahn Gesellschaft.)

Offices: Unterdem Linden 31, Berlin, Germany, and 1 London Wall Bldgs., London, E. C. 2, England. E. Davis, chm. of directors.

Inc. April 6, 1900, in Germany. **Cap.** £800,000; par £1; all issued. Capital in 1914 was 200,000 20 mark shares, plus 200,000 shares without par value held by South West Africa Co., Ltd. This was converted into sterling and increased to present amount in Sept., 1921; 200,000 £1 shares issued to redeem 200,000 deferred shares, and 200,000 £1 shares in exchange for 200,000 20 mark shares, plus a bonus of 20 marks per share; remaining 400,000 shares were underwritten and offered to shareholders at 25s. Old shares were made invalid after Feb. 1922.

On March 31, 1921, there was a surplus of 193,231 marks. Reserves were 2,450,000 marks.

Property: formerly owned by German interests, and taken over during the war by the S. A. Government, comprises 1,000 sq. miles of mining rights and 500 sq. miles of freehold in Otavi district, taken over from The South West Africa Co., Ltd., includes the Tsumeb copper mine. Company formed Otavi Exploring Syn. (q. v.) to prospect the area.

Tsumeb Mine: is developed by 6 shafts and open-cast workings to 434' depth. High grade ore averages 16% copper and 25% lead, and low grade 7½ and 5½%. Equipment includes power plants, 2 small blast furnaces with 50 tons total capacity, etc. Ore reserves at end of 1921, were 758,000 tons. Production for 8 months ended Nov. 30, 1921, was 26,000 tons of ore shipped, 1,100 tons of copper matte and 200 tons pig lead. See Copper Handbook, Vol. XI, for more complete description of this company's holdings.

SOUTH WEST AFRICA CO., LTD., (THE) SOUTHWEST AFRICA

Secretary and offices: C. Launspach, 1 London Wall Bldgs., London, E. C. 2, England.

E. Davis, chairman of board of directors; T. Toennesen, agt. at Grootfontein, S. W. Africa.

Inc. Aug. 18, 1892, in England. **Cap.** £300,000, increased successively to £400,000, £500,000, £1,000,000, and finally, in 1902, to £2,000,000; £1 par; 1,750,000 issued. Company has arranged to take over from the Public Trustee 1,200,000 ex-enemy shares at 11/6 per share. Capital will be correspondingly reduced.

Dividends: were 5% in 1908; 7½% in 1909; 5% in 1910; 7½% in 1911; 5% in 1912 and 1913, none since. During 1920 the income totaled £36,714, including £33,710 dividends on investments, which were valued at £1,284,457 at the end of the year. These consist mainly of British and foreign Government bonds. There was a loss of £4,134. Over and above government bonds and farm debtors, current assets were £521,698 and liabilities,

£13,872. Surplus was £95,239. Claims made against German debtors, etc. have been in part, £590,000, paid since 1920.

Property: about 1,600,000 acres of unsold freehold land in Damaraland; a two-thirds interest in the South African Co., Ltd., owning about 60,000 sq. miles of mining rights, in Angola, Portuguese S. W. Africa; nearly one-half interest in the Hanseatice Mining Co., owning mining rights covering about 15,000 sq. miles; a 200,000 share interest in the Otavi Mines & Railway Co., and interest in the Southwest African Mining Syndicate and the Otavi Exploring Syndicate, Ltd.

In March, 1920, a mandate was given the Union of South Africa over "German Southwest Africa," by the Allied Powers and proclamations by it have recognized company's title to Damaraland concession and granted company sole right to prospect and exploit minerals until Nov. 17, 1923; other rights have been cancelled. Exploration is underway to determine what properties are to be permanently secured.

TRANSVAAL

ANGLO-AMERICAN CORP'N. OF SO. AFRICA, LTD. TRANSVAAL

Office: 201, The Corner House, Johannesburg, Transvaal, Africa; **London office:** C. W. Moore, sec., 5 London Wall Bldgs., London, E. C. 2, England; **New York office:** R. B. Burton, 120 Broadway, New York.

Officers: Ernest Oppenheimer, chairman, and W. L. Honnold, permanent directors; Carl R. Davis, cons. engr. New York Committee, E. R. Stettinius, chm., J. R. Finch, W. L. Honnold and C. H. Sabin.

Inc. Sept. 25, 1912, in the Transvaal. **Cap.** £4,000,000 authorized, £3,320,000 registered, and £3,194,028 issued; par £1; increased March, 1920 from £1,000,000 to £2,000,000 and to present amount in May.

Revenue for 1920 was £389,848, of which £347,700 was profit. Liquid assets on Dec. 31 were £1,146,166 including dividends receivable; liabilities £964,123. Surplus was £152,301.

Dividends: 10% in 1920; 5% in 1921.

Property: company owns important interests in the Rand Selection Corporation, Schapenrust claims (Brakpan Mines), Springs Mines, Daggafontein Mines, Cons. Diamond Mines of South West Africa, West Springs and New Geduld Deep.

Company is primarily an exploration and holding company.

BRAKPAN MINES, LTD. TRANSVAAL

Offices: J. H. Jefferys, sec., 5 London Wall Bldgs., London, E. C. 2, England, **African office:** The Cons. Mines Selection Co., Ltd., secs., 409 The Corner House, Johannesburg, Transvaal. **Mine office:** Box 3, Brakpan, Transvaal, Africa.

F. R. Lynch, chairman of board of directors; C. R. Davis, cons. engr.; C. B. Brodigan, mine mgr.; J. Ewing, cons. mech. engr.

Inc. Feb. 16, 1903, in the Transvaal. **Cap.** £850,000; £1 par; all issued.

Revenue in 1920 was £1,440,901 and profit, £549,893. Liquid assets as of Dec. 31 were £457,511; liabilities including taxes, £420,268. Surplus was £34,089 and reserve, £20,505.

Dividends: from 1912 to 1918, inclusive, total 340%; 32½% being paid in 1918; 27½% in 1919; 45% in 1920; 30% in 1921.

Property: 3,387 claims in the Far East Rand goldfield.

Development: by 5 shafts, deepest 4,614', one being an incline. New work in 1920 amounted to 17,336'. Reserves are estimated (Dec. 31, 1921) at 2,423,230 tons of $8.61 ore, the reef having a thickness of 68".

Equipment: electric power, complete with hoists, compressors, ventilating fans, tramways, shops, 160 stamps, 12 tube-mills, and cyanide plant of 75,000 tons monthly capacity, assay-office, and dwellings. Plant is being reconstructed and will have a capacity of 120,000 tons.

Production, years ended December 31:

Year	Ore treated, tons	Yield Gold, oz.	Average p. t. Ex-tract dwt.	%	Total cost
1922 (3 mos.).....	30,548	15,136	...	....	...
1921.....	659,800	285,228	...	....	...
1920.....	596,500	253,665	8.51	96.10	29/7
1919.....	544,200	250,257	9.20	97.88	26/8
1918.....	617,100	258,272	8.37	96.35	25/5
1917.....	677,500	276,738	8.17	96.70	20/3

CENTRAL MNG & INVESTMENT CORP. LTD. **TRANSVAAL**

Office: 1 London Wall Bldgs., London, E. C. 2, England; J. L. Siddall, sec.; Sir Lionel Phillips, chairman of board of directors.

Officers: F. Heim, P. Troquet and A. W. Rogers, mgrs. in London. F. Raleigh and E. G. Izod, mgrs. at Johannesburg; H. F. Marriott, cons. engr. in London; H. Stuart Martin and E. H. Clifford, cons. engrs. in South Africa.

Inc. May 9, 1905, in England. **Cap.** £3,400,000; shares £8 par; all issued.

Profit in 1917 was £349,090, £397,000 in 1918 and £809,800 in 1919. In 1920, revenue was £506,628 and profit £390,284 and excess of current liabilities was £304,281. Surplus was £100,396; reserves £778,985.

Dividends: 3¾% in Dec. 1921; 7½% in 1920; 11¼% in 1919; 6¼% in 1918; 5% in 1917 (8s. per share), 5% in 1916, nil in 1915; 2 1/5 in 1914, nil in 1913; 5% in 1912; £2.16s. per share from 1908 to 1911, inclusive.

Company is a holding concern, interested in the City Deep, Crown Mines, Daggafontein, Durban Roodepoort Deep, New Modder, Nourse Mines, Robinson Deep, Robinson Gold, Rose Deep, Village Deep, Rand Mines, Ferreira Deep, Geduld Prop., Geldenhuis Deep, Modder B., Modder Deep, Modderfontein East and East Rand Proprietary companies, all large gold producers on the Rand, and in Rhodesia Broken Hill, Transvaal Cons. Land & Exploration, and Witbank Colliery.

Corporation is responsible for the initiation of and holds a controlling interest in Trinidad Leaseholds, Ltd., a highly successful oil company in the island of Trinidad. It is also interested in the Magadi Soda Co., Ltd., Chemical and Metallurgical Corp., Premier Hydraulic Tin Mines of Nigeria, North Venezuelan Petroleum Co. and Chilean Electric Tramway & Light Co. and is actively connected with the base metal industry in Great Britain through its interest in the British Metal Corporation, Ltd.; Williams, Foster & Co., and Pascoe, Greenfell & Sons, Ltd.

CITY DEEP, LTD. **TRANSVAAL**

Office: Rand Mines, Ltd., sec., The Corner House, Johannesburg, Transvaal, Africa; **London office:** A. Moire & Co., London secs., 1 London Wall Bldg., E. C. 2, England.

Officers: J. R. Leisk, chairman of board of directors; P. W. Sherwell, mgr.; The Central Mng. & Invest. Corp., Ltd., cons. engrs.

Inc. Feb. 15, 1899, in the Transvaal. **Cap.** £1,295,000 increased from £1,250,000 in mid-1920; £1 par; all issued.

Revenue in 1920 £1,961,297 and profit £644,184. Realizable assets on Dec. 31 were £609,419; current liabilities £510,665 including amount payable to U. of S. A. Government. Surplus was £303,201. Share premium account £437,933.

Dividends: from 1912 to 1918, inclusive, 298¾%, 27½% being paid in 1918; 23¾% in 1919; 32½% in 1920; 37½% in 1921; 17½% in Feb. 1922.

Property: 1,081 claims on the Rand, worked by 3 vertical shafts 4,340', 4,340' and 227' deep; and another being sunk. Reserves at beginning of 1921 were 3,099,200, averaging $9 in gold per ton. Also owns real and cash assets of The City & Suburban Gold Mng. & Estate Co. purchased in 1920 for 45,000 City Deep shares.

Equipment: complete with mill having 350 ordinary and 4 Nissen stamps, 12 tube-mills, and cyanide plant.

Production, year ended December 31:

Year	Ore treated, tons	Gold Yield	Working Profit
1921.....	995,100	£2,180,887	£695,527
1920.....	862,500	1,951,330	649,348
1919.....	617,800	1,314,017	457,687
1918.....	670,100	1,274,881	447,293
1917.....	744,100	1,468,104	655,998

CONS. GOLD FIELDS OF SO. AFRICA, LTD., THE TRANSVAAL

Offices: J. Bradshaw and H. G. Sidgreaves, joint secs., 8 Old Jewry, London, E. C. 2, England; and 233 Broadway, New York. Lord Harris, chm. of directors.

Inc. Aug. 2, 1892, in England. **Cap.** £4,500,000; £1 par; in 2,000,000 ordinary 1,250,000 6% first cumulative and 1,250,000 6% second cumulative pfd., shares; all issued.

Revenue for year ended June 30, 1921, was £3,608. Cash and loans were £111,098; current liabilities £40,631. Surplus was £57,343.

Dividends: on first preference shares is paid Jan. 1 and July 1; on second preference, April 1 and October 1; on ordinary, since the Boer War, 25% in 1901-02; nil in 1902-03; 12½% in 1903-04; 15% in 1904-05; nil in 1905-06; 12½% in 1906-07; 20% in 1907-08 35% in 1908-09; 30% in 1910-11; 17½% in 1911-12; 10% in 1912-13; 5% in 1913-14; 7½% each in 1914-15, 1915-16, 1916-17, 1917-18, 1918-19 and 1919-20; none since.

Because of the limited scope of its charter, company on July 31, 1919, sold its assets to a new company, the New Consolidated Gold Fields, Ltd., (q. v.), of which it holds as its principal asset, the entire capital stock, £4,500,000.

CONSOLIDATED LANGLAAGTE MINES, LTD. TRANSVAAL

Offices: 10-11 Austin Friars, London, E. C. 2, England, and Consolidated Bldg., Johannesburg, Transvaal, S. A.

Officers: J. Munro, chairman; Johannesburg Cons. Investment Co., Ltd., sec. and London agts.; Jas. G. Lawn, cons. engr.; A. E. Payne, mine mgr.

Inc. September, 1902, in Transvaal. **Cap.** £950,000; £1 par; all issued; £300,000 in 5½% debentures authorized; outstanding, £25,000. Company was formed to acquire the New Croesus Gold Mining Co., Ltd., and the Langlaagte Star Gold Mng. Co., Ltd.

Annual report for years ending December 31, shows:

Year	Revenue	Profit	Dividends	Balance from Last Year	Balance Forward
1920..	£807,412	£185,109	£118,750	£74,683	£81,748
1919..	706,071	185,156	118,750	77,431	74,083
1918..	637,122	159,232	47,500	59,082	77,431
1917..	729,938	228,553	166,250	98,627	59,082
1916..	785,637	279,662	213,750	75,196	98,627

Dividends: for 1913, 10%; 1914, 20%; 1915, 25%; 1916, 22½%, 1917, 17½%; 1918, 5%; 12½% each in 1919, 1920 and 1921.

Property: 409 claims, and 210 deep level claims, on Farm Langlaagte, No. 13, 4 miles west of Johannesburg. Also 30 claims under lease for erecting plants and 3 water-rights.

Development: on the southern end of the property, the East and West shafts have been sunk 4,640′ and 3,970′. New openings in 1920 totaled 11,125′. There were 125 drills operated. The flow of water was as much as 115 millions gallons during 1920. Ore reserves are estimated at 1,339,000 tons, valued at $6.20 per ton, with a stoping width of 51″.

Equipment: includes 100-stamp mill with 1,900-lb. stamps, 10 tube-mills and cyanide plant with capacity of 53,000 tons monthly.

Production:

Year	Tons	Gold, oz.	Cost per ton
1921.....	440,600	.....	...
1920.....	503,900	144,569	5.67
1919.....	507,800	149,497	4.74
1918.....	503,300	148,730	4.55
1917.....	585.650	171,326	4.10
1916.....	627,050	184,938	3.88
1915.....	636,500	184,839	3.50

CROWN MINES, LTD. **TRANSVAAL**

Offices: A. Moir & Co., London secs., 1 London Wall Bldgs., E. C. 2, England; and Rand Mines, Ltd., secs., The Corner House, Johannesburg, Transvaal, Africa.

S. Evans, chairman and managing director; H. C. Boyd, director. The Central Mng. & Invest. Corp., Ltd., cons engrs.; A. J. Walton, gen. mgr.; A. V. Lange, and E. Beamont, joint managers.

Inc. March 31, 1892, in the Transvaal. **Cap.** £1,000,000, 10s. par; par; 1,880,212 issued. Debentures: £1,000,000, 5% first mortgage authorized, £320,000 outstanding.

Gross income for 1920 was £3,711,735 and net £1,067,182, debtors, cash and bullion on Dec. 31 totalled £1,006,878 and current liabilities (excluding annuities to U. of S. A. Government, were £811,685. Surplus was £457,352.

Dividends: totaled 727% from 1898 to 1910; 120% in 1910; 110% in 1911, 1912 and 1913; 85% in 1914; 65% in 1915; 50% in 1916; 40% in 1917; 30% in 1918; 40% in 1919; 77½% in 1920; 32½% in 1921.

Property: 2,339 claims and freehold rights over 3,609 morgen, and also Ophirton, Booysen Reserve and Lakeview Twps., all situated on the Rand, Transvaal.

Development: by 14 shafts. Ore is hoisted through No. 5 and 7 shafts which are connected by two main haulage-levels.

Ore reserves estimated as follows:

Year	Tons	Gold per ton, dwt.
1920.....	8,131,700	6.40
1919.....	8,451,400	6.30
1918.....	8,298,100	6.40
1917.....	8,988,000	6.30

Equipment: immense mining and reduction plants, including 835 stamps, 26 tube-mills, sand and slime plants capable of treating 7,666 tons of ore daily.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit	Cost per ton
1921	2,177,000	£3,358,304	£ 672,067	...
1920	2,201,000	3,704,474	1,093,336	23/9
1919	1,945,000	2,992,204	750,442	23/1
1918	1,861,000	2,528,760	410,642	22/9
1917	2,100,000	2,700,096	673,966	19/4

This company is probably the largest gold producer in the world.

EAST RAND PROPRIETARY MINES, LTD. **TRANSVAAL**

Offices: Rand Mines, Ltd., secs., The Corner House Johannesburg, Transvaal; and Herbert T. Hayward, London sec., 4 London Wall Bldgs., E. C. 2, England.

Officers: Sir Harry Ross Skinner, chm.; The Central Mining & Investment Corporation, Ltd., cons. engrs.; E. C. J. Meyer, mgr.

Inc. May 6, 1893 in the Transvaal. **Cap.** £2,514,000; £1 par; 2,445,897 issued. **Debentures:** £1,500,000 authorized; £623,371 outstanding.

The Angelo, Driefontein, Comet, Cason and Blue Sky companies were amalgamated with East Rand Proprietary in 1908.

Revenue in 1920 was £2,240,561 and profit was £152,363. Liquid assets on Dec. 31 were £881,499 and sundry creditors, etc., £183,190. Surplus was £494,528. Cash assets Dec. 31, 1921, were £1,059,118.

Dividends: between 1903 until amalgamation 132½%; since when (July 1908) 211¼%, or £5,030,957, has been paid, with last of 2½% in 1916.

Property: 4,412 claims, 1½ acres each, on the Rand, Transvaal.

Development: by numerous shafts and extensive workings. Reserves at end of 1919 were 2,634,350 tons of $6.30 ore, and 2,410,850 tons of $6.10 ore in 1920. Recent results have been unsatisfactory in spite of a comprehensive development program begun in late 1920.

Equipment: full complement for mining; 440 stamps, 19 tube-mills and cyanide plants.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit
1921.....	1,506,000	£2,064,349	£ 57,891
1920.....	1,460,000	2,209,536	192,994
1919.....	1,409,500	1,958,674	303,816
1918.....	1,372,300	1,597,075	52,916
1917.....	1,741,300	1,910,384	188,951
1916.....	1,936,220	2,365,107	487,165

In 1914, the directors thought that 20 years' profitable work was ahead of the company, but, like several other great consolidations on the Rand, the predicted estimates were not realized. While this is one of the world's great gold producers, it is very probable that a large production cannot be continued for much longer.

FERREIRA DEEP, LTD. TRANSVAAL

Offices: Rand Mines, Ltd., sec., The Corner House, Johannesburg, Transvaal, S. A.; and A. Moir & Co., London secs., 1 London Wall Bldgs., E. C. 2, England.

Officers: F. Raleigh, chm.; The Central Mng. & Invest. Corp., Ltd., cons. engrs.; P. Selby, mine mgr.

Inc. Aug. 25, 1898, in the Transvaal. **Cap.** £1,000,000; £1 par; 980,000 issued.

Accounts for year ended Sept. 30, 1921, shows; net profit, £200,903; with balance carried forward £103,163. Current assets exceeded liabilities by £64,448.

Dividends: 1902 to 1920 inclusive, 662%, 22½% being paid in 1920. In 1921, 15% was paid.

Property: 275 mining claims at Witwatersrand, formerly owned by the Barnato Cons. Mines, Ltd., the Rand Mines, Ltd., and the Ferreira Gold Mng. Co., Ltd., each of these companies receiving a stock interest in the Ferreira Deep Ltd., in payment for the claims.

Development: by extensive workings. Ore reserves were estimated on Sept. 30, 1921, at 780,314 tons averaging $7.70 per ton in gold compared with 993,174 tons of $7.80 ore in 1920, and 807,880 tons of $8.20 ore in 1919.

Equipment: complete power and mining plants, with 160 stamps, 4 tube-mills and cyanide unit, with capacity of 36,000 tons per month. The 120-stamp mill acquired from Ferreira Gold is not operated.

Production, years ending September 30:

Year	Ore treated, tons	Gold Yield	Cost per ton
1922 (3 mos.).....	83,900	£ 137,311	29/3
1921.....	375,700	698,652	26/7
1920.....	398,400	700,031	26/
1919.....	414,890	667,567	25/1
1918.....	508,200	806,487	23/5
1917.....	586,320	957,973	21/3
1916.....	643,460	1,130,227	20/11

GEDULD PROPRIETARY MINES, LTD. TRANSVAAL

Offices: 94 Main St., Johannesburg, Transvaal, S. A.; and Pinners Hall, Austin Friars, London, E. C. 2, England.

Officers: P. M. Anderson, chm.; Union Corp., Ltd., secs.; S. Macphail, gen. mgr.; H. R. Hill, cons. engr.

Inc. March 28, 1899, in the Transvaal. **Cap.** £1,500,000; £1, par; 1,328,052 issued.

Profit after taxes was £311,992, in 1920 with surplus of £55,547. Revenue was £1,020,585 and net profit £296,637. Current assets over liabilities totalled £377,944. Surplus was £129,468.

Dividends: 5% in 1914; 10% in 1915, 1916 and 1917; 11¼% in 1918; 16% (scrip distribution) in 1919; 17½% each in 1920 and 1921.

Property: 2,481 claims in the Heidelberg district, East Rand.

Development: by 7 shafts, deepest 2,942'. Reserves were 3,545,000 tons of $8.10 ore over a stope width of 62" at end of 1921, an increase of 325,000 tons.

Equipment: complete with 100 stamps, 8 tube-mills, and cyanide plant.

Production: 425,550 tons yielding £631,364 in 1017; 513,200 tons yielding £745,818 in 1918; 516,000 tons yielding £853,406 in 1919; 526,700 tons yielding £1,023,954 in 1920; 537,800 tons yielding £991,238 in 1921. Costs are a little over £1 ($5) per ton.

GENERAL M'G & FINANCE CORP'N, LTD. TRANSVAAL

Head office: H. W. Dalton, sec., General Mining Bldg., Johannesburg, Transvaal, S. A. **London office:** Winchester House, Old Broad St., E. C. England.

Sir G. Albu, chairman of board; A. French, mgr.; C. E. Farguharson, sub.-mgr.; E. Hay, tech. advisor; E. Farrar, mechanical engr.; H. W. Clayden, electrical and mechanical engr.; A. Heymann, cons. chemist F. A. G. Maxwell, chief metallurgist.

Inc. Dec. 30, 1895, in the Transvaal. **Cap.** £1,875,000; shares £1 par; all issued.

Company has large interests in and manages the Aurora West United, Meyer & Charlton, New Goch, Roodepoort United, Van Ryn Estate and West Rand Cons. mines, all producers. Also controls the Cinderella Cons New Steyn, Transvaal Silver & Base Metals, Ltd., and Rand Collieries, partly developed.

Profits in 1916 were £35,616, and increase of £20,509; £44,144 in 1917; £25,434 in 1918; £5,116 in 1919; £53,913 in 1920.

Dividends: have been irregular, amounting to 67½% up to 1911; noth ing since.

GOV'T GOLD M'NG. AREAS (MODDERFONTEIN) CONS., LTD.

Offices: 10 and 11 Austin Friars, London, E. C. 2, England; and Consolidated Bldg., Johannesburg, Transvaal, S. A.

Officers: S. B. Joel, chm.; J. Munro, deputy chm.; Johannesburg Cons. Investment Co., Ltd., secs., Jas. G. Lawn, cons. engr.; C. Marx, Jr., mgr.

Inc. Feb. 26, 1910, in the Transvaal. **Cap.** £1,400,000; £1 par; all issued.

Annual Reports for years ending December 31st, show:

Year	Revenue	Profit	Dividends	Balance from last year	Balance forward.
1920	£3,388,524	£1,708,164	£700,000	£352,539	£467,536
1919	2,677,604	1,246,875	525,000	271,885	352,539
1918	2,162,584	876,326	385,000	146,332	271,885
1917	1,930,657	693,915	175,000	280,498	146,332
1916	1,008,780	204,688	.....	11,599	280,498
1915	719,625	156,210	.....	.....	111,599

Dividends: 12½% in 1917; 27½% in 1918 37½% in 1919; 50% in 1920; 55% in 1921.

Property: 2,633 claims, 1½ acres each, on the Far East Rand.

Development: four 7-compartment shafts, 2,538', 2,433', 3,895', and 3,821' deep; two 3,100' apart and two 4,000' apart. Main reef was cut in N.-W. shaft in 1912 at depth of 2,395', where it was 31" wide, and worth $7.15 per ton. The dip is 15° S. W. In N.-E. shaft reef was cut at 2,273', being 21" wide, worth $7.70; at 3,579' in the S. E. shaft it was 57" wide, worth $16.50; and in the S.-W. shaft at 3,608', 30" wide, worth $3.80 per ton.

Ore reserves. 3,665,000 tons of 6.9 dwt. ore in 1915; 4,930,000 of 7.2 dwt. in 1916; 7,016,000 tons of 7.5 dwt. in 1917; and 9,445,000 tons of 8 dwt. in 1918; 11,001,700 tons of 8.6 dwt. in 1919; 10,291,000 tons of 8.2 dwt. in 1920.

Equipment: complete, with 200 (2,000 lb. each) stamps, 25 tube-mills and cyanide plants, with monthly capacity of 135,000 tons. There are 7,600 natives employed.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit	Cost per ton
1921.....	1,625,000	£3,498,441	£1,749,402	.....
1920.....	1,515,000	3,388,524	1,708,164	22/2
1919.....	1,361,000	2,677,604	1,246,875	21/-
1918.....	1,303,500	2,162,585	876,327	19/7
1917.....	1,298,000	1,930,657	693,916	19/-
1916.....	744,000	1,008,643	204,688	21/6
1915.....	576,100	720,000	156,210	19/6

The above table shows the progress of this great new gold producer. Life of mine is estimated to be 25 years from Jan. 1, 1919.

JOHANNESBURG CONS. INVESTMENT CO., LTD. TRANSVAAL

Offices: Consolidated Bldg., Johannesburg, Traisvaal, S. A.; and 10 Austin Friars, London, E. C. 2, England.

Officers: S. B. Joel, permanent chm.; J. G. Lawn, (cons. engr.) and J. Munro, joint mng. dir. in So. Africa; J. H. Crosby, gen. mgr. in So. Africa; W. J. Benson, London mgr.; T. Honey, London sec.

Inc. September, 1889, in the Transvaal. **Cap.** £4,500,000; £1 par; 3,950,000 issued.

Profit for year ended June 30, 1920, was £499,194 and £191,453 was carried forward. Profit in 1921 was £387,959 after depreciation, taxes, etc. Including mortgage loans and accrued dividends, current assets were £1,606,430; liabilities current were £1,449,105. Investments were valued at £3,915,649. Reserve was £250,000. Balance carried forward was £184,412.

Dividends: 182½% from 1894 to 1918, inclusive; 7½% in 1918-19; 10% and bonus 2½% in 1919-20; 10% in 1920-21.

Company carries on a general agency and investment business, buys and sells real estate and mining properties in South Africa, and is especially interested in the finance and control of Barnato holdings. It has large interests in the following mines: Consolidated Lanlaagte, Government Gold

Mining Areas (Modderfontein), Langlaagte Estate & Gold, New Primrose Gold, New State Areas, New Unified Main Reef, Randfontein Central, Van Ryn Deep, and Witwatersrand Gold, all gold producers save the New State, which is developing. During 1920, company acquired large interests in coal companies of Natal and the Transvaal.

In fiscal year 1921, company's group of mines produced £9,926,943 in gold.

KNIGHTS DEEP, LTD. **TRANSVAAL**

In liquidation by voluntary action beginning early in 1921; D. Christopherson, et al, liquidators, Box 1167, Johannesburg, Transvaal, S. A.; London agt., E. Ashmead, 8 Old Jewry, E. C. 2, England. Two distributions, of 12 and 4%, were made in 1921. Fire destroyed surface plant in Sept. 1920, and ore being very low grade, 0.18 oz. per ton recovery, it was decided not to rebuild. See Vol. XIV for description.

LANGLAAGTE ESTATE & GOLD MNG. CO., LTD. **TRANSVAAL**

Offices: Consolidated Bldg., Johannesburg, Transvaal, S. A. and 10 Austin Friars, London, E. C. 2, England.

Officers: S. B. Joel, chm.; J. Munro, v. c.; Johannesburg Cons. Invest. Co., Ltd., secs. and London agts.; T. H. L. Paull, mgr.; Jas. G. Lawn, cons. engr.

Inc. Jan. 13, 1888, in the Transvaal. **Cap.** £950,000; £1 par; 886,500 issued.

Revenue in 1919 was £650,369, of which £146,989 was profit; balance forward was £70,898. In 1920, revenue was £774,031 and profit £153,353. Current assets were £157,812 and liabilities £141,602. Surplus was £88,049.

Dividends: total 609% since 1889; of which 15% in 1919; 12½% each in 1920 and 1921.

Property: covers a large area on the Rand opened by the Hebbard and Main shafts, 3,418 and 3,276′ deep. New work in 1920 totaled 9,913′. The Langlaagte mine is worked out. Ore reserves at end of 1920 estimated to be 1,016,800 tons averaging $6.40 over 55″; they were 1,002,400 tons averaging $6.50 per ton in 1919.

Equipment: complete with 200-stamp mill containing 5 tube-mills and cyanide plant.

Production: in 1918 was 152,282 oz. of gold from 533,690 tons of ore, with a total cost of 19/ ($4.56) per ton. In 1919, 475,480 tons of ore yielded 139,082 oz. gold, at cost of 21/2 per ton; in 1920, 465,300 yielded 138,773 at cost of 26/8; in 1921, gold from 479,300 tons was valued at £773,588.

MESSINA (TRANSVAAL) DEV. CO., LTD. **TRANSVAAL**

Head office: 11 Queen Victoria St., London, E. C. 4, England. **Mine office:** Messina, Zoutpansberg, Transvaal, South Africa.

Officers: J. P. Grenfell, chm.; G. R. Newman, sec.; A. B. Emery, gen. mgr.

Inc. Jan. 30, 1905, in England. **Cap.** £250,000; 5s. par, 727,154 issued. Capital increased from £110,000 to £200,000 in 1908, and to present amount in 1911. **Bonds:** £250,000 6% issued April, 1912, at 95%, redeemable at 105% by drawing or purchase in open market at or under that price; £125,000 outstanding.

The year ended June 30, 1919, resulted in a loss of £39,373; after allowing £55,600 for depreciation and railway guarantee, and surplus was £46,757. In 1920, operating revenue was £174,089 and a net loss of £124,424. On June 30 cash, debtors and products were £333,989; creditors totaled £124,247 and advances on products £100,519. There was a debit balance of £77,667.

Dividends: in 1915-16 were 40%; 20% in 1916-17; none since.

Property: about 22,432 acres of copper-bearing lands, including the Messina and Vogelsang mines; also coal and lime claims in the Zoutpans-

berg district. Ore contains chalcocite, bornite, and some chalcopyrite and occurs in veins in granite.

A new company, Transvaal Smelting & Refining Co., has been formed, with a new and larger smelting plant to treat Messina and other ores as well.

Development: by the 1,033' Messina and 1,742 Vogelsang shafts, and extensive workings.

Ore reserves: in 1919, reserves were 415,000 tons of 3.25% ore; also 325,000 tons of 1.4% jig tailings. On June 30, 1920, they were 518,710 tons of ore assaying 3.23% copper.

Equipment: includes a 250-ton mill and 2 reverberatory furnaces.

Production, years ending June 30:

Year	Ore treated, tons	Cop., %	Copper long tons
1920	92,147	2.85	2,100
1919	.....	....	2,703
1918	120,899	3.47	3,537
1917	142,588	3.98	5,111
1916	112,043	5.43	5,732
1915	91,033	....	5,331
1914	64,304	....	4,007
1913	24,847	....	1,473

Since beginning of operations production totals 35,000 tons of copper valued at £3,500,000.

Operations were suspended in May 1920 to await better copper prices.

MODDERFONTEIN B GOLD MINES, LTD. **TRANSVAAL**

Office: Rand Mines, Ltd., secs., The Corner House, Johannesburg, Transvaal, S. A., and A. Moir & Co., London secs., 1 London Wall Bldgs., E. C. 2, England.

Sir E. A. Wallers, chairman of board; C. L. Butlin, mgr.; The Central Mng. & Invest. Corp. Ltd., cons. engrs.

Inc. Nov. 18, 1908, in the Transvaal. **Cap.** £700,000; 5s par; all issued. Originally £1 par, shares were divided into 4 of 5s in 1920.

Gross revenue in 1921 was £1,938,038 and net profit £1,003,969. Current assets over liabilities were £143,323 on Dec. 31. The surplus was £308,485.

Dividends: from 1912 to 1920 inclusive, total 607½%; 95% in 1921.

Property: 1,467 claims in the Far East Rand.

Development: new work in 1921 was 24,726', compared with 20,542' in 1920. A deep circular shaft, 20' in diameter, has been bottomed at 1,769'. Ore reserves (Dec. 31, 1921) are estimated at 2,773,300 tons, averaging $9.60 per ton across 63 inches.

Equipment: complete with 80 ordinary and 24 Nissen stamps, 9 tube-mills, and cyanide plants of 64,000 tons monthly capacity.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Cost per ton
1921	687,500	£1,906,856	22/5
1920	627,700	1,736,750	26/1
1919	649.500	1,574,940	26/
1918	605,500	1,253,614	19/8
1917	517,500	1,193,717	19/5

MODDERFONTEIN DEEP LEVELS, LTD. **TRANSVAAL**

Offices: 94 Main St. (P. O. Box 1125), Johannesburg, Africa; Finners Hall, Austin Friars, London, E. S. 2, England; and care M. Tourret, 34 Rue Vignon, Paris, France.

Officers: P. M. Anderson, chm. of directors; Union Corp. Ltd., secs.; H. R. Hill, cons. engr.; J. D. F. Schleiss, act. gen. mgr.

Inc. April 26, 1899, in the Transvaal. **Cap.** £500,000; 5s par; all issued; originally £1 par; subdivided in 1919.

Profit in 1921 was £766,992. Cash and debtors on Dec. 31, were £748,194; creditors £63,622 and unpaid dividends £440,098. Surplus was £179,456.

Dividends : 35% in 1915; 67½% in 1916; 85% in 1917; 97½% in 1918; 115% in 1919; 145% in 1920; 150% in 1921.

Property: 377 claims in Boksburg district, Witwatersrand, developed by vertical shafts. Reserves at end of 1921 were 4,375,000 tons of ore averaging 0.465 oz. gold, over stoping wdth of 177"; an ncrease of 275,000 over previous year. With others, company has taken an interest in the Rand Refinery Co.

Equipment: complete with mill capable of treating 1,500 tons daily, or over 44,000 tons monthly. Employees number 285 whites and 2,394 natives.

Production, years ending June 30:

Year	Ore treated, tons	Gold Yield	Cost per ton
1922 (3 mos)	56,600	£153,527	..
1921	509,300	1,477,610	22
1920	507,700	1,466,595	22/8
1919	507,200	1,223,620	18/3
1918	505,950	1,035,472	17/5
1917	494,400	964,343	16/4

MODDERFONTEIN EAST, LTD. TRANSVAAL

Offices: Rand Mines, Ltd., sec., The Corner House, Johannesburg, Transvaal, S. A., and A. Moir & Co., London secs., 1 London Wall Bldgs., E. C. 2, England.

Officers: M. Honnet, chm.; The Central Mng. & Invest. Corp., Ltd., cons. engrs.; E. Pam, mgr.

Inc. July 2 1917, in Transwaal. **Cap.** £1,215,624; par £1; all issued. Debentures: £500,000 6½%; £410,760 outstanding.

Revenue in 1920-21 £663,482 and profit £174,339. Cash assets on June 30 were £677,552; sundry creditors £518,710.

Property: 800 claims, a lease on 650 claims, and the unproclaimed freehold Farm Klipfontein No. 11 of 3.451 morgen. On proclamation of farm, 800 to 1,000 additional claims will be acquired; making in all 2.250 to 2,450 claims in the Boksburg district. Reefs thus far opened show an average width of 24" carrying 0.94 oz. in gold. The western area only is now being attacked.

Development: by 3 shafts sunk and equipped by former companies and 2 new shafts. Three only are in present use. Extensions in 1921 were 25,076' compared with 20.270 in 1920. Reserves as of June 30, 1921, are 1,611.700 tons of $7.70 ore over stope width of 57"; with 338.600 tons additional of lower grade not profitable under present scale of operations.

Equipment: includes mill of 55 stamps, 4 tube mills and cyanide unit, with 27,000 ton monthly capacity, 7 miles away, leased from New Kleinfontein Co. An 80,000 ton reduction plant was purchased in situ in 1920-21, but will not be moved to company's ground until later. Natives employed number 2,000.

Production: years ended June 30: in 1919-20 (last 2 mos.) 7,559 oz. gold from 39,500 tons of ore; in 1920-21, 118,938 from 297,800 tons. Cost in latter year was 30s 5d per ton.

NEW CONS. GOLD FIELDS, LTD. TRANSVAAL

Subsidiary of Cons. Gold Fields of So. Africa, Ltd.

Offices: J. Bradshaw and H. G. Sidgreaves, joint secs., 8 Old Jewry, London, E. C. 2, England; and 233 Broadway, New York.

Lord Harris, chairman of board of directors. Johannesburg staff: D. Christopherson, mgr.; C. Hely-Hutchinson, asst. mgr. Engineering staff:

Davis Wilkinson, cons. engr. and G. A. Chalkley, supt'g engr.; W. A. Caldecott, met. engr., in Africa; Amor F. Keene, cons. engr. in America. A. E. Pettit, res. engr. in London. J. G. McDonald, agt. in Rhodesia; J. McDougall, agt. in America.

Inc. Aug. 8, 1919, in England. **Cap.** £4,500,000; £1 par; all issued and owned by Cons. Gold Fields.

Revenue from dividends, etc., for year ending with June 30, 1921, was £429,984, and profit £371,452. Excess of current assets was £653,145. After depreciation of investments there was a debit balance of £111,214.

Dividends: 6% in 1919-20; none in 1920-21.

Company is a holding concern, formed to take over all assets of Cons. Gold Fields (q. v.), which comprise investments valued at £3,680,234, in many important mines and other industries, including: American Trona, Crown Mines, Gold Fields American Development Co., Government Gold Mining Areas (Modderfontein) Consolidated, Mississippi River Power, Robinson Deep, Simmer Deep, Simmer & Jack Proprietary, Sub Nigel, Ltd. and South American Gold & Platinum, many described under their respective titles. Company also owns considerable real estate in the Transvaal, Rhodesia and London.

NEW KLEINFONTEIN CO., LTD. **TRANSVAAL**

Offices: H. Cameron, sec., Natl. Bank Bldgs., Simmonds St., Johannesburg, Transvaal, Africa; and J. H. Clark, sec., 208 Salisbury House, London, E. C. 2, England.

Officers: Sir Wm. Dalrymple, chm.; E. J. Way, cons. engr.; J. P Harding, mgr.

Inc. April 2, 1894, in the Transvaal. **Cap.** £1,300,000; £1 par; 1,151,540 issued.

Net profit in 1919 was £192,372 and £166,924 was carried forward. In 1920, net profit was £81,330, and £179,814 carried forward. Reserve was £15,000.

Dividends: from 1894 to 1917, inclusive, 212%; including 5% in 1917. None in 1918 and 1919; 5% each in 1920 and 1921.

Property: 1,805 claims on the Witwatersrand, covering 4.7 miles on the strike of the reef, and reveloped by 8 shafts. The property, is divided into three sections, but the Apex section was closed down in early 1920, due to low values. Reserves are estimated (end of 1920) to be 1,623,574 tons averaging 0.266 oz. gold per ton.

Equipment: complete and includes two mills, the Kleinfontein with monthly capacity of 50,000 tons, and the Apex leased to Modderfontein East.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit
1921	581,060	£835,239	£68,452
1920	630,020	929,478	92,372
1919	561,820	875,490	76,499
1918	674,740	860,265	49,828
1917	785,090	1,013,300	216,289

The life of mine is reported by management to be 6 years from Jan. 1, 1920.

NEW MODDERFONTEIN GOLD MNG. CO., LTD. **TRANSVAAL**

Head office: Rand Mines, Ltd., secs., The Corner House, Johannesburg, Transvaal, Africa. **London office:** A. Moire & Co., secs., 1 London Wall Bldgs., London, E. C. 2, England.

Sir E. A. Wallers, chairman of board of directors; E. Miles Sharp, mgr.; The Central Mng. & Invest. Corp., Ltd., cons. engrs.

Inc. June 1, 1895, in Transvaal. **Cap.** £1,400,000; £4 par; all issued and paid up. Shares were split into 10 shillings par in 1920.

Accounts for year ended June 30, 1920, show revenue £3,002,073 of

which £1,720,203 was profit. Cash assets exceeded liabilities by £101,563. Surplus was £306,849.

Dividends: 70% from 1906 to 1911; 25% in 1912; 30% in 1913; 30% in 1914; 31¼% in 1915; 32½% in 1916; 32½% in 1917; 40⅝% in 1918; 62½% in 1919; 82½% in 1920; 100% in 1920-21.

Property: 1,301 claims, 1,808 acres, considered by some authorities one of the greatest gold mines in the world, when production, present profits and future possibilities are considered.

Development: by 13 shafts to 2,258'. Ore reserves estimated at end of June, 1921, were 8,478,700 tons assaying 0.425 oz. gold per ton, over 68" stope width.

Equipment: includes mill with 236 stamps (180 Californian and 56 Nissen), 15 tube-mills and cyanide plants, capable of treating 105,000 tons per month. Native employees number 5,400.

Production, years ending June 30:

Year	Ore treated, tons	Yield per ton	Cost per ton
1921	1,083,000	40/11	23/5
1920	968,500	43/2	21/11
1919	920,500	43/10 ($10.52)	20/2 ($4.84)
1918	684,100	45/7 (10.87)	21/3 (5.07)
1917	656,700	43/4 (10.36)	19/5 (4.61)
1916	635,000	48/2 (11.54)	17/3 (4.14)

NEW STATE AREAS, LTD. **TRANSVAAL**

Office: 10 Austin Friars, London, E. C. 2, England, and Consolidated Bldg., Johannesburg, Transvaal, Africa.

Officers: S. B. Joel, chm. of directors; The Johannesburg Cons. Invest. Co., Ltd., secs., E. W. Jenkin, mgr.; Jas. G. Lawn, cons engr.

Inc. Feb. 20, 1918, in the Transvaal. **Cap.** £1,500,000; £1 par; all issued, part paid.

At end of 1920 cash amounted to £346,885, and stores £42,398.

Property: 1,176 claims on farm De Springs No. 15, and 874 claims on Geduld No. 24, in the Far East Rand.

Development: Dec., 1920, the N. shaft had cut the reef at 3,578'. Here it was faulted and disturbed and only assayed 1 dwt. over 6 inches. The S. shaft, 3,955' deep, cut the reef at 3,676' showing values of 4.49 oz. over 18.9". They are 27' 9" by 12' 9" inside measurement.

Equipment: includes boilers, hoist, compressors, electric power, shops, and all necessary buildings. Company employs 570 natives. An all sluicing reduction plant with monthly capacity of 50,000 tons is being erected.

NOURSE MINES, LTD. **TRANSVAAL**

Offices: Rand Mines Ltd., secs., The Corner House, Johannesburg, Transvaal, Africa; and A. Moir & Co., secs., 1 London Wall Bldgs., London, E. C. 2, England.

E. G. Izod, chairman of board of directors; S. Beaton, mgr.; The Central Mng. & Invest. Corp., Ltd., cons. engrs.

Inc. Sept. 12, 1894, in the Transvaal. **Cap.** £850,000; £1 par; 827,821 issued.

Revenue in 1920 was £796,441 of which £85,607 was profit. In 1921 revenue was £907,843, and profit £117,801. Excess cash assets was £75,-103; and surplus £116,267.

Dividends: total 282¼% from 1898 to 1920, incl.; 10% in 1918; 7½% in 1919; 8¾% in 1920-21; 7½% in 1921-22.

Property: 669 claims on the Witwatersrand.

Development: by vertical shafts. Ore reserves total 1,589,030 tons of 0.345 oz. ore on June 30, 1921. New work in 1920 amounted to 16,115' and in 1921, 17,410'.

Equipment: capable of mining and treating 50,000 tons per month.

Production: 471,000 tons of 26/2 ($6.26) ore in 1918; and 495,100 tons of 28/- ($6.72) in 1917. Output in 1919 was 457,800 tons averaging 27/1 ($6.50) at a cost of 26/7 ($6.38); in 1920 it was 477,300 tons averaging 33/1, at a cost of 26/7; in 1921 it was 508,350 tons averaging 35/6 at a cost of 30/10.

PREMIER (TRANSVAAL) DIAMOND MIN. CO., LTD. TRANSVAAL

Offices: J. A. Stevens, sec., 6½ Austin Friars, London, E. C. 2, England; T. D. Edington, sec., and W. M. Chalmers, asst. sec., Cullinan Bldg., Johannesburg; M. S. Knowles, mine sec., Elandsfontein, Transvaal.

Paris correspondents: Credit Lyonnais, 19 Boulevard des Italiens, Paris, France.

Sir T. M. Cullinan, chairman of board of directors; D. McHardy, gen. mgr.

Inc. Dec. 1, 1902, in the Transvaal. **Cap.** £80,000, in 160,000 5s. preference shares and 320,000 2s. 6d. deferred shares, all issued. Control is held by De Beers Consolidated.

Financial statement, years ending Oct. 31:

Year	Revenue	Profit	U'n Govt's share	Dividends	Net cur. assets
1921..	£539,824	£90,356	£54,213	.....	£636,609
1920..	2,098,483	1,349,073	799,400	£532,500	1,293,675
1919..	1,961,259	1,210,980	726,588	432,500	1,166,141
1918..	1,203,904	665,272	400,245	252,500	715,386

Trading and emergency funds amount to £550,000.

Dividends: paid regularly on preference shares, they being entitled to a cumulative dividend of 250% per annum. Deferred shares received a total of 6,300% from 1904 to 1919-20, inclusive, 1,100% being paid in the last year, none in 1919-21.

Property: 3,484 diamond-bearing claims in the Pretoria district, developed by open-cut to depth of 294'. Drilling has shown diamond-bearing ground to depth of 1,000'. Reserves to 460' are estimated at 39,000,000 loads (1,600 lb. each).

Equipment: suitable for handling and treating 50,000 loads dily. Including stores, the whole plant cost £1,940,638. The 4 treatment plants, etc., known as "gear" cost £983,902.

Production, years ending Oct. 31:

Year	loads	Yield, carats	Value per load	Cost per load
1921.....	1,954,230	411,981	4/6	3/4
1920.....	4,660,498	820,564	9/	3/3
1919.....	4,529,261	814,577	8/8	2/11
1918.....	4,805,851	851,573	5/—	2/3
1917.....	4,928,629	906,341	4/10	2/3
1916.....	1,572,252	419,947	6/—	2/8
1915.....	Closed on account of war.			
1914.....	7,683,943	1,417,755	3/3	2/6
1913.....	10,434,680	2,107,983	4/6	2/7

The value per carat is now 51 shillings ($12.24); in 1909 it was 12 shillings ($2.90).

RANDFONTEIN CENTRAL GOLD MIN. CO., LTD. TRANSVAAL

Office: 10 Austin Friars, London, E. C. 2, England; and Consolidated Bldg., Johannesburg, Transvaal, Africa.

Officers: S. B. Joel, chm.; J. Munro, v. c.; The Johannesburg Cons. Investment Co., Ltd., secs.; G. H. Beatty, gen. mgr.; Jas. G. Lawn, cons. engr.

Inc. March 26, 1907, in the Transvaal **Cap.** £4,750,459; £1 par; all

issued. **Debentures:** £3,000,000 6% authorized, of which 2,315,600 are outstanding.

Financial Statement, years ended December 31:

Year	Revenue	Working Profit	Balance forward
1920.....	£2,300,696	£158,100	£4,821*
1919.....	2,215,695	309,089	.....
1918.....	1,991,839	108,072	27,669
1917.....	2,462,635	478,063	336,018
1916.....	2,835,892	834,555	418,200

*Debit balance.

Dividends: 17½% from 1912 to 1918; none since 1915.

Property: 3,511 claims in one block, and 6 water rights on the W. Rand, covering reef for over 7 miles. In September, 1920, the Randfontein Deep, Ltd. holdings and assets (except cash) were purchased for 250,459 Randfontein Central shares.

Development: by 14 shafts; the North and South being 3,896 and 4,712' deep at end of 1920. Mine workings are being reorganized and the northern section is to be gradually abandoned. The W. reef where cut at 4,130' averaged 0.605 oz. gold over 48" width. Reserves Dec. 31, 1920, were 3,593,410 tons of 0.31 oz. ore.

Reserves: consist of ,4944,302 tons of $7.80, 3,486,917 tons of $4.60, and 3,268,654 tons of $2.80 ore, a total of 11,699,873 tons. The last mentioned is at present unprofitable. At the end of 1918 the total was 4,254,000 tons of 6.8 dwt. gold ore across width or thickness of 50".

Equipment: extensive and modern, including 1,000-stamp mill, 26 tube-mills, and cyanide plant, capable of treating 3,100,000 tons per annum. Hoists capable of raising 5 tons from 5,000' depth at speed of 4,000' per minute are being installed. Employs 1,400 whites and 14,261 natives.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yields	Cost per ton	
1921....	1,465,500	£2,249,847	...	.....
1920....	1,560,000	2,300,596	27/6	.....
1919....	1,729,400	2,215,695	22/1	.....
1918....	1,745,000	1,991,839	21/6	($5.10)
1917....	2,017,181	2,467,636	21/7	.....
1916....	2,209,622	2,890,000	18/1	(4.34)

The above tables show steadily decreasing returns, which have been due to floods, labor troubles, and epidemic. When the new shafts and pumping stations are completed a larger output and gold production is expected as development work is satisfactory.

RAND MINES, LTD. **TRANSVAAL**

Offices: S. C. Steil, sec., The Corner House, Johannesburg, Transvaal Africa; and A. Moir & Co., secs., 1 London Wall Bldgs., London, E. C. 2, England.

Sir E. A. Wallers, chairman of board of directors; E. T. Mellor, cons. geologist; H. A. Read, financial manager.

Inc. Feb. 22, 1893, in the Transvaal. **Cap.** £550,000; 5s. par; 2,125,995 issued. Listed on London Stock Exchange. On Dec. 29, 1919, 60,000 American shares were listed on the New York Curb, representing 150,000 English shares. These shares were offered the public at $40. During 1920 they fell to $20. Bankers Trust Co., New York, transfer agent, Chase National Bank, New York registrar.

Company is closely affiliated with the **Central Mining & Investment Corp.** successor to Wernher, Beit & Co.

Financial Statement:

Year	Revenue	Dividends Paid	Carried Forward	Reserve Fund	Value of Investments
1920	£902,235	£770,673	£627,766	£2,344,194	£2,745,125
1919	892,077	531,498	865,821	2,574,744	2,930,983
1918	560,660	451,773	361,074	2,805,628	3,166,003
1917	893,846	770,673	348,898	2,877,878	3,242,020

Dividends: 3,020% since 1898; 85% being paid in 1918; and 100% in 1919.

Property: the company owns a substantial though not a controlling interest in the producing mining companies named in the following table, and also 1,252 claims owned outright, and a ½ interest in 864 claims. Its shareholdings are so extensive that it practically dominates many of the companies and its income is derived almost entirely from the dividends paid by them.

Mines	Int. held in 1920 %	1921 Tons	Gold yield per ton	Total profit	Ore Reserves 1920, Tons.
Bantjes Consolidated	Crushing finally ceased 29th January 1919.				
Brakpan	1.57	659,800	42/3	£ 516,000	2,549,625
City Deep	13.56	995,100	43/8	818,560	3,099,200
Consolidated Main Reef	0.38	571,500	36/9	149,218	1,186,000
Crown Mines	41.41	2,177,000	30/10	661,815	8,131,700
Durban Roodepoort Deep	28.86	317,900	35/5	31,561	1,094,960
East Rand	0.77	1,506,000	27/5	65,934	2,410,850
Ferreira Deep	36.35	367,100	34/1	136,138	993,174
Geduld Prop.	0.19	538,800	36/7*	376,630	3,220,000
Geldenhuis Deep	48.22	573,450	28	5,435	1,467,100
Modderfontein B	7.57	687,500	55	1,006,346	3,006,000
Modderfontein East ..	7.02	304,950	42/2	125,533	1,755,400
Modder Deep	0.82	509,300	56/11*	927,371	4,100,000
New Modderfontein ..	7.32	1,163,000	49	1,572,801	8,869,760
Nourse Mines	43.98	516,200	34/2	70,416	1,550,250
Robinson Deep	16.45	695,200	31/5	188,005	1,597,000
Robinson Gold	5.32	460,300	21	23,978	115,200
Rose Deep	38.10	644,500	25/7	127,673	3,060,040
Spring Mines	0.54	479,850	46	407,000	3,002,981
Village Deep	9.92	581,800	33/2	115,289	2,381,200
Village Main Reef	Crushing ceased Oct. 31, 1920.				
Wolhuter Gold	1.64	378,600	27	71,738	661,904

*Includes estimated preminum on gold.

The Modder and Spring companies in the Far East Rand are believed to have a long assured life with continuance of dividends and the Rhodesia Broken Hill paid its first dividends (10%) in Aug. 1920. The holdings are so varied that depletion at one property is offset by development in another mine.

Disbursements to company shareholders for the 14 years ended December 1921, total £11,742,723 or 175% per annum on the shares issued. As this company is interested in mines producing 40% of the Rand output, and the Rand produces 40% of the world's gold, it dominates 16% of the gold output of the entire world

ROBINSON DEEP, LTD. **TRANSVAAL**

London office: J. T. Bedborough, 8 Old Jewry, London, E. C. 2, England. **Mine address:** Consolidated Gold Fields Bldgs., Johannesburg, Transvaal. D. Christopherson, chairman of board of directors.

Inc. Dec. 31, 1915, in the Transvaal to acquire assets of Robinson Deep

Gold Mining Co., Ltd. **Cap.** £925,000, in 500,000 cumulative preference A assets, cash £64,605; bullion £28,774; investments, £8,681; debtors, £12,-807 B shares are issued credited as fully paid.

Report for year ended Dec. 31, 1921, showed a net profit of £139,499, making surplus £284,051; dividend £50,000; expenditures, £76,472; reserve for redemption pfd shares, £1,000; net surplus, £156,580. Current assets, cash £64,605 bullion £28,774; investments, £8,681; debtors, £12,-627. Current liabilities, loans, £300,000; creditors, £58,744.

Dividends: 8s. on A shares in 1916; 4s. in 1917; 2s. in 1918; none in 1919; 2s. in 1920.

Property: 557 claims, 835 acres, on the Rand, Transvaal, includes holdings of Booysen's Estate, Ltd., Booysen's Freehold, South Deep, Ltd., and Turffontein Estates, Ltd.

Development: by 3 shafts, one a new 7-compartment shaft 4,500' deep. Reserves are given as 1,597,000 tons, assaying 6.9 dwt. per ton, and 195,000 tons partly developed, assaying $7.11 per ton.

Equipment: includes mill with 300 stamps, 10 tube-mills, and cyanide plants.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield
1921.....	*695,200	£1,090,738
1920.....	624,600	1,000,693
1919.....	580,500	904,605
1918.....	529,300	713,442
1917.....	561,400	772,619
1916.....	632,000	934,522

*Estimated

Costs are about 26/- ($6.24) per ton.

Company employs 11 white men and 161 natives.

ROBINSON GOLD MINING CO. **TRANSVAAL**

Office: A. Moir & Co., secs., 1 London Wall Bldgs., London, E. C. 2, England. **African office:** Rand Mines Ltd., secs., Johannesburg.

Officers: F. Raleigh, chairman of directors; G. Hildrick-Smith, gen. mgr.; Central Min. & Invest. Corp., cons. engrs.

Inc. 1887, in Transvaal. **Cap.** £2,750,000; £5 par; all issued.

Report for year 1921, showed £488,046 from ore sales with working profit £23,978; other income, £17,022; net profit £21,958; giving total surplus of £145,470 on Jan. 1, 1922. Current assets exceed liabilities by £49.618.

Dividends: a total of 436% from 1889 to 1921, inclusive; or £11,980,937; 3% in 1920, 2% in 1921.

Property: 172 claims, 5 mining rights and 1 water right on the Rand, and freehold. The property has been fully developed, and has reserves of about 115,200 tons, Jan. 1, 1921, with a large amount of low grade Main Reef ore. The estimated life should end in 1922. Mine has been one of the great gold producers. Company also owns 40,000 fully paid 10s. shares in Crown Mines, Ltd.

Equipment: includes 230-stamp mill and cyanide works.

Production: year ended Dec. 31, 1920, 475,200 tons yielded £573,571, with profit of £86,203. or 3s. 8d per ton. Costs were 20s. 6d per ton, an increase of 2d over 1919. Tonnage mined in 1921 was 460,300 tons yielding £482,645, with profit of £23,978.

ROOIBERG MINERALS DEVELOPMENT CO., LTD. TRANSVAAL

London Agency: John H. Clark, sec., 208 Salisbury House, London, E. C.

Main office: Natl. Bank Bldg., Simmonds St., Johannesburg, S. A.

Wm. Dalrymple, chairman of board of directors; Max Baumann, mgr.

Inc. May 19, 1908, in the Transvaal. **Cap.** £180,000; £1 par; all issued. Statement for year ended June 30, 1918, shows revenue of £85,384 and profit of £8,765. For same period in 1919 the revenue was £54,587, and expenditures £70,178. In 1920, revenue was £68,827 and expenditures, £61,164. Current assets exceed liabilities by £19,935.

Dividends: has paid 107½% since 1910; 5% in 1916-17; 5% in 1919-20.

Property: tin lode claims in the Waterburg district of the Transvaal, covering over 5,000 morgen.

Development: by 619' main shaft with 5,164' of new work in 1918; this work costing $9.30 per ton of ore mined. Surface prospecting is done by hydraulicking.

Equipment: a mill with 10 stamps, tube-mill and concentrators.

In 1920 company mined and milled 15,420 tons ore containing 1.62% tin with a recovery of 76.3%, with a total output of 330 tons of tin, practically the same as in 1919.

SIMMER & JACK PROPRIETARY MINES, LTD. **TRANSVAAL**

Office: J. T. Bedborough, 8 Old Jewry, London, E. C. 2, England

D. Christopherson, chairman of board of directors; C. D. Leslie, cons. engr., O. P. Powell, supt. eng.; C. H. Greathead, mgr.

Inc. 1887, in the Transvaal. **Cap.** £3,000,000; £1 par; all issued.

Report for year ended June 30, 1921, showed revenue, £890,834, expenditures, £771,580, operating profit, £119,253; dividend, £75,000.

Dividends: since 1889 total 402¼%; 1¼% in 1918-19; 17½% in 1919-20; 2½% in 1920-21.

Property: 624 claims, 936 acres, on the Rand, Transvaal. **Reserves:** estimated at 1,081,000 of $5.70 partly developed ore.

Equipment: complete mining and milling plants with 320 stamps, 7 tube-mills and cyanide plant.

Production: for year ended June 30, 1921, was 784,200 tons of ore, containing 160,807 oz. gold.

SIMMER DEEP, LTD. **TRANSVAAL**

In liquidation, Dec. 17, 1920. E. Dexter, receiver, 21 Ironmonger Lane, London, E. C. 2, England. See volume XIV for detailed description.

SPRINGS MINES, LTD. **TRANSVAAL**

London office: J. H. Jefferys, sec., 5 London Wall Bldgs., London, E. C. 2, England. **Main office:** Cons. Mines Selection Co., Box 5657, Johannesburg, Transvaal.

F. R. Lynch, chairman of board of directors; A. A. Coaton, mine mgr.; C. R. Davis, cons. engr.

Inc. May 4, 1909, in Transvaal. **Cap.** £1,500,000; £1 par; £1,267,236 issued. **Debentures:** £315,000 authorized of 6% first mortgage; £86,945 outstanding.

Accounts for 1920, show gold receipts £1,157,052 and a net profit of £435,124, giving a surplus of £483,699.

Dividends: 10% in fully paid £1 shares of West Springs for every 10 of Springs held, on July 2, 1918; and 12½% on December 30, 1918; none in 1919; 20% in 1920; 15% in 1921.

Property: 3,568 acres, on De Rietfontein No. 14 farm, East Rand, adjoining the West Sprnigs, Ltd.

Development: by two 7-compartment shafts, both over 3,500' deep, which cut the reef at 3,433' and 3,692' respectively.

Equipment: electric and steam power, hoists, compressors, shops, 80 heavy (2,000 lb.) stamps, 8 tube-mills, and cyanide plant of 40,000 tons monthly capacity.

Production, for the past three years is as follows (for comparison's sake, the standard price of gold has been taken):

	1918	1919	1920
Tons milled	427,610	434,610	465,800
Working profit	£ 423,696	£ 248,574	£ 166,984
Revenue per ton milled	42s. 4.37d	38s. 2.41d	37s. 10.15d
Working costs per ton milled	22s. 6.57d	26s. 9.14d	30s. 8.11d
Working profit per ton milled	19s. 9.80d	11s. 5.27d	7s. 2.04d
Development footage	17,890 ft.	18,560 ft.	18,408 ft.
Ore Reserve—tons	2,367,636	2,417,298	2,726,178
Ore reserve—value	9.26 dwt.	8.74 dwt.	8.76 dwt.

In addition to the working profit £166,984, the premium on gold, after allowing for exchange on remittances and insurance, and the pro rata loss on the joint purchase of stores during the war period, resulted in a credit of £271,504, the total working profit for the year being increased to £437,488, as compared with £343,665 for the preceding year. The results indicate a gradual improvement in breaking and transport facilities, supplemented in the south shaft section by the completion of the ore bins and loading station at the junction of the west, north-west and south-west haulages, and the bringing into use of the new station and bin to serve the area contiguous to the 8th Level west haulage.

Ore reserves: Jan 1st, 1922; 3,056,231 tons of $8.92 ore.

UNION CORPORATION, LTD. **TRANSVAAL**

Offices: 94 Main St., Johannesburg, South Africa; **London office:** Pinners Hall, Austin Friars, E. C. 2, **Paris office:** 34 Rue Vignon, Paris, France.

Directors: J. Temperley, chairman of board; **London staff:** Sir Henry Strakosch, managing director; Joseph Kitchin, mgr.; E. J. Hess and C. T. Pott, joint sub-mgrs.; Henry Clark, sec.; **Johannesburg staff:** P. M. Anderson, mgr.; V. J. Ronketti, sec., Paris; M. Tourret, agent.

Inc. Dec. 29, 1897, in the Transvaal. **Cap.** £1,015,000, in 1,000,000 ordinary and 15,000 founders shares, £1 par. In 1898 200,000 fully-paid ordinary shares were issued at £1.12 6d. and 100,000 such shares in exchange for the 15,000 founders shares. In 1904 225,000 shares were issued at £2.10 each; in 1905, 75,000 shares at £2.10, making total capital of £1,400,000. In 1917, in order to meet depreciation on several of the shareholdings, capital was reduced by writing off 7/6 per share. Present capital is £875,000 in 1,400,000 shares of 12/6 each. All the shares are issued and fully paid.

Net profits for 1921 were £179,516 including £68,355 brought forward from 1920; £30,000 was placed to reserve account, £140,000 was paid as dividend (20 per share or 16%) and £77,872 carried forward.

Property: company is a holding corporation, and controls or is heavily interested in the following African mining companies:

Geduld Proprietary Mines, Ltd., Modderfontein Deep Level, Ltd., Princess Estate & Gold Mining Co., Ltd., Randfontein Deep, Ltd., Van Dyk Proprietary Mines, Ltd., and Withok Proprietary Company, Ltd.; also in Klerksdorp Exploration, Land & Estate Co., Ltd., holding mining and land interests in South Africa. In Mexico, company controls La Fe Mining Co., Ltd., a silver-lead-gold property in Mexico, and in the San Francisco Mines of Mexico, Ltd., a silver-lead-zinc property in Mexico. It also owns other claims and land interests in the Ojo Caliente district, Zacatecas.

The company carries on a general finance business, and is also in the administration and management of industrial undertakings, mainly mining or those allied to the mining and metallurgical industries.

Company employed 5,999 natives and 700 whites in 1921.

The operations of the subsidiary companies are described under their own titles.

VILLAGE MAIN REEF GOLD MINING CO., LTD. **TRANSVAAL**

In liquidation: F. de M. Cunynghame, liquidator, 8 Old Jewry, London, E. C. 2, England.

A disastrous collapse of the mine workings on the 16th level in Oct. 1921, coupled with the practical exhaustion of the mine led management to stop all mining operations and to liquidate company. See Vol. XIV for description of company.

WEST SPRINGS, LTD. **TRANSVAAL**

Promoted by Anglo-American Corporation of South Africa, Ltd.

London Office: E. Shephard, 5 London Wall Bldgs., Finsbury Circus, London, E. C. 2, England.

Ernest Oppenheimer, chairman of board of directors; H. W. Pridgeon, mine mgr.; C. R. Davis, cons. engr.

Mine office: Box 4567, Johannesburg, S. A.

Inc. June 14, 1918, in the Transvaal. **Cap.** £1,400,000; £1 par; all issued; 453,449 being fully paid and 947,581, 14s paid. In 1921, 200,000 shares were subscribed for and taken in South Africa.

Balance sheet Dec. 31, 1920 showed general expenses to date £23,293. Shaft sinking and equipment, £663,029; stores, etc., £55,654; cash, £50,987. Loan, Springs Mines, Ltd., for development £22,199.

Property: a Government lease of mineral rights on 2,236 claims on Farm De Rietfontein No. 14, Far East Rand, Transvaal, immediately west of the Springs Mines, Ltd., with which arrangements were made for mine development by west haulage level of Springs Mines S. shaft. A share of profits is payable to the Union Government.

Development: two shafts are being sunk, the reef was cut at 4,105′ in first shaft, and proved to be 100′ wide but too low grade to pay at that point, but exploratory work at rate of about 3,500′ yearly, has shown reef to have a width of 22-26″ of ore that assay $5.73 to $7.04 per ton, part of it with a width of 35″ of $8.56 ore. Late in 1921, new work showed 26″ of $8.50 ore for a length of 65′ on reef.

Second shaft is 2,940′ deep with diamond drill hole reaching reef at 4,800′.

Main level connects with working of Springs Mines, Ltd., and that company is also doing development work on West Springs.

ZAAIPLAATS TIN MINING CO., LTD. **TRANSVAAL**

Office: E. G. Crake, Pinners Hall, Austin Friars, London, E. C. 2, England. A. Gilbertson, mgr.; W. J. Gau, cons. eng.

Inc. Aug. 18, 1908, in the Transvaal. **Cap.** £63,750, in 255,000 shares of 5s. par, all issued.

Loss for quarter year ended July 31, 1921, was £799.

Dividends: from 1908 to February, 1919, inclusive, 625%; 30% in 1918-19.

Property: 234 tin claims, 23 miles W. of Potgietersrust, Transvaal, equipped with 15 stamps, crushing 13 tons a day, 4 tube-mills, and concentrator; there is also a smelter.

Production: for quarter ending July 31, 1921 was 30.45 tons of 65.92% tin concentrate, from 2,562 tons of crude ore. In 1918 company produced 355 tons of 70% concentrate from 28,132 tons of ore. Costs are around 60/- ($14.40) per ton.

WEST AFRICA

GOLD COAST COLONY

ABBONTIAKOON MINES, LTD. **GOLD COAST**

Office: E. Price, sec., 19 St. Swithin's Lane, London, E. C. 2, England.

E. Davis, chairman board of directors; S. H. Ford, supt. engr.; New Consolidated Gold Fields, Ltd., cons. engrs.

Inc. Feb. 24, 1909, in England. **Cap.** £800,000; 10s par; 1,273,601 issued.

The year 1919 resulted in a loss of £6,332, with balance carried forward of £82,276. In 1920 there was a profit of £13,596 after depreciation. Cash assets over liabilities were £6,031. Surplus was £62,440. There was an operating loss of £37,400 in 1921.

Dividends: in 1914, 20%; in 1915, 5%; then none until 5% in 1920.

Property: 918 claims, 1½ acres each, near Tarkwa, Wassau, Gold Coast Colony, West Africa, on the Government railroad.

Development: by 3,312′ shaft. Reserves are given as 499,153 tons of 0.488 oz. ore and 557,280 tons averaging 0.315 oz. and under, as of Dec. 31, 1920.

Equipment: mill with 25 stamps, 2 tube-mills, and cyanide plant of 15,000-ton monthly capacity.

Production:

Year	Ore treated, tons	Value	Cost per ton
1921	83,114	£140,217	....
1920	84,805	200,739	44/1
1919	91,186	210,630	41/
1918	106,481	208,435	38/
1917	116,688	221,408	36/
1916	117,885	231,000	27/

ABOSSO GOLD MINING CO., LTD. GOLD COAST

Office: T. J. Foster, sec., 461 Salisbury House, London, E. C. 2, England.

T. F. Dalglish, chairman of board of directors; and G. W. Campion, gen. mgr.

Inc. June 18, 1901, in England. **Cap.** £400,000; £1 par; all issued.

There was a loss of £5,387 for year ended June 30, 1921, after depreciation. Current liabilities exceeded assets by £7,011. Surplus was £12,588.

Dividends: since 1905 total 77½%, 12½% being paid in 1920.

Property: 600 claims in the Wassau district, Gold Coast Colony, West Africa. In 1920, company took over holdings of Wassau Mng. Co.

Development: by 1,880′ shaft. Ore reserves were estimated at 301,550 tons with value of 34/6 per ton as of June 30, 1921. The stoping width is 64″.

Equipment: complete for mining, steam power, also 50 stamps, tube-mill, grinding pans, and cyanide plant, of 15,000 tons monthly capacity.

Production, years ending June 30:

Year	Ore treated, tons	Yield	Cost per ton
1921	59,933	£132,322	43/4
1920	82,588	177,736	29/5
1919	80,075	132,027	32/6
1918	102,256	152,320	29/-
1917	112,460	167,270	26/1
1916	113,300	179,459	25/7

ASHANTI GOLDFIELDS CORPORATION, LTD. GOLD COAST

Office: H. Morgan, sec., 6 Southampton St., Holborn, London, W. C. 1, England.

Officers: Jeremiah Colman, chm.; Sir Geo. L. Johnston, deputy chm.; W. R. Feldtmann, cons. engr.

Inc. May 25, 1897, in England. **Cap.** £250,000; 4s. par; all issued.

Profit for 1920 was £122,332. In 1921, for year ended June 30, revenue

was £393,144 and profit £80,621. Cash, bullion and debtors totalled £110,222 and current liabilities £73,596. Surplus was £73,514. Reserves were £155,000.

Dividends: since 1900 total 999½%, 70% being paid in 1918, 75% in 1919, 62½% in 1920, 20% in 1921.

Property: 100 sq. miles at Obuasi in Gold Coast Colony, West Africa, 124 miles from the coast, includes the Ashanti, Ayeinm and Justice mines. Mine is the largest producer in the region.

Geology: the Obuasi shoot occurs in disturbed ground, close to the intersection of two fissure planes. The normal fissure filling or vein formation is a brecciated graphitic schist, in places very friable. The main vein is a solid quartz body 1,000′ long on some levels, and from 3 to 40′ wide. The ore, owing to parallel streaks of graphite, has a banded structure. Some gold is free, the remainder being in pyrite and other sulphides. The Ayeinm shoot, in the same main fissure, is pear-shaped in horizontal section, being 700′ long and from 4 to 60′ wide. Gold content in both shoots is erratic.

Development: by shafts to 2,000′ depth. Mining is rendered difficult by the weakness of the rock, the irregular and great thickness of the quartz, the flat pitch of the shoot and the graphitic selvage on the footwall.

Reserves have varied as follows:

Year	Tons	Dwt. per ton	Gross Value
1921	511,400	22.6	£2,451,500
1920	510,100	23.01	2,490,000
1919	529,500	27.2	2,644,000
1918	526,200	28.5	2,735,000
1917	534,100	24.5	2,772,000
1916	436,600	24.9	.....

Equipment: complete for mining, with mill containing 50 stamps, 7 ball-mills, Edwards' roasting furnaces, fine grinding and cyanide plant of 15,000 tons monthly capacity. Because of increasing difficulty in obtaining wood fuel, wet concentration treatment will be adopted.

Production: years ended June 30:

Year	Ore treated, tons	Yield	Cost per ton
1922 (9 mos.)	66,020	£274,771	.....
1921	71,411	313,301	84/5 .....
1920	60,363	283,027	85/3 .....
1919	85,566	429,271	59/- ($14.24)
1918	105,452	464,102	54/- (12.96)
1917	116,883	483,911	49/3 (11.79)
1916	136,994	475,958	44/7 (10.70)

The Ashanti only was operated 1919-21.

GOLD COAST

PRESTEA BLOCK A, LTD.

Office: E. Price, sec., 19 St. Swithin's Lane, London, E. C. 4, England. E. Davis, chairman of board of directors; C. P. C. Beresford, gen. mgr.; A. E. Pettit, cons. engr.

Inc. Nov. 20, 1903, in Great Britain. **Cap** £1,150,000; £1 par; 1,049,876 issued.

In 1917 there was an operating loss of £20,728, and in the year 1918 a loss of £18,470, after allowing £29,521 for depreciation and other charges. In 1919, there was a profit after depreciation of £6,828. In 1920 there was a loss of £23,982 and a debit balance carried forward of £216,152. Liquid assets over liabilities were £48,851.

Property: 747 claims, 1½ acres each, and lumber and rubber concessions near the Ancobra river, Gold Coast Colony.

Development: by 3 shafts, exposing 199,315 tons of 41/1 ore at the end of 1920.

Equipment: 110-stamp mill and cyanide plant; practice described by P. T. Bruhl in "Eng. & Min. Journ." of February 23, 1918.

Production:

Year	Ore treated, tons	Gold Yield	Cost per ton
1921	87,300	£191,001	.....
1920	115,670	256,678	48/6.....
1919	181,398	330,090	32/9.....
1918	190,906	322,350	32/4 ($7.72)
1917	229,249	284,025	31/4 (7.48)

TAQUAH MINING & EXPLORATION CO., LTD. GOLD COAST

Office: T. J. Foster, sec., 461 Salisbury House, London, E. C. 2, England.

T. F. Dalglish, chairman of board of directors; G. W. Campion, gen. mgr. D. A. Thompson, mine mgr.

Inc. Dec. 29, 1900, in Great Britain. **Cap.** £500,000; £1 par; 349,979 issued.

Profit for year ended June 30, 1921, was £6,999; £34,417 was carried forward. Current assets over liabilities were £52,075.

Dividends: 100% from 1909 to June, 1919; 12½% in 1919-20; none in 1920-21; 5% in Jan., 1922.

Property: large concessions in Gold Coast Colony, West Africa. **Development:** by 2,470′ shaft, and current operations on lower levels. Reserves were 210,406 of 54/9 ore on June 30, 1919 and 182,226 tons averaging 52/6 a year later.

Equipment: complete mining plant and 50-stamp cyanide mill.

Production:

Year	Ore treated, tons	Yield	Cost per ton
1921	32,451	£107,562	52/5
1920	52,711	173,880	40/8
1919	59,213	169,184	36/8
1918	64,829	180,786	37/ ($8.88)
1917	63,883	175,643	36/11 (8.86)

CONSOLIDATED MAIN REEF MINES & EST., LTD. TRANSVAAL

Offices: A. Moir & Co., London secs., 1 London Wall Bldgs., E. C. 2, England, and Rand Mines, Ltd., secs. The Corner House, Johannesburg, Transvaal.

Officers: M. Honnet, chairman of board of directors; The Central Mng. & Invest. Corp., Ltd., cons. engrs.; J. E. Healey, gen. mgr.

Inc. July, 1896, in the Transvaal, to acquire the properties of the Main Reef Gold Mining Co., Ltd., and the Cons. Anglo-Tharsis Gold Mining Co., Ltd. **Cap.** £950,000; £1 par, increased to £1,247,602 in January, 1918; all issued.

Dividends: 106¼ from 1906 through 1917-18; 5% in 1918-19; 12½% each in 1919-20 and 1920-21; 5% in Feb. 1922.

Property: 1,977 claims, including holdings of Main Reef West, Ltd., absorbed in 1918, and an estate of 7.66 sq. miles six miles west of Johannesburg.

Development: ore reserves to below 4,000′ in depth are 1,176,500 tons averaging $7.50 gold per ton, for width of 49″, as of June 30, 1921.

Equipment: includes 240-stamp mill, 6 tube-mills, cyanide plant and necessary surface equipment.

Production, years ended June 30:

1922 (6 mos)	298,500	tons	yielding	£	554,225	at	cost	of	30/10	per ton
1921.....	561,800	"	"		1,105,077	"	"	"	32/3	" "
1920.....	557,500	"	"		1,039,397	"	"	"	29/2	" "
1919.....	570,710	"	"		841,676	"	"	"	26/3	" "
1918.....	539,760	"	"		760,496	"	"	"	22/7	" "
1917.....	342,895	"	"		501,281	"	"	"	19/6	" "
1916.....	294,766	"	"		442,649	"	"	"	....	" "

ADDENDA & ERRATA

ST. JOSEPH LEAD CO. — MISSOURI

Offices: 61 Broadway, New York, and Bonne Terre, Mo.

Officers: Clinton H. Crane, pres. and chairman ex. comm.; L. H. Besson, v. p.-sec.; Irwin H. Cornell, v. p. and sales mgr.; with Daniel K. Catlin, Firmin Desloge, Max Kotany, M. F. Watts, Andrew Fletcher, Jr., Gust Setz, Charles M. Chapin, F. W. Shibley and E. C. Smith, directors. H. B McGown, asst. treas.; C. J. Adami, gen. mgr., Bonne Terre, Mo.

Inc. March 25, 1864, in New York. **Cap.** $20,000,000; $10 par; outstanding 1,549,413 shares. Annual meeting 1st Thursday after 1st Tuesday in March. **Transfer office:** 61 Broadway. **Registrar:** New York Trust Co. Stock listed on New York Stock Exchange. Bonded debt retired Jan. 1, 1916.

Range of shares during 1920 in New York was 17 7/8 in April and 10 in December. Total sales were 94,620 shares. In 1921, the range was 14 1/8 to 10½, with total sales of 28,903 shares.

Operations for 1921 resulted in a deficit (after charges for depreciation and depletion) of $185,011, compared with a surplus in 1920 (after similar allowances, of $3,011,426 or $1.94 a share earned on shares then outstanding.

Subsidiary bonds: Miss. River & Bonne Terre Ry. 1st M. 5%, sinking fund gold bonds, due Oct. 1, 1931; $1,398,000 outstanding.

Comparative general balance sheet (including subsidiaries):

Assets

Year	Property & Equip.	Sinking fund	Current	Deferred debts	Total
1920	$22,321,861	$12,472	$7,717,685	$ 775,196	$30,827,214
1919	22,678,664	.....	7,212,742	585,306	30,476,712
1918	23,729,705	.....	7,660,432	645,411	32,035,548
1917	19,671,960	.....	8,334,372	670,393	28,676,725
1916	22,750,727	.....	4,266,373	1,427,627	28,444,727

Liabilities

Year	Capital Stock	Miss. & B. T. Loan	Current	Reserves	Surplus	Total
1920	$15,729,976	$1,398,000	$ 986,009	$1,614,277	$11,098,952	$30,827,214
1919	14,096,650	1,639,000	855,268	1,130,452	12,755,342	30,476,712
1918	14,096,750	1,806,000	777,222	2,097,036	13,258,539	32,035,548
1917	14,096,650	1,850,000	967,883	92,848	11,669,344	28,676,725
1916	14,094,660	2,032,000	1,700,319	4,810	4,188,520	22,020,309

Income Account.

Year	Net Income	Fed. Taxes	Depletion	Dividends	Profit or Loss
1920	$ 4,813,512	$ 600,000	$1,202,086	$2,889,436	+$ 121,990
1919	2,295,256	117,844	1,116,816	1,550,479	— 489,882
1918	5,121,164	2,000,000	1,297,981	2,819,004	— 995,821
1917	10,130,460	.....	4,520,186	3,535,532	— 413,142
1916	8,004,649	.....	3,330,182	1,409,466	+ 3,265,001

Dividends: 1885-1912, 6%; 1913, 5%; 1914, 2½%; 1915, 6%; 1916, 10%; 1917, 25%; 1918, 20%; 1919, 11%; 1920, 20%; 1921, 10%. In addition, 15% was paid in 1916 and 10% in 1917 from amortization reserve; and also a stock dividend in September, 1920, in ratio of 1 share for each 10 held. The total is over $23,000,000, or 373%, since 1874, exclusive of stock distributions of 33⅓% in 1891, 50% in 1902, 25% in 1905, 100% in 1906 and 10% in 1920.

Net profits earned per share have been: $2.47 in 1915; $3.32 in 1916; $3.98 in 1917; $1.29 in 1918; $0.75 in 1919; $1.94 in 1920, nil in 1921.

The St. Joe Lead Co. owns directly, the mineral rights to 6,484 acres of lead bearing land in southeastern Missouri, 4,244 acres of which lie in the Flat River-Leadwood district and 2,240 acres in Bonne Terre. Through ownership of the Doe Run Lead Co., also owns mineral rights on 7,054 acres in the Flat River-Leadwood and Doe Run districts.

The company is the largest independent lead producer in America, and the second largest after the A. S. & R. Co.

Property: 13,498 acres of lead-bearing land in southeastern Missouri, in St. Francois and Jefferson counties, 7,054 acres of which are owned by Doe Run; power plants, mill, smelting plants, the entire $3,000,000 capital stock and $1,102,000 par value bonds of the Miss. River & Bonne Terre Railway; also $499,450 of the $500,000 capital stock of the Bonne Terre Farming & Cattle Co.; and 96% of the capital stock of The Doe Run Lead Co. The Miss. & Bonne Terre Ry. owns the St. Francois County R. R. Co.

The Baker Lead Co.'s 357 acre tract near Leadwood, St. Francois county, was purchased in 1920 for $357,000.

All told, the St. Joseph company controls 26,885 acres of mineral land. Company owns 1,000 houses tenanted by employees, and operates mercantile stores.

Although stock control of The Doe Run company is held by St. Joe, by a court decree, June 18, 1920, property of the former taken over in 1917, was reconveyed to Doe Run, which now again becomes a subsidiary of St. Joe.

The holdings are in the disseminated lead ore region in the Flat River-Leadwood, Bonne Terre and Doe Run districts, of S. E. Missouri, where production from ores in the lower Bonne Terre dolomite began in 1869. The producing area is within 5 miles of the towns of St. Francois and Desloge. There are six companies operating and seven concentrating mills in commission, those of the St. Joe Co. and its subsidiary handling 8,6000 tons out of a total of 20,000 tons daily output.

Development: by 17 shafts to depth of 480'.

The mines are estimated to contain 19,450,000 tons of developed and 15,525,000 tons of undeveloped ore.

Equipment: includes the modern 2,400-ton mill at Bonne Terre, that of 2,000 tons at Leadwood, and that of 4,200 tons at Rivermines; all in St. Francois county. Together these mills include 28 gyratories, and 140 Wilfley tables. Flotation is used, the company operating under license of Minerals Separation. Also the smelter at Herculaneum, near St. Louis, capable of treating 12,000 tons of concentrates per month from the company's mills, an output of 120,000 tons of lead yearly. Concentrates assay from 65 to 74% lead, 14% sulphur, and 1 to 5% zinc. Electrical dust precipitators are used at the smelter.

Milling practice is described in "Met & Chem. Eng." of Sept. 15, 1917, and July 15, 1916; concentration methods are given in Bulletin 130 (1917) of the A. I. M. E.; the baghouse and matte granulation plants at Herculaneum in the "Eng. & Min. Jour." of Feb. 17 and Dec. 16, 1917; and in same journal of June 29, 1918, and Sept. 18, 1920 describes the property and mill tests.

Production:

Year	Ore, tons	Concentrates, tons	Lead, tons
1920	2,133,327	119,429	78,497
1919	1,978,922	114,449 (approx.)	68,000
1918	2,999,490	133,099	79,620
1917	2,485,431	157,767	94,820
1916	2,431,939	169,302	91,073
1915	2,127,333	136,379	90,120
1914	1,989,047	120,710	81,716

CONSOLIDATED COPPERMINES COMPANY. NEVADA

Supplementing statement on page 1170 of this book.

Under date of June 5, 1922, announcement was made of a plan and agreement for re--organizing the Company. Under this plan, the mortgage securing the bonds of the old Company would be foreclosed and the properties acquired by a new company with an authorized capital of $8,000,000, divided into 1,600,000 shares, par value $5.00; no bonds. Approximately 740,000 shares of stock in the new company at $5.00 per share to be issued for the face value of all bonds and other outstanding obligations of the old company. Approximately 500,000 shares to be offered to stockholders of the old company on the basis of two shares of old stock and a cash payment of $2.50 for each share of stock of the new company, this stock offered to stockholders having been underwritten. The announcement further states:

The plan of reorganization clears the new company from debt with the consequent heavy burden of interest charges and provides, besides 335,000 unissued shares, approximately $1,250,000 cash in its treasury for working capital and future corporate purposes.

"The plans of the old company for some time past have contemplated stripping certain porphyry deposits and erecting concentrating and smelting works for treating low grade porphyry ores in connection with high gade oxidized ores and a limited tonnage of low grade sulphide ores. Inability to secure the necessary finances prevented the consumation of these plans. In the meantime the Nevada Consolidated Copper Company fortunately discovered, at moderate depth, a large body of high grade direct smelting contact sulphide ores on ground which adjoins Minnesota claim of the old company. Upon the Minnesota and other claims of the old company high grade sulphide ores of the same character are indicated and actually exposed. It is expected that the work on such claims will develop valuable sulphide orebodies. Such direct smelting sulphide ores are favorably regarded by smelters and should, when opened up, provide a revenue for the new company without immediate expense for smelting or other reduction works. If ever advisable, a smelter (the only plant required for such ores) can be erected at reasonable cost. The Committee believes that the exploitation resulting from the execution of the Plan of reorganization insures the success of the company by operations along these lines and will recommend that the new company proceed accordingly."

TROY ARIZONA COPPER CO. ARIZONA

Address: Henry Rudolph, sec.-treas., 170 Broadway, New York City.

In 1922, a new directorate was elected.

Officers are now as follows: John F. Galvin, pres.; Augustus K. Sloan, Howard C. Rogers, Benjamin F. Einbigler and Henry Rudolph, directors.

Work under J. C. Devine, mgr., to be resumed July, 1922. Company's property favorably reported on by Roy G. Mead, G. G. Wald and J. C. Devine.

HOLTYREX COMPANY. **ONTARIO**

Address: W. C. Young, 301 Bank of Hamilton Bldg., Toronto, Canada.

Officers: A. J. Young, pres.; C. G. Knott, sec. L. H. Holland, mine mgr.

Inc. in 1922, in Ontario. **Cap.** $3,000,000; par $1; 1,500,000 shares issued for property. Chartered Trust & Ex. Co., and Prudential Trust Co., Ltd., of Toronto, registrars.

Property: 160 acres, N. E. of the McIntyre and N. of the Plenaurum and is represented to be on the strike of the Hollinger-McIntyre ore zone to show the main contact and to have seven vein outcrops, one of which carries visible gold, but the government map (1921) shows No. 5 vein of the Hollinger running into Plenaurum ground, not Holtyrex.

Development: by 23 pits and a 50′ shaft. Diamond drill exploration being done, and company being financed by stock sales, June, 1922.

SINCLAIR SILVERS CONSOLIDATED **NEVADA**

One of a half dozen more or less suspicious promotions fathered by Chas. S. Cresser & Co. of New York City, in 1920, in connection with the Lawson-Van Riper attempt to get the Public's money in Universal Silvers and its associated affiliated promotions of similar character. Cresser's activities failed to finance Cons. Silver, one of the brood, and in May, 1922, stockholders in Sinslair Silver Cons. were offered ten shares of new stock for each old share in Cons. Silvers, Inc., reorganized and renamed the Cons. Mining & Refining Co. Cons. Silvers shares were sold by the company at 3c. a share, by Cresser at 25c. a share. Circulars and letters of Cons. Mng. & Ref. Co. do not give the capitalization or number of shares, but do offer "Prefered rights" at 25c. each, preferred up to 10% dividends and subscribers to each right to get also, same dividends (if there are any) as holder of 1,000 shares Cons. Mng. & Ref Co. stock and the "Right" is convertible into 1,000 shares of common stock.

GREAT WESTERN MINING & DEVELOPMENT CO. **OREGON**

Address: Medford, Oregon.

Property: the Lone Pine quartz mine, acquired, and reopened late 1921, by this new company.

GREAT NATIONAL MEXICAN SM. CO. **MEXICO**

Addreess: 120 Broadway, New York. **Mine Address:** San Juan, Coahuila, Mex.; W. A. Conley, supt.

Officers: Fred Hellmann, pres.; W. E. Bennett, v.-p.; A. E. Thiele, treas.; John Russell, mgr.

Property: the Reforma mine, 140 acres, patented, in Coahuila. Silver-lead ore, averaging 30% lead and 11 oz. silver per ton, occurs in a mineralized zone, 100′ in width. The formation consists of brecciated limestone.

Development: by tunnels and shafts.

Acquired in 1890, the property has been operated nearly continuously since, with a normal annual production of about 15,000 tons of smelting ore. Stock of campany is closely held.

EL PORVENIR MINING CO. **MEXICO**

Address: Cusihuiriachic, Chih., Mex. Is an American company owning the Porvenir mine and producing in 1921.

MINA LA OLVIDADA **MEXICO**

Address: No. 9, Calle Aldama, Chihuahua, E. de Chih., Mex. Mine at Cusi. Active 1921.

CONCHENO MINING CO. **MEXICO**

Address: First National Bank, El Paso, Texas. This American company owns and operated the Concheno mine in 1921-22, at Ocampo, Chih., Mex.

CIA. MINERA EL REFUGIO **MEXICO**

Address: Parral, Chih.; Mex.

Is controlled by the Alvarado Mining & Milling Co., whose address is 347 Madison Ave., New York City.

Owns the Refugio mine at Parral.

BUNKER HILL COPPER CO., erroneously printed: **Bunker Hill Mines Co.**, on first description under that title on page 234.

PORCUPINE DAVIDSON GOLD MINES, LTD. **ONTARIO**

The following paragraph from the editorial column of the Canadian Mining Journal is reprinted for our readers benefit: "We must confess that the Davidson is not in the same class as the Associated Goldfields. It, the Davidson, has something to show in the way of ore. Also it has a very decorative directorate. But its finances have been juggled so wonderfully and fearfully that only an expert accountant could tell a shareholder where he stands. Neither concern is a credit to Canadian gold mining."

CONS. SOUTHERN ARIZONA MINING CO. **ARIZONA**

Erroneously printed **Continental Cons. Copper Co.** in third heading on page 254.

ASSOCIATED GOLDFIELDS MINING CO.,, LTD. **ONTARIO**

Merged 1921 with other companies to form Canadian Associated Goldfields, Ltd.

The Canadian Mining Journal of June 16, 1922 says this new company is an "illicit promotion," and "Against a capitalization of $30,000,000, its mining properties are given a book-value of $20,985,398. This, of course, is an arrant absurdity. It would be much nearer the truth to cut off the five figures to the right of the dollar sign and let it go at that."

KITTIMAC MINING & MILLING CO. **COLORADO**

Herbert E. Curran, receiver, Room 44 Capital Bldg., Denver, Colo.

This company was organized in Colorado in 1916, as a reorganization of the Kittamac Mines Co. of Wyoming, thus acquiring title to the Kittimac mine and the mill and flotation plant put up by J. M. Hyde, the flotation expert. In Oct., 1916 mill was started and shipments of concentrate made. Various changes in the mill made in November and December of 1916, failed to make the work a commercial success, and mine and mill were shut down and company went into hands of a receiver.

In Oct., 1921, work was resumed under H. G. Brent as manager, and the property optioned to Pittsburgh people, who organized the San Juan Consolidated Mine & Milling Co., to take over the property.

SAN JUAN CONSOLIDATED M. & M. CO., INC. **COLORADO**

Office: 626 Wabash Bldg., Pittsburgh, Pa. **Mine address:** Silverton, Colo.

Property: the Kittmac group, formerly owned by the Kittimac Mines Co. (1915), in theEureka mining district, better known as the San Juan district, 8½ miles N. of Silverton and 3½ miles S. E. of Eureka.

Property consists of 76 claims in a solid block, 7,200′ long by 2,900′ wide, crossed by 9 vein outcrops, viz. Calibre vein, a gold bearing vein, 30′ wide, traceable 9,000′; Isabella, 3′-5′ wide traceable 6,000′, and at 450′ depth 12-19′ thick; Little Joe vein, 3′ wide and outcropping for 3,300′; Midnight Sun, No. 1 and No. 2 veins, Stanton, London, Esmeralda and Elvina veins. The Isabella vein is reported to show 12′-19′ of silver lead (sulphide) ore, averaging $23 for 12′ width.

Reports by A. S. Walter (1915) and Morris Stockder (1910), show that property had an orebody of commercial size opened up at that time, but operations in 1916 were unprofitable. Veins, like that of Camp Bird mine occur in San Juan andesite (1,000′ thick) capping Silverton formation.

Development: has not been done below the main haulage tunnel. There are 2 tunnels on Little Joe vein; the upper, only used for air, is 160′ above main tunnel on which 3,000′ of work was done up to 1915. At 1,745′ drifts were run on ledges. Before the Isabella vein is reached, tunnel opens the Little Joe vein for 1,000′, with 3 oreshoots on which the Martin, Harper & Kelly stopes, were opened and worked.

The Isabella vein is opened by a 600′ drift exposing 6′-18′ of milling ore fro 400′ in length and developing 10,000 tons of ore, said to be left on stope (1915). An output of 100 tons daily can it is said be maintained, when mine is in full operation.

Equipment: at mine includes compressor, rock crusher and orebin and a 10,400′ rope tram (Bleichert) to the Kittimac mill of 100 ton capacity, but without flotation units.

Pre-war costs are reported to have averaged $115 per day for labor alone on a 100 ton basis.

BACA FLOAT MINING & CATTLE CO. ARIZONA

Office: 811 Great Southern Life Bldg., Dallas, Tex.

New York Office: 50 E. 42nd St., New York City.

Officers: A. Robt. Grund, pres., New York City, with Wm. T. Connelly

Officers: A Robt. Grund, pres., New York City, with Wm. T. Connelly, sec.; Jas. E. Bouldin, treas., with Albert T. Walraven and Jos. W. Bailey, directors, all of Dallas, Texas.

Inc. in Delaware. **Cap.** $5,000,000; par $100.

Property: 45,000 acres of grazing and mineral lands, comprising the north half of the Baca Float No. 3 in Santa Cruz county, Ariz., 8 miles from Tubac. The mineral claims cover 8,500 acres and include six mines worked by leasors until Jan. 1, 1922.

Development: reported to include a 428′ Alto shaft at the mine of that name, a 185′ shaft and 3 tunnels at the Royal Blue mine, an 1,800′ tunnel and 322′ shaft at the Eureka mine, a 450′ shaft at the Soledad mine, and prospect shafts at the Trenton-Georgia mine. These properties were developed by various mining company's, who became trespassers, when the courts decided the ground belonged to the Baca grant No. 3. We are told that five of the mines were operated and shipments made by leasors in 1921, who paid comapny 25% royalty, but these leases were cancelled when a warrantly deed to the property was received by the government on March 9, 1922. According to estimates made by the company's president, these mines have 55,000 ton of siliceous ore of milling tenor on dumps, that will it is said assay $30 in slver-lead and copper.

There is an 100 ton mill on the Royal Blue mine erected in 1919 by a former leasor. Proerty examined by Clarence King (1919) H. R. Plate and Josiah Trerise, but the reports are not obtainable. Total workings said to be about 65,000′, said to expose 450,000 tons of ore averaging $15 per ton net. We hope this is so.

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